

Text Amendment Request(s): Volumes 2 and 3, Chapters 12 & 13 (12-01 to 12-05 & 13-01 to 13-06)

I. GENERAL INFORMATION

Description: Chapter 12, Resilience: Living with Water and Natural Hazards generally addresses issues related to hazard mitigation, stormwater management, and flood/wind protection. Chapter 13, Environmental Quality generally addresses issues related to environmental protection, sustainability, and climate change.

Assessment: The staff finds that since the last revision of the Master Plan, the City has made significant progress in implementing the various goals and strategies outlined in Chapters 12 and 13. Of the 37 specific actions in Volume 2, Chapter 12, Resilience, the City has completed 18 and 12 are ongoing or in progress. The remaining 7 will be revised as necessary and included in the updated version. Of the 37 specific actions in Volume 2, Chapter 13, Environmental Quality, the City has completed 18 and 7 are ongoing or in progress. The remaining 12 actions will be revised or carried over into the updated version.

Requests: The City Planning Commission solicited proposals for Master Plan text amendments from the general public, as well as various City and other governmental agencies and departments. The below table is a summary of each request received by the City Planning Commission, the applicant, and the subject of the request.

<i>Request</i>	<i>Applicant</i>	<i>Chapter</i>	<i>Subject</i>
12-01	Sustaining Our Urban Landscape	V. 2 Ch. 12	Protection of heritage trees
12-02	Greater New Orleans Urban Water Collaborative	V. 2 Ch. 12	Withstanding storms and stormwater management
12-03	Greater New Orleans Urban Water Collaborative	V. 3 Ch. 12	Updating Resilience background
12-04	Mayor’s Office	V. 2 Ch. 12, 13	Revise conditions, goals and strategies
12-05	City Planning Commission	V. 2 Ch. 12	Various revisions throughout Resilience
13-01	Residents of Gordon Plaza	V. 2 Ch. 13	Soil, air and water contamination
13-02	Sustaining Our Urban Landscape	V. 2 Ch. 13	Stormwater management
13-03	Louisiana Landmarks Society	V. 3 Ch. 13	Lead Poisoning

Request	Applicant	Chapter	Subject
13-04	Greater New Orleans Urban Water Collaborative	V. 2 Ch. 13	Water pollution
13-05	Councilmember Ramsey	V. 2 Ch. 13	Add goal to encourage installation of public and private electric vehicle charging stations
13-06	City Planning Commission	V. 2 Ch. 13	Various revisions throughout Environmental Quality

II. ANALYSIS

A. What general and specific text changes were included in the requests made for the petitioned chapter(s)?

The most significant request, from the Office of Resilience and Sustainability, is to consolidate chapters 12 and 13 into a single chapter addressing resilience. This change is the result of a broader interpretation of the word “resilience” since the last revision that encompasses economic, social, environmental, and hazard mitigation topics in the context of individuals, communities, institutions, businesses and city systems. This consolidation of chapters also embeds the concept behind as well as goals and strategies included in the City’s Resilience Strategy, *Resilient New Orleans*, which was released in August of 2015.

The remaining requests generally build on the work the City has accomplished since the last revision. These include adding additional goals related to environmental quality, climate change, hazard mitigation, stormwater management, and even the use of electric vehicles. Each of these revisions is intended to take the City to the next level and ensures a more resilient and sustainable future.

B. How did the staff respond to each request for text change for the petitioned chapter(s)?

Overview

In looking at each of the proposed amendment requests for both the Volume 2 and Volume 3 chapters, the staff reconciled each with the existing Master Plan framework and the proposed consolidation of Chapters 12 and 13. This was most efficiently done by beginning with the proposal from the Office of Resilience and Sustainability for the Volume 2 goals, strategies, and actions. By incorporating much of the work the City has accomplished since the last revision, as well as consolidating the concepts and actions laid out in *Resilient New Orleans* and the *Greater New Orleans Urban Water Plan*; many of the other proposed amendments have already been addressed. Where requests have not been addressed by this package, the staff has either added the requested action where it would be most appropriate in the new framework, or addressed the request separately below.

Text 12-05 and 13-06

These were specific requests made by City Planning Commission staff prior to the proposal to rescind and replace chapters 12 and 13 with a single resilience chapter. Since these were specific edits to the existing text, they are no longer required.

Summary

The following table contains a summary of each request and how the staff responded to each. For requests that the staff recommends **Approval** or **Modified Approval**, proposed text is included in the next section.

<i>Request</i>	<i>Subject</i>	<i>Staff Recommendation</i>
12-01	Protection of heritage trees	Approval: Addressed within Goal 6, Strategy 6A, Action 4
12-02	Withstanding storms and stormwater management	Modified Approval: Addressed throughout, specific actions added within Strategies 2A, 2B, 3B, and 4B
12-03	Updating Resilience background	Modified Approval: Incorporated into narrative text.
12-04	Revise conditions, goals and strategies	Approval: Accepted as basis for rewrite
12-05	Various revisions throughout Resilience	Withdrawn: No longer required
13-01	Soil, air and water contamination	Modified Approval: Addressed within Goal 6, Strategy 6D
13-02	Stormwater management	Modified Approval: Generally addressed by 12-04
13-03	Lead Poisoning	Approval: Incorporated into narrative text, addressed in Goal 6, Strategy 6D, Action 2.
13-04	Water pollution	Approval: Addressed throughout, specific action added within Strategy 6C
13-05	Add goal to encourage the installation of public and private electric vehicle charging stations	Approval: Addressed within Goal 5, Strategy 5C, Actions 6 and 7
13-06	Various revisions throughout Environmental Quality	Withdrawn: No longer required

III. SUMMARY

The proposed amendment consolidates Chapters 12 and 13 in Volume 2 and 3 to a single chapter in each titled “Adapt to thrive: Environmental stewardship, disaster risk reduction, and

climate change”. This consolidation creates efficiency and synergy between environmental stewardship and improvement, with hazard mitigation and resilience. The result is greater consistency with the planning work done since the last Master Plan update such as *Resilient New Orleans*, *Greater New Orleans Urban Water Plan*, *Main Street Resilience Plan*, and the *2015 Hazard Mitigation Plan Update*.

IV. PRELIMINARY STAFF RECOMMENDATION¹

The staff recommends **MODIFIED APPROVAL** of text amendment requests 12-01, 12-02, 12-03, 12-04, 12-05, 13-01, 13-02, 13-03, 13-04, 13-05, and 13-06 to rescind and replace the Master Plan **Volume 2, Chapter 12- Resilience** and **Chapter 13- Environmental Quality** with the revised **Volume 2, Chapter 12- Adapt to Thrive**, and **Volume 3 Chapter 12- Resilience** and **Chapter 13- Environmental Quality** with the revised **Volume 3, Chapter 12- Adapt to Thrive** as proposed.

V. TEXT AMENDMENT RECOMMENDATION

Below is the recommended text for Volume 2, Chapter 12 and Volume 3, Chapter 12. For Volume 2, the recommended text is to replace the existing Volume 2, Chapters 12 and 13 in their entirety. No portions of the previous chapters will remain, unless carried over into the new recommended text. For Volume 3, the recommended text is to replace the existing Volume 2, Chapters 12 and 13. Some text from the previous version remain, as noted in *strikethrough and italics*; and will be updated in the same form and theme but with new information as gathered from the responsible parties of each section. Text indicated in underline was included verbatim, as proposed by the applicant.

VI. CITY PLANNING COMMISSION MEETING (FEBRUARY 7, 2017)

The Senior City Planner summarized the text amendment request Text 13-01.

A number of residents and representatives of the residents of Gordon Plaza spoke on behalf of their request to include language advocating for identifying funds for relocation as soon as possible. The commissioners asked several questions to clarify the request and to determine if there were any issues with pending litigation that may influence their decision.

Commissioner Green made a motion to accept the applicant’s recommendation for Text 13-10, adding a new action under Goal 6, Strategy 6D, Action 7 to read “Identify and apply for Federal, State, and other funding or resources to relocate consenting residents of the Gordon Plaza Subdivision that was built on the Agriculture Street Landfill, a Superfund site.” Commissioner Duplessis seconded the motion. Several of the Commissioners expressed concern with including the word “consenting” with the thought that if living at the site is an imminent risk to public health, residents should not have a choice to stay. Commissioner Green agreed to rescind his motion, and made an

¹ Subject to modification by the City Planning Commission

alternate motion to add a new action under Goal 6, Strategy 6D, Action 7 to read “Identify and apply for Federal, State, and other funding or resources to relocate residents of the Gordon Plaza Subdivision that was built on the Agriculture Street Dump, a Superfund site.” Commissioner Duplessis seconded the motion, and it was adopted.

Motion

BE IT MOVED BY THE CITY PLANNING COMMISSION THAT TEXT 13-01 IS HEREBY RECOMMENDED FOR **MODIFIED APPROVAL**. BE IT FURTHER MOVED THAT THE EXECUTIVE DIRECTOR IS HEREBY AUTHORIZED TO NOTIFY THE CITY COUNCIL OF SAID ACTION.

YEAS: Brown, Duplessis, Green, Steeg, Stewart

NAYS: None

ABSENT: Hughes, Isaacson, Mitchell, Wedberg

The Senior City Planner summarized text amendment requests Text 12-01 through 12-05, and Text 13-02 through 13-06.

Nobody spoke in favor or in opposition of the requests.

Commissioner Green made a motion to accept staff recommendation for Text 12-01 through 12-05, and Text 13-02 through 13-06. Commissioner Stewart seconded the motion, which was adopted.

Motion

BE IT MOVED BY THE CITY PLANNING COMMISSION THAT TEXT 12-01, 12-04, 13-03, 13-04 AND TEXT 13-05 ARE HEREBY RECOMMENDED FOR **APPROVAL**, AND THAT TEXT 12-02, 12-03, AND 13-02 ARE HEREBY RECOMMENDED FOR **MODIFIED APPROVAL**. BE IT FURTHER MOVED THAT THE EXECUTIVE DIRECTOR IS HEREBY AUTHORIZED TO NOTIFY THE CITY COUNCIL OF SAID ACTION.

YEAS: Brown, Duplessis, Green, Steeg, Stewart

NAYS: None

ABSENT: Hughes, Mitchell, Isaacson, Wedberg

VOLUME 2
chapter



ADAPT TO THRIVE: ENVIRONMENTAL STEWARDSHIP, DISASTER RISK REDUCTION, AND CLIMATE CHANGE

Goal	Policies for Decision Makers	For More Information, See Page:
1 <i>A healthy, functioning coast that sustains communities, industries, and ecosystems while providing critical flood protection as part of a Multiple Lines of Defense strategy</i>	1.A. Leverage critical resources for local and regional coastal protection 1.B. Advocate and coordinate with neighboring parishes for the implementation of the state’s Multiple Lines of Defense vision and a flood protection system that can withstand a 500 year storm. 1.C. Coordinate with the private sector and advocate for the growth and development of a regional water management industry 1.D. Become a model for the nonstructural urban adaptation component of the State’s Coastal Master Plan	
2 <i>A New Orleans that embodies the principle of living with water, managing urban stormwater and groundwater carefully to align with natural processes and support economic growth</i>	2.A. Implement comprehensive stormwater management to complement the traditional drainage system of pipes and pumps with green infrastructure that delays and detains stormwater in landscaped features. 2.B. Institutionalize comprehensive stormwater management planning and project delivery across city government	
3 <i>A population that has the ability and capacity to adapt to a changing environment and future threats</i>	3.A. Incentivize property owners to invest in risk reduction 3.B. Develop clear guidance on risk reduction measures in the built environment 3.C. Promote community-based green infrastructure and capacity-building 3.D. Develop the knowledge and capacity of emerging environmental stewards	
4 <i>A New Orleans that is prepared for future</i>	4.A. Invest in pre-disaster planning for post-disaster recovery	

	disasters and ready to carry out an efficient, comprehensive, and equitable recovery	4.B. Improve the redundancy and reliability of our critical infrastructure	
		4.C. Incorporate all perils, climate change impacts, and equity into Hazard Mitigation planning	
		4.D. Develop the preparedness of neighborhoods and businesses	
5	Improved environmental quality, increased resource efficiency, and economic growth through the mitigation of our climate impact	5.A. Adopt and implement a Climate Action Plan	
		5.B. Reduce waste and conserve resources	
		5.C. Encourage, incentivize, and expand low carbon transportation alternatives, including public transit, walking, and biking	
		5.D. Promote renewable energy and energy efficiency	
6	Environmental quality and justice through targeted investments in natural resources and improved ecosystem services.	6.A. Target investments in new and enhanced green spaces in areas of highest risk with the most vulnerable populations, underserved and low-income neighborhoods, and communities of color.	
		6.B. Design projects that prioritize enhanced ecological function	
		6.C. Prevent illegal disposal of hazardous waste	
		6.D. Identify, remediate, and redevelop contaminated sites and buildings	
7	Global leadership in urban resilience and sustainability, with the facilities and resources to share our experiences while continuing to learn from the daily realities of a complex urban condition	7.A. Increase public awareness and education, locally and international, of New Orleans' resilience challenges and its efforts to build urban resilience	
		7.B. Integrate resilience-driven decision making across public agencies	

FINDINGS

- New Orleans has always faced the risk of flooding from three sources: the Mississippi River, heavy rains, and hurricane storm surge.
- Hurricane storm surge poses the greatest threat of catastrophic flooding in New Orleans.
- Risk of flood damage has been modulated by several factors: increased structural flood protection in the form of flood gates and levees; increased development in low-lying, vulnerable areas; soil subsidence; and coastal erosion.
- Global sea level rise and the risk of stronger, more frequent hurricanes as a result of global warming may also be contributing to increased risk.
- The Dutch provide a 1-in-10,000-year level of protection for high-density urban areas, 1-in-4,000-year level of protection for medium-density areas, and 1-in-2,500-year level for rural areas.
- Significant funds have been appropriated to implement coastal restoration and urban mitigation projects, but more is required.

CHALLENGES

- Raising public awareness about the realities of environmental hazards, probability, risk and mitigation options after 50 years of reliance on external levees as a guarantee of protection.
- Securing additional funding for more robust storm surge protection beyond a 1-in-100-year level of protection.
- Securing adequate funding on an accelerated basis for further coastal restoration efforts.
- Implementing citywide flood elevation, land use, and building requirements appropriate to different parts of the city to establish a higher overall level of community resilience.
- Addressing the increased cost of retrofitting structures and building new structures to be more resilient to flooding.
- Balancing expedient building and re-building practices against the city's long term security.
- Retrofitting the city's drainage infrastructure to improve water management practices and to better incorporate water into the urban landscape.
- Coordination between local, state, and federal efforts to make the city more resilient.

Acronyms

To aid in reading this section, below is a list of acronyms used within the text:

CAO	Chief Administrative Officer	NORA	New Orleans Redevelopment Authority
CPC	City Planning Commission	EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency	CZO	Comprehensive Zoning Ordinance
GIS	Geographic Information Systems	DFIRM	Digital Flood Insurance Rate Map
ACE	Army Corps of Engineers	DSP	Department of Safety and Permits
ORS	Office of Resilience and Sustainability	DNR	Louisiana Department of Natural Resources
CPRA	Louisiana Coastal Protection and Restoration Authority	BFE	Base Flood Elevation

A Introduction

The actions we take today will shape our future city for the coming generation. What must we do now to make the next generation more equitable, more adaptable, and more prosperous? How can we make their New Orleans a dynamic urban landscape—aligned with its natural environment? What leadership is needed—from individuals, communities, and the public and private sectors—to realize the city we envision?

For centuries, we have demonstrated our ability to innovate and adapt in the face of major challenges. While New Orleans has recovered from many shocks in the past, our future is threatened by rising seas and coastal erosion, crime and a lack of economic opportunity, income inequality and disparate health outcomes. New Orleans will continue to lead, serving as an urban laboratory for innovation and change, working to recognize and adapt to an unpredictable future, and remaining committed to the equitable adaptation and transformation of coastal cities worldwide. As a global leader, we have a responsibility to seek wisdom and guidance from around the world, to listen to the stories of our peers, and to share our progress toward shaping the future city—a Resilient New Orleans.

A Implementation Strategies

A recommendations **Summary** linking goals, strategies and actions appears below and is followed by one or more early-action items under the heading **Getting Started**. The **Narrative** follows, providing a detailed description of how the strategies and actions further the goals. Background and existing conditions discussion to inform understanding of the goals, policies, strategies and actions are included in Volume 3, Chapter 12.

Summary

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions				
		How	Who	When	Resources	For More Information, See Page:
1. A healthy, functioning coast that sustains communities, industries, and ecosystems while providing critical flood protection as part of a Multiple Lines of Defense strategy	1.A. Leverage critical resources for local and regional coastal protection	1: Dedicate City resources as matching funds for the State's Coastal Master Plan projects in Orleans Parish	Mayor's Office, City Council, ORS	First Five Years	RESTORE Act, BP Settlement, NDR, HMGP	
		2: Advocate for increased state and federal resources for coastal protection and restoration projects	ORS, Mayor's Office	First Five Years	Staff time	
	1.B. Advocate and coordinate with neighboring parishes for the implementation of the state's Multiple	1: In Partnership with the CPRA, advocate for the implementation of coastal protection and restoration projects that benefit Greater New Orleans	ORS, Mayor's Office	First Five Years	Staff time	

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions					For More Information, See Page:
		How	Who	When	Resources		
	Lines of Defense vision and a flood protection system that can withstand a 500-year storm.	2: Improve coordination in coastal restoration between New Orleans and other local, state, and federal agencies, such as through participation in the Governor's Coastal Advisory Committee	ORS, Mayor's Office	First Five Years	Staff time		
		3: Develop a comprehensive coastal land-loss and restoration awareness campaign	ORS; local community, philanthropic, nonprofit, and corporate partners	First Five Years	Philanthropy, staff time		
	1.C. Coordinate with the private sector and advocate for the growth and development of a regional water management industry	1: Promote workforce development opportunities for local residents in the emerging water management sector	Network for Economic Opportunity, ORS, City departments, private-sector and institutional partners	Ongoing	NDR, Staff time		
		2: Leverage private sector resources and interests to advance coastal protection and restoration projects	ORS, New Orleans Business Alliance, private-sector partners	Ongoing	Staff time		
	1.D. Become a model for the nonstructural urban adaptation component of the State's Coastal Master Plan	1: Ensure consistency between the State's Coastal Master Plan and the City's Resilience Strategy, Master Plan, and land use regulations	CPC, ORS	Ongoing	Staff time		
		2: Integrate risk mitigation into land use and other planning decisions	CPC	Ongoing	Staff time		
		3: Work with CPRA and other state and local partners to integrate urban water management and coastal management practices	ORS	First Five Years	Staff time		
		4: Pilot nonstructural recommendations from the 2017 Coastal Master Plan in New Orleans	SWBNO, DPW, ORS, NORA	First Five Years	CPRA, HMGP, staff time		
	2. A New Orleans that embodies the principle of living with water, managing urban	2.A. Implement comprehensive stormwater management to complement the traditional drainage system of pipes	1: Implement district-scale comprehensive water management plans through the retrofit of parks, playgrounds, neutral grounds, and other open spaces.	Capital Projects, DPW, SWBNO, Parks and Parkways, ORS, NORA, CPC	Medium-Term	NDR, HMGP, staff time	

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions					For More Information, See Page:
		How	Who	When	Resources		
stormwater and groundwater carefully to align with natural processes and support economic growth	and pumps with green infrastructure that delays and detains stormwater in landscaped features.	2: Utilize data-driven tools to support the strategic prioritization and design of projects in order to enhance performance and achieve resilience goals such as social equity and economic development.	ORS, SWBNO	Ongoing	NDR, philanthropy, staff time		
		3: Prioritize the long-term financing and operations and maintenance of green infrastructure projects in the design phase	ORS, Capital Projects, DPW, design and engineering consultants	First Five Years	NDR, staff time		
		4: Establish a publicly accessible, citywide ground and surface water monitoring network to allow for active management of groundwater which will reduce subsidence, and inform siting and design of new green infrastructure facilities	SWBNO, ORS	First Five Years	NDR, philanthropy, staff time		
	2.B. Institutionalize comprehensive stormwater management planning and project delivery across city government	1: Support the enforcement of the CZO's stormwater regulations by establishing a Stormwater Enforcement Division within the Department of Safety and Permits	CPC, ORS, CAO, DSP	First Five Years	Staff time		
		2: Formalize a cross-agency stormwater project delivery team	ORS, CPC, SWBNO, DPW, Parks and Parkways, NORA, Capital Projects, Place-Based Planning	First Five Years	Staff time		
		3: Develop the capacity of the Resilience Project Design Review Committee	ORS, City Departments	First Five Years	Staff time		
		4: Establish hazard mitigation and stormwater management best practices in design and construction of public facilities, including freeboard, the use of pervious paving, and building elements that detain and retain stormwater runoff	ORS, DPW, Capital Projects	Ongoing	Staff time		
3. A population that has the ability and capacity to adapt to a changing environment and future threats	3.A. Incentivize property owners to invest in risk reduction	1: Secure funds and implement a grant program to support risk reduction measures such as home elevation, hardening, and energy efficiency/generation projects on private properties for low- and moderate-income homeowners	NORA	First Five Years	NDR, staff time		

Comment [TJA1]: Modified Text 12-02

Comment [TJA2]: Modified Text 12-02

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions					
		How	Who	When	Resources	For More Information, See Page:	
	3.B. Develop clear guidance on risk reduction measures in the built environment	1: Establish stormwater management best practices for public infrastructure and residential, commercial, and public buildings	SWBNO, DPW, ORS, Capital Projects	First Five Years	NDR, HMGP, philanthropy, staff time		
		2: Incorporate green infrastructure and resilient design measures into general specifications for streets and public rights-of-way	DPW	First Five Years	Staff time		
		3: Develop storm hardening and structural adaptation design standards for residential, commercial, and public buildings.	ORS, City Departments, local designers and developers	First Five Years	Philanthropy, staff time		
		4: Pursue floodplain management policy changes that are more protective of life and property; and that increase the City's standing in FEMA's Community Rating System.	ORS, DSP	Ongoing	Staff time		
	3.C. Promote community-based green infrastructure and capacity-building	1: Support and implement small scale demonstration projects to promote environmental education and stewardship	City Departments, local community and advocacy groups	First Five Years	Philanthropy, staff time		
		2: Incorporate creative community engagement and educational components into the design of green infrastructure projects	ORS, City Departments	First Five Years	NDR, philanthropy, staff time		
	3.D. Develop the knowledge and capacity of emerging environmental stewards	1: Support and promote the work of community-based organizations focused on youth development and education	ORS	Ongoing	Staff time		
	4. A New Orleans that is prepared for future disasters and ready to carry out an efficient, comprehensive, and equitable recovery	4.A. Invest in pre-disaster planning for post-disaster recovery	1: Develop a comprehensive plan for post-disaster recovery that incorporates critical infrastructure systems, land use, housing, economic development, and public health services	Office of Homeland Security, ORS, City Departments	First Five Years	Staff time	
			2: Implement and regularly maintain a citywide parcel and building survey that can be quickly updated after a disaster	ITI	First Five Years	Staff time	
			3: Establish a disaster recovery fund for the City of New Orleans	CAO	First Five Years	Staff time, private investment	

Comment [TJA3]: Modified Text 12-02

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions					
		How	Who	When	Resources	For More Information, See Page:	
	4.B. Improve the redundancy and reliability of our critical infrastructure	1: Implement resilient infrastructure recovery and risk transfer for critical assets that pre-funds catastrophic losses through the transfer of risk to the private market	ORS, SWBNO, DPW	First Five Years	Staff time, private investment		
		2: Implement a microgrid pilot project	ORS, SWBNO, Entergy, other federal and private partners	First Five Years	USDOE, NDR, philanthropy, staff time		
	4.C. Incorporate all perils, climate change impacts, and equity into Hazard Mitigation planning	1: Support and strengthen the city's professional Hazard Mitigation Unit	Mayor's Office, CAO, Office of Homeland Security	First Five Years	Staff time		
		2: Continue to update the Hazard Mitigation Plan to reflect latest projections and scenarios	Office of Homeland Security	Ongoing	Staff time		
		3: Utilize the "Orleans Parish 2015 Hazard Mitigation Plan Update" and all future updates in concert with the Master Plan	CPC, Office of Homeland Security	Ongoing	Staff time		
		4: Work with FEMA, the Army Corps of Engineers and regional stakeholders to evaluate storm frequency and probability based on actual risk and future risk due to climate change.	Mayor's Office, ORS, Office of Homeland Security	First Five Years	Staff time		
	4.D. Develop the preparedness of neighborhoods and businesses	1: Launch a Neighborhood Resilience program	NORA, ORS	First Five Years	Philanthropy, staff time		
		2: Develop a Small Business Preparedness program	Office of Resilience, City Departments, local business community, neighborhood and business improvement associations	First Five Years	Philanthropy, staff time		
	5. Improved environmental quality, increased resource efficiency, and economic growth through the mitigation of our climate impact	5.A. Adopt and implement a Climate Action Plan	1: Set ambitious greenhouse gas emissions reductions targets for the short- and long-term	ORS, City Departments, Mayor's Office	First Five Years	Staff time	
			2: Complete an annual community-wide and municipal greenhouse gas inventory	ORS, City Departments	Ongoing	Philanthropy, staff time	
3: Build the city's capacity to conduct climate mitigation planning and implementation			Mayor's Office, CAO	First Five Years	Philanthropy, staff time		

Comment [TJA4]: Modified Text 12-02

ONGOING

FIRST FIVE YEARS: 2017–2021 MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions					For More Information, See Page:
		How	Who	When	Resources		
	5.B. Reduce waste and conserve resources	1: Develop a communication and education campaign to increase participation in the city's recycling program	Department of Sanitation	First Five Years	Staff time		
		2: Complete a feasibility analysis of creating a public composting program	Department of Sanitation	First Five Years	Staff time		
		3: Create a long-term strategic plan to address waste management and reduction in the city	Department of Sanitation	First Five Years	Staff time		
	5.C. Encourage, incentivize, and expand low carbon transportation alternatives, including public transit, walking, and biking	1: Develop a multimodal regional transit vision	Mayor's Office, RTA, City Departments	First Five Years	Staff time		
		2: Encourage mixed uses in land use and zoning in strategic locations such as transit corridors and nodes	CPC	First Five Years	Staff time		
		3: Develop and adopt a "Vision Zero" policy with the goal of no pedestrian or bicycle fatalities on city streets	DPW, Mayor's Office, RTA, transit advocates	Ongoing	Staff time		
		4: Implement an equitable bike share program	Mayor's Office, outside partners	Ongoing	Staff time, private investment		
		5: Plan for the transition of the city fleet to low-carbon and electric vehicles	5: Plan for the transition of the city fleet to low-carbon and electric vehicles	First Five Years	Staff time		
		6: Adopt zoning and building regulations to accommodate and encourage the location of electric vehicle charging stations at residential, commercial, and industrial properties	CPC, DSP, Property Management	First Five Years	Staff time		
		7: Develop strategy and program for installation of public electric vehicle charging stations to encourage the use of electric vehicles	DPW, Mayor's Office, Property Management	Medium-Term	Staff time		
	5.D. Promote renewable energy and energy efficiency	1: Implement ambitious energy efficiency measure in municipal buildings	CAO	First Five Years	Philanthropy, staff time		
		2: Incentivize the adoption of energy benchmarking and energy efficiency measures in large commercial and institutional buildings	ORS, Mayor's Office, Downtown Development District, corporate and philanthropic partners	First Five Years	Staff time		

Comment [TJA5]: Text 13-05

Comment [TJA6]: Text 13-05

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions				
		How	Who	When	Resources	For More Information, See Page:
		3: Seek energy efficiency financing mechanisms in partnership with banks and lenders	ORS	First Five Years	Staff time, private investment	
		5: Work with Entergy and the City Council's Utility Regulatory Office to implement a decoupling ordinance to promote energy efficiency	ORS, City Council, Mayor's Office, Entergy	First Five Years	Staff time	
		6: Work with Entergy and the City Council's Utility Regulatory Office to advance energy efficiency	ORS, City Council, Mayor's Office, Entergy	First Five Years	Staff time	
6. Environmental quality and justice through targeted investments in natural resources and improved ecosystem services.	6.A. Target investments in new and enhanced green spaces in areas of highest risk with the most vulnerable populations, underserved and low-income neighborhoods, and communities of color.	1: Mitigate urban heat island through the targeted planting of trees and other enhancements in underserved areas, particularly where the most vulnerable populations (elderly, youth, low-income) live	Parks and Parkways, ORS, City Departments, nonprofit and philanthropic partners	Medium-Term	NDR, philanthropy, staff time	
		2: Mitigate air quality by planting trees to reduce contaminants and buffer transit corridors.	• Who: Parks and Parkways, ORS, City Departments, nonprofit and philanthropic partners	Medium-Term	NDR, philanthropy, staff time	
		3: Increase access to parks and recreational corridors to improve public health outcomes in underserved and vulnerable areas	Parks and Parkways, NORDC, ORS, City Departments, nonprofit and philanthropic partners	Ongoing	NDR, HMGP, philanthropy, staff time	
		4: Incentivize protection of the existing tree canopy through development and adoption of a no net loss tree canopy strategy.	Parks and Parkways, CPC	Medium-Term	Philanthropy, NDR, Staff time	
		5: Analyze potential resilience project uses prior to disposition of City land, including for stormwater management, recreation, or other community use.	CPC	First Five Years	Staff time	
	6.B. Design projects that prioritize enhanced ecological function	1: Prioritize the expansion of the tree canopy and the use of planting materials that serve a positive ecological function in green infrastructure and other enhanced green spaces	Parks and Parkways, DPW, ORS	Ongoing	Staff time, EPA	

Comment [TJA7]: Text 12-01

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions				
		How	Who	When	Resources	For More Information, See Page:
	6.C. Prevent illegal disposal of hazardous waste	2: Design and implement green infrastructure interventions to improve water quality	SWBNO, City Departments	Ongoing	Staff time, EPA	
		1: Provide proper and convenient disposal services for household hazardous waste items	Department of Sanitation	Ongoing	Staff time, EPA	
		2: Provide adequate code enforcement of environmental health hazard protections	Health Department, Mosquito and Termite Control	Ongoing	Staff time	
		3: Support compliance with the MS4 permit by strengthening policies and enforcement mechanisms to reduce litter, pet waste, excess nutrients, sediment, and other pollutants in the storm drainage network	SWBNO, ORS, DPW	Ongoing	Staff time	
		4: Explore creative environmental design methods to deter illegal waste and contaminant disposal	NORA, Code Enforcement, nonprofit partners	First Five Years	Staff time, Private investment	
		5: Work with the private sector to develop local reuse and recycling markets for common illegally disposed waste items like scrap tires	Sanitation, City Departments	First Five Years	Staff time, Private investment	
	6.D. Identify, remediate, and redevelop contaminated sites and buildings	1: Identify and apply for federal, state, and other funding to remediate brownfields and other contaminated sites	ORS	Ongoing	Staff time, EPA	
		2: Provide increased funding and support for lead remediation initiatives for homes, schools, and gardens	Health Department, ORS, academic partners	First Five Years	Staff time, EPA, HUD	
		3: Pursue public engagement and education around environmental contamination and lead remediation	Health Department, Louisiana Department of Environmental Quality	First Five Years	Staff time, DEQ, EPA	
		4: Develop an inventory and map of all inactive, abandoned, or closed waste disposal and waste incineration sites	Sanitation, ITI	First Five Years	Staff time	

Comment [TJA8]: Text 13-04

Comment [TJA9]: Text 13-03

Comment [TJA10]: Text 13-01

ONGOING

FIRST FIVE YEARS: 2017–2021

MEDIUM TERM: 2022–2026

Goal	Recommended Strategy	Recommended Actions				
		How	Who	When	Resources	For More Information, See Page:
		5: Develop and establish standards for the use of sites formerly used for waste disposal or incineration and preventing new construction of residential, educational, or institutional facilities.	CPC, DSP	First Five Years	Staff time	
		6: Identify funding and resources to assist and support residents living in or near designated brownfields, superfund sites, or other areas with documented environmental justice issues	ORS, Mayor's Office, OCD	Medium Term	Staff time	
		7: Identify and apply for Federal, State, and other funding or resources to relocate consenting residents of the Gordon Plaza Subdivision that was built on the Agriculture Street Landfill, a Superfund site.	Mayor's Office	First Five Years	Staff time, EPA, LDEQ	
7. Global leadership in urban resilience and sustainability, with the facilities and resources to share our experiences while continuing to learn from the daily realities of a complex urban condition	7.A. Increase public awareness and education, locally and international, of New Orleans' resilience challenges and its efforts to build urban resilience	1: Establish a resilience center	ORS; philanthropic, academic, private, and community partners	First Five Years	Philanthropy, staff time	
		2: Maintain New Orleans' participation in peer-to-peer best practices sharing networks (C40, Compact of Mayors, etc)	Mayor's Office, ORS	Ongoing	Philanthropy, staff time	
	7.B. Integrate resilience-driven decision making across public agencies	1: Develop the capacity of the Office of Resilience and Sustainability	Mayor's Office, CAO	First Five Years	NDR, philanthropy, staff time	
		2: Formalize a cross-agency resilience-building team	Mayor's Office, ORS, City Departments	First Five Years	Staff time	
		3: Develop the capacity of cross-agency resilience design review	ORS, City Departments	First Five Years	Staff time	

Comment [TJA11]: Text 13-01

Comment [TJA12]: Text 13-01

Comment [TJA13]: Text 13-01

Narrative

Below is a more detailed narrative of the various goals, strategies and actions highlighted in the “Summary” chart.

GOAL 1: A healthy, functioning coast that sustains communities, industries, and ecosystems while providing critical flood protection as part of a Multiple Lines of Defense strategy

1A: Leverage critical resources for local and regional coastal protection

1: Dedicate City resources as matching funds for the State’s Coastal Master Plan projects in Orleans Parish

- **Who:** Mayor’s Office, City Council, ORS
- **When:** First Five Years
- **Resources:** RESTORE Act, BP Settlement, NDR, HMGP

2: Advocate for increased state and federal resources for coastal protection and restoration projects

- **Who:** ORS, Mayor’s Office
- **When:** First five years
- **Resources:** Staff time

1B: Advocate and coordinate with neighboring parishes for the implementation of the state’s Multiple Lines of Defense vision and a flood protection system that can withstand a 500 year storm.

1: In Partnership with the CPRA, advocate for the implementation of coastal protection and restoration projects that benefit Greater New Orleans

- **Who:** ORS, Mayor’s Office
- **When:** First five years
- **Resources:** Staff time

2: Improve coordination in coastal restoration between New Orleans and other local, state, and federal agencies, such as participation in the Governor’s Coastal Advisory Committee

- **Who:** ORS, Mayor’s Office
- **When:** First five years
- **Resources:** Staff time

3: Develop a comprehensive coastal land-loss and restoration awareness campaign

- **Who:** ORS; local community, philanthropic, nonprofit, and corporate partners
- **When:** First five years
- **Resources:** Philanthropy, Staff time

1C: Coordinate with the private sector and advocate for the growth and development of a regional water management industry

1: Promote workforce development opportunities for local residents in the emerging water management sector

- **Who:** Network for Economic Opportunity, ORS, City departments, private-sector and institutional partners
- **When:** Ongoing

- **Resources:** Staff time, NDR

2: Leverage private sector resources and interests to advance coastal protection and restoration projects

- **Who:** ORS, New Orleans Business Alliance, private-sector partners
- **When:** Ongoing
- **Resources:** Staff time

1D: Become a model for the nonstructural urban adaptation component of the State’s Coastal Master Plan

1: Ensure consistency between the State’s Coastal Master Plan and the City’s Resilience Strategy, Master Plan, and land use regulations

- **Who:** CPC, ORS
- **When:** Ongoing
- **Resources:** Staff time

2: Integrate risk mitigation into land use and other planning decisions

- **Who:** CPC
- **When:** Ongoing
- **Resources:** Staff time

3: Work with CPRA and other state and local partners to integrate urban water management and coastal management practices

- **Who:** ORS
- **When:** First five years
- **Resources:** Staff time

4: Pilot nonstructural recommendations from the 2017 Coastal Master Plan in New Orleans

- **Who:** SWBNO, DPW, ORS, NORA
- **When:** First Five years
- **Resources:** CPRA, HMPG, Staff time

Goal 2: A New Orleans that **embodies the principle of living with water**, managing urban stormwater and groundwater carefully to align with natural processes and support economic growth

2A: Implement comprehensive stormwater management to complement the traditional drainage system of pipes and pumps with green infrastructure that delays and detains stormwater in landscaped features.

1: Implement district-scale comprehensive water management plans through the retrofit of parks, playgrounds, neutral grounds, and other open spaces.

- **Who:** Capital Projects, DPW, SWBNO, Parks and Parkways, ORS, NORA, CPC
- **When:** Medium-term
- **Resources:** NDR, HMGP, Staff time

2: Utilize data-driven tools to support the strategic prioritization and design of projects in order to enhance performance and achieve resilience goals such as social equity and economic development.

- **Who:** ORS, SWBNO

Comment [TJA14]: Modified Text 12-02

- **When:** Ongoing
- **Resources:** NDR, Philanthropy, Staff time

3: Prioritize the long-term financing and operations and maintenance of green infrastructure projects in the design phase

- **Who:** ORS, Capital Projects, DPW, design and engineering consultants
- **When:** First five years
- **Resources:** NDR, Staff time

4: Establish a publicly accessible, citywide ground and surface water monitoring network to allow for active management of groundwater which will reduce subsidence, and inform siting and design of new green infrastructure facilities

- **Who:** SWBNO, ORS
- **When:** First five years
- **Resources:** NDR, Philanthropy, Staff time

2B: Institutionalize comprehensive stormwater management planning and project delivery across city government

1: Support the enforcement of the CZO's stormwater regulations by establishing a Stormwater Enforcement Division within the Department of Safety and Permits

- **Who:** CPC, ORS, CAO, DSP
- **When:** First Five Years
- **Resources:** Staff time

2: Formalize a cross-agency stormwater project delivery team

- **Who:** ORS, CPC, SWBNO, DPW, Parks and Parkways, NORA, Capital Projects, Place-Based Planning
- **When:** First Five Years
- **Resources:** Staff time

3: Develop the capacity of the cross-agency Resilience Project Design Review Committee

- **Who:** ORS, City Departments
- **When:** First five years
- **Resources:** Staff time

4: Establish hazard mitigation and stormwater management best practices in design and construction of public facilities, including freeboard, the use of pervious paving, and building elements that detain and retain stormwater runoff

- **Who:** ORS, DPW, Capital Projects
- **When:** Ongoing
- **Resources:** Staff time

Goal 3: A population that has the ability and capacity to **adapt to a changing environment and future threats**

3A: Incentivize property owners to invest in risk reduction

Comment [TJA15]: Modified Text 12-02

1: Secure funds and implement a grant program to support risk reduction measures such as home elevation, hardening, and energy efficiency/generation projects on private properties for low- and moderate- income homeowners

- **Who:** NORA
- **When:** First five years
- **Resources:** NDR, Staff time

3B: Develop clear guidance on risk reduction measures in the built environment

Comment [TJA16]: Modified Text 12-02

1: Establish stormwater management best practices for public infrastructure and residential, commercial, and public buildings

- **Who:** SWBNO, DPW, ORS, Capital Projects
- **When:** First five years
- **Resources:** NDR, HMGP, Philanthropy, Staff time

2: Incorporate green infrastructure and resilient design measures into general specifications for streets and public rights-of-way

- **Who:** DPW
- **When:** First five years
- **Resources:** Staff time

3: Develop-storm hardening and structural adaptation design standards for residential, commercial, and public buildings.

- **Who:** ORS, City Departments, local designers and developers
- **When:** First five years
- **Resources:** Philanthropy, Staff time

4: Pursue floodplain management policy changes that are more protective of life and property; and that increase the City's standing in FEMA's Community Rating System.

- **Who:** ORS, DSP
- **When:** Ongoing
- **Resources:** Staff time

3C: Promote community-based green infrastructure and capacity-building

1: Support and implement small scale demonstration projects to promote environmental education and stewardship

- **Who:** City Departments, local community and advocacy groups
- **When:** First five years
- **Resources:** Philanthropy, Staff time

2: Incorporate creative community engagement and educational components into the design of green infrastructure projects

- **Who:** ORS, City Departments
- **When:** First five years
- **Resources:** NDR, Philanthropy, Staff time

3D: Develop the knowledge and capacity of emerging environmental stewards

1: Support and promote the work of community-based organizations focused on youth development and education

- **Who:** ORS
- **When:** Ongoing
- **Resources:** Staff time

Goal 4: A New Orleans that is **prepared for future disasters** and ready to carry out an efficient, comprehensive, and equitable recovery

4A: Invest in pre-disaster planning for post-disaster recovery

1: Develop a comprehensive plan for post-disaster recovery that incorporates critical infrastructure systems, land use, housing, economic development, and public health services

- **Who:** Office of Homeland Security, ORS, City Departments
- **When:** First five years
- **Resources:** Staff time

2: Implement and regularly maintain a citywide parcel and building survey that can be quickly updated after a disaster

- **Who:** ITI
- **When:** First five years
- **Resources:** Staff time

3: Establish a disaster recovery fund for the City of New Orleans

- **Who:** CAO
- **When:** First five years
- **Resources:** Staff time, Private investment

4B: Improve the redundancy and reliability of our critical infrastructure

1: Implement resilient infrastructure recovery and risk transfer for critical assets that pre-funds catastrophic losses through the transfer of risk to the private market

- **Who:** ORS, SWBNO, DPW
- **When:** First five years
- **Resources:** Staff time, Private investment

2: Implement a microgrid pilot project

- **Who:** ORS, SWBNO, Entergy, other federal and private partners
- **When:** First five years
- **Resources:** USDOE, NDR, Philanthropy, Staff time

4C: Incorporate all perils, climate change impacts, and equity into Hazard Mitigation planning

1: Support and strengthen the city's professional Hazard Mitigation Unit

- **Who:** Mayor's Office, CAO, Office of Homeland Security
- **When:** First five years
- **Resources:** Staff time

2: Continue to update the Hazard Mitigation Plan to reflect latest projections and scenarios

- **Who:** Office of Homeland Security
- **When:** Ongoing

Comment [TJA17]: Modified Text 12-02

- **Resources:** Staff time

3: Utilize the “Orleans Parish 2015 Hazard Mitigation Plan Update” and all future updates in concert with the Master Plan

- **Who:** CPC, Office of Homeland Security
- **When:** Ongoing
- **Resources:** Staff time

4: Work with FEMA, the Army Corps of Engineers and regional stakeholders to evaluate storm frequency and probability based on actual risk and future risk due to climate change.

- **Who:** Mayor’s Office, ORS, Office of Homeland Security
- **When:** First five years
- **Resources:** Staff time

4D: Develop the preparedness of neighborhoods and businesses

1: Launch a Neighborhood Resilience program

- **Who:** NORA, ORS
- **When:** First Five Years
- **Resources:** Philanthropy, Staff time

2: Develop a Small Business Preparedness program

- **Who:** Office of Resilience, City Departments, local business community, neighborhood and business improvement associations
- **When:** First five years
- **Resources:** Philanthropy, Staff time

Goal 5: Improved environmental quality, increased resource efficiency, and economic growth through the **mitigation of our climate impact**

5A: Adopt and implement a Climate Action Plan

1: Set ambitious greenhouse gas emissions reductions targets for the short- and long-term

- **Who:** ORS, City Departments, Mayor’s Office
- **When:** First five years
- **Resources:** Staff time

2: Complete an annual community-wide and municipal greenhouse gas inventory

- **Who:** ORS, City Departments
- **When:** Ongoing
- **Resources:** Philanthropy, Staff time

3: Build the city’s capacity to conduct climate mitigation planning and implementation

- **Who:** Mayor’s Office, CAO
- **When:** First Five Years
- **Resources:** Philanthropy, Staff time

5B: Reduce waste and conserve resources

1: Develop a communication and education campaign to increase participation in the city's recycling program

- **Who:** Department of Sanitation
- **When:** First Five Years
- **Resources:** Staff time

2: Complete a feasibility analysis of creating a public composting program

- **Who:** Department of Sanitation
- **When:** First five years
- **Resources:** Staff time

3: Create a long-term strategic plan to address waste management and reduction in the city

- **Who:** Department of Sanitation
- **When:** First five Years
- **Resources:** Staff time

5C: Encourage, incentivize, and expand low carbon transportation alternatives, including public transit, walking, and biking

1: Develop a multimodal regional transit vision

- **Who:** Mayor's Office, RTA, City Departments
- **When:** First five years
- **Resources:** Staff time

2: Encourage mixed uses in land use and zoning in strategic locations such as transit corridors and nodes

- **Who:** CPC
- **When:** First five years
- **Resources:** Staff time

3: Develop and adopt a "Vision Zero" policy with the goal of no pedestrian or bicycle fatalities on city streets

- **Who:** DPW, Mayor's Office, RTA, transit advocates
- **When:** Ongoing
- **Resources:** Staff time

4: Implement an equitable bike share program

- **Who:** Mayor's Office, outside partners
- **When:** Ongoing
- **Resources:** Staff time, Private investment

5: Plan for the transition of the city fleet to low-carbon and electric vehicles

- **Who:** CAO
- **When:** First five years
- **Resources:** Staff time

6: Adopt zoning and building regulations to accommodate and encourage the location of electric vehicle charging stations at residential, commercial, and industrial properties

- **Who:** CPC, DSP, Property Management
- **When:** First five years
- **Resources:** Staff time

7: Develop strategy and program for installation of public electric vehicle charging stations to encourage the use of electric vehicles

- **Who:** DPW, Mayor's Office, Property Management
- **When:** Medium-term
- **Resources:** Staff time

Comment [TJA18]: Text 13-05

5D: Promote renewable energy and energy efficiency

1: Implement ambitious energy efficiency measure in municipal buildings

- **Who:** CAO
- **When:** First five years
- **Resources:** Philanthropy, Staff time

2: Incentivize the adoption of energy benchmarking and energy efficiency measures in large commercial and institutional buildings

- **Who:** ORS, Mayor's Office, Downtown Development District, corporate and philanthropic partners
- **When:** First five years
- **Resources:** Staff time

3: Seek energy efficiency financing mechanisms in partnership with banks and lenders

- **Who:** ORS
- **When:** First five years
- **Resources:** Staff time, Private investment

4: Work with Entergy and the City Council's Utility Regulatory Office to implement a decoupling ordinance to promote energy efficiency

- **Who:** ORS, City Council, Mayor's Office, Entergy
- **When:** First five years
- **Resources:** Staff time

5: Work with Entergy and the City Council's Utility Regulatory Office to advance energy efficiency

- **Who:** ORS, City Council, Mayor's Office, Entergy
- **When:** First five years
- **Resources:** Staff time

6: Work with Entergy New Orleans and the City Council's Utility Regulatory Office to increase the share of renewable energy in the Integrated Resource Plan

- **Who:** ORS, City Council, Mayor's Office, Entergy

- **When:** First five years
- **Resources:** Staff time

Goal 6: Environmental quality and justice through targeted investments in natural resources and improved ecosystem services.

6A: Target investments in new and enhanced green spaces in areas of highest risk with the most vulnerable populations, underserved and low-income neighborhoods, and communities of color.

1: Mitigate urban heat island through the targeted planting of trees and other enhancements in underserved areas, particularly where the most vulnerable populations (elderly, youth, low-income) live

- **Who:** Parks and Parkways, ORS, City Departments, nonprofit and philanthropic partners
- **When:** Medium-term
- **Resources:** NDR, Philanthropy, Staff time

2: Mitigate air quality by planting trees to reduce contaminants and buffer transit corridors.

- **Who:** Parks and Parkways, ORS, City Departments, nonprofit and philanthropic partners
- **When:** Medium-term
- **Resources:** NDR, Philanthropy, Staff time

3: Increase access to parks and recreational corridors to improve public health outcomes in underserved and vulnerable areas

- **Who:** Parks and Parkways, NORDC, ORS, City Departments, nonprofit and philanthropic partners
- **When:** Ongoing
- **Resources:** NDR, HMGP, Philanthropy, Staff time

4: Incentivize protection of the existing tree canopy through development and adoption of a no net loss tree canopy strategy.

- **Who:** Parks and Parkways, CPC
- **When:** Medium-term
- **Resources:** Philanthropy, NDR, Staff time

Comment [TJA19]: Text 12-01

5: Analyze potential resilience project uses prior to disposition of City land, including for stormwater management, recreation, or other community use.

- **Who:** CPC
- **When:** First five years
- **Resources:** Staff time

6B: Design projects that prioritize enhanced ecological function

1: Prioritize the expansion of the tree canopy and the use of planting materials that serve a positive ecological function in green infrastructure and other enhanced green spaces

- **Who:** Parks and Parkways, DPW, ORS
- **When:** Ongoing
- **Resources:** Staff time, EPA

2: Design and implement green infrastructure interventions to improve water quality

- **Who:** SWBNO, City Departments
- **When:** Ongoing
- **Resources:** Staff time, EPA

6C: Prevent illegal disposal of hazardous waste

1: Provide proper and convenient disposal services for household hazardous waste items

- **Who:** Sanitation Department
- **When:** Ongoing
- **Resources:** Staff time, EPA

2: Provide adequate code enforcement of environmental health hazard protections

- **Who:** Health Department, Mosquito and Termite Control
- **When:** Ongoing
- **Resources:** Staff time

3: Support compliance with the MS4 permit by strengthening policies and enforcement mechanisms to reduce litter, pet waste, excess nutrients, sediment, and other pollutants in the storm drainage network

- **Who:** SWBNO, ORS, DPW
- **When:** Ongoing
- **Resources:** Staff time

Comment [TJA20]: Text 13-04

4: Explore creative environmental design methods to deter illegal waste and contaminant disposal

- **Who:** NORA, Code Enforcement, nonprofit partners
- **When:** First five years
- **Resources:** Staff time, Private investment

5: Work with the private sector to develop local reuse and recycling markets for common illegally disposed waste items like scrap tires.

- **Who:** Sanitation, City Departments
- **When:** First five years
- **Resources:** Staff time, Private investment

6D: Identify, remediate, and redevelop contaminated sites and buildings

1: Identify and apply for federal, state, and other funding to remediate brownfields and other contaminated sites

- **Who:** ORS
- **When:** Ongoing
- **Resources:** Staff time, EPA

2: Provide increased funding and support for lead remediation initiatives for homes, schools, and gardens

- **Who:** Health Department, ORS, academic partners
- **When:** First five years
- **Resources:** Staff time, EPA, HUD

Comment [TJA21]: Text 13-03

3: Pursue public engagement and education around environmental contamination and lead remediation

- **Who:** Health Department, Louisiana Department of Environmental Quality
- **When:** First five years
- **Resources:** Staff time, LADEQ, EPA

4: Develop an inventory and map of all inactive, abandoned, or closed waste disposal and waste incineration sites

- **Who:** Sanitation, ITI
- **When:** First five years
- **Resources:** Staff time

5: Develop and establish standards for the use of sites formerly used for waste disposal or incineration and preventing new construction of residential, educational, or institutional facilities.

- **Who:** CPC, DSP
- **When:** First five years
- **Resources:** Staff time

6: Identify funding and resources to assist and support residents living in or near designated brownfields, superfund sites, or other areas with documented environmental justice issues

- **Who:** ORS, Mayor's Office, OCD
- **When:** Medium-Term
- **Resources:** Staff time

Comment [TJA22]: Modified Text 13-01

7: Identify and apply for Federal, State, and other funding or resources to relocate consenting residents of the Gordon Plaza Subdivision that was built on the Agriculture Street Landfill, a Superfund site.

- **Who:** Mayor's Office
- **When:** First five years
- **Resources:** Staff time, LADEQ, EPA

Comment [TJA23]: Added by CPC at hearing Text 13-01

Goal 7: Global leadership in urban resilience and sustainability, with the facilities and resources to share our experiences while continuing to learn from the daily realities of a complex urban condition

7A: Increase public awareness and education, locally and international, of New Orleans' resilience challenges and its efforts to build urban resilience

1: Establish a resilience center

- **Who:** ORS; philanthropic, academic, private, and community partners
- **When:** First five years
- **Resources:** Philanthropy, Staff time

2: Maintain New Orleans' participation in peer-to-peer best practices sharing networks (C40, Compact of Mayors, etc)

- **Who:** Mayor's Office, ORS
- **When:** Ongoing
- **Resources:** Philanthropy, Staff time

7B: Integrate resilience-driven decision making across public agencies

1: Develop the capacity of the Office of Resilience and Sustainability

- **Who:** Mayor's Office, CAO
- **When:** First five years
- **Resources:** NDR, Philanthropy, Staff time

2: Formalize a cross-agency resilience-building team

- **Who:** Mayor's Office, ORS, City Departments
- **When:** First five years
- **Resources:** Staff time

3: Develop the capacity of cross-agency resilience design review

- **Who:** ORS, City Departments
- **When:** First five years
- **Resources:** Staff time

VOLUME 3
chapter



ADAPT TO THRIVE: ENVIRONMENTAL STEWARDSHIP, DISASTER RISK REDUCTION, AND CLIMATE CHANGE

A Context

Many of the threats to New Orleans are not surprises to residents or visitors. The most prominent environmental shocks come in the form of severe storms or hurricanes and flooding events. The impacts from these events are only exacerbated by the presence of cumulative physical stresses, like land subsidence and coastal wetland loss, and social stresses, like poor economic, educational, and health outcomes among vulnerable populations.

City resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.

Our environment is changing. Climate change is accelerating it. New Orleans was founded in the 18th century due to its strategic location for commerce in the Mississippi River Delta and on the Gulf of Mexico. Today, the natural systems upon which the city was built continue to sustain the city, but also threaten it. The deltaic soils underfoot and the wetlands that largely surround the city are part of a shifting coastal landscape that offers unique challenges for the built environment. The natural and coastal systems of Southeast Louisiana are directly connected to the urbanized area of New Orleans, providing natural protections from storms and storm surge and creating landscapes for economic development.

Shocks like hurricanes are compounded by daily stresses on the city's natural and built environment. The rapid loss of coastal wetlands puts extra stress on the city's food protection system, while hard surfaces that do not absorb water and sinking urban soils exacerbate food risk from regular rainfall. Sea level rise and a projected increase in frequency and intensity of storm events are expected to accelerate coastal land loss, adding greater stresses to our levee and food protection system, while more extreme heat will directly threaten other infrastructure systems and the health of our residents. We are already facing many climate change-related challenges in advance of other cities and regions around the world due to our unique geography.

City resilience is about more than building stronger infrastructure to hold back the water and withstand the wind. Our capacity to adapt is founded on our knowledge and learning from past experiences with shocks and stresses. However, some fundamental aspects of our existence as a coastal city have been hidden behind walls and under asphalt, including our slowly sinking deltaic soils and our disappearing wetlands. While we now may recognize the risks that a hurricane presents, we still lack a widespread public awareness of how climate change increases the future risks to our city.

We will continue to adapt to our semiaquatic home. With a comprehensive coastal master plan and implementation strategy, Louisiana is already taking action on coastal protection and

restoration efforts. Today, New Orleans is ready to be an urban model for living with water and adapting to the rapid environmental changes that will only accelerate with climate change.

Equity is critical to our resilience.

Many New Orleanians suffer the chronic social stresses of poverty, unemployment, and violence. Wide disparities exist in employment and wages, educational attainment, and health outcomes. These social stresses are correlated with a greater vulnerability to physical shocks: low-income households in New Orleans are more likely to be located in areas at greater risk of flooding and land subsidence. These chronic stresses compound the risks of intermittent shocks, leaving our communities that already experience inequity further exposed to risk, and weakening our resilience as a city.

Even as we look to the future, we cannot ignore past injustices. Racial inequity is present in every facet of our society—employment and income, education and health, violence and justice, housing and social mobility. To advance as a city, we must confront this reality collectively and seek meaningful ways to address its effects in our institutions, our communities, and our families. With a strategy that prioritizes racial equity, we will be stronger as a society and more capable of responding to adversity.

The future is uncertain.

As we seek to make resilience thinking a part of our daily practice, we must plan and prepare for a future that remains uncertain. Even in our recent history, new challenges have emerged. For example, following the levee failures and floods of 2005, New Orleans spent years preparing for another major storm event, only to be shocked in 2010 by BP’s drilling rig explosion and oil spill—considered the largest environmental disaster in US history—which sent over 210 million gallons (780,000 cubic meters) of oil flowing across our coast.

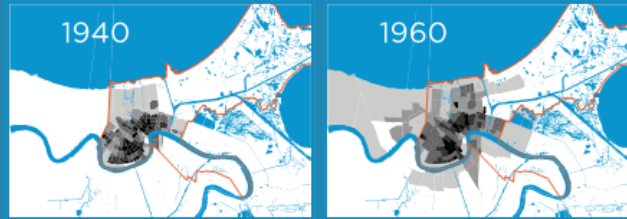
While not common to our city, other potential threats could include terrorist attacks, infectious disease epidemics, drought, and civil unrest. We might not know what shocks we will face, but we do know our future will be dynamic and complex. We need transportation systems that can get us to work every morning, but also move us to safety during a crisis. We need electricity and water systems that we can count on to keep us productive and that we know will perform under stress. We need a government that is agile enough to deliver critical services to all people in all conditions. By creating systems that are flexible enough to address multiple challenges and reliable enough to continue to support us, we can shape a city that can thrive no matter what may happen.

~~INSERT DEMOGRAPHICS AND MAP GRAPHICS FROM RESILIENTNOLA REPORT~~

Comment [TJA24]: Universal Text 2.1

Population Density: 1940 - 2010

The population of New Orleans in 2000 was almost exactly the population of the city in 1940. However, the city occupied approximately twice the land area, spreading away from the high ground near the river toward lower-lying areas.

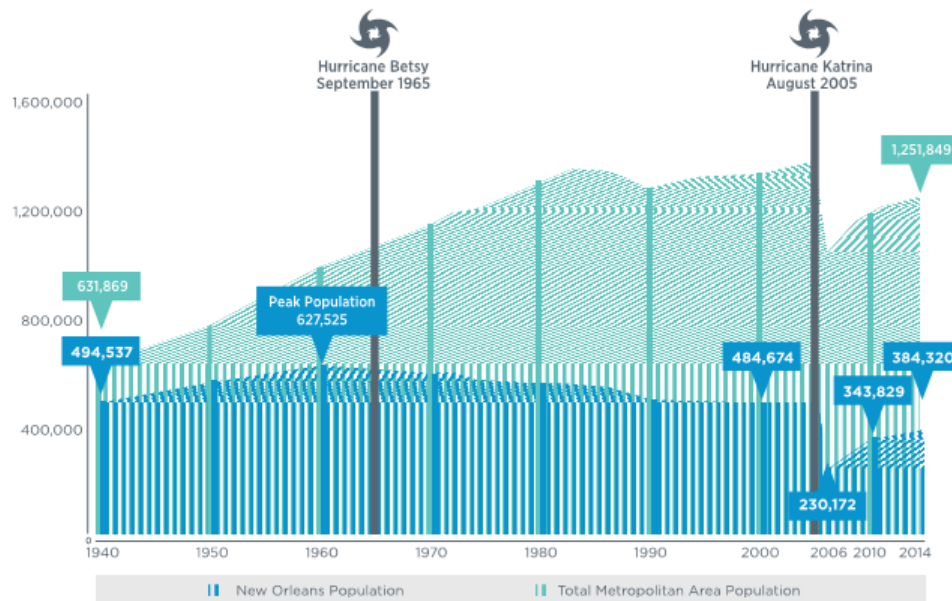


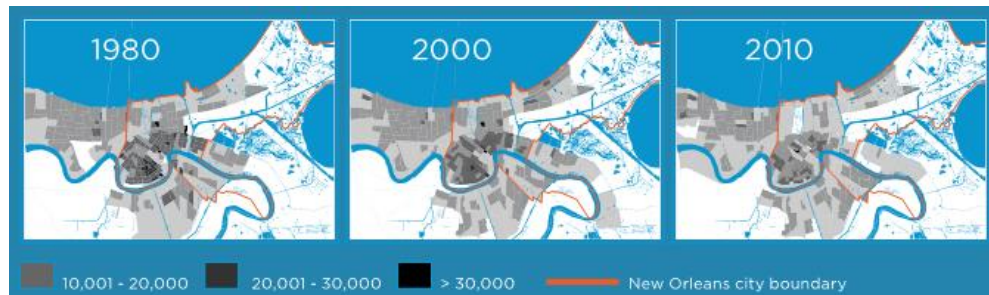
PEOPLE PER SQUARE MILE

0 - 1,000	1,001 - 5,000	5,001 - 10,000
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The City has abandoned a long history of living with water. For the first two centuries of the city's existence, we occupied the high ground nearest the Mississippi River and the natural ridges throughout the region. With the advent of highly efficient pumping technology in the early 20th century, the draining of swampland in low-lying parts of the city and region incentivized new development to spread into previously uninhabitable locations. With this development came suburbanization and regional sprawl, setting the stage for challenges to our water management and food protection systems, as well as to our ability to connect residents to regional job opportunities.

Population Change: 1940 - 2014





1. History of Disaster Risk and Recovery²

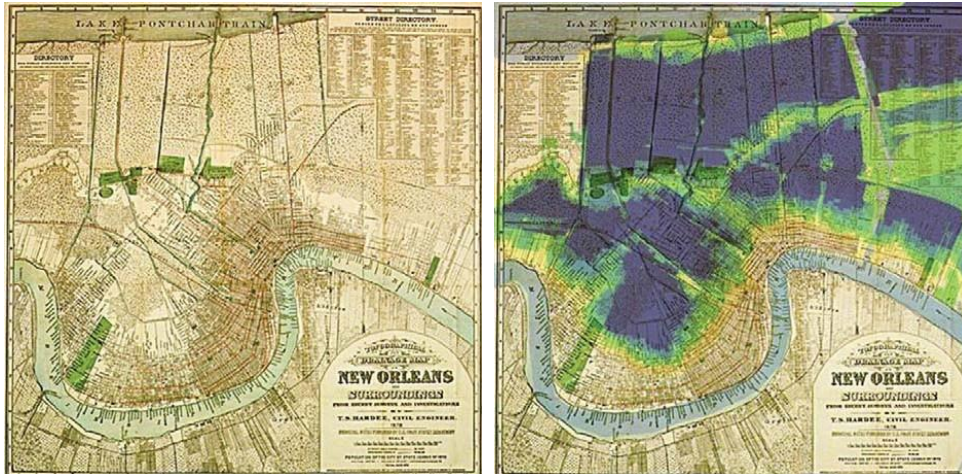
Hurricanes in 1722 and 1723 introduced the early French settlers to the natural risks of New Orleans' site and there have been 27 major floods between the founding of the city and 2017. Before the twentieth century, the community—as individuals and as a local government—had responsibility for responding to floods and other hazards, which included non-flood threats, such as yellow fever epidemics. Organizations like the Red Cross and the National Guard, as well as big companies that owned infrastructure like railroads and utilities became involved in storm response in the early twentieth century, and after the 1947 hurricane, federal assistance became more prominent. The combination of a history of hazards and a thriving international port economy meant that the city leadership was always anxious to send the message that everything returned quickly to normal. Before the 1960s, however, there was not a large population living in the most vulnerable areas of New Orleans.

Hurricane Betsy in 1965 was a turning point in the history of risk and approach to mitigation in New Orleans. This hurricane had the most devastating impact on the city up to that point—flooding 43 percent of the city and damaging over 14,000 homes. Quick immediate clean up and repair was followed within a few years by a series of actions and broader events that resulted in a less, rather than more, resilient city:

- Congress appropriated additional funds to strengthen the regional levee system and the National Flood Insurance Program, with a promised protection level for a 1-in-200-year storm. The hurricane protection program remained incomplete when Hurricane Katrina arrived 40 years later.

²

The information and discussion in this section is greatly indebted to Colton, *et al.*, *Community Resilience*.



Historical extent of the city's street grid as shown on the 1878 Hardee map and 1878 map with Hurricane Katrina flood depths superimposed shows that most areas that flooded after Hurricane Katrina were not settled in 1878.

- The Army Corps of Engineers improved levees around the city core and New Orleans East, Jefferson Parish and St. Bernard Parish, but did not provide protection from storm surges or from a 1-in-100-year flood.
- Levee and canal building contributed to coastal erosion.
- Population increased in the most flood prone areas of the city and in previously uninhabitable parts of New Orleans East, as well as the suburban parishes.
- Drainage pumps dried out parts of the city, soil subsidence inside the levees increased, and a bowl effect resulted, with more frequent flooding from rain storms.
- Rain storm flooding in vulnerable areas such as Broadmoor was reduced significantly by the Army Corps of Engineers Southeast Louisiana Drainage Project, which enlarged drainage and pump capacity.
- Participation in the National Flood Insurance Program in New Orleans tended to be more frequent in the areas with a history of stormwater flooding, and not where risk from hurricanes was greatest.
- Inconsistent building code enforcement detracted from official protection measures.

All of these activities during the 40 years between Hurricane Betsy and Hurricane Katrina made New Orleanians believe that their risk was being managed and controlled. They could see that areas with repeated flooding from rainstorms were being improved—the areas of high frequency risk. However, in areas of low frequency but high consequence risk—the areas that suffered the most devastating flooding in the aftermath of Hurricane Katrina—residents had no risk information to weigh in making decisions about where to live.³

- In parts of the city like Broadmoor, which had experienced a history of repeated stormwater flooding because of low elevations and poor drainage infrastructure, conventional Army Corps strategies based on structural improvements to the system along with funds to elevate and reconstruct homes with a history of repetitive flood losses were implemented after Hurricane Katrina.

³ This discussion is based on Earthea Nance, "Responding to Risk: The Making of Hazard Mitigation Strategy in Post-Hurricane Katrina New Orleans," *Journal of Contemporary Water Research & Education*, Issue 141 (March 2009), 21–30; C.E. Colton, R.W. Kates, and S. B. Laska, *Community Resilience: Lessons from New Orleans and Hurricane Katrina*, CARRI Research Report 3 (September 2008), p.3. (Community and Regional Resilience Initiative of the Oak Ridge National Laboratory, www.resilientUS.org.)

- Neighborhoods like Gentilly, New Orleans East, and the Lower 9th Ward did not have a history of stormwater flooding and poor drainage (though individual properties still experienced repeated stormwater flooding depending on individual circumstances). The newer developments in New Orleans East were built with up to date drainage infrastructure and with man-made lakes to serve as stormwater retention ponds. This was also true of newer development on the West Bank. Before Hurricane Katrina, residents in the East had no reason to think their neighborhoods were especially flood-prone because they did not experience stormwater flooding during the deluges that periodically flooded other areas.
- City government and city residents believed that the system of levees, floodwalls and pumps designed, built and funded by the federal government would protect them from catastrophic storm consequences and, as a result, did not focus on land use strategies, stringent code enforcement and emergency preparedness because of a lessened sense of vulnerability. Within the levees, slab on grade became the norm in new construction and habitation of ground floor areas in elevated houses was allowed.
- Evacuation became a favored strategy to reduce hurricane impacts on populations. Because the science of weather prediction was much more precise, significant advance notice of hurricanes became possible. Communications media could disseminate information. At the same time, it was clear that many people would decide not to evacuate and the evacuation planning neglected the needs of residents with few resources, disabilities, illness or other problems. At the time of Hurricane Katrina, the state's Emergency Operations Plan was incomplete and the inadequacy of the federal response is well known.

In the wake of the 2005 protection failures, the Army Corps of Engineers set up a group to learn lessons and identify future risks, the Interagency Performance Evaluation Task Force, popularly known as IPET. The Corps also asked the National Academy of Engineering and the National Research Council to organize a committee to review IPET's draft reports. The final National Academy review, published in 2009, contained the following comments and recommendations:

- No protective structures can ever completely eliminate risk from flooding.
- Even though the pre-Hurricane Katrina system proved vulnerable, "it appears that reconstruction activities are taking place largely according to the system's pre-Hurricane Katrina footprint. . . .at the very least, there should be discussions that consider the pros and cons of different designs and different levels of protection across the region."
- It will not be possible to provide equal degrees of protection across the city, as higher elevations are inherently safer than low-lying areas. Voluntary relocation, with adequate resources, should be considered for very vulnerable areas.
- Significant floodproofing is essential where people continue to live in vulnerable areas, such as elevation of houses to at least the 100-year storm level and strengthening of critical infrastructure.
- The 1-in-100-year flood protection standard is inadequate "for heavily-populated urban areas where the failure of protective structures would be catastrophic—such as New Orleans."
- Strategies to create shelters within neighborhoods for those unable to leave should be pursued in addition to comprehensive evacuation programs.
- Communicating risks to residents in laymen's terms is critical.
- An independent "second opinion" on the system should be solicited regularly.⁵

2. ADAPTATION AND TRANSFORMATION

⁴ Colten, et al., p.9

⁵ National Academy of Sciences, *The New Orleans Hurricane Protection System: Assessing pre-Hurricane Katrina Vulnerability and Improving Mitigation and Preparedness*, Report in Brief, (2009), www.nap.edu.

Throughout our city's history, water has been essential to New Orleans' existence but has also threatened it. The only constant in our natural environment since the city's founding in 1718 has been change. New Orleans is built upon some of the newest land in the world—the shifting soils of the Mississippi River Delta. Prior to the construction of major levees and food control structures in the 20th century, the Mississippi River spent more than 7,000 years changing course and depositing sand, clay, and silt along its banks to build the land around us. In the past 100 years, we have channelized the river, dug canals, laid pipelines, drained wetlands, and introduced invasive species—all to establish conventional settlement and commercial patterns on a challenging environment.

Largely due to our own influence, New Orleans has been losing the coastal wetlands that sustain us both physically and economically at a rate of more than 16 square miles (41 square kilometers) per year. River levees deprive the delta of the necessary sediment to build new wetlands; canals and pipelines destabilize marshes, allowing exposure to damaging saltwater. Even in the city, the soft soils beneath us are not static. The ground in New Orleans is sinking—as much as 10 feet over the past 100 years in some parts of the city. Known as subsidence, this process is partially a result of our practice of pumping water out of the city as quickly as possible, which dries and compacts the typically moist soil—buckling streets, bursting pipes, and destabilizing utility poles.

Sea level rise and the increased frequency and intensity of extreme storm events are projected to accelerate coastal land loss, adding greater stresses to our levee and food protection system, while more extreme heat will directly threaten other infrastructure systems, such as electricity distribution, and the health of our residents. New Orleans is arguably more threatened by global climate change than almost any other US city, but we are also more capable than ever to address its effects.

New Orleans is ready to become a global leader in addressing environmental and climate change. We must align our infrastructure and urban environment to the realities of our delta soils and geography. Rather than resist water, we must embrace it, building on the confluence of Louisiana's culture, history, and natural systems. As we look to the wisdom of the past, we must also prepare for the risks of the future.

The infrastructure of the future city will look different than it does today. Our parks and schoolyards will be designed with native plants and trees to soak up water; our canals and streets will provide greenways for recreation and water management. The infrastructure of the future New Orleans will work with natural systems, be redundant and reliable, provide multiple benefits to residents, and even beautify the city.

Our adaptation must be both physical and behavioral. Our historical experience of living with water in Southeast Louisiana has been largely forgotten. Much of our water flows behind walls and through culverts, where we rarely see it. Despite being a place that is so defined by hydrology, we have systematically hidden water from our daily experience. We need spaces where we can regularly encounter the water that surrounds us, learn about how it shapes our city, and explore ways to manage its presence.

Generational change starts at a young age, with children being exposed to water during swimming lessons, in parks, and on neighborhood streets. For our students, incorporating our local geography and hydrology into formal education is essential to begin lifelong learning and engagement with the risks and opportunities of our collective future. With a new generation of

emerging environmental stewards, we are poised to become a global leader in sustainable environmental management.

Being ready for a dynamic future economy will be an important outcome of our successful adaptation. Building new types of infrastructure and retrofitting conventional systems is already growing our local water economy. More than 14,000 new water management jobs have been added to our region since 2010, with more growth projected.

Our future in the Mississippi River Delta will inevitably be wet—with less land around us and more intense storms projected—and in order to thrive and prosper we need to accept water and transform how we manage it. Our dynamic environment both sustains and threatens us in Southeast Louisiana, and our understanding and stewardship of it will only become more critical.

A resilient approach examines the relationship among critical systems and commits to collaboration between private, public, local, regional, and national actors. We have already begun to work together to protect and restore our coast. We are committed to comprehensive urban water management that will help us live with our abundance of water.

A. THE BIG PICTURE: COASTAL RESTORATION

New Orleans is increasingly susceptible to widespread coastal flooding. This flooding represents an existential challenge to our population, property, and way of life. Action is needed now. Investments in large scale coastal restoration as well as natural and built flood protection assets continue to be necessary for the City’s survival in the near and distant future.

In the aftermath of 2005’s Hurricanes Katrina and Rita, Congress authorized the U.S. Army Corps of Engineers (USACE) to design and construct the Hurricane & Storm Damage Risk Reduction System (HSDRRS) for southeast Louisiana.⁶ “The HSDRRS generally consists of multiple projects and authorizations forming a comprehensive system of levees, floodwalls, gates, internal drainage and pumping stations and other structures, integrated into a single system designed to reduce the risk of hurricane and storm damage to the Greater New Orleans area and southeastern Louisiana.”⁷ The HSDRRS is integrated with the Mississippi River flood system along the main stem of the Mississippi River which protects against riverine flooding.⁸

While HSDRRS plays a major role in storm protection for Greater New Orleans, it must not be forgotten that HSDRRS is but one line of protection from coastal flooding. Coastal wetlands serve as another. Wetlands can absorb storm surge and reduce wave action. Modeling by the Louisiana Coastal Protection and Restoration Authority indicates that when levees and wetlands are implemented together the level of effectiveness increases and this may play a large role in storm damage risk reduction systems⁹.

⁶ U.S. Army Corps of Engineers. Greater New Orleans Hurricane and Storm Damage Risk Reduction System: Facts and Figures. May 2016. Available at: <http://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/TFH%20FF%20Brochure%2027%20May%202016%20Final.pdf>

⁷ U.S. Army Corps of Engineers. Review Plan: Final Revision: Implementation of Section 2035 of WRDA 2007 for the Greater New Orleans (GNO) Hurricane and Storm Damage Risk Reduction System (HSDRRS). Pg 5. Dec 2012. Available at: <http://www.mvn.usace.army.mil/Portals/56/docs/PD/PeerReview/GNOHSDRRSReviewPlan.pdf>

⁸ *Id.*

⁹ Louisiana Coastal Protection and Restoration Authority. Draft 2017, Louisiana’s Comprehensive Master Plan for a Sustainable Coast. pg 77. Available at: http://coastal.la.gov/wp-content/uploads/2016/08/2017-MP-Book_Single_Combined_01.05.2017.pdf

Unfortunately, since 1932, Louisiana lost in excess of 1800 sq/miles of land as a result of subsidence, disconnecting the Mississippi River waters and sediments from marshes, storm surges, human impacts, and hurricanes.¹⁰ In addition, Louisiana's coastal wetlands are susceptible to the impacts of global climate change. The best available science has predicted relative sea level along the Gulf Coast region including Louisiana within 2 to 4ft as a result of global sea level rise from melting ice and local subsidence."¹¹

In November 2005, the Louisiana Legislature created the Coastal Protection and Restoration Authority (CPRA) with the mission of coordinating local, state and federal agencies to achieve comprehensive protection and restoration, particularly through integrating activities in wetland restoration and flood control.¹³ CPRA created Louisiana's Comprehensive Master Plan for a Sustainable Coast. The current 2017 Louisiana Master Plan "sets an ambitious path to respond to the loss of our coastal land and the threats from storm surge events. The master plan, in its purest sense, is a list of projects that build or maintain land and reduce risk to our communities."¹² The 2017 Master Plan recommends 120 projects that build or maintain more than 800 square miles of land and reduce expected damage by \$8.3 billion annually by year 50, or by more than \$150 billion over the next 50 years, and are expected to pay for themselves three times over the course of implementing the plan.

Under the CPRA's medium environmental risk scenario evaluation of Orleans Parish, New Orleans faces significantly increased wetland loss of approximately 51 square miles or 32% of the parish land primarily in the New Orleans East Area over the next 50 years if no additional coastal protection or restoration efforts are implemented. Additionally, with no future action, areas outside of the hurricane protection system face severe future storm surge based flood risk. Over the next 50 years, 100-year flood depths increase to over 15 feet outside the levee system, additional areas of New Orleans East may experience 1-6 feet future flood depths.¹³ However CPRA believes if the Master Plan projects in the New Orleans region are implemented, Orleans Parish will see an 83% reduction in Land Loss than if no action was taken.¹⁴ The reductions include \$70 million less in economic damage over 25 years, and \$200 million less within 50 years.¹⁵ In order to reduce the potential flood risk to the City of New Orleans CPRA has proposed a combination of structural shoreline protection measures, nonstructural protection which may include elevations and possible buy outs, structural protections, and marsh creation.¹⁶ The CPRA has also proposed to make improvements to the Hurricane Storm Damage Risk Reduction System (HSDRRS) levees surrounding the East Bank of Greater New Orleans.

The City of New Orleans is committed to supporting the efforts of the Louisiana Coastal Protection and Restoration Authority (CPRA) by leveraging financial resources available through the BP Deepwater Horizon settlement, the National Disaster Resilience Competition, and the RESTORE Act. In partnership with the CPRA, the City will help advance coastal

¹⁰ Louisiana Coastal Protection and Restoration Authority. Draft 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast.pg ES2. Available at: http://coastal.la.gov/wp-content/uploads/2016/08/2017-MP-Book_Single_Combined_01.05.2017.pdf

¹¹ U.S. Global Change Research Program. Global Climate Change Impacts In the United States: A State of Knowledge Report from the U.S. Global Change Research Program. 2009. Pg 57. Available at: <https://www.whitehouse.gov/sites/default/files/microsites/ostp/climate-impacts-report.pdf>

¹² Louisiana Coastal Protection and Restoration Authority. Draft 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast.pg ES-1. Available at: http://coastal.la.gov/wp-content/uploads/2016/08/2017-MP-Book_Single_Combined_01.05.2017.pdf

¹³ Louisiana Coastal Protection and Restoration Authority. 2017 Coastal Master Plan Attachment A9: Parish Fact Sheets. Pg 29. 2017. Available at: http://coastal.la.gov/wp-content/uploads/2016/08/Appendix-A_Attachment-A9.pdf

¹⁴ Id at 30

¹⁵ Id at 30

¹⁶ id

restoration and protection projects in Orleans Parish that benefit the city of New Orleans and the region, providing flood protection, habitat restoration, and workforce opportunities.”¹⁷ The City’s Resilience Strategy, notes that many residents lack risk awareness because challenges remain hidden behind floodwalls and under asphalt. “Much of our water flows behind walls and through culverts, where we rarely see it. Despite being a place that is so defined by hydrology, we have systematically hidden water from our daily experience. We need spaces where we can regularly encounter the water that surround us, learn about how it shapes our city, and explore ways to manage its presence.”¹⁸

The Office of Resilience and Sustainability (ORS), which oversees implementation of the City’s Resilience Strategy, is committed to addressing coastal challenges and building the local, national, and international support necessary to expand efforts to restore the Coast. One way ORS builds support for coastal restoration is through the Annual Christmas Tree Drop. Every year OCR, the City Department of Sanitation and Development, US Fish and Wildlife Service, and the LA National Guard work together to collect thousands of Christmas trees from residents of New Orleans for repurposing into a Christmas tree fence erosion barrier in Bayou Sauvage. This program diverts waste from landfills while simultaneously mitigating wetland loss. This effort has garnered local and national media coverage.

Whereas improvements to the New Orleans Hurricane & Storm Damage Risk Reduction System (HSDRRS) by the U.S. Army Corps of Engineers has decreased risk from pre Hurricane Katrina and Rita levels, the remaining vulnerabilities are still significant, likely to be exploited, and costly in response. Although HSDDRS performed as designed in 2012¹⁹, Hurricane Isaac inflicted upon the City millions in damages from widespread flooding, power loss due to failure of grid systems, and damages to physical structures.²⁰ Therefore, pursuant to implementation of the Resiliency Strategy, the City will undertake complimentary efforts to HSDDRS such as: 1.) strengthening and increasing the capacity of the Sewerage and Water Board’s existing “pumps and pipes” system; 2.) providing a replicable framework for implementation of non-structural strategies, such as green infrastructure features, reducing the flow of stormwater to the pump stations during peak times of rainfall events; 3.) participating in constructive partnerships with other local, State, Federal, and Non-Governmental actors to advance ecosystem restoration projects which provide ecosystem services such as flood protection to Orleans Parish residents. Pursuant to a Multiple Lines of Defense Strategy, the City will align “our infrastructure and urban environment with the realities of our delta soils and geography.”²¹ The strategic utilization of gray and green infrastructure, based upon the best available science, will allow the City to strategically contain and manage significant amounts of water that fall within HSDRRS, including that which might overtop HSDRRS during storm surge events.

The City of New Orleans is and will continue to be active in advancing large scale coastal restoration and flood protection. The City will work with partners, including but not limited to the CPRA and the USACE, to build a more resilient New Orleans. ORS will implement the City’s coastal initiatives in a manner that is both transparent and accountable.

¹⁷ *Id.* at 36

¹⁸ City of New Orleans. Resilient Nola. Pg 33. Available at: http://resilientnola.org/wp-content/uploads/2015/08/Resilient_New_Orleans_Strategy.pdf

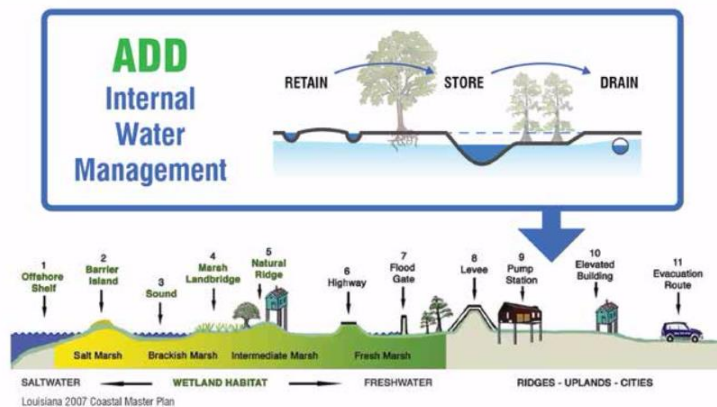
¹⁹ Greater New Orleans Storm Damage Risk Reduction System: Facts and Figures. U.S. Army Corps of Engineers: June 2015 Available at: http://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/USACE_TFH%20FF%20Brochure%20June%202015%20Final.pdf

²⁰ City of New Orleans Application to the US Department of Housing and Urban Development’s National Disaster Resilience Competition: Draft for Public Comment. City of New Orleans. February 25, 2015. Available at: http://www.nola.gov/resilience/resources/cno-ndrc-draft-for-public-comment_sec-11/

²¹ City of New Orleans. Resilient New Orleans: Strategic Actions to Shape Our Future City. August 2015. Available at: http://resilientnola.org/wp-content/uploads/2015/08/Resilient_New_Orleans_Strategy.pdf

B. MULTIPLE LINES OF DEFENSE AND URBAN WATER MANAGEMENT²²

A major lesson of Hurricane Katrina is that New Orleans cannot simply rely on bigger or better levees, gates, and pumps for protection. The city must become the expert in its own protection and resilience by adopting a strategy that addresses multiple lines of defense, some of which will require continued advocacy and vigilance, and some of which the city and its citizens can take charge of themselves. The multiple lines of defense range from restoration of coastal wetlands, to internal and external structures, to non-structural strategies (such as land use and building codes), to emergency preparedness.



Greater New Orleans is now surrounded by 133 miles (214 kilometers) of newly strengthened levees, floodwalls, and pump stations—the largest coastal food control system in the nation. This recent \$14.5 billion investment in hard infrastructure is critical to our future, but coastal restoration and comprehensive urban water management must complement and support that investment to ensure maximum food protection capacity.

Addressing today's water and soil management challenges requires a new paradigm in which stormwater and groundwater are managed as valuable resources. The 2012 Greater New Orleans Urban Water Plan outlines the changes necessary to achieve a more sustainable balance between ground and water, through a long term program of retrofits to existing systems and the urban landscape. The retrofits emphasize slowing and storing stormwater rather than pumping, circulating surface water and recharging groundwater, creating vital public spaces around water, and incorporating natural elements and processes into the operation of an integrated living water system.

New Orleans relies on forced drainage systems to keep dry. This single-purpose approach to stormwater management is expensive and resource-intensive, yet streets still flood regularly due to rainfall. This approach is also the primary cause of subsidence in the region, and diminishes the value of the region's waterways and water bodies as public assets.

The Urban Water Plan proposes new water-based amenities in the form of blueways, greenways, water plazas, and parklands. A finer grain of investment—in the form of street retrofits and strategic adaptations of vacant lots and underutilized public rights-of-way—

²² This section heavily influenced by and attributed to the Greater New Orleans Urban Water Plan (2012)

reduces localized flooding, improves soil stability, and provides environmental benefits to every neighborhood in the city.

The plan embodies the following principles:

Live with Water: Water is a fact of life on the delta. Making space for water and making it visible across the urban landscape allows it once again to be an asset to the region.

Slow and Store: Stormwater moving fast is hard to manage. Holding it where it falls, slowing the flow of water across the landscape, and storing large volumes of rainfall for infiltration and other uses are fundamental strategies for managing stormwater. Pump stations are activated when necessary, rather than as a default every time it rains.

Circulate and Recharge: Surface waters and groundwater move naturally across and within every delta. Incorporating surface water flows and higher water levels into everyday water management improves groundwater balance, water quality, and the region's ecological health.

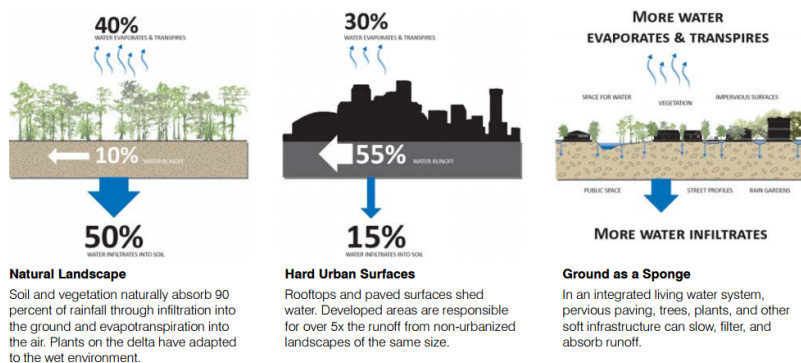
Work with Nature: The region's diverse flora and fauna already store, filter, and grow with water. Integrating these natural processes with mechanical systems enhances the function, beauty, and resilience of the region's water infrastructure and landscape.

Design for Adaptation: Change is constant on the delta. Designing systems for dynamic conditions, and to support diverse uses, economic development, and environmental restoration maximizes the value of necessary water infrastructure investments.

Work Together: Water knows no boundaries. Collaborations across neighborhood, cultural, and political boundaries and developing solutions at all scales—from individual properties to regional networks—are prerequisites for building a stronger future.

Ground as Sponge

Allowing the land to absorb runoff



The current approach to managing stormwater dictates that every drop of water that falls must be pumped out, but this wastes resources and leads to imbalances between soils and water. A new approach to stormwater and groundwater management suggests instead an integrated living water system that provides measurably higher levels of safety, reduces the rates at which the

land is sinking, and establishes the reputation of New Orleans as a driver of innovation for climate-adaptive planning, design, and technology.

Slow

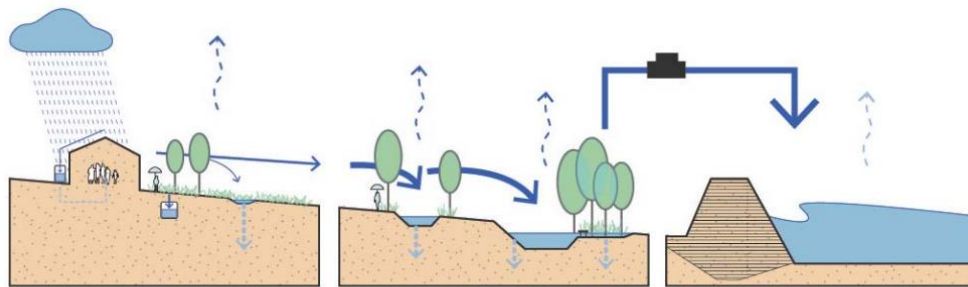
The structure of existing drainage systems resemble the branches of a tree, with gutters feeding small pipes that connect to larger pipes that empty into canals. Imagine that each tree, garden, and park is a leaf on the region's "drainage tree." Unfortunately, this tree has been stripped of its leaves. Because of how land has been developed, with houses and parking lots built where there had once been water-absorbing wetlands and forests, the branches and the trunks remain but too there are too few "leaves" to slow the flow of stormwater. Rooftops, yards, driveways, parking lots, and streets can be redesigned and retrofitted to function as if they were the leaves of a tree. Each slows and absorbs water where it falls, and the water that does run off is cleaner and reduced in volume.

Store & Use

The metaphor of the tree has further utility in thinking about the importance of storing water within a drainage network. Each tree is a reservoir within which water from the last rainstorm is stored, and from which the tree's tissues draw the moisture that is necessary for survival and growth. Similarly, existing drainage networks benefit from the addition of storage areas that can accommodate stormwater that exceeds the capacity of existing systems. Safely stored, stormwater can be absorbed into the ground to replenish groundwater.

Drain

With enough Slow and Store features in place, the urban landscape will produce runoff at lesser rates of flow and in lower total quantities. In other words, the volume of stormwater and the speed at which that water arrives at the City's pump stations each time it rains will both be lower. A storm that once required one thousand cubic feet per second (CFS) of pumping capacity to keep a given catchment area dry may only require 600 CFS of pumping capacity, because so much of the stormwater is held upstream where it falls, and safely contained in storage basins that are integrated into the drainage system. This means that smaller rain events that once triggered pumping may be handled entirely by Slow and Store features, while more intense storms will also place a lesser burden on pump stations, so that there are fewer incidences of system overflows and street flooding overall. This approach prioritizes investments in distributed water management features upstream over more significant investments in bigger pipes and pumps.



Slow

Rooftops, driveways, streets, and sidewalks can be redesigned to catch rain where it falls, and to allow some of that water to soak into the ground. A healthy urban tree canopy also slows the flow of water and improves environmental quality.

Store & Use

Large scale detention and retention features integrated into canal networks and public spaces provide additional storage capacity. Stored water can be used for irrigation, recreation, and other purposes.

Drain When Necessary

Pumping should not be the only solution for managing stormwater. Slow and Store features lessen loads on pumping stations, provide additional factors of safety, and enhance the capacity of drainage systems overall.

Unlike denser urban areas, the opportunities for water storage in New Orleans abound. Space for both small-scale distributed interventions like stormwater best management practices (BMPs) and larger-scale water storage solutions necessary to address the severe flooding problem can be found in the following spaces:

- Vacant and blighted properties
- Existing parks
- Streets and neutral grounds (medians)
- Rights-of-way along major infrastructure
- Brownfields (polluted industrial properties that have been abandoned)

There are approximately 20,000 vacant, blighted, and adjudicated properties across New Orleans²³. The investment required to provide basic maintenance and code enforcement with no return makes these properties a financial liability but prime candidates for water management. Existing parks can be adapted, too, to retain their own runoff and making more space for water retention. Corridors and other rights-of-way can be used to both retain water and create new water connections across the city. Streets and neutral grounds may individually manage a relatively small volume of stormwater, but collectively can have a significant impact. Incorporating integrated water management practices into planned reconstruction and retrofit projects can place the City in the lead of a sustainability movement that helps build public awareness and buy-in.

C. STRUCTURAL PROTECTION AND EMERGENCY MANAGEMENT AT THE CITY AND REGIONAL LEVEL

The traditional arena of structural protection is where most immediate attention, effort and funding have been applied since Hurricane Katrina. Structural protections will always be necessary in New Orleans and real progress is being made in the quality of the city's levees, flood gates, and floodwalls. In 2012, the US Army Corps of Engineers completed work on the new \$14.6 billion New Orleans Hurricane & Storm Damage Risk Reduction System (HSDRRS), providing protection from a 1-in-100-year storm. Repairs and improvements completed since Hurricane Katrina include:

- The installation of flood gates at the mouths of the city's drainage canals to prevent storm surge from entering the heart of the city
- Raising the height of numerous levees
- Repairing levees and floodwalls that were breached during Hurricane Katrina
- Strengthening floodwalls to add a higher margin for safety
- Adopting an overall higher standard for the structural integrity of levees and floodwalls in their design and construction
- Armoring levees to protect against erosion and intrusion of water during storm events

~~INSERT STATISTICS ABOUT CURRENT FLOOD RISK AND MAPS OF 100-YEAR MODEL AND CURRENT DFIRM.~~

As noted earlier, in the second half of the twentieth century, decisions on where buildings were

²³ This estimate is in housing units so single properties with two units are over-counted. Yaukey, Peter and Knaggs, Dylan, "Evaluating Blight Reduction in New Orleans, 2010-2014"

Comment [TJA25]: Universal Text 2.1

located and how they were built across the city had implications for protection from both high frequency/ low consequences flooding and low frequency/high consequences flooding. Instead of densifying the higher ground neighborhoods close to the banks of the Mississippi River or focusing on successful revitalization of troubled “dry” neighborhoods, middle class and working class New Orleanians left the city core for suburban-style, somewhat less dense neighborhoods, and ignored the city’s tradition of building at least a few feet above grade—assuming that the levees would protect them.

~~An official Orleans Parish Hazard Mitigation Plan was adopted in December 2005 and an update is in preparation as of mid-2009.¹⁹ The city’s Hazard Mitigation Unit, within the Office of Homeland Security and Emergency Preparedness has the following objectives:~~

- ~~• Communicate hazards and risks to New Orleans residents in coordination with the Office of Emergency Preparedness, the Office of Communications, the Office of Recovery, the LRA, Governor’s Office of Homeland Security and Emergency Preparedness, FEMA, and the Army Corps of Engineers.~~
- ~~• Develop comprehensive solutions, policies, and programs to manage hazards and risks in coordination with the Department of Safety and Permits, the Office of Emergency Preparedness, and the City Planning Commission.~~
- ~~• Build long-term City capacity in hazard mitigation and risk reduction, including acquiring funds for hazard mitigation projects.~~
- ~~• Include knowledge about hazards and risks in city planning and project development processes.~~
- ~~• Incorporate hazard mitigation and risk reduction principles and requirements into the City’s Master Plan and Municipal Code.~~

~~The evacuation experience in advance of Hurricane Gustav in 2008 was in some respects a success. Those with transportation took the “contraflow” routes out of the city to shelters run by nonprofit institutions or to their preferred locations. However, people unable to secure transportation were put in buses by the state, not told where they were going, and then deposited in locations such as empty warehouses and big box stores for a week without adequate services. Although plans have now been made to correct these problems, the experience created a disincentive that will discourage some people from participating in the next mandatory evacuation.~~

~~For people of modest means, the cost of evacuation in lost income and extra expenses can be particularly difficult, but evacuation as a regular event is costly and disruptive for all residents and businesses. Another lesson learned from the Gustav experience was the danger posed by vessels in the city’s canals. Vessels will have to be secured or moved upriver, or the Coast Guard will sink them on site.~~

Comment [TJA26]: Universal Text 2.1

3. SUSTAINABLE DEVELOPMENT AND RESILIENCE

A. BUILDING NEIGHBORHOOD RESILIENCE

Land use

The new Comprehensive Zoning Ordinance, adopted in 2015, addresses neighborhood resilience through a number of new policies. The ordinance encourages density on higher ground, near the river, and provides density bonuses in exchange for using sustainable building practices, or providing other public benefits. Article 23 of the ordinance requires commercial, multi-family and industrial development with over 5,000 square feet of impervious surface to manage the first 1.25” of stormwater on site. It also includes new landscape requirements and permeable open space requirements in most districts, to reduce impervious surfaces and increase tree canopy citywide.

Elevating buildings

Elevating buildings is an effective, self-guided way of further reducing flood risk. Elevation requirements for new structures are governed by the Base Flood Elevations (BFE's) that the City Council adopted in 2015. To mitigate the risk of flooding and to limit the potential exposure of taxpayers, FEMA delineates Special Flood Hazard Areas or "flood zones" and prescribes a certain minimum building elevation within the flood zone to protect structures from an estimated 1-in-100-year flood. The enforcement of this elevation requirement by local governments is mandatory if a community wishes to remain eligible for the National Flood Insurance Program. The elevation requirement is triggered when a new structure is built and when a renovation exceeds 50% of the value of the pre-existing structure. FEMA updated the flood maps for Orleans Parish and made them effective in 2015. In adopting these new flood maps, the City Council revised the floodplain management ordinance to require elevation citywide of at least 3 feet above nearest top of curb, or 1 foot above the BFE, whichever is greater.

B. CLIMATE CHANGE²⁴

For New Orleans, climate change is not a future scenario, but a current reality. The environment of South Louisiana is changing rapidly, from our eroding coastal marshes to subsiding land in our urban neighborhoods. The City faces many challenges caused or worsened by climate change due to our unique geography. Sea level rise and a projected increase in the intensity of weather events are expected to accelerate coastal land loss—increasing storm and surge exposure while adding greater stresses to the levee and flood protection systems. Meanwhile, more extreme heat episodes will directly threaten the health of residents and the reliability of infrastructure systems, including energy and water. The City has experienced record high temperatures over the past several years, causing higher concentrations of air pollutants and ozone in which accelerates the spread of allergens, exacerbating respiratory illnesses and allergy problems. A sustained warmer climate also increases the risk of vector-borne diseases such as malaria, dengue fever, and Zika virus.

While it is true the climate is in a constant state of change and Earth has undergone cyclical periods of warming and cooling before, the rate of change currently occurring is unprecedented and staggering in its speed. In previous cycles in which the Earth has warmed after an ice age over the past million years, it took about 5000 years to warm about 5 degrees Celsius. In the past hundred years alone, Earth's average temperature has warmed .7 degrees and models predict it could rise another 1-6 degrees in the next 100 years.²⁵ This climate shift is occurring faster than any other during the past 65 million years.²⁶ This rate of change will stress and kill many species that will not be able to adapt in time. Humans are highly adaptable, but with an already overcrowded planet and an expectation to add up to 4 billion more people by 2100 our largely coastal settlements are only becoming more overburdened and threatened.

The world has been showing momentum with international agreements in the last few years that demonstrate a shared understanding of the scale of the problem and willingness to cooperate to fix it. These include the Conference of Parties 21 (COP21) agreement in Paris in December 2015 signed by 195 nations which pledges to hold the increase in global average temperature to "well below" 2 °C above pre-industrial levels and to "pursue efforts to limit the increase to 1.5 °C." In addition, two international agreements were reached in October 2016: the Kigali amendment to the Montreal Protocol, in which the same countries agreed to phase out hydrofluorocarbons by 80% by 2050, a coordinated action that could reduce global

²⁴ Climate Action for a Resilient New Orleans, 2017, DRAFT

²⁵ <http://earthobservatory.nasa.gov/Features/GlobalWarming/page3.php>

²⁶ <http://news.stanford.edu/news/2013/august/climate-change-speed-080113.html>

warming by 0.2°C to 0.44°C; and the first worldwide agreement to reduce greenhouse gas pollution from air travel in which the aviation industry will monitor and offset its emissions to phase in carbon neutrality for an industry responsible about 2% of emissions worldwide.²⁷

Globally, cities comprise only 2% of the earth's land mass, but are responsible for 80% of energy use and 70% of emissions, and city government is uniquely positioned for valuable action. In the absence of national leadership, U.S. cities, states, and companies that understand the risk must address climate change. More than 7,000 cities around the world have committed to taking action on climate change, and in the U.S. hundreds of cities have set reduction targets and developed strategies to achieve them including New Orleans. The City is a part of several networks that provide opportunity to learn from other cities including C40, a network of cities committed to addressing climate change; ICLEI – Local Governments for Sustainability; Urban Sustainability Directors Network (USDN); and 100 Resilient Cities—Pioneered by The Rockefeller Foundation (100RC).

C. RESILIENT AND SUSTAINABLE DEVELOPMENT PATTERNS

“Smart growth” is a term used to describe policies and planning that coordinate development, transportation, and the preservation of natural and open spaces and promote neighborhood resilience. As defined by Smart Growth America, the six goals of smart growth are: revitalization of existing neighborhoods and increased neighborhood livability; better access to jobs, services and amenities and less traffic; thriving cities, suburbs and towns; shared prosperity for all residents; lower costs and taxes; and preserved open space.²⁸ Development that is based on smart growth principles is not only resource efficient but is also generally healthier for residents because of decreased pollution from cars and increased opportunities for walking and other physical activity.

Many parts of New Orleans already illustrate the building blocks of smart growth, such as a mix of land uses, a well-integrated street network, an abundance of parks and open space, and a variety of transportation options. However, other areas of the city lack some or all of these elements. As the Unified New Orleans Plan (UNOP) and Neighborhood Rebuilding (Lambert) Plans emphasized, walkability—though a high priority for most neighborhoods—is compromised in several areas due to the need for infrastructural repairs such as sidewalks and street lights or due to a lack of services and amenities within walking distance. Many areas of the city are still not well-served by public transit and remain primarily dependent on automobiles (*see Chapter 11—Transportation*).

4. Energy Efficiency and Renewable Energy

A. ENERGY EFFICIENCY

Energy efficiency is the degree to which a building or product's overall energy consumption is reduced due to its design features and technologies. Energy efficient buildings are generally seen as a “win-win” for individuals and municipalities: the more energy efficient a building, the less it will cost its inhabitants to operate. Likewise, the less energy required by a municipality, the less stress is put on its limited resources—both natural and financial. Residents and owners of existing buildings can cut energy use by up to 30 percent by utilizing

²⁷ <http://www.unhabitat.org/downloads/docs/GRHS2011/P1HotCities.pdf>

²⁸ Smart Growth America: www.smartgrowthamerica.org. It is important to note that although smart growth principles often coalesce around higher residential densities, density can be an average across an entire area and does not necessarily mean “high rises” in traditionally low-rise neighborhoods or other types of intensified land use that is not compatible with existing neighborhood character. See also: Chapter 5: Neighborhoods and Housing for a more in-depth discussion of preserving neighborhood character in New Orleans.

energy savings strategies, which can result in energy cost savings of around 50 cents per square foot per year.²⁹ Because energy-producing plants are often major sources of pollution, energy efficient buildings also reduce pollution in the region from which they draw power by demanding less production of power in the first place.

Increased energy efficiency may be achieved in numerous ways, many of which impose minimal up-front costs. In older buildings, including much of the traditional building stock of New Orleans, low-cost strategies such as filling gaps in doors and windows to make them more air-tight can dramatically increase a building's energy efficiency. Installing light-emitting diode (LED) light bulbs—which use about 80 percent less energy than standard light bulbs and last 25 times as long³⁰—and replacing appliances with more energy-efficient models are other low-cost, noninvasive ways of making a building more energy-efficient. Other methods of increasing energy-efficiency include upgrading a building's heating and/or cooling system and installing newer, higher-quality insulation in the walls and roof.

New buildings may achieve energy efficiency through any of the above techniques, as well as in strategic choices in a building's siting and layout. For instance, siting a building to reduce the amount of heat from the sun, or "solar gain," that enters a building or to allow for cross-breezes and maximum daylight can reduce the need for air conditioning and artificial lighting and thus reduce a building's net energy without increasing up-front costs.

The City of New Orleans has several initiatives already underway to increase energy efficiency in municipal operations. They include:

- ▲ ~~Plans to retrofit 200 City Buildings, which is projected to increase energy efficiency by 20 percent and save \$1.8 million in energy costs per year.~~
- ▲ ~~Replacing street lights and traffic signals with more energy-efficient technologies.~~
- ▲ ~~Computerization of lights on playgrounds to save energy use when playgrounds are not in use.³¹~~

Comment [TJA27]: Universal Text 2.1

B. RENEWABLE ENERGY

Electricity generation is the leading cause of industrial air pollution in the U.S.³² Renewable sources of energy offer alternatives to traditional and nonrenewable sources (*e.g.*, oil, coal, natural gas, nuclear) that are cleaner, regenerative, rapidly replenished, or for all practical purposes cannot be depleted. Renewable energy sources include sunlight, wind, rain, the flow of tides and rivers, and geothermal heat. Renewable energy is generally regarded as healthier for humans as well as for the natural environment because it emits less environmental pollution and waste. Studies also indicate that considerable economic benefits flow from increased use of renewable energy sources, including lower fuel, utility and health care costs and significant potential for creating jobs.³³

Renewable energy sources that offer potential for widespread adoption in New Orleans' geography and climate include biomass from landfill gas, municipal solid waste gasification, and wood-waste; geothermal power generation; hydrokinetic power from water flows; wind power generation at small scales; photovoltaic (solar electric) power generation and solar thermal energy (solar hot water). Renewable energy can be made available in two ways: property owners can install energy generating devices on their properties, and the local utility company can produce energy from renewable sources and make that

29 U.S. Department of Energy: <https://energy.gov/energysaver/how-energy-efficient-light-bulbs-compare-traditional-incandescents>. Retrieved January 2017.

30 Energy Star website: www.energystar.gov. Retrieved March, 2009.

31 City of New Orleans: <http://cityofno.com/portal.aspx?portal=47&tabid=4>

32 Green-e: <http://www.green-e.org/whyre.shtml>.

33 Ibid.

available to consumers.³⁴ Some of the energy sources mentioned above are more appropriate for small-scale (e.g., residential) installations, while others are typically undertaken only by municipalities (e.g., biomass from landfills).

INSERT STATS ON SOLAR INVESTMENTS AND ENERGY SOLAR PLANT

C. FINANCIAL AND TECHNICAL ASSISTANCE

There are several programs to assist New Orleans property owners with designing and upgrading buildings for greater energy-efficiency. Additionally, several organizations are working to increase the availability and use of renewable energy in New Orleans through financial and technical assistance. They include:

Financial Assistance and Incentives

- ▲ **Energy Smart:** In June, 2008, the New Orleans City Council passed a resolution to adopt the Energy Smart New Orleans Efficiency Program.³⁵ This program calls for making 2,500 homes and small businesses per year more energy efficient, “weatherizing” the homes of 300 low-income and elderly customers a year at no cost to the residents, installing solar energy systems in 500 homes per year and other energy-efficient initiatives over 10 to 15 years.³⁶ The program will be given nearly \$11 million between 2009 and 2012.³⁷
- ▲ **Weatherization Grants:** The US Department of Energy offers weatherization grants to homeowners.³⁸
- ▲ **The Home Energy Rebate Option (HERO)**—a component of the Home Energy Loan Program of the Louisiana Department of Natural Resources—offers a cash-rebate payment to Louisiana residents who make an energy efficiency improvement of 30 percent or more to existing homes.³⁹
- ▲ **Green Mortgages:** Several New Orleans banks have offered “green mortgages,” which allow a home owner to use mortgage financing for energy efficiency improvements or gives the mortgagee a discount in closing costs for having energy-efficient appliances or other upgrades on the property.⁴⁰
- ▲ **The Global Green Schools Initiative** seeks to create healthier, more energy-efficient K-12 schools by offering grant funding for the greening of New Orleans schools. An initial five schools will receive up to \$75,000 in grant funds toward energy audits, technical assistance, and improvements to increase energy efficiency, indoor air quality, and if feasible, create on-site renewable energy generation. As of 2009, two of the five schools have been completed, one is in progress, and two have yet to be determined.
- ▲ **One Block off the Grid (1BOG)** announced in May, 2009 that it has teamed with installer South Coast Solar to offer community solar purchasing and installation. Community purchasing allows owners to pay less for solar installation by organizing large groups of consumers and providing purchasing and installation at a reduced cost.⁴¹
- ▲ **Federal Tax Credits:** The Federal Department of Energy offers a 30 percent tax credit

34 Alternatives to fossil fuels for vehicles are also part of the movement towards renewable energy but are not discussed here. For more information on renewable vehicle fuels, visit the U.S. Department of Energy’s Alternative Fuels and Advanced Vehicles Data Center: <http://www.afdc.energy.gov/afdc/>.

<http://www.energy-louisiana.com/geauxgreen/>

35 <http://www.energy-neworleans.com/IRP/>; <http://tinyurl.com/1mmlkh>

36 Egler, Bruce. “New Orleans City Council Approves Financing for Energy Efficiency Program.” The Times-Picayune. November 6, 2008. http://www.nola.com/news/index.ssf/2008/11/financing_for_no_energy_conser.html Retrieved March, 2009.

37 Alliance for Energy: <http://www.all4energy.org/news/energy-smart-update>

38 www.energy.gov

39 <http://dnr.louisiana.gov/sec/execediv/techasmt/programs/residential/hero/>

40 GreeNOLA plan

41 <http://1bog.org/about-us/>

towards the cost of purchasing and installing solar generation devices, including solar water heaters.⁴²

- ▲ **State Tax Credits:** Louisiana's "solar tax credit bill" (Act 371) was passed in 2007 and offers an additional 50 percent tax credit for each renewable energy system installed—up to \$25,000—which makes it the largest solar tax credit in the country.⁴³ This means that a resident of Louisiana can receive up to 80 percent of the cost of solar devices in tax credits. In addition, Senate Bill 91, which was passed in 2009, creates a tax credit of up to 25 percent of the costs for anyone, corporate or individual, who owns a qualified energy resource—including wind, solar, and other sources—up to \$3,750,000. The tax credit can be transferred or traded, and can be used up to five years after it is first issued. Senate Bill 92 is similar, but reenacts an old bill that gives tax credit for wind and solar energy installation, and specifies that the credit cannot be used twice. House Bill 858 allows third party installers and owners to receive the 50 percent state tax credit on solar installations, which will lead to the creation of more green jobs and help the growing solar power market. Finally, House Bill 733 gives tax credits to employers for creating jobs in the green industry, involved in fields such as energy efficiency, energy audits, renewable energy, and building deconstruction.^{44,45}
- ▲ **Senate Bill 224** (2009) creates "sustainable energy financing districts" within the state, which can provide local homeowners and commercial taxpayers with tax-exempt bonds to improve energy efficiency or install renewable energy devices. The goal of the bill is to encourage and permit the growth of energy efficiency, and allows local governments to give out loans beyond their budgetary capacity.

Technical Assistance and Low-Cost Energy Efficiency Upgrade Services

- ▲ **The Alliance for Affordable Energy (AAE):** Founded in 1985, the AAE "conducts community education campaigns on energy issues, helps citizens and businesses become more energy efficient, and promotes sustainable energy policy solutions."⁴⁶ AAE's BuildSmart Weatherization Program offers technical assistance in weatherization.
- ▲ **NOLA 100**, a collaboration of nonprofit rebuilding organizations, has helped to weatherize 44 homes and has incorporated energy efficiency strategies into homes produced by its partners.⁴⁷
- ▲ **Entergy New Orleans**—the sole electric utility company for the city—has launched a \$2 million energy efficiency program that will weatherize more than 1,400 homes and businesses and offer property owners financial incentives to insulate their homes.⁴⁸
- ▲ **Total Community Action** provides assistance with the weatherization of homes.
- ▲ **Green Light New Orleans** donates and installs energy-efficient CFL light bulbs in the homes of low-income residents.⁴⁹
- ▲ **Solar America Cities Program:** In 2007 the City of New Orleans was named one of 25 Solar America Cities by the U.S. Department of Energy. This award includes a two-year grant to accelerate the adoption of solar technology. The funding will be used to complete a comprehensive city plan for the expansion of solar technology; explore and evaluate ways in which the City can support or encourage adoption of solar technology; reduce or eliminate obstacles to solar adoption; stimulate the supply side of the solar marketplace; continue the process of recruiting private sector businesses to operate here to be involved in the supply of

42 <http://www.energy.gov/taxbreaks.htm>

43 City of New Orleans Carbon Footprint Report. July, 2009.

44 City of New Orleans Carbon Footprint Report. July, 2009.

45 "VICTORY! - Energy efficiency, renewable energy, solar tax credit and green jobs bills pass." <http://all4energy.org/news/victory-energy-efficiency-renewable-energy-solar-tax-credit-and-green-jobs-bills-pass>

46 www.all4energy.org.

47 www.nola100.org

48 Mowbray, Rebecca. "Energy rolls out energy efficiency program that will work to weatherize homes, businesses." Times-Picayune, January 25, 2009.

49 www.greenlightneworleans.org.

solar technology; and begin to train developers, builders and craftspeople about the technology, and educate the public on the benefits and affordability of solar power technology for their homes and businesses.^{50,51}

- ▶ **Department of Energy Office of Energy Efficiency and Renewable Energy:** Executives from the Office of Energy Efficiency and Renewable Energy and the National Renewable Energy Lab (NREL) have established an office in New Orleans to promote energy conservation and the use of renewable energy systems in the city's rebuilding plans. The office offers technical assistance to municipalities, designers, developers, and private contractors.⁵²
- ▶ **The Center for Bioenvironmental Research at Tulane University and Global Green,** a national environmental organization, are currently conducting a study to determine the viability of river power for the Holy Cross neighborhood and for Tulane University's planned Riversphere research center and museum.⁵³

Workforce Development

- ▶ **The Energy Smart program (see above)** will provide education to contractors about energy efficient building techniques.
- ▶ **Energy's energy efficiency program (see above)** will also invest in workforce development in home energy analysis, conservation recommendations and insulation installation.
- ▶ **LA Green Corps:** A collaboration of a network of organizations providing workforce development in energy efficiency industries.
- ▶ **The Alliance for Affordable Energy's Workforce Development Division** trains young adults in building weatherization and making energy efficiency improvements.⁵⁴

(See also: *Chapter 9: Sustaining and Expanding New Orleans' Economic Base.*)

5. Green Building

What is green building? "Green" or "sustainable" building uses building design and construction techniques that have a minimal impact on the natural environment and that result in buildings that are healthier for their inhabitants, produce less waste, and use fewer resources over the course of their lifetimes. Energy efficiency, as described above, is one aspect of green buildings.

Sustainable design often starts with the building site itself: A site that is in an existing neighborhood and already connected to public services and infrastructure such as sewage, water and electricity is considered more "green" because it requires fewer resources to develop. Absorbing rainwater and minimizing water runoff through grading and landscaping techniques helps reduce a building's impact on drainage infrastructure, and preserving a portion of the building site as open or natural space helps to reduce a building's impact on the surrounding environment. Furthermore, siting a building where it will receive the most sunlight in winter and/or shade in summer also reduces its environmental impact by ensuring that it will require less energy to heat and cool.

The choice of building materials is also important: everything from the frame to the finishes of a building may be derived from renewable and/or local sources that don't require extensive transport or that are naturally-occurring and not environmentally harmful when disposed of. Sustainable design may also incorporate resource-efficient fixtures and technologies such as toilets that use less water (or even no water at all), motion-detecting

50 http://solarpowernola.com/solar_in_nola.htm

51 City of New Orleans Carbon Footprint Report. July, 2009.

52 Burger, Andrew. "New Orleans Gets Smart on Energy as it Rebuilds." Global Warming Is Real blog post, March 6, 2009. www.globalwarmingisreal.com. Retrieved March, 2009.

53 <http://www.tulane-city-center.org/programs/projects/mapping-new-orleans-historic-and-cultural-places>. Retrieved March, 2009.

54 www.all4energy.org

lights that shut off when no one is in the room, and water heaters that conserve energy by heating water on demand rather than keeping a store of hot water continually hot when not in use. On-site power generation such as windmills, solar panels, and geothermal generators also lessens a building's environmental impact and energy costs by reducing the net energy demand of a building. Finally, green building even incorporates the construction process, such as how construction waste is removed from the building site and whether it is recycled or reused.

Green building principles can be applied to all types of buildings, from homes to schools to factories, and from new construction to renovations of existing buildings. In fact, the “greenest” building projects may be rehabilitation and reuse of existing structures, which is often more energy and cost efficient than new construction (and in New Orleans, may also contribute to goals of historic preservation—*See Chapter 6 for more details*).

What are the benefits of green building? Building tenants and users benefit from green buildings because they are healthier, use less toxic materials and therefore have better air quality, and allow for more daylight and fresh air. Building owners benefit from lower operating costs due to greater resource efficiency as well as higher asset values. Municipalities benefit from green buildings because they are less taxing on local resources and produce less pollution and solid waste. Green buildings also benefit the natural environment as a whole by consuming fewer natural resources and producing less pollution and waste.

What is LEED? The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a third-party certification program for green buildings. The LEED certification process involves measuring a building's sustainable features, including site development, water savings, energy efficiency, materials selection and indoor environmental quality. Buildings may be LEED certified at various levels, including silver, gold, and platinum levels of certification, which indicate successively higher levels of overall sustainable construction and design. Although LEED is currently the most common green building rating system, there are several other similar rating systems used in the U.S. and internationally.⁵⁵

Green Building in New Orleans. In the extensive rebuilding since Hurricane Katrina, green building techniques have been used throughout New Orleans. As of January 2017, there were 468 LEED registered projects in New Orleans, including the Columbia Parc public housing redevelopment, 52 schools, and several community centers, federal government buildings, and commercial facilities.⁵⁶ Many more projects in New Orleans have utilized green building techniques but have not applied for LEED certification.

UPDATE THESE PROGRAMS

Programs that offer technical assistance with green building strategies include:

- ▲ *The Center for Sustainable Engagement and Development (CSED)'s mission includes encouraging restorative rebuilding, sustaining natural systems, and preserving resources in New Orleans' Lower Ninth Ward.*
- ▲ *Tulane City Center GreenBuild: Provides research and education on sustainable design prototypes for New Orleans.*⁵⁷
- ▲ *Build It Back Green: A free program offered by the nonprofit Global Green that provides technical assistance with home rebuilding using principles of energy efficient and healthy buildings, and works to increase awareness about low cost, resource efficient building*

⁵⁵ See: www.breem.org, www.thegbi.org/green-globes-tools, www.nahbgreen.org.

⁵⁶ US Green Building Council. www.usgbc.org

⁵⁷ www.tulanegreenbuild.com

⁵⁸ <http://www.edcmag.com/Articles/Leed/908b4e8fccc7c010VgnVCM100000f932a8c0>

techniques.⁵⁹

- **The Green Project** operates a Warehouse Store selling salvaged building materials and provides workshops on green building.⁶⁰
- **Alliance for Affordable Energy's BuildSmart Learning Center** features a life-sized model New Orleans home that showcases techniques for energy efficiency, residential solar power and environmentally appropriate building practices. The center also offers demonstrations and building workshops, a reference library with practical how-to guides, books on green building techniques, contact information for local businesses and general construction texts.⁶¹

Comment [TJA29]: Universal Text 2.1

6. Urban Agriculture and Gardening

The term “urban agriculture” refers to the growth or production of food for consumption or sale in and around a city or town. The term “community gardening” can include urban agriculture as well as recreational gardening in a community setting. Urban agriculture and community gardening were on the rise in New Orleans for several years before Hurricane Katrina, and has been regaining popularity since then. As of January 2017, there were 43 officially designated community gardens⁶² in addition to numerous commercial urban farms and school gardens throughout New Orleans.

The benefits of urban agriculture and community gardening include:

- **Productive use of vacant land.** Urban agriculture should be seen as one of many tools available to eliminate blight, either temporarily or permanently. (*For additional blight remediation strategies, see Chapter 5—Housing and Neighborhoods.*)
- **Improved access to fresh food.** New Orleans and Louisiana have particularly high rates of chronic diseases that are affected by food choice. Access to a local garden or other local source that produces fresh food has been shown to improve the diet of local residents. (*See also: Chapter 5—Housing and Neighborhoods for a discussion on recruiting fresh food retailers and supermarkets in underserved areas.*)
- **Lower food costs and environmental impact.** Growing fruits and vegetables for consumption saves households money that they would otherwise spend at the supermarket. Even when purchased, food that is grown and produced locally is often less expensive than food that must be transported from far - and also has less environmental impact - due to decreased packaging, storing and shipping waste.
- **Business opportunities.** Urban agriculture can be very productive through greenhouses and other intensive techniques, producing significant harvests on relatively small plots of land. Programs in other parts of the country have created thriving businesses that supply restaurants with produce. One home gardener estimates that his garden yielded an 862 percent return on investment.⁶³ MacArthur Genius Grant Awardee and urban farmer Will Allen states that each square foot of produce he grows in an urban greenhouse in Wisconsin brings in \$30. Nonetheless, Allen's renowned urban gardening project—Growing Power⁶⁴—and many other community gardening programs rely on foundation grants for survival.⁶⁵
- **Community building and social capital.** A community garden is not only a source of food and flowers but also a place that builds community. Several programs across the country use community gardens to provide job training and entrepreneurial experience for at-

59 <http://globalgreen.org/neworleans/>

60 www.thegreenproject.org

61 <http://www.all4energy.org/sustainable-rebuild/buildsmart-learning-center>

62 Parkway Partners, 2017

63 http://www.kitchengardeners.org/2009/03/whats_a_home_garden_worth.html#more; <http://my.kitchengardeners.org/forum/topics/economics-of-home-gardening>.

64 <http://www.growingpower.org/>

65 Roythe, Elizabeth. “Street Farmer.” The New York Times: July 5, 2009.

risk youth.⁶⁶ Schoolyard gardens have also become popular educational tools.⁶⁷

Community gardens. Many cities utilize public land as community gardens that lease small garden plots to residents at a low cost on a first-come, first-served basis. Typically, residents must agree to keep the plot in acceptable condition, but may grow whatever they choose. There are several community gardens throughout New Orleans.

Private gardens and food production. The City's new Comprehensive Zoning Ordinance, adopted in 2015, allows farming without livestock in all districts, and allows farming with livestock as a conditional use in most districts. The ordinance also includes standards for keeping chickens for personal use citywide.

Several initiatives are under way to increase access to urban agriculture:

- ~~The Viet Village Urban Farm in New Orleans East sits on 20 acres in the heart of a residential community, and will have 30 to 40 community garden plots, five 1-acre commercial growing plots, a poultry and livestock area for free-range chickens and goats, areas for recycling of organic wastes, and three market pavilions where growers can sell fresh-grown delicacies.^{68,69}~~
- ~~The Hollygrove Market and Farm, founded by the Carrollton-Hollygrove Community Development Corporation and the New Orleans Food and Farm Network, grows and sells fresh and affordable produce.~~
- ~~The New Orleans Food and Farm Network works to ensure equal access to fresh foods for all New Orleanians and provides training, seeds, and technical assistance to growers of all levels.⁷⁰~~
- ~~Parkway Partners offers technical assistance to residents to develop vacant land into community gardens, including legal assistance and gardening education.~~
- ~~Edible School Yard: The Samuel J. Green Charter School's Edible School Yard helps integrate organic gardening and fresh seasonal cooking into the school's curriculum. Students are involved in all steps of the process, from planting seeds to cooking.~~
- ~~Food Policy Advisory Council: Established by the New Orleans City Council, the Council advises the city on ways to increase access to healthy food and healthy eating choices for all residents.~~
- ~~The Lower Ninth Ward Farming Coalition is a partnership of local groups working to establish a sustainable food system in the Lower Ninth Ward.⁷¹~~

7. Solid Waste

~~The City of New Orleans Carbon Footprint Report, published in July, 2009 as part of the Cities for Climate Protection Campaign (see above), found that in 2007, the solid waste produced in New Orleans was composed of:~~

- ~~26.2 percent paper waste~~
- ~~16.4 percent food waste~~
- ~~7.6 percent plant debris~~
- ~~13.5 percent wood or textiles~~

⁶⁶ See: www.growingpower.org and www.added-value.org.

⁶⁷ See: www.edibleschoolyard.org.

⁶⁸ Tulane City Center: <http://www.tulaneccitycenter.org/news/37/>; <http://www.gourmet.com/food/2009/05/gardening-101-new-orleans-east>

⁶⁹ <http://vietvillage-urban-ag.org/default.aspx>

⁷⁰

New Orleans Food and Farm Network: www.noffn.org.

⁷¹

<http://www.lowernineurbanfarming.org/>

▲ 36.3 percent from other sources.⁷²

A. RESIDENTIAL AND COMMERCIAL SOLID WASTE

The City of New Orleans Department of Sanitation enforces the sanitation code, provides public education on littering and waste reduction programs, oversees the Louisiana Department of Environmental Quality (LDEQ) compliance order relative to the closed Recovery 1 municipal landfill, and oversees contracts with three businesses to pick up trash and garbage from residential and commercial addresses in three zones: north of I-10; south of I-10; and the French Quarter and Downtown Development District (DDD). Customers are billed for these services on their water and sewer bill. ~~The contracts were executed in 2006 and cover 7 years. The French Quarter and Downtown Development District receive daily service, while the rest of the city receives twice weekly trash pickup. Some businesses and large multi-family developments are required to pay for the service. This residential and commercial waste goes to the city's Florida Transfer Station on Elysian Fields and the Riverbirch Landfill in Gretna, a Type I and II landfill authorized to receive industrial, residential or commercial solid waste. This landfill is expected to continue to have sufficient capacity for these categories of waste from the City until at least 2043.~~

~~The 2009 budget for the Sanitation Department is \$43 million and it has 31 full time employees. Funding comes primarily from the General Fund, with smaller amounts from the Downtown Development District and federal grants. Unfunded priorities for 2009 included additional funds for special events clean up, street cleaning, the hauling and waste disposal contract, temporary laborers, recycling and municipal dumpsters.~~

Comment [TJA31]: Universal Text 2.1

B. CONSTRUCTION DEBRIS

In addition to the Type I and II landfills, there are several landfills in the region that are open for disposal of construction debris (C/D): the Highway 90 Jefferson Parish landfill in Avondale; and the Gentilly Landfill at 10200 Almonaster Avenue, owned by the city and operated by AMID/Metro Partnership.

The Gentilly Landfill

The Gentilly Landfill (sometimes called "Old Gentilly") is built on top of a closed municipal landfill that operated from the 1960s to 1982. It is located within the regional business park. The city submitted a permit request to the Louisiana Department of Environmental Quality (LDEQ) in 2002 for a construction debris and wood waste (Type III) landfill and was issued a permit with a number of conditions. ~~The conditions had not yet been met at the time Hurricane Katrina struck. The LDEQ issued an emergency permit in September 2005, which has since been extended many times. After the Louisiana Environmental Action Network sought judicial review of the order because of concerns about potential leaching of toxics and other issues, LDEQ settled in 2006 by agreeing to a series of actions and monitoring activities:~~

- ▲ ~~The landfill is limited to receive no more than 50,000 cubic yards of debris a day, but was reported by the federal General Accounting Office to be receiving approximately 6,000 to 7,000 cubic yards a day in summer 2008.⁷³~~
- ▲ ~~Disposal must be sequenced on the site, so that when the debris reaches 25 feet, a new section must be opened up, and so on over the entire site.~~
- ▲ ~~Ten inclinometers were installed on the southern slope of the landfill to monitor the integrity of the slope. It is the only landfill in Louisiana to have these installations and so far the landfill is stable.~~
- ▲ ~~A groundwater monitoring plan was implemented with 11 groundwater wells around~~

⁷² City of New Orleans Carbon Footprint Report, July, 2009.

⁷³ GAO-08-985R, Hurricane Katrina: Continuing Debris Removal and Disposal Issues, August 25, 2008.

the perimeter and 3 surface water sampling ports. Quarterly tests for 62 chemicals in groundwater and 9 chemicals in surface water are taken. Reports indicate that the 8 chemicals found outside of normal ranges are present in surrounding soil sediment and not in water filtered of the soil sediment. The estimated remaining permitted capacity of the landfill is 11.4 million wet weight tons, with an estimated facility life of 210 months (17.5 years).

A lawsuit was filed in late 2007 alleging that much of the property occupied by the landfill was sold as subdivision lots in the 1990s and also includes land owned by the school district. As of 2009, the suit had not yet been resolved.

Comment [TJA32]: Universal Text 2.1

C. RECYCLING

Beginning in 2012, the City of New Orleans resumed residential curbside recycling for neighborhoods throughout the city except for the Downtown Development District and French Quarter. Pickup is weekly and made in citizen-requested recycling bins.

INSERT INFORMATION ABOUT RECYCLING PARTICIPATION

Comment [TJA33]:

D. COMPOSTING

As of 2017, New Orleans did not offer municipal composting service. However, many U.S. cities offer curb-side pick-up of compostable waste in addition to pick-up of trash and recycling. Twenty-four percent of the New Orleans' solid waste is composed of food or plant debris (*see above*) and could therefore be used as compost if the city offered such a program. The City of San Francisco's compost pick-up program also accepts all types of paper; if New Orleans could also offer this service, more than half of the city's solid waste could be composted. The Department of Sanitation is exploring the feasibility of a drop-off composting program.

For more information on the city's waste management systems, see Chapter 10—Community Facilities, Services and Infrastructure.

8. Environmental Health

The City Department of Health is charged with enforcement, adjudication and correction activities to maintain environmental health standards. The Department's Environmental Enforcement program had a budget of *\$346,860 in 2009, and planned to perform at least 3,500 environmental hazard inspections in that year.* *For more information on code enforcement, see Chapter 5—Neighborhoods and Housing.*

Comment [TJA34]: Universal Text 2.1

A. AIR QUALITY

In 2007, the Louisiana Department of Environmental Quality measured five common urban air pollutants⁷⁴ and reported that pollutant levels were not high enough to pose a threat to the health of New Orleans residents.⁷⁵

The Louisiana Bucket Brigade is a nonprofit environmental health and justice organization that provides technical assistance and resources, including EPA-approved "buckets" for obtaining and testing air samples for pollution. The City Department of Health administers the state-funded Asthma in Louisiana program, which provides asthma treatment and prevention; in 2009 the budget for this program was \$523,110.⁷⁶

Comment [TJA35]: Universal Text 2.1

⁷⁴ Pollutants measured included: Nitrous Oxide (NO_x); Sulfuric Dioxide (SO_x); Carbon Monoxide (CO); Volatile organic compounds (VOCs); and particulate matter (PM₁₀), a unit of measurement for particles and particle density in the air. For more information, visit:

http://www.icleiusa.org/action-center/learn-from-others/2.1.Fact%20Sheet_Air%20Pollutants%20and%20Public%20Health_BD.pdf.

⁷⁵ City of New Orleans Carbon Footprint Report. July, 2009.

⁷⁶ City of New Orleans adopted operating budget for 2009.

B. LEAD CONTAMINATION

Lead poisoning circumvents long-term resilience and sustainability of communities because it is a root cause of numerous health problems.⁷⁷ These problems include learning disabilities and behavioral problems in children, as well as reproductive, nervous system, and blood pressure problems in adults.

Studies have also shown strong links between early childhood lead exposure and subsequent delinquency/criminal behavior in teenagers.^{78/79} Two major sources of lead contamination in residential neighborhoods are gasoline lead additives (which contaminate soils primarily through vehicle emissions) and lead-based paint. Although leaded paint and gasoline are now regulated by federal legislation that limit their use (lead-based interior paint is now banned nationally and tetraethyl lead is banned for highway use by vehicles), older parts of US cities typically exhibit high concentrations of lead due to decades of accumulation.⁸⁰

During recent years, there have been changes in perspective on the lead issue, especially as it affects children's health. In 2012, the Centers for Disease Control (CDC) stated that there is no known safe level of lead exposure and furthermore changed "guideline" to "reference value"^{81, 82} This change challenges public health agencies and city officials in New Orleans with questions about how to reduce lead exposure. Before 2012, the blood lead exposure guideline was 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$); however, the current reference value is 5 $\mu\text{g}/\text{dL}$, or half the previous guideline. The CDC continues to emphasize the need for primary prevention and this requirement presents a substantial challenge to the medical community and the citizens of New Orleans.

The common method for determining the need for environmental intervention has been to organize blood lead level tests on children. If blood lead was above the desired level, then steps were taken to conduct a home inspection and arrange intervention, which involved public education and lead dust control. There are two major problems with this process. First, using children's blood to test for lead in the environment fails to meet the criteria for primary prevention of exposure, which would entail elimination of the hazard, not merely evidence that the hazard is present in the environment. The second issue concerns the effectiveness of the intervention. Studies on the effectiveness of medical interventions have been conducted by the Cochrane Collaboration⁸³, which conducted a thorough review of extensive data from several studies. This review indicates that this common and accepted program of lead intervention is not effective. To quote the Cochrane Collaboration:

77 Bellinger DC. 2011. The Protean Toxicities of Lead: New Chapters in a Familiar Story. *Int J Environ Res Public Health* 8: 2593-2628.

78 Needleman, HL, C McFarland, RB Ness, SE Fienberg and MJ Tobin. 2003. Bone lead levels in adjudicated delinquents. A case control study, *Neurotoxicology and Teratology* 24: 711-7.

79 Mielke HW, Zahran S. 2012. The urban rise and fall of air lead (Pb) and the latent surge and retreat of societal violence. *Environ Int* 43:48-55.

80 Datko-Williams L, Wilkie A, Richmond-Bryant J. 2014. Analysis of U.S. soil lead (Pb) studies from 1970 to 2012. *Science of the Total Environment* (468-469): 854-63.

81 The reference value is defined as the 97.5 percentile of the children's blood lead level based on the results of the National Health and Nutrition Examination Survey (NHANES). See below.

82 Centers for Disease Control and Prevention. CDC response to Advisory Committee on Childhood Lead Poisoning Prevention recommendations in "Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention". US Department of Health and Human Services, Atlanta, GA, USA.

83 Yeoh B, Woolfenden S, Lanphear B, Ridley GF, Livingstone N, Jorgensen E. 2014. Household interventions for preventing domestic lead exposure in children.

This review of 14 studies found that educational and dust control interventions are not effective in reducing blood lead levels of young children. There is currently insufficient evidence that soil abatement or combination interventions reduce blood lead levels and further studies need to address this.

Furthermore, a study of children's blood lead levels in states with strong lead-based paint regulations compared with states having weak or no regulations found little difference between them. The conclusion indicated there is a problem with focusing intervention efforts on lead-based paint regulations alone.⁸⁴ Lead exists in all environmental compartments including water (such as in Flint, Michigan where the corrosion of old lead pipes dissolved lead into the drinking water), air (from sanding lead-based paint from homes and the use of lead additives in gasoline), and soil (air lead particles settling on the ground). Due to high traffic volume within interiors of cities, the soil becomes more contaminated than soil in outlying areas of cities. Information about the impact of soil lead on children's health is a well-studied topic in New Orleans.^{85/86}

Beginning in 1990, research teams led by Dr. Howard Mielke, first at Xavier University and then at Tulane University School of Medicine, collected over 15,000 soil samples from across New Orleans. Lead is invisible in soil and must be analyzed with specialized instruments. The projects also collaborated with the Louisiana Healthy Homes and Childhood Lead Poisoning Prevention Program to coordinate the soil lead concentration data of residential areas with the blood lead data of children living in the same New Orleans residential areas. In 2001, the team created a map illustrating these soil lead concentrations in New Orleans. The goal was to illustrate and evaluate the influence of environmental lead on children's exposure [8]. The pre-Katrina study revealed some of the highest known concentrations of soil lead contamination in the nation in New Orleans—particularly among the city's oldest neighborhoods. A 2006 Environmental Protection Agency (EPA) study also showed that residential soils in New Orleans exceeded the EPA and Louisiana Department of Environmental Quality standard for soil lead levels in more than one-third of 147 samples collected. For example, the soil in St. Roch contained some of the highest concentrations of lead ever recorded for residential soil in the nation. The critical problem identified by Dr. Mielke and researchers from the Childhood Lead Poisoning Prevention Program was, and continues to be, that across the city children's blood lead is strongly associated with soil lead.

In August of 2005, Hurricane Katrina created a unique natural experimental condition not possible by any scientific manipulation by flooding 80% of New Orleans. Ten years after Katrina, Dr. Mielke's team remapped New Orleans [10]. The post-Katrina data were sorted by the same census tracts (n=176) used for the pre-Katrina results. The data-sets included soil lead (n=3314 and 3320, pre- vs. post-Katrina), blood lead (n=39,620 and 17,739, pre- vs. post-Katrina), distance from the city center, and changes in percentage of pre-1940 housing. Statistical analysis was by permutation procedures and Fisher's Exact Tests. Pre- vs. ten years post-Katrina soil lead median concentrations decreased from 280 ppm to 132 ppm, and median

84 Kennedy, C., Lordo, R., Sucusky, M.S., Boehm, R., Brown, M.J. 2016. Evaluating the effectiveness of state specific lead-based paint hazard risk reduction laws in preventing recurring incidences of lead poisoning in children. *Int. J. Hygiene and Environmental Health*. 219(1), 110-7.

85 Mielke HW, Gonzales CR, Powell E, Jartun M, Mielke PW. 2007. Nonlinear association between soil lead and blood lead of children in metropolitan New Orleans. *Sci Total Environ* 388:43-53.

86 Mielke HW, Dugas Dianne, Mielke PW Jr., Smith KS, Smith SL, Gonzales CR. 1997. Associations between Soil Lead and Childhood Blood Lead in Urban New Orleans and Rural Lafourche Parish of Louisiana. *Environ Health Perspect*.

blood lead levels decreased from 5 $\mu\text{g}/\text{dL}$ to 1.8 $\mu\text{g}/\text{dL}$. With the exception of age of housing results, which did not change, all other differences were profound (P-values were extremely small $<10^{-12}$). From the perspective of the entire city, all variables including age-of-housing, soil lead levels, and blood lead levels decreased substantially with increasing distance from the center of New Orleans. This decrease of lead on soil surfaces throughout the city was associated with the decline also of children's blood lead thus underscoring soil as a critical reservoir of lead exposure.⁸⁷

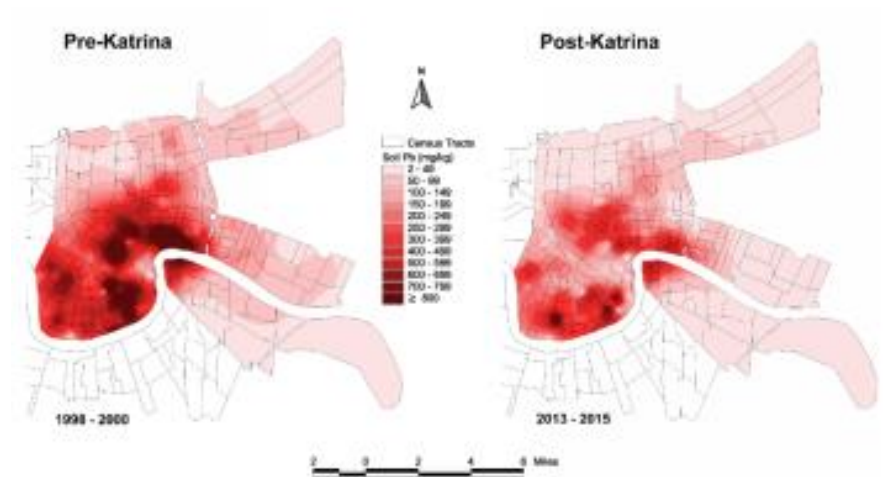


Figure 1: Pre-Katrina vs. ten years post-Katrina Maps show invisible lead in soil (Gonzales, Powell and Mielke, Tulane University School of Medicine)

There are several critical lessons learned from the aftermath of Hurricane Katrina. Although the age of housing did not change, the blood lead of the children living in older housing decreased markedly. This indicates that older homes per se are suitable for inhabitation by children and do not pose a lead hazard when maintained in ways that do not release lead dust from old paint. However, an important caveat must be stated: Landscaping with low lead soil around older homes is required to create lead safe play areas for children. Preservation of old homes is consistent with these findings. The storm surge and construction activities after Katrina brought in enormous amounts of low lead soil into the city. Eighty percent of the homes were flooded and cleaned out before they were re-inhabited. This storm surge, soil renewal, and major cleaning out of homes decreased lead levels in and around residences. Children living in the city currently show blood lead level responses below 2 $\mu\text{g}/\text{dL}$ when the soil lead of their community is less than 40 ppm. This lead level clearly demonstrates that the old U.S. Environmental Protection Agency 400 ppm soil lead standards did not include a margin-of-safety. New Orleans studies demonstrate that to achieve primary prevention of childhood lead exposure, soil standards must include at least a 10-fold margin-of-safety. To achieve this margin-of-safety, New Orleans has a major resource in the form of low lead soil in outlying

87 Mielke, H.W., Gonzales C.R., Powel, E.T., Mielke P.W. Jr. 2016. Spatiotemporal dynamic transformations of soil lead and children's blood lead ten years after Hurricane Katrina: New grounds for primary prevention. Environment International.

areas of New Orleans (all cities have a similar resources of clean soil) and available for transport into the city.⁸⁸

New Orleans has a virtually unlimited, accessible supply of low lead soil sediments that originate from the Mississippi watershed. These soils can be used to improve the quality of garden soils (Chapter 13, Section 6) and all play areas of the city. To improve the long-term resilience and sustainability of communities requires paying attention to ways to reduce children's blood lead exposure.^{89/90} Because of the fundamental changes in definitions of what constitutes excessive lead exposure, the current lack of an effective method for household lead intervention, and the need for primary prevention, it is imperative to recognize that the old lead standards are no long valid. Fortunately, New Orleans has an extraordinary opportunity to use resources in outlying areas of the city for inexpensive transportation of low lead soil into the city to mimic the changes to the city that were initiated by the Hurricane Katrina storm surge. Mother's nature experiment in the form of Hurricane Katrina, while wreaking havoc on the city, has also presented an evidentiary opportunity to change the devastating consequences of elevated blood lead levels of the city's children and citizens.

Various grass root organizations and some city agencies have attempted to ameliorate the soil lead problem in New Orleans with varying degrees of success. Operation PayDirt, a national, artist-driven, multidisciplinary project served to educate large numbers of people in several cities about the dangers of lead poisoning;⁹¹ however, the project did not change the quality of even one area in New Orleans. The city also became engaged in intervention of soil lead on public playgrounds of the city.⁹² However, the project was unsupported by State regulators and was shelved. Urban gardeners are currently receiving sound information about improving soil quality through such projects as The Tulane University's Goldring Center for Culinary Medicine at Liberty's Kitchen.⁹³ Also, as a result of funding from HUD and local funding from the Greater New Orleans Foundation some childcare center play areas received low lead soil interventions but projects ceased because of lack of funding.⁹⁴ However, all New Orleans communities require low lead water, soil, and air for resilience and sustenance of the health of children and ultimately the future of communities.

Comment [TJA36]: Text 13-03

C. ILLEGAL DUMPING

Illegal dumping in portions of New Orleans East corridor, a serious problem before Hurricane Katrina, accelerated after the storm. Landowners were operating unpermitted dumps and individuals dropped trash and debris by the side of the road. In some cases, debris was pushed into wetlands and petroleum and heavy metals leached from car junkyards into the water.

88 Mielke HW, Gonzales CR, Smith MK, Mielke PW. 2000. Quantities and associations of lead, zinc, cadmium, manganese, chromium, nickel, vanadium, and copper in fresh Mississippi delta alluvium and New Orleans alluvial soils. *Sci Total Environ* 246 (2-3):249-59.

89 Mielke HW, Gonzales CR, Powell E, Mielke PW. 2013. Environmental and health disparities in residential communities of New Orleans: The need for soil lead intervention to advance primary prevention. *Environ Int* 51:73-81.

90 Filippelli, G.M. and Laidlaw, M.A.S., 2010. The Elephant in the Playground: Confronting lead-contaminated soils as an important source of lead burdens to urban populations. *Perspectives in Biology and Medicine*, 53: 31-45.

91 Mel Chin and Operation PayDirt/Fundred Project. <http://www.fundred.org/about/operation-paydirt.php>.

92 Playgrounds remediated for lead. City of New Orleans. <https://data.nola.gov/Administrative-Data/PlaygroundsRemediated-for-Lead-2011-Map/bg76-nvb32011>. [Accessed 13 July 2016].

93 The Goldring Center for Culinary Medicine, Tulane School of Medicine Teaching Kitchen.

94 Mielke HW, Covington TP, Mielke PW, Wolman FJ, Powell ET, Gonzales CR. 2011. Soil intervention as a strategy for lead exposure prevention: The New Orleans lead-safe childcare playground project. *Environ Pollut* 159:2071-2077.

In March and April of 2007, LDEQ, along with federal and local authorities, implemented “Operation Cleansweep” to find illegal dumps and enforce the law. They went door to door in the corridor, inspecting 178 sites and referring 147 for enforcement. The 82 percent of sites referred indicates how widespread the problem was. Violations included the unauthorized disposal of solid waste, transporting solid waste to an unauthorized location, and open burning of debris. Twenty potential wetland sites were also examined for potential violations and five property owners were cited.

City government does not have adequate resources for regular enforcement of dumping. The City should ask LDEQ and federal authorities to assist the city and repeat the 2007 sweeps every two years. However, in 2008 Councilmember Willard Lewis established an Illegal Dumping Task Force made up of relevant city departments, to focus on strengthening code enforcement of illegal dumping in the city’s industrial areas, particularly in New Orleans East.

Comment [TJA37]: Universal Text 2.1

D. OTHER ENVIRONMENTAL HEALTH HAZARDS

Blight and Vacancy. Vacant properties pose health hazards in the form of physically unstable structural elements, mold and mildew, insects and vermin, as well transient “squatters” who may present the additional risks of fire and crime. Unoccupied residential addresses in New Orleans are estimated to number as many as 20,000 as of 2014.⁹⁵

For more information on code enforcement, see Chapter 5—Neighborhoods and Housing.

Brownfields. Brownfields are industrial and commercial sites that are abandoned or underused because of real or perceived contamination. There are 15 identified brownfields in New Orleans. The largest deterrent to brownfield redevelopment is the cost—again, either real or perceived—of remediating or removing hazardous materials from these sites. Benefits of redeveloped brownfield sites include increased quality of life for nearby residents, elimination of contamination, and increased municipal tax revenues from redevelopment activities and from a renewed productivity of formerly inactive land.⁹⁶ Federal tax incentives allow taxpayers to receive a federal income tax deduction for certain qualifying remediation costs. The Mayor’s Office of Resilience and Sustainability maintains a database of potential brownfield sites, and is able to provide assistance in the redevelopment of those properties.

Superfund Site. The Environmental Protection Agency (EPA) since 1980 has identified sites contaminated with hazardous materials that meet criteria as among the most dangerous to human health and the environment—popularly called superfund sites.⁹⁷ The only superfund site in New Orleans is the Agriculture Street Landfill. The site served as a municipal landfill from 1909 to 1960 and then was briefly reopened to accept debris from Hurricane Betsy. Closed again in 1966, part of the site was redeveloped starting in 1976 with housing, businesses, and an elementary school. Resident advocacy resulted in placement of the site on the National Priorities List (the Superfund List) in 1994 and EPA supervised site remediation was completed in 2002 (soil removal, placement of plastic barrier, placement of clean soil).

Site inspections of the Agriculture Street Landfill were conducted after Hurricanes Katrina, Gustav and Ike by the EPA and the Louisiana Department of Environmental Quality. No damage was found. After two 5-Year Reviews by the EPA, the agency has found that the remedy is successful and the procedure is underway to remove the site from the National Priorities List.

⁹⁵ Yaukey, Peter and Knaggs, Dylan, “Evaluating Blight Reduction in New Orleans, 2010-2014”

⁹⁶ International City/County Management Association. Brownfields Redevelopment: A Guidebook for Local Governments and Communities—Second

Edition. A publication of the Superfund/Brownfield Research Institute. <http://www.smartgrowthamerica.org/resources.html>.

⁹⁷ US EPA: http://epa.custhelp.com/cgi-bin/epa.cfg/php/enduser/std_adp.php?p_faqid=172.

However, there are currently no plans for redevelopment of the site.⁹⁸

B What The Public Said

- Safety needs to be a priority—hurricane protection, flood protection, personal, neighborhood safety.
- Protect the city so evacuation isn't always necessary.
- Adopt flood control systems used in other cities/countries that are below sea level.
- Protect and restore local and regional wetlands.
- Improve stormwater drainage and pumping systems.
- Require multi-tiered emergency planning for evacuation and shelter with residents input.
- Provide storm shelters within the city.
- Adopt building code standards that stand up to hurricane conditions (like in Florida).
- Report drainage problems and help enforce code violations.
- Use more pervious surfaces and less concrete.
- Use landscaping and tree planting strategies to mitigate runoff.
- Create retention ponds and catch basins to manage storm water.
- Elevate buildings and livable space.
- Install generators on-site, and elevate building systems above likely flood levels.
- Adopt the “Dutch system” of water management (*i.e.*, hold more water in the city with canals and retention ponds).
- Maintain water management facilities and infrastructure.
- Advocate for federal funding and accountability for flood protection.
- Educate the public about risk levels.
- Offer incentives to property owners to address flood mitigation and water retention on-site.
- Identify risk areas and encourage development in more flood-resistant areas.
- Set minimum building levels above flood levels.
- Take a comprehensive “systems approach” to dealing with water.
- Ambitious building elevation requirements are essential. Base flood elevation requirements are not enough.
- Increase use of renewable energy.
- Provide incentives for on-site solar energy production.
- Increase energy efficiency in homes and businesses.
- Establish workforce development programs in renewable energy and related technologies.
- Re-establish citywide recycling service.
- Embrace green building technologies in public and private development.
- Encourage deconstruction, salvaging and reuse of building materials during construction demolition.
- Promote the image of New Orleans as a “green” and sustainable city.

⁹⁸ http://www.dhh.louisiana.gov/offices/publications/pubs-205/AgricultureStLandfill-NewOrleansHC082906_1.pdf

- Examine the city's building code for ways to incorporate green building standards.
- Encourage the use of pervious surfaces and less reliance on concrete.
- Provide supermarkets within easy access of all residents.
- Support and encourage urban agriculture.