

Healthy Waterways:

A Health Impact Assessment of the City of Rochester,
New York's Local Waterfront Revitalization Program

Report, June 2013



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View from Durand Eastman Beach

Healthy Waterways Report Summary

The Healthy Waterways project assessed the potential health impacts of the City of Rochester, New York's Local Waterfront Revitalization Program (LWRP). The LWRP is a New York State program that supports local efforts to develop comprehensive plans for waterfront areas. The Healthy Waterways project was conducted in anticipation of the City of Rochester's 2013 LWRP planning process. The LWRP focuses on waterfront areas within the City of Rochester along the Erie Canal, the Genesee River, and Lake Ontario, with the exception of the Port of Rochester. The Port of Rochester is addressed in a separate planning process. This report presents the project's findings and assessments for consideration by the city and interested stakeholders as the LWRP is developed and implemented.

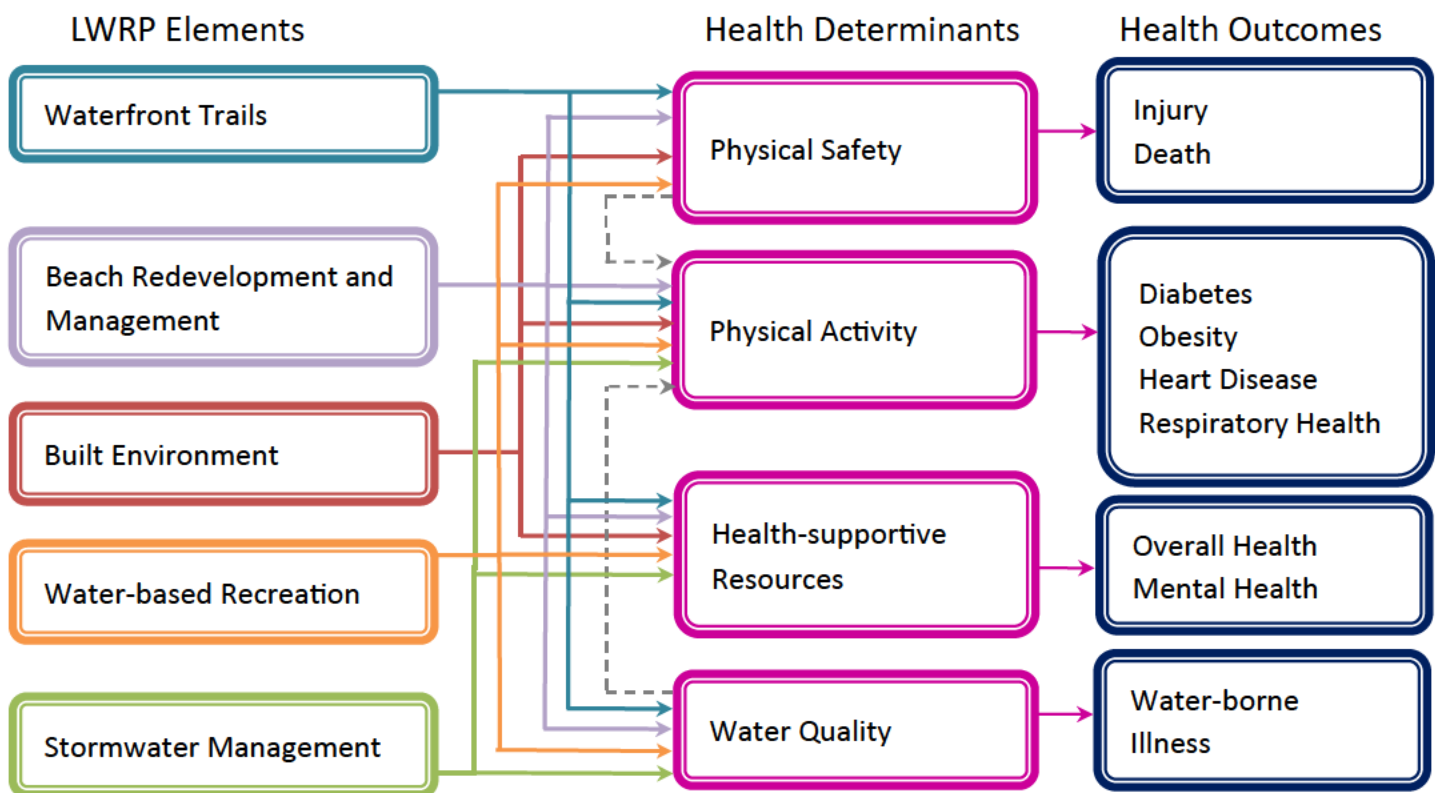
Health Impact Assessment (HIA) is a tool for providing information about how proposed plans and policies may impact community health. HIA is based on the fact that social and environmental conditions strongly affect people's health. HIAs offer recommendations to maximize the health benefits and minimize negative health impacts of non-health decisions. HIA also assesses the distribution of health impacts throughout the population, so that recommendations can promote equity and help reduce health disparities. Healthy Waterways was conducted to assess how changes to Rochester's waterfront might affect community health, and to ensure that health is considered throughout the LWRP.

Health Conditions of Rochester's Waterfront Population

Changes in the waterfront may affect the health of people who live nearby, those who use the waterfront, and the general population in different ways. The HIA assessed impacts on all three groups, with an emphasis on those whose health is most likely to be affected by changes in the waterfront environment. These populations of concern included children, older adults, low-income and minority residents of the waterfront areas.

Four health determinants were selected for assessment based on stakeholder input and direct connection to the health outcomes of concern: physical activity, water quality, health-supportive resources, and physical safety. It is important to note that many of these health determinants are interrelated. For example, improving the perceived safety of an area may increase outdoor physical activity. We assessed each health determinant's relationship to waterfront development, the current status of that health determinant, and evidence (literature, local data, experience of other communities, and survey data) of its impacts on specific health outcomes.

The HIA focused on five types of waterfront changes addressed in the LWRP: waterfront trails, beach redevelopment and management, built environment, water-based recreation, and stormwater management. Each of these elements is likely to affect several of the health determinants.



Waterfront Trails

The Genesee Riverway Trail (GRT) system is a pedestrian/biking trail that runs along the Genesee River from the Erie Canal north to where the river enters Lake Ontario. The city’s existing plans to expand and improve the Genesee Riverway Trail (GRT) system are likely to improve health by promoting physical activity. Our recommendations support building new sections so that the trail is continuous, improving maintenance (trash collection, smoother surface, plowing), adding amenities (water fountains, restrooms, lights, signage, etc.), and including additional access points to facilitate use by waterfront community residents. Improving communications and programming could also increase trail use. To maximize these impacts, it is important that concerns about physical safety and crime be addressed in all trails-related decisions.

Beach Redevelopment and Management

Rochester’s waterfront assets include two seasonally lifeguarded sand beaches: Ontario Beach, which is owned by the City of Rochester and operated by Monroe County; and Durand Beach, which is owned and operated by the City of Rochester. The two beaches vary greatly by geography, amenities, uses and number of visitors. Beaches can provide an opportunity for active and passive recreation. However, there are also risks, including exposure to poor water quality and safety issues (e.g. drowning). Additionally, changes such as increased fees or reduced public access could pose negative impacts to health by discouraging people from using the beach.

Beach redevelopment presents significant opportunities to positively impact physical activity and access to health supportive resources. Our recommendations include prioritizing projects that promote physical activity and increased use of the beach areas for passive recreation. Doing so will require improving actual and perceived water quality and public safety. Improved communication, coordination, and monitoring by government agencies, private entities, and community groups is essential to this effort. Our recommendations are aimed at ensuring that beach development increases healthy and safe use by a wide range of local, regional, and visitor populations.

Built Environment

Rochester's waterfront currently features a mix of land uses including housing, open spaces, recreational facilities, and commercial/industrial enterprises. Waterfront development changes the natural and built environments in ways that can affect human health. The challenges of balancing economic, equity and public interests are increased in waterfront areas by the high value of waterfront property.

Healthy Waterways focused on waterfront built environment changes in southwest Rochester, where brownfield redevelopment and other community planning efforts are currently underway. We found that future development within the LWRP may affect community members' physical activity and recreational opportunities, access to health-supporting goods and services, and neighborhood employment and economy. Many of the process (community input, etc.) and design standards (walkability, access, etc.) already included in the city's zoning codes and planning programs promote healthy neighborhoods. Based on our assessment, implementing these and other provisions to increase visual and physical access to the waterfront is particularly important to local communities.

Water-based Recreation

Waterfronts provide many opportunities for active and passive water-based recreation. The potential for water-based recreation varies with the diverse geography within Rochester's LWRP. The north end of the Genesee River runs through a gorge and the central portion (near downtown) is characterized by waterfalls and steep banks. Thus, most recreational access to the river is south of the city center, with the exception of fishing sites at the Charlotte Pier, Turning Point Park and Seth Green Drive (note that beachfront recreation is addressed separately, and that the Port of Rochester is not included in this assessment). Although these uses have expanded in recent years, the recreational potential of the waterfront is still underutilized. In particular, there are many opportunities to expand water-based recreation by low-income residents. Fishing and boating were widely described by community members as stress-reducing forms of passive recreation that are accessible to people of varied abilities. Although increasing water-based recreation would have positive impacts on health, there are potential risks related to physical safety and water quality that need to be considered. Our recommendations offer suggestions for prioritizing development of water-based recreation along Rochester's waterfront in ways that maximize health benefits for diverse populations.

Stormwater Management

Stormwater runoff refers to the amount and quality of water that runs off the land into surface waters. Because stormwater runoff carries pollution, it is a major contributor to poor water quality. Changes in stormwater management have the potential to impact human health, primarily through affecting exposure to polluted water. If water quality improves, the disease risk for people engaged in water-contact recreation will decline. Water quality improvements may have secondary impacts on physical activity and access to health supportive resources if swimming, boating, fishing, or other water-based uses increase.

Stormwater management is an important local tool for improving water quality. Many types of ‘green infrastructure’ implemented to improve water quality, such as grassy swales or wetlands, can have additional public health benefits as open space. Our recommendations emphasize stormwater management measures with health “co-benefits” such as providing areas for public access or physical activity.

Recommendations Summary

In addition to recommendations related to the various plan elements, Healthy Waterways resulted in several cross-cutting recommendations that were emphasized by stakeholders throughout the process:

- Maintain or improve access from adjacent neighborhoods to the waterfront
- Improve safety and security for people using the waterfront area
- Increase public awareness among area residents and visitors of how to access Rochester’s diverse waterfront resources in ways that support health
- Improve coordination among agencies and between jurisdictions (city/county/neighboring towns) responsible for managing different areas of the waterfront
- Monitor, analyze, and report progress, challenges, and opportunities in implementing these goals and recommendations

We also identified a set of overarching recommendations for the LWRP and related decision making processes:

- Add community health to the 2013 LWRP Vision Statement
- Add community health to the 2013 LWRP Goals
- Include information on health and demographics in the LWRP background and inventory
- Incorporate community health into the Department of State’s policy guidelines for all LWRPs
- Promote HIA in future city and county decision making processes

Overall, our findings show that implementation of the LWRP is likely to promote community health. Our assessment also identified opportunities to maximize health benefits, particularly for vulnerable populations living near the waterfront, and to avoid unintended risks to health.

Chapter 1: Introduction

Healthy Waterways was a Health Impact Assessment (HIA) of the City of Rochester, New York's Local Waterfront Revitalization Program (LWRP). The LWRP is a comprehensive plan for the city's waterfront areas. Healthy Waterways was conducted in anticipation of the City of Rochester's 2013 LWRP planning process. It was conducted by the University of Rochester Medical Center Environmental Health Sciences Center in partnership with government and community stakeholders. This report presents our assessment findings and recommendations for consideration as the LWRP is developed and implemented.

The City of Rochester's historical development was closely tied to its water resources, including the Genesee River, Lake Ontario, and the Erie Canal. These waterways were essential for manufacturing, trade, energy, and transportation. Today, these waterfront areas remain key resources for recreation and economic opportunities. The State of New York's Local Waterfront Revitalization Program supports communities' efforts to develop comprehensive plans and implementation programs for improving their waterfront areas [1]. The City of Rochester is currently in the process of updating its Local Waterfront Revitalization Program (LWRP), with an expected completion date of December 2013.

There are many connections between the waterfront and economic development, recreation, and protection of natural resources. Less clear, however, are the ways in which waterfront uses can impact community health. The goals of Healthy Waterways were to assess how future changes along Rochester's waterfront might affect community health, and to make recommendations that maximize the health benefits of the LWRP.

What is an HIA?

HIA is a policy and planning tool that provides information about how proposed policy actions may affect community health. Based on this information, HIAs develop recommendations to maximize the health benefits and minimize negative health impacts of the decision. HIAs also assess whether impacts will affect some groups of people differently than others. This assessment helps decision makers consider the health equity implications of the policy. HIA is a systematic approach to reviewing, analyzing, and applying multiple sources of information to the decision at hand in a systematic way.¹

HIA is based on the increasing recognition that social and environmental conditions strongly affect people's health, and that these conditions are shaped by decisions outside the health arena. For example, zoning decisions, development of parks, and planning of transportation projects typically do not include consideration of health impacts. However, these decisions may affect people's

¹ More information about HIA is available on the Health Impact Project website at: www.healthimpactproject.org/hia.

physical activity, exposure to air pollution, and risks of traffic accidents.

HIA is relatively new in the United States, but is growing rapidly with support by government agencies, private foundations, and non-profit groups [2-5]. The basic framework for an HIA is outlined in Table 1A.

What is the LWRP?

The City of Rochester's Local Waterfront Revitalization Program (LWRP) is the official statement of land use and development policy for the city's waterfront areas. The city's first LWRP was adopted by City Council and approved by the Department of State in 1990. A revision was drafted in 1999, but was never finalized. According to the 1999 draft, the goal of Rochester's LWRP is to "suggest how the Erie Canal, Genesee River and Lake Ontario can be protected as a unique and unified resource and developed to enhance Rochester's quality of life and stimulate economic growth [1]."

The current LWRP revision process was initiated in 2012, with an initial goal of completion by June 2013 (subsequently revised to December 2013). Because the LWRP was not completed before the HIA, we were not able to assess the health impacts of the plan's final recommendations. Instead, we identified five elements likely to be included in the LWRP that could have significant health impacts (waterfront trails, built environment, beach area redevelopment and management, water-based recreation, and stormwater management; Table 1B).

About the Local Waterfront Revitalization Program

Local governments in New York State have the opportunity to participate voluntarily in the NYS Coastal Management Program (CMP) by preparing and adopting a Local Waterfront Revitalization Programs (LWRP). The NYS Department of State's Office of Communities & Waterfronts oversees this program.

An LWRP is a locally prepared comprehensive land and water use plan for a community's natural, public, and developed waterfront resources. An LWRP uses zoning, site plan review and other strategies to provide more detail to the CMP. Major federal, State and local agency actions within the defined LWRP boundary must be consistent with an approved local program [1]. Funding to implement planned waterfront improvement projects identified in the LWRP is available on a competitive basis through NYS Environmental Protection Fund Local Waterfront Revitalization

About Health Impact Assessment (HIA)

Many non-health policies have significant impacts on health. HIA provides a framework and tools for considering "health in all policies."^a HIA is officially defined by the International Association for Impact Assessment as:

"A combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects."

^a Collins and Koplan, 2009 http://www.hiacollaborative.org/downloads/JAMA_HIA_2009.pdf

Table 1A: Framework for HIA [6]

Steps	Outputs
Screening	<ul style="list-style-type: none"> • Describes proposed policy, program, plan, or project, including timeline for decision and political and policy context. • Presents preliminary opinion on importance of proposal for health and the opportunities for HIA to inform the decision, and states why the proposal was selected for screening. • Outlines expected resource requirements to conduct HIA. • Provides recommendation on whether HIA is warranted.
Scoping	<ul style="list-style-type: none"> • Summarizes pathways and health effects to be addressed, and provides rationale for those included and excluded. • Identifies affected populations and vulnerable groups. • Describes research questions, data sources, the analytic plan, data gaps, and how gaps will be addressed. • Identifies alternatives to the proposed action to be assessed. • Summarizes stakeholder engagement, issues raised by stakeholders, and responses to those issues.
Assessment	<ul style="list-style-type: none"> • Describes the baseline health status of affected populations. • Analyzes and characterizes beneficial and adverse health effects of the proposal and each alternative. • Describes data sources and analytic methods used. • Documents stakeholder engagement and integrates input into analyses. • Identifies clearly the limitations and uncertainties of the analysis
Recommendations	<ul style="list-style-type: none"> • Identifies alternatives to proposal or actions that could be taken to avoid, minimize, or mitigate adverse effects and to optimize beneficial ones. • Proposes a health-management plan to identify stakeholders who could implement recommendations, indicators for monitoring, and systems for verification.
Reporting	<ul style="list-style-type: none"> • Provides clear documentation of the proposal analyzed, the population affected, stakeholder engagement, data sources and analytic methods used, findings, and recommendations. • Communicates findings and recommendations to decision makers, the public, and other stakeholders in a form that can be integrated with other decision-making factors (technical, social, political, and economic).
Monitoring and Evaluation	<ul style="list-style-type: none"> • Tracks changes in health indicators or implementation of HIA recommendations. • Evaluates (a) whether the HIA was conducted according to its plan and applicable standards (process evaluation), (b) whether the HIA influenced the decision-making process (impact evaluation), and (c) when practicable, whether implementation of the proposal changed health indicators (outcome evaluation).

Program grants. Additionally, projects that are recommended in an approved LWRP may be given higher priority for funding by other State and federal agencies. LWRPs must address the 44 New York State Coastal Policies and develop sub-policies, where necessary [7]. Many of the 44 Coastal Policies relate to health; those particularly relevant to the LWRP elements assessed in this report are listed in Table 1C.

Table 1B: LWRP Elements addressed in Healthy Waterways

Waterfront Trails	The Genesee Riverway Trail system is a multi-use trail that runs along the Genesee River from the Erie Canal north to where the river enters Lake Ontario. Changes considered for the future include improving connectivity so that the trail is continuous and does not travel along streets, improved maintenance (trash collection, improved surface, plowing), added amenities (water fountains, restrooms, lights, signage, etc.), and additional entrances to facilitate use by neighbors. Finally, the LWRP could propose communications and programming directed at increasing trail use.
Beach Redevelopment and Management	Rochester’s waterfront assets include two seasonally lifeguarded sand beaches: Ontario, which is owned by the City of Rochester and operated by Monroe County; and Durand, which is owned and operated by the City of Rochester. The two beaches vary greatly by geography, amenities, uses and number of visitors. Beach redevelopment presents significant opportunities to positively impact physical activity and access to health supportive resources. Negative impacts could result, however, from increasing fees to the extent that use declines or from encouraging more swimming without adequate safety protections.
Built Environment	The waterfront currently features a mix of uses including housing, open spaces, recreational facilities, and commercial/industrial enterprises. Waterfront development changes the natural and built environments in ways that can affect human health. The relationship between development and community health is supported by a well-established and growing evidence base within health, community planning, and design fields. Although the research on health-promoting community design does not specifically address waterfront development, the same general principles apply. However, the challenges of balancing economic, equity and public interests are increased in waterfront areas by the high value of waterfront property. The various improvements associated with waterfront redevelopment would likely increase access to health-supportive resources, and improve opportunities for physical activity and enhanced physical safety. However, future development of waterfront areas could negatively affect current residents. Risks include gentrification (potentially affecting access to safe and affordable housing) and reduced access to the waterfront.

Table 1B: LWRP Elements addressed in Healthy Waterways (Continued)

Waterfront Trails	<p>The north end of the Genesee River runs through a gorge and the central portion (near downtown) is characterized by waterfalls and steep banks. Thus, most recreational access to the river is south of the city center, with the exception of fishing sites at the Charlotte Pier, Turning Point Park and Seth Green Drive. There are no designated fishing piers or locations south of the falls, but people are regularly seen fishing at informal fishing spots along the river and canal. The Genesee Waterways Center, located in Genesee Valley Park (southwest), is a nonprofit organization offering canoe and kayak rentals, rowing and sculling, and various other water-based programs throughout the year such as regattas and family programs. Although many of the policies and proposed improvements associated with water-based recreation would have positive impacts on health, there are potential risks related to physical safety and water quality that need to be considered.</p>
Beach Redevelopment and Management	<p>Stormwater runoff refers to the amount and quality of water that runs off the land into surface waters. Because stormwater runoff carries nutrients, bacteria, sediment, and chemicals with it, it is a major source of non-point source pollution. Changes in stormwater management have the potential to impact human health, primarily through affecting exposure to polluted water. If water quality improves, the disease risk for people engaged in water-contact recreation might decline. However, there is limited evidence that water-borne illness is of local concern. Water quality improvements may have secondary impacts on physical activity and access to health supportive resources if it contributes to water quality improvements that increase swimming, boating, fishing, or other water-based uses.</p>

Table 1C: Coastal Policies Related to the Healthy Waterways Assessment [7]

<p>Policy 1: Restore, revitalize, and redevelop deteriorated and underutilized waterfront areas for commercial, industrial, cultural, recreational, and other compatible uses.</p>
<p>Policy 8: Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bio-accumulate in the food chain or which cause significant sub-lethal or lethal effect on those resources.</p>
<p>Policy 9: Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks, and developing new resources.</p>
<p>Policy 18: To safeguard the vital economic, social and environmental interests of the state and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards which the state has established to protect valuable coastal resource areas.</p>
<p>Policy 19: Protect, maintain, and increase the level and types of access to public water-related recreation resources and facilities.</p>

Table 1C: Coastal Policies Related to the Healthy Waterways Assessment (Continued)

Policy 20: Access to the publicly-owned foreshore and to lands immediately adjacent to the foreshore or the water's edge that are publicly-owned shall be provided and it shall be provided in a manner compatible with adjoining uses

Policy 21: Water-dependent and water-enhanced recreation will be encouraged and facilitated, and will be given priority over non-water-related uses along the coast.

Policy 22: Development, when located adjacent to the shore, will provide for water-related recreation, whenever such use is compatible with reasonably anticipated demand for such activities, and is compatible with the primary purpose of the development.

Policy 23: Protect, enhance and restore structures, districts, areas or sites that are of significance in the history, architecture, archaeology or culture of the state, its communities, or the nation.

Policy 33: Best management practices will be used to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters.

Policy 38: The quality and quantity of surface water and groundwater supplies will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.

What is Healthy Waterways?

Between January 2012 and June 2013, University of Rochester Environmental Health Sciences Center staff worked with a wide range of community stakeholders, local government, and consultants to conduct the Healthy Waterways HIA coordinated with the City of Rochester's ongoing LWRP revision. This report summarizes our process, the resulting assessment, and recommendations for the LWRP. We refer throughout to Rochester's LWRP, which is available on the NYS Department of State website.²

The Healthy Waterways HIA was supported by a grant from the Health Impact Project - a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts. Although we endeavored to incorporate broad input at every stage of this assessment, the recommendations set forth in this report are those of the authors and do not necessarily reflect the view of the Health Impact Project, the Robert Wood Johnson Foundation, The Pew Charitable Trusts, the technical support team, or community stakeholders.

² The City of Rochester's LWRP is available at:
http://www.dos.ny.gov/communitieswaterfronts/WFRevitalization/LWRP_status.html

The primary objectives of the Healthy Waterways project were to:

- Provide data to support recommendations that maximize health benefits of future waterfront uses in the City of Rochester’s Local Waterfront Revitalization Program (LWRP)
- Increase stakeholders’ understanding of how elements of the LWRP might impact the health of various populations in Rochester
- Enhance community engagement in the LWRP by identifying and communicating potential health implications of the program
- Partner with the City of Rochester, its Consultant, and the Waterfront Advisory Committee (WAC) to integrate health considerations into LWRP recommendations

As the first HIA conducted in Rochester, Healthy Waterways served as a demonstration for potential local practitioners of HIA. Thus, in addition to the above project objectives, an overarching goal of Healthy Waterways was to increase the community’s understanding of HIA practice and its potential value for informing local decision-making processes.

Key concepts and terms often used in HIA [8]

Health: A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

Health Impact: Any change in the health status of an individual, population, or sub-population, or any change in the physical, natural, or social environment that has a bearing on public health.

Health Outcome: The changed health status of an individual, population, or sub-population related to health determinants. Health outcomes can be positive or negative.

Health Determinants: Any factor known to impact the health of an individual, population, or sub-population. Health determinants include:

Features of *the social and economic environment* such as income and education;

Features of *the natural and built environment* such as air quality, housing and pedestrian infrastructure;

A person’s *individual characteristics and behaviors* such as genetics and smoking.

Health Equity: Health equity refers to disparities between population groups in the presence of disease, health outcomes, or access to care that result from a variety of changeable social factors such as income inequality, educational quality, natural and built environmental conditions, individual health behavior choices, and access to health care. Health equity is improved as these disparities are eliminated or minimized. Health inequity is exacerbated as these disparities grow.

Stakeholders: Individuals or organizations who are affected by the policy, plan, or project under consideration; have an interest in the health impacts of the policy, project, or plan under consideration; and/or have direct or indirect influence on the decision-making and implementation process of the policy, project or plan under consideration.

About This Report

This report summarizes the Healthy Waterways process, findings, and recommendations.

Chapter 2: Methods

This chapter describes the Healthy Waterways HIA, including how the project was identified and our scope of work (screening and scoping). It provides an overview of how we selected the four key health determinants and health outcomes of concern, explains research questions guiding the project, and describes impacted populations, the stakeholder engagement process, data sources, and how we developed recommendations.

Chapter 3: Rochester's Waterfront – People and Places

Using available data, this chapter defines populations likely to be most affected by the LWRP, and summarizes the current conditions surrounding Rochester's waterfront, including environmental and geographic characteristics, social environment characteristics, demographics, and the current health status of the populations most likely to be affected by the LWRP.

Chapter 4: Current Conditions – Waterfronts and Health

This section presents information on the current status of the four primary health determinants assessed in this HIA (physical activity, water quality, health-supportive resources, and physical safety). We used existing literature to link the health determinants to health outcomes discussed in Chapter 3.

Chapter 5: Findings – Health Impacts of Potential Local Waterfront Revitalization Program Elements

This chapter outlines the current status of the five health-related LWRP elements (waterfront trails, beach redevelopment and management, built environment, water-based recreation, and stormwater management) and assesses how changes resulting from the LWRP may impact associated health determinants for different population groups.

Chapter 6: Recommendations

Our recommendations relate to the overall vision for Rochester's waterfront, specific plan recommendations, and ongoing evaluation of the LWRP. We also include recommendations that may not be relevant for the LWRP, but that arose throughout the assessment and may be addressed by other local stakeholders or projects.

Chapter 7: Reporting – Dissemination, Evaluation, and Monitoring

Here we present an initial evaluation of the HIA process, as well as suggestions for monitoring future health impacts of changes in Rochester's waterfront.

More information about HIA is available on the Health Impact Project website at:
www.healthimpactproject.org/hia.

When completed, the City of Rochester's LWRP will be available at:
http://www.dos.ny.gov/communitieswaterfronts/WFRevitalization/LWRP_status.html

An electronic version of this report, the executive summary, and additional information on data collection is available at: <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>



Charlotte Pier is a popular fishing spot at the mouth of the Genesee River

Table 2A: Healthy Waterways and LWRP Timelines

Time Period	LWRP Activities	Healthy Waterways Activities
January 2012		Screening
February 2012		
March 2012		Scoping and stakeholder engagement
April 2012		
May 2012		
June 2012		
July 2012		Data collection and analysis
August 2012		
September 2012		
October 2012		
November 2012		Draft report
December 2012	Scoping meetings; LWRP document format and mapping	
January 2013	Development of Advisory Committee	
February 2013	Appointment of Waterfront Advisory Committee	
March 2013	First WAC meeting Begin drafting of LWRP	Stakeholder input on report and draft recommendations
April 2013		Stakeholder input on recommendations and draft revisions
May 2013		Final Healthy Waterways report
June 2013		Dissemination/reporting/evaluation
July 2013	Public meeting	
August 2013	Draft revision	
September 2013		
October 2013		
November 2013		
December 2013	Final LWRP document	
January 2014	LWRP document released to public	

Chapter 2: Methods

As outlined in Chapter 1, Healthy Waterways followed the Health Impact Assessment framework of:

- Screening
- Scoping
- Assessment
- Recommendations
- Reporting
- Monitoring and Evaluation

Healthy Waterways activities are detailed below. This project was planned to run in parallel to the LWRP. However, due to delays in the original timeline of the LWRP process, the majority of the HIA was conducted in advance of the Waterfront Advisory Committee’s (WAC) engagement and development of the LWRP (Table 2A). The HIA team was represented on the WAC.

This report and accompanying materials comprise the “reporting” phase of the HIA; the final section of this report outlines our approach to monitoring and evaluation of the HIA’s impact on the decision making process. Because ongoing involvement by key stakeholders is a key part of the HIA approach, this section begins with a brief overview of our stakeholder participation strategy throughout this project, and then summarizes our approach to completing each stage of the HIA.

Stakeholder Engagement

During the screening and scoping phases, we met with stakeholder groups to identify health concerns around Rochester’s waterfront. Input was solicited from stakeholder groups involved in or likely to be affected by changes in the waterfront that had implications for human health. The LWRP is a comprehensive planning process that addresses natural resources, residential development, transportation, and other activities within the waterfront area. Although Healthy Waterways addressed only a subset of the LWRP elements, these were topically diverse. Because the LWRP encompasses such a broad range of issues and areas, we used a variety of strategies, including:

- We attended scheduled meetings of stakeholder groups to present our project and elicit their input on key health problems, health determinants, and potential plan elements.
- Technical Advisory Groups were convened on three plan elements. The City of Rochester and Monroe County were represented on all three groups:

- Waterfront trails (representatives from regional trails and active transportation groups, and health agency staff interested in physical activity)
- Beachfront management (beach managers and recreation staff)
- Waterfront redevelopment in southwest Rochester (community leaders and staff of community organizations)

These groups informed our data collection efforts, provided existing data, reviewed draft reports, and advised on recommendations related to their interests and expertise.

- Additional experts and interest groups were contacted for data and advice with respect to specific issues, including water quality, water-based recreation, and public safety.
- We provided regular updates and solicited input from several existing coalitions with broad-ranging interests in environment and health in Rochester, including the Rochester Health Impact Assessment Learning Group, the CARE collaborative, and the University of Rochester Environmental Health Sciences Center’s EHSC Community Advisory Board. These consultations related to our overall plan, progress, and lessons learned.
- As described below, several public surveys were conducted to obtain input from communities (e.g. southwest community residents) and user groups (e.g. trail and beach users) to complement information obtained from other sources.
- The draft report was widely disseminated for review by interested individuals and groups, and an open working session was held to collect input for the final report.

Throughout the project, stakeholders also helped connect project staff with community and other interest groups for assistance with specific components of the project. For example, community stakeholders helped identify survey events and locations for the Southwest Community Survey.

Screening

Before undertaking the Healthy Waterways project, we worked with the City of Rochester, the Monroe County Department of Public Health, and the Rochester Environmental Health Sciences Center’s (EHSC) Community Advisory Board to assess the likelihood that an HIA of the LWRP would significantly contribute to the planning process. We determined that:

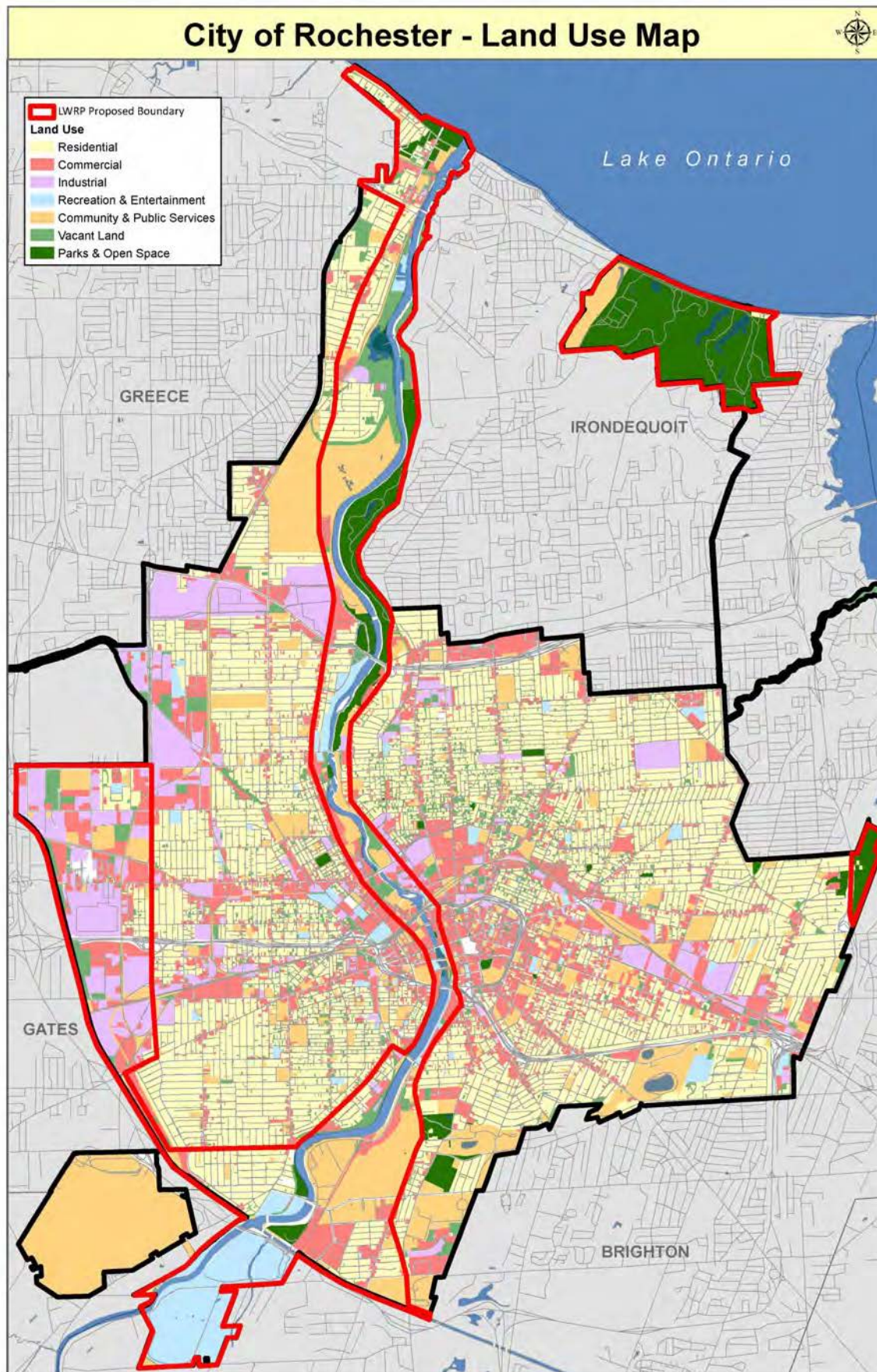
- i. *The LWRP will affect community health:* The LWRP will guide future development of waterfront properties (residential and commercial), improvements in trails, parks and beaches, and other changes that may directly or indirectly affect health.

- ii. *Absent an HIA, the LWRP would not focus on health impacts:* The LWRP is required to address 44 coastal management policies outlined by the New York State Department of State.
- iii. Although many of these relate to health, improving community health is not an explicit goal of the LWRP process. HIA highlights the potential direct and indirect human health impacts of these policies. The City of Rochester Planning Department was supportive of a “parallel track” HIA that could provide health information and stakeholder engagement in support of their ongoing efforts.
- iv. *An HIA could enhance stakeholder engagement in the LWRP:* The LWRP process involves several public meetings, as well as a Waterfront Advisory Committee including community leaders and professionals involved with environmental protection, land use, and development. By highlighting community health effects of the LWRP and providing opportunities to participate in the HIA, we expected to engage new groups in the LWRP.
- v. *An HIA was feasible and timely:* Healthy Waterways would provide relevant local data to inform the LWRP recommendations and support community health. Case studies from other communities also provided extensive related experience. The HIA began in January 2012, 18 months prior to the initially expected completion of the LWRP (later delayed to December 2013), which allowed sufficient time to collect and analyze information and make recommendations on specific LWRP elements.

Stakeholder Groups Engaged in Scoping Process
<ul style="list-style-type: none"> • City of Rochester <ul style="list-style-type: none"> • Environmental Services • Fire • Neighborhood & Business Development • Police • Recreation and Youth Services • Federation of Monroe County Environmentalists • Genesee Transportation Council • Healthi Kids, Finger Lakes Healthy Systems Agency • Monroe County <ul style="list-style-type: none"> • Environmental Services • Public Health • Water Quality Coordinating Committee • Parks & Trails New York • PLEX Neighborhood Association • PLEX-Southwest Rochester Riverfront Steering Committee • Rochester HIA Learning Group • Sector 4 CDC • Southwest Common Council • UR EHSC Community Advisory Board

Given these conditions, the research team determined that an HIA of the LWRP had the potential to enhance the process in ways that would promote community health.

Map 2A – Land Use and Proposed Local Waterfront Revitalization Program Boundary



Provided by the City of Rochester

Scoping

Geographic scope

The waterfront boundary addressed by the LWRP is a narrow geographic area along the shorelines of the canal, river, and lake (Map 2A). However, changes guided by the LWRP will affect people living outside this narrow waterfront area. Although our primary focus was on activities in the LWRP boundary, we extended our analysis to the waterfront neighborhoods that may be directly affected by development changes along the waterfront. To a lesser degree, we considered those who travel to use waterfront resources such as trails and beaches, and those affected indirectly (e.g. by impacts on the city's or county's budgets, programs, economic development or services). For beaches, trails, and other resources available to the public, we assessed the entire LWRP area. However, for issues related to community development (residential, commercial, and industrial) we focused on community impacts in southwest Rochester, particularly the PLEX (Plymouth-Exchange) neighborhood. As described in Chapter 3, PLEX has the highest percentage of racial minority populations and the second lowest mean income of neighborhoods adjacent to the waterfront. PLEX also has relatively poor health outcomes compared to the city and other neighborhood groups. PLEX is one of the few neighborhoods with direct access to the river that is also expected to see significant development connected with other ongoing city planning processes, namely brownfield redevelopment around the former Vacuum Oil site. Thus, HIA recommendations for this area have the potential to be implemented in the short-term and to serve as a model for other areas that may be developed in the future.

We do not emphasize current conditions and potential changes around the Port of Rochester and the Charlotte neighborhood, which is addressed by a separate city plan in coordination with the LWRP [9].

Scoping Health Outcomes of Concern

As described further in Chapter 3, we consulted local health department data to identify the most significant health issues facing communities in Rochester. Additionally, we asked stakeholders in our initial scoping meetings what health outcomes they felt were both important to the community and related to community members' use of the waterfront. To select the health outcomes to focus on for our HIA, we evaluated outcomes suggested by stakeholders with respect to these criteria:

- Does this health outcome have a disproportionate impact on vulnerable populations (vulnerable because of age, income, race, disability, or other factor)?
- Is this health outcome important to/prevalent among the entire Rochester population?
- How strong is the link between health outcomes and health determinants? How likely is this outcome to be impacted by LWRP elements?
- Is there existing relevant data or could we reasonably collect data needed to assess impacts on this outcome?
- Will information on this outcome influence the LWRP process or plan?

HIA practitioners commonly use these criteria to narrow their scope [10,11]. We also considered issues such as waterborne illness that may not be as significant for the health of the overall population, but could be strongly linked to water-based activities.

Using the above criteria, we narrowed the identified health outcomes to:

- Obesity, cardiovascular disease, stroke and diabetes
- Respiratory health
- Physical injury and death
- Mental health
- Waterborne disease

This list was reviewed and approved by City Planning and County Health Department staff, community leaders in southwest Rochester, and relevant key informants.

Scoping Key Health Determinants

Health Impact Assessment is based on the observation that health outcomes are strongly affected by features of the built, natural, or social environment. These features are commonly referred to as “health determinants.” Based on stakeholder input and an initial literature review, we identified nine health determinants that might be affected by activities in the waterfront:

- Physical activity
- Water quality
- Health-supportive resources
- Physical safety
- Air quality
- Stress
- Sun exposure
- Environmental toxicants
- Insects

It was not feasible to examine all of these due to time and resource limitations. Based on literature review and stakeholder input, we analyzed how these nine health determinants affect the health outcomes of concern.

This analysis revealed four health determinants that are most strongly associated with the health outcomes of concern: physical activity, water quality, health-supportive resources, and physical safety (Table 2B). Stress and air quality were not selected as key health determinants due to lack of information. Our analysis also suggested that the LWRP will have limited impact on changes in health related to sun exposure, insects, and environmental toxicants for local populations. Therefore, we focused our assessment on the remaining four “key health determinants.” Figure 2A depicts a

simplified pathway diagram outlining connections between key health determinants and the health outcomes of concern.

Scoping LWRP Plan Elements

Next, we identified potential LWRP elements (actions, policy changes, or projects likely to be included in the LWRP) that might significantly affect the four priority health determinants and, hence, influence the identified key health outcomes. We consulted stakeholders and existing literature to link potential elements to specific health determinants.

Because the HIA began before the LWRP was underway, we defined expected LWRP elements based on program criteria, discussions with city staff, and review of past local LWRP documents. This process yielded five potential LWRP elements that are of high importance to local communities and are likely to have a significant impact on health. As described in Chapter 1, these include:

- Waterfront trails
- Beach redevelopment and management
- Built environment
- Water-based recreation
- Stormwater management

These LWRP elements are assessed in detail in Chapter 5.

Health Determinant Pathways

The final step of the scoping process was to connect the impacts of policy change – in this case, LWRP elements – with health impacts. This process began with compiling health determinant pathways that outline the connections between the identified plan elements, health determinants, and health outcomes. This report is organized around defining these connections. Full pathways for each element are found in Chapter 5.

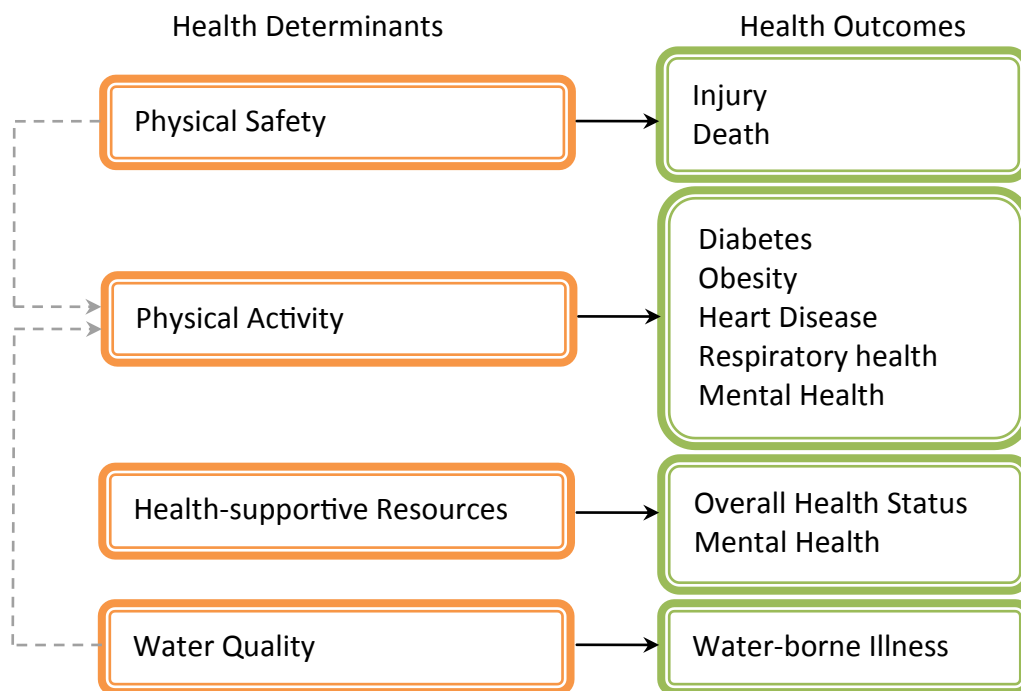
Assessment

We employed a variety of methods to assess current conditions in Rochester’s waterfront and potential impacts of the LWRP, including literature reviews, analysis of existing data, and limited new data collection. Because many of the LWRP elements affect the same health determinants, we begin by assessing health outcomes of concern (Chapter 3) and how each key health determinant affects those outcomes (Chapter 4). Chapter 5 describes how each LWRP element is likely to impact the key health determinants. Below is a brief overview of data sources and methods used as a basis for this assessment. Detailed results of the assessment are presented in Chapters 3 -5.

Table 2B: Health Determinants

Physical Activity	Waterfronts offer opportunities for physical activity and recreation. While there are many efforts in Rochester to promote physical activity among populations at high risk for diabetes, obesity and heart disease, there is room for improvement in addressing some of the primary barriers to physical activity, including crime and sense of security, expansion and use of trails, and access to water-based physical activity.
Water Quality	Swimming and limited-contact water recreation activities such as boating expose users to bacteria and other pollutants, and can lead to water-borne illness. The LWRP has the potential to both affect water quality and the extent of human exposure to surface water.
Health-supportive Resources	Health-supportive Resources include opportunities for passive recreation, healthy food access (local fish and fresh produce), health-promoting retail, mental health and health services, economic improvements (jobs, access to financial assistance, stronger tax base), education, housing, and social cohesion. The LWRP’s impacts on how waterfront land is used may change residents’ access to these resources.
Physical Safety	Concerns about physical safety include unintentional injuries such as accidents and drowning, as well as injuries related to crime. LWRP-related changes in the physical environment may change physical safety hazards, use patterns that expose people to risk, and perceptions of safety.

Figure 2A – Health Determinant to Health Outcome Pathways



Literature Reviews

We relied on literature reviews to identify relevant experiences from other communities. The literature review encompassed research linking the plan elements, health determinants of study, and health outcomes of concern. The project team began by using the Human Impact Partners' Evidence Base database³ and sources cited in other HIAs to gather existing knowledge of the relationship between health determinants and changes to the built and social environments. We also searched PubMed, reports from government and community agencies, and consulted with stakeholders for additional references. Sources included research publications, case studies, web sites, and reports from government or other institutions on developments in other cities.

Existing Conditions Data Collection and Analysis

We used existing local and national data to characterize current conditions with respect to geography, demographics, and health. Data sources included American Fact Finder (U.S. Census Bureau), the City of Rochester Planning and Environmental Services departments, Monroe County Department of Public Health, and community organizations.

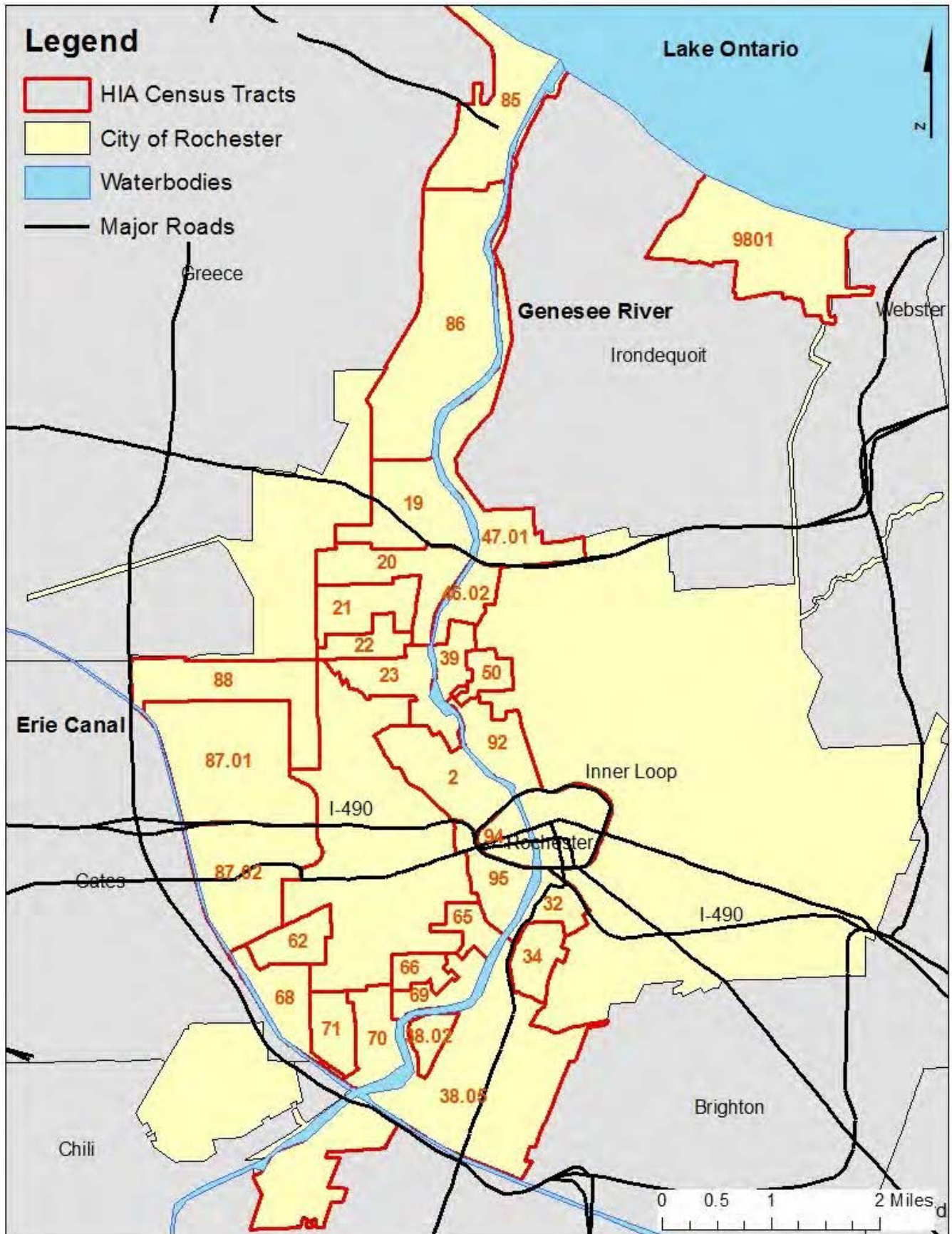
We considered several factors when selecting data sources and geographic scale. For instance, the Human Impact Partners' HIA Toolkit emphasizes the importance of clarifying impacts on different populations, particularly impacts on "populations vulnerable to or experiencing health disparities" [12]. Although the LWRP boundary comprises only a narrow strip of land along the waterfront, populations affected by changes in this area are much broader than those who live on the waterfront. For example, communities adjacent to the LWRP boundary are likely to be affected by waterfront changes. In addition, people who travel from farther away to visit Rochester's waterfront may be affected. Another consideration for data collection was geographic scale. For example, crime data are available by census tract, but many health data are only available by zip code or county. For consistency, we collected information at the census tract level wherever possible. To do this, we created a "waterfront area" consisting of 30 census tracts that include or are directly adjacent to the LWRP boundary (Map 2B). Because some tracts were too small for comparison and because most community members can more easily relate to neighborhoods, we combined census tracts roughly by neighborhood (these neighborhoods are generally recognized by residents and the city for planning purposes). We refer to these groups throughout the report as "neighborhood groups" or "waterfront neighborhoods." Several neighborhood groups had to be combined to create areas with large enough populations to report reliable health data (Map 2C). We

³ <http://www.humanimpact.org/evidencebase>

⁴ Tract 9801 (Durand Eastman Park) was excluded from analysis because of its small population. Tract 38.02 (University of Rochester) was excluded from demographic and income analyses because its population is made up of students, which skews demographic information. Crime statistics are included in this tract because they are still relevant for analysis. Because health statistics were provided by neighborhood group, we were unable to remove this tract for YPLL and other health statistics.

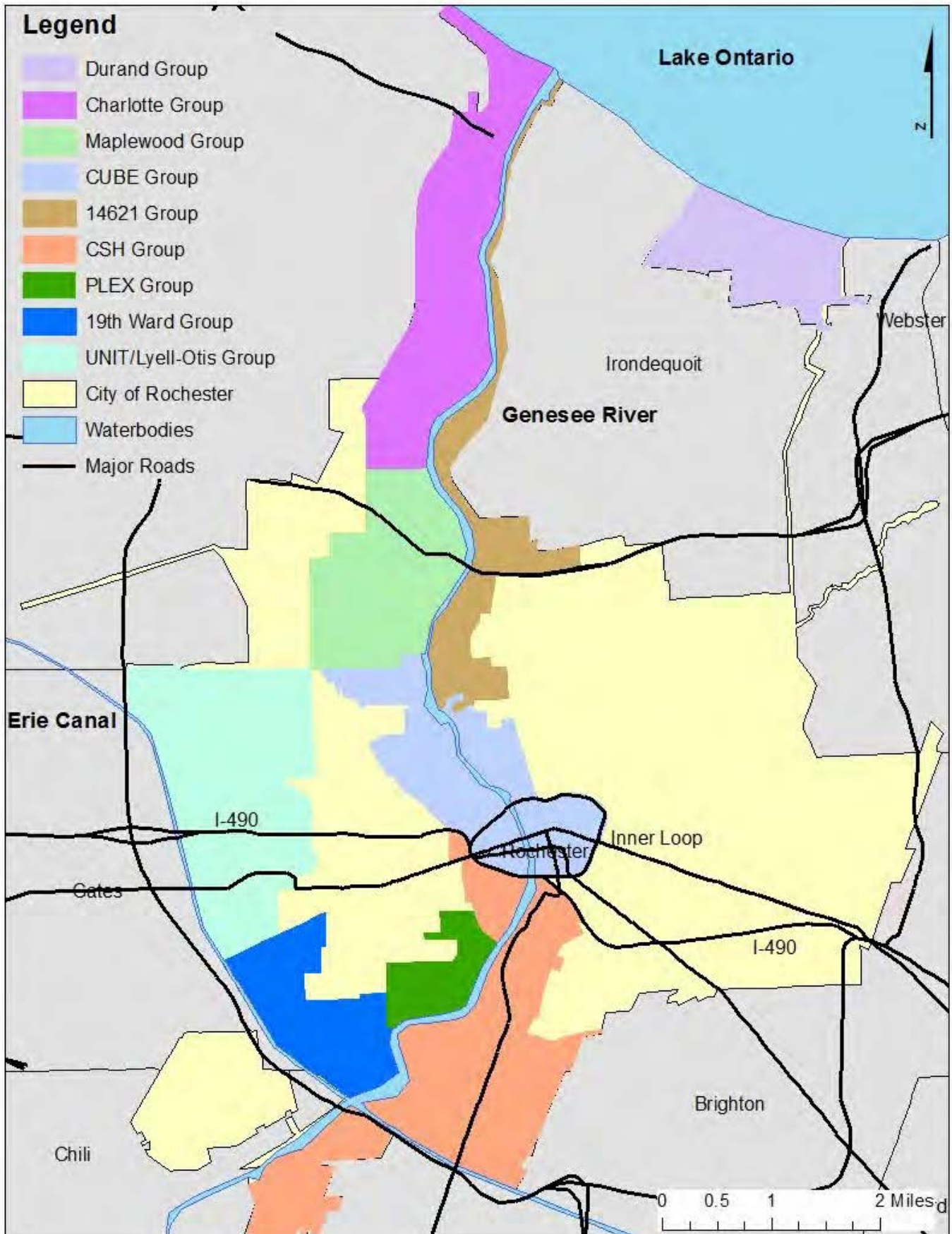
⁵ Groups were based on existing neighborhood boundaries, similarities in mean household income, and geographic proximity. Collapsing the 30 census tracts into neighborhoods reduces some of the nuances of demographic differences within these areas. However, it allows for clearer description of the differences between sections of the LWRP area. In addition, the total number of people in each census tract is too small to allow for accurate reporting of certain health data (YPLL, Table 3C). Grouping tracts into eight neighborhoods allows us to report this health data at the finest scale possible. The Durand Group was excluded from this analysis, and is not counted among the eight groups.

Map 2B – Healthy Waterways HIA Census Tracts (tracts overlapping or directly adjacent to the LWRP boundary)



Census tract data provided by the City of Rochester

Map 2C – Waterfront Neighborhood Groups (by approximate neighborhood)



Neighborhood data provided by the City of Rochester

Table 2C: Description of Primary Data Collection Efforts

Survey	Number of Participants	Person-Hours of Data Collection	Dates and Locations	Description
Trail User Counts	2,019	249	July 2012; 12 sites along Genesee Riverway Trail	Counted trail users, recorded type of use (pedestrian/bicyclist/other), gender, approximate age (youth/adult), and helmet usage.
Trail User Survey	265			Surveyed trail users at each site. Topics included type and frequency of use, desired trail features, and safety and security along the trail.
Beach User Survey	202	90	July – August 2012 at Durand and Ontario Beaches	Surveyed beach users at each beach. Topics included type and frequency of use, effect of possible changes to the waterfront, and water quality.
Southwest Community Survey	199	65	July – August 2012 at community events and meetings in southwest Rochester	Surveys were primarily collected at public locations. Topics included self-report of current health status, physical activity levels, food sources, self-reported impact on health from potential waterfront changes, and
General Public Survey	123	26	October - November 2012 at the Rochester Public Market	An MPH student surveyed people at the Rochester Public market about past and future waterfront use. Topics included type and frequency of beach and trail use, barriers to access or use, safety and security, and the potential impact of

grouped these neighborhoods by similar mean income.⁴ Neighborhood groups were reviewed by the city and key stakeholders to ensure appropriate aggregation.⁵ Groups with neighborhood names represent tracts comprising all or part of the named neighborhood, but may include portions of other neighborhoods because tracts do not exactly match established neighborhood boundaries. For example, “CUBE” is comprised of tracts in the Central Business District, Upper Falls, Brown Square, and Edgerton neighborhoods; “CSH” includes tracts from the Corn Hill, South Wedge and Highland neighborhoods. Table 3A summarizes the demographics of these neighborhood groups, including totals for the entire LWRP area, the City of Rochester, and Monroe County. The demographics of these neighborhood groups are discussed further in Chapter 3.

New data collection

After initial review of available data and consultation with stakeholders, it became clear that there were significant gaps in information connecting local waterfront uses and human health. For example, we knew that the waterfront trails in Rochester are a resource for physical activity and that the city plans to expand these trails. However, there was no information on how these trails are currently used, how often, and by whom. To fill these gaps, we undertook three surveys in summer 2012 of current waterfront residents and resource users (Table 2C). The first was a Community Survey with residents of southwest Rochester to help characterize current health conditions in that community and identify potential impacts of the LWRP on community members’ health. We also conducted a Beach Survey and a Trail User Survey to gain insight into how and by whom Rochester’s beaches and trails are currently used, how current uses impact health, and how those factors are likely to change based on LWRP recommendations. Trail user counts were taken in connection with the Trail User Survey. In addition, we refer to a survey conducted by a University of Rochester Public Health masters student at the Rochester Public Market. The purpose of this survey was to identify barriers to use of Rochester’s trails and beaches for non-users. We refer to this survey throughout this report as “general public survey.”

Survey results were double entered and analyzed in Excel. Data analysis characterized use patterns, public opinions, and differences in responses between subgroups of the population. Relevant survey results are summarized throughout this report.⁶

⁶ Detailed reports of survey results are available online at <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>

Recommendations Development

After completing the assessment, we consulted with stakeholders to develop recommendations. It became apparent that the HIA could influence the LWRP in at least three ways:

- Building a case for discussions of health as a goal in the introduction, vision and overview sections
- Providing health-related data for the inventory and analysis sections of the LWRP
- Proposing health-related recommendations for various plan elements

Chapter 6 summarizes these recommendations.

Monitoring and Evaluation

Because the LWRP was not complete at the time the HIA was finished, we could not fully evaluate the impact of the Healthy Waterways recommendations on the LWRP planning process and final outcome. In this section, we describe the impacts to date and potential future impacts of the HIA on the LWRP process. We also describe plans for evaluating the future impact of the HIA and related recommendations.

Chapter 3: Rochester's Waterfront – People and Places

Introduction

This chapter provides an overview of the environmental, land use, and geographic characteristics of Rochester's waterfront, populations living in the waterfront area and affected by waterfront uses, and the health status of vulnerable populations. We give particular attention to low-income neighborhoods in southwest Rochester, which have the potential to be among the most significantly affected by changes in Rochester's waterfront in the near future.

Geography of the LWRP

The LWRP boundary includes diverse geographic features and land uses within the City of Rochester. The boundary encompasses waterfronts from the southern border of the city along the Erie Canal north along the banks of the Genesee River to the Port of Rochester and Lake Ontario Beaches. Land uses within the waterfront include numerous parks, residential, and industrial/commercial areas (Map 2A).⁷ Land uses within the LWRP are further discussed in Chapter 5; here we provide a brief overview of the physical characteristics that shape and constrain uses of the waterfront. Additional detail about the waterfront geography and resources is provided in the LWRP.

The southernmost section of the LWRP is dominated by parklands where the Erie Canal crosses the Genesee River. The LWRP boundary includes Genesee Valley Park, which borders the river just south of the Erie Canal. The boundary extends west from this park along the Erie Canal, with adjacent residential neighborhoods, and industrial areas farther west. The University of Rochester occupies a mile of waterfront along the eastern shore of the Genesee River. The remainder of this southern section is a mix of parkland and residential areas stretching north to downtown Rochester. With the exception of the waterfront near the University of Rochester campus and in Genesee Valley Park, most of the riverbank is hardened with cement walls for flood control.

Industrial and commercial buildings front the river through downtown Rochester. North of the Court Street Dam, a series of waterfalls makes the Genesee unnavigable. Steep gorges border the river on both sides of the falls, limiting direct access to the river in this area. North of downtown, industrial/commercial land uses give way to residential areas. However, because of the gorges, residents do not have direct access to the river except in parks where roads and trails make it possible to descend the steep banks. Approximately halfway between downtown and the lake, there are also two large cemeteries on the upland areas of the west side of the river. Still further north, Turning Point Park provides access to wetland areas that have recently been developed with boardwalks to increase accessibility.

⁷ Note that maps included in this report use the waterfront boundary developed for the 1999 draft LWRP; this boundary may be changed during the process of developing the 2013 LWRP.

In the northernmost portion of the waterfront, the community of Charlotte borders the western shore of the Genesee River. The LWRP surrounds the Port of Rochester where the Genesee River empties into Lake Ontario. However, the LWRP does not include the Port of Rochester, which has a separate but coordinated planning process through the Marina Project [9]. Just to the west of the river mouth lies Ontario Beach Park and, further west, residential areas. The eastern shore of the river is bordered by the Town of Irondequoit. The LWRP also covers an area of Lake Ontario shoreline to the east encompassing Durand Eastman Park, which is city-owned but physically located like an island within the Town of Irondequoit.

Overview of the Affected Population

The waterfront area encompasses a diverse swath of Rochester's neighborhoods, from the commercial and recreational development around the Port of Rochester on Lake Ontario's shore, through some of the most economically distressed communities in north and southwest Rochester, relatively affluent communities, Rochester's urban core, and the University of Rochester's mile-long waterfront. These communities are demographically (Table 3A) and socio-economically (Table 3B) diverse.

Different health determinants may be more important for different subpopulations. In addition, people who live near or who regularly use waterfront resources may be more significantly affected by changes in the LWRP. To capture these differences, the assessment refers to impacts on three population groups: residents living within or near the LWRP boundary ("LWRP area residents"), current and potential users of waterfront resources ("LWRP users"), and the general public ("City of Rochester and Monroe County residents"). Among the LWRP area residents, we focus particularly on vulnerable subpopulations including children, older adults, racial and ethnic minorities, and low-income residents.

LWRP Area Residents

People living inside or near the LWRP boundary may be directly affected by changes along the waterfront. For example, development has the potential to increase housing costs and displace low-income residents (gentrification). Changes in trails and beaches may improve physical activity opportunities for waterfront area residents. Waterfront changes may also affect residents' access to health-supportive resources and alter social dynamics in the neighborhoods.

Overall, 41% of Rochester residents (12% of Monroe County residents) live in one of the 30 census tracts comprising the eight waterfront neighborhood groups defined in Chapter 2. As noted above, geography and existing land uses (steep gorges, downtown commercial and industrial areas, and established parkland and trails) limit the number of people who actually live in the narrow LWRP boundary. However, some neighborhoods, particularly portions of southwest Rochester along Plymouth and Exchange Streets, and southeast Rochester along Mt. Hope Ave, have direct access to the river or canal. A small residential area along Lake Ontario also borders the water.

Four subpopulations of the waterfront area may experience more significant health impacts: racial and ethnic minorities, low-income residents, children, and older adults. All four of these subpopulations may be disproportionately affected by waterfront changes because they tend to have more limited access to transportation (e.g. low-income people are less likely to have cars; disabled older adults may have difficulty riding buses), and they may be more dependent on local resources for physical activity, economic opportunities, and spaces to interact with friends, neighbors, and community members. Similarly, low-income residents may be more strongly impacted by housing and economic changes.

Additionally, as discussed below, minorities and low-income residents may have higher rates of health conditions that are affected by changes in the built environment, such as obesity, diabetes, and heart disease. Finally, children are of special concern because poor air and water quality and contaminated fish, food and soil have greater impacts on children than on adults [13]. Concerns about children’s environmental health extend to all children who use waterfront resources (such as beaches, parks, and fishing areas), but those who live in waterfront neighborhoods are most likely to be affected by changes resulting from the LWRP. Different impacts on these vulnerable populations are discussed throughout this report.

Our first step was to characterize the vulnerable populations within the LWRP area. Table 3A shows the demographic characteristics of people living within the eight waterfront neighborhood groups. LWRP area residents as a whole are demographically very similar to the City of Rochester. However, demographic characteristics vary greatly among the eight waterfront neighborhood groups. For instance, the proportion of African Americans ranges from 10% (Charlotte) to 85% (PLEX). The proportion of Hispanics/Latinos is similar to the citywide average in Charlotte, Maplewood, CUBE, and Lyell-Otis (12-20%), lowest in CSH, PLEX, and the 19th Ward (below 10%), and highest in 14621 (35%). The proportion of children under age 5 ranges from 4% (CSH) to 9% (CUBE, 14621, PLEX). Maplewood has the lowest percent of adults over age 65 (5%), while the adjacent area of Charlotte has the highest (15%).



The neighborhoods within the LWRP boundary vary demographically and socio-economically. Some neighborhoods have access to the riverfront while others have limited access to the waterfront. The residential street pictured here ends at the Genesee Riverway Trail in the PLEX neighborhood, but is separated from the trail and river by woods and a fence.

Table 3A: Demographic Characteristics of Waterfront Neighborhood Groups

Neighborhood Group	Total Population	Children Under 5	Adults 65 and older	White ^a	Black or African American ^a	Hispanic or Latino ^a
	#	%	%	%	%	%
Charlotte	9,052	5%	15%	86%	10%	12%
Maplewood	13,389	7%	5%	41%	46%	14%
CUBE ^b	12,164	9%	7%	40%	41%	19%
14621	9,399	9%	13%	33%	41%	35%
CSH ^{c,d}	15,242	4%	11%	61%	28%	4%
PLEX	6,235	9%	11%	6%	85%	9%
19th Ward	12,438	7%	9%	29%	65%	5%
UNIT, Lyell-Otis	7,823	7%	11%	52%	34%	20%
All Waterfront Neighborhoods ^e	85,742	7%	10%	45%	42%	14%
City of Rochester	211,457	7%	9%	46%	41%	16%
Monroe County	742,783	6%	14%	77%	15%	7%

^a ACS “One race” total does not include combinations with one or more races. Ethnicity is based on any race

^b Includes census tracts from the Central Business District, Upper Falls, Brown Square, and Edgerton neighborhoods.

^c Includes census tracts from the Corn Hill, South Wedge and Highland neighborhoods.

^d Census tract 38.02 (University of Rochester) was excluded from the group's demographic, employment, income and housing tenure calculations because the population is based on students living on campus and would skew the results.

^e Excludes census tracts 38.02 (University of Rochester) because of a high student population and 9801 (Durand Eastman Park) because of its low population.

Sources: 2011 American Community Survey 5-year, <http://factfinder2.census.gov>; MCDPH, Vital Records files, provided by MCDPH staff on 2/9/2013

Neighborhoods with mean values/rates above the citywide average indicated in bold.

The mean household income in waterfront neighborhoods is around 10% lower than the citywide mean (\$38,535 versus \$42,796), but varies greatly by neighborhood (Table 3B). CUBE (\$26,550), PLEX (\$28,310), and 14621 (\$30,600) have the lowest mean incomes, and Charlotte (\$48,945) has the highest. Because changes to the LWRP have the potential to influence housing cost and availability, we also report housing tenure (owner occupancy versus rental). The lowest-income neighborhoods tend to have higher rental housing rates: CUBE (88%), 14621 (71%), and PLEX (71%). One exception is the CSH neighborhood group (Corn Hill, South Wedge and Highland) which has a high rental rate (72%) despite having a higher mean income. This may be influenced by their proximity to the University of Rochester and recent upscale rental developments in Corn Hill.

This data suggests that different vulnerable populations may be of particular concern in different waterfront neighborhood groups. For example, due to the high proportion of residents over age 65 in Charlotte, waterfront development in this area should take into account impacts on older adults. Prior research suggests Latinos and recent immigrants are most likely to catch and eat local fish in

Table 3B: Social Environment Characteristics

Neighborhood Group	Mean Household Income	Unemployment	Proportion of Renter-Occupied Units	Part I Violent Crime Rate	Robbery Rate
		% ^a	%	per 1,000	per 1,000
Charlotte	\$48,945	11%	41%	2.91	1.33
Maplewood	\$42,523	10%	52%	8.60	3.58
CUBE^b	\$26,550	21%	88%	17.73	8.11
14621	\$30,600	17%	71%	8.07	2.37
CSH^{c, d}	\$39,921	9%	72%	4.21	2.19
PLEX	\$28,310	21%	71%	15.48	4.55
19th Ward	\$45,991	12%	41%	3.57	1.00
UNIT, Lyell-Otis	\$40,358	10%	42%	5.66	1.54
All Waterfront Neighborhoods^e	\$38,535	13%	60%	7.94	3.14
City of Rochester	\$42,796	12%	59%	9.19	3.81
Monroe County	\$68,500	8%	34%	N/A	N/A

^a Percent of Civilian Labor Force that is Unemployed

^b Includes tracts from the Central Business District, Upper Falls, Brown Square and Edgerton neighborhoods.

^c Includes tracts from the Corn Hill, South Wedge and Highland neighborhoods.

^d Tract 38.02 (U of R) was excluded from the group's demographic, employment, income and housing tenure calculations because the population is based on students living on campus and would skew the results.

^e Excludes census tracts 38.02 (University of Rochester) because of a high student population and 9801 (Durand Eastman Park) because of its low population.

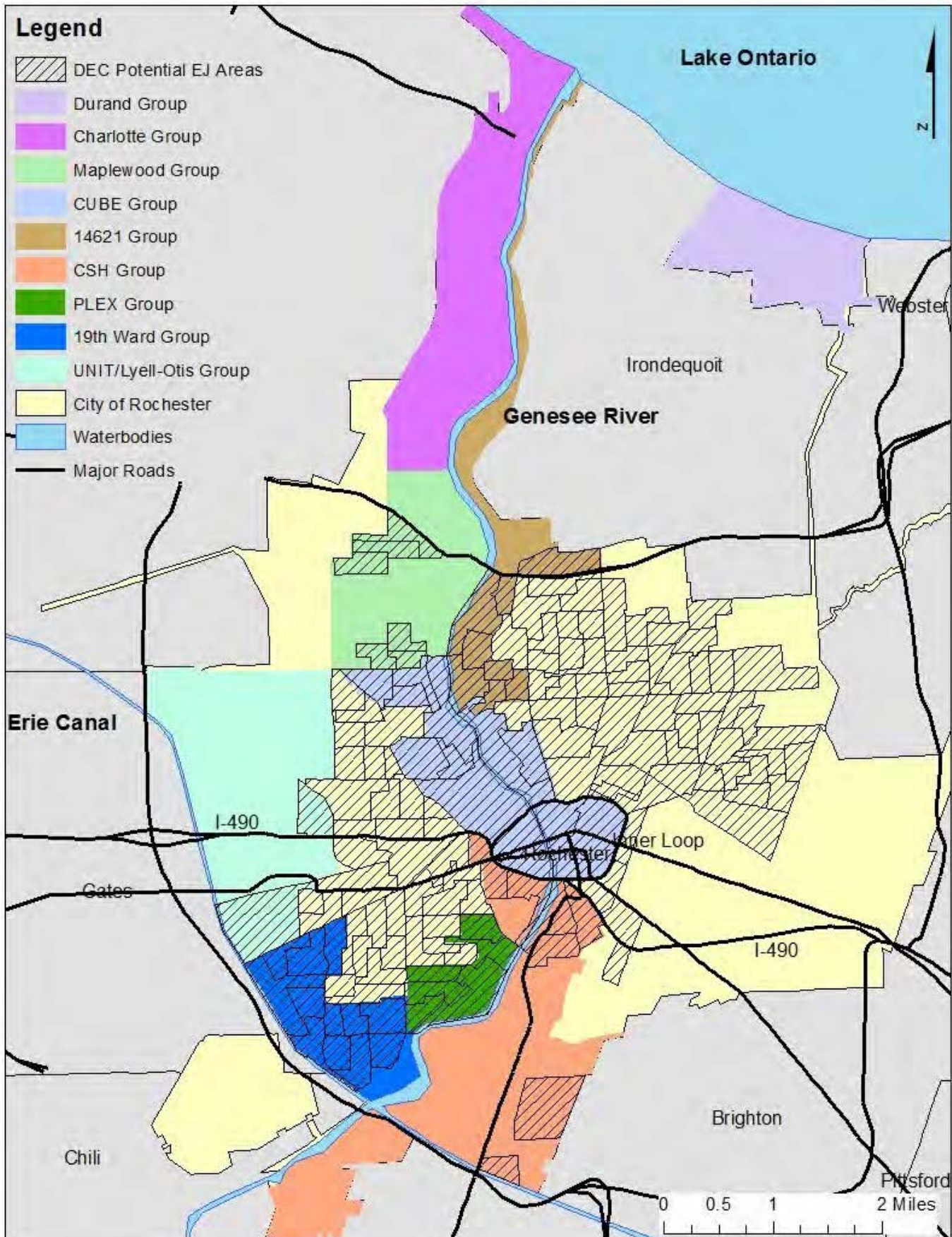
Sources: 2011 American Community Survey 5-year, <http://factfinder2.census.gov>; Rochester Police Department, 2012 Rochester Crime by Census Tract, provided by RPD staff in 2013 (rates are based on 2010 U. S. Census population data)

Neighborhoods with mean values/rates above the citywide average indicated in bold.

excess of the New York State Department of Health's advisories [14]. The high proportion of Latinos in 14621 suggests the need to address language barriers in communication about waterfront resources in this area.

The New York State Department of Environmental Conservation (DEC) Office of Environmental Justice produced maps of "potential environmental justice areas" in the state based on 2000 Census Data [15]. The map of environmental justice (EJ) communities in Rochester shows that many of the waterfront neighborhoods are designated as potential EJ communities by the DEC (Map 3A). This designation entails special considerations for public participation, grants, permitting, and enforcement by DEC. Overall, 45% of Rochester's EJ communities lie within a waterfront neighborhood group. Tables 3A, 3B, and 3C show that there may be additional waterfront communities that merit special consideration of environmental burdens on vulnerable populations. Throughout this report, we focus on community impacts in southwest Rochester, particularly the PLEX neighborhood. PLEX has the highest percentage of total racial minorities (85% Black or African

Map 3A – Potential Environmental Justice Areas as Outlined by NYS DEC



Nearhood data provided by the City of Rochester. DEC EJ data downloaded from <http://www.dec.ny.gov/>

American), the second lowest mean income (\$28,310), a high number of children under age 5 (9%), and an elevated proportion of adults over 65 (11%). PLEX also has relatively poor health outcomes compared to the city and most other waterfront neighborhoods (Table 3C). For example, PLEX’s rate of low birth weight babies is 15.60 per 100 live births, higher than the citywide rate (11.10) and nearly double the countywide rate (8.35). Focusing on how waterfront changes will affect the health of people in this area provides a model that may be applied to similar populations elsewhere in Rochester. Additionally, because this neighborhood is one of the few with direct access to the river, waterfront changes might affect community members more than in areas separated from the water by parks and steep gorges. Finally, an active community engagement and planning process related to brownfield redevelopment of the Vacuum Oil site near PLEX was recently conducted in coordination with the LWRP. Healthy Waterways recommendations for this area have the potential to be implemented in brownfield redevelopment activities.

Table 3C: Population Health

Neighborhood Group	Low Birth Weight Rate (per 100 ^a)	Very Low Birth Weight Rate (per 100 ^a)	Premature Birth Rate (per 100 ^b)	YPLL ^c
Charlotte	6.00	1.60	10.40	6.10
Maplewood	9.80	2.40	12.90	17.30
CUBE^d	13.40	2.90	14.00	18.10
14621	12.10	3.30	15.10	10.80
CSH ^{e,f}	7.80	1.70	9.90	8.40
PLEX	15.60	4.30	17.60	13.40
19th Ward	11.00	2.70	14.40	14.40
UNIT, Lyell-Otis	13.00	0.20	12.90	12.80
All Waterfront Neighborhoods^g	N/A	N/A	N/A	11.70
City of Rochester	11.10	2.73	13.30	10.80
Monroe County	8.35	1.84	10.68	6.70

^a Per 100 births with known birth weight

^b Per 100 births with known gestation

^c The 2006-2009 Years of Potential Life Lost (YPLL) is based on a life expectancy of 75 years

^d Includes tracts from the Central Business District, Upper Falls, Brown Square and Edgerton neighborhoods.

^e Includes tracts from the Corn Hill, South Wedge and Highland neighborhoods.

^f Tract 38.02 (U of R) was excluded from the group’s demographic, employment, income and housing tenure calculations because the population is based on students living on campus and would skew the results.

^g Excludes census tracts 38.02 (University of Rochester) because of a high student population and 9801 (Durand Eastman Park) because of its low population.

Sources: 2011 American Community Survey 5-year, <http://factfinder2.census.gov>; MCDPH, Vital Records files, 2006-2010 birth statistics and 2006-2009 YPLL provided by MCDPH staff on 2/9/2013

Neighborhoods with rates above the citywide rate indicated in bold.

LWRP Users

The second subpopulation that may be particularly affected by changes in the waterfront are people who use waterfront trails, beaches, and parks, but who may not live in the LWRP area. In addition to assessing current waterfront users, we considered how changes in the waterfront may affect who uses these resources– and how – in the future. For example, improving facilities at the beaches might increase the total number of people who visit the beach, increase how frequently individuals use the beach, or change what they do at the beach.

Survey responses indicated that bicyclists traveled on average over four miles, and walkers over one mile, to access the trail. Trail users who drove or took the bus traveled on average over 9 miles to get to the trail. Beach users included visitors from many of Rochester’s suburbs, other parts of New York State, and out of state. We compared the demographic characteristics of beach and trail users with those of the populations of Rochester and Monroe County (Table 3D). Our survey data suggests that the people currently using these resources are more racially and economically similar to Monroe County overall than to City of Rochester residents or to residents of the waterfront neighborhoods.

Table 3D: Demographics of beach and trail users compared to the City of Rochester and Monroe County

	Total N	White	Black or African American	Hispanic or Latino	Household Income					
					Less than \$10,000	\$10,000 - \$14,999	\$15,000 - \$24,999	\$25,999 - \$34,999	\$35,000 - \$74,999	\$75,000 or More
Trail Survey^a	265	83%	12%	12%	12%	3%	7%	9%	28%	41%
Beach Survey^a	202	89%	7%	12%	7%	3%	8%	9%	44%	28%
City of Rochester^b	86,009	46%	41%	16%	18%	8%	16%	14%	29%	15%
Monroe County^b	293,104	77%	15%	7%	8%	5%	11%	11%	32%	33%

^a N reflects total number of surveys completed, not the number who answered each question. Percentages are based on the total number who answered each question.

^b N reflects total number of households

Sources: 2011 American Community Survey 5-year, <http://factfinder2.census.gov>; Healthy Waterways, 2012 Beach and Trail User Surveys

City of Rochester and Monroe County Residents

Even if they do not directly use waterfront resources, residents of the entire City of Rochester (and to a lesser extent all of Monroe County) may be affected by changes in the waterfront area. For example, economic development in the waterfront areas could indirectly benefit all residents of Rochester by increasing the tax base for the city, lessening the tax burden on residents and supporting expansion of services.

Waterfront changes may also impact county residents through county government-sponsored programs. The mean household income for City of Rochester residents is lower than Monroe County residents overall (Table 3B). As described below, city residents also have higher rates of heart disease, diabetes, and obesity [16]. Similarly, YPLL is higher for city residents (10.8 years) than County residents (6.7 years); YPLL for LWRP residents is higher still, at 11.7 (Table 3C). City residents are therefore more likely to rely on publicly-funded health insurance such as Medicaid, which is partially funded by county taxpayers. Waterfront-based economic development that creates jobs and reduces poverty in the city may benefit residents of the entire county through the reduction of public assistance, medical, and other social costs. Similarly, physical changes to the waterfront that improve low-income residents' health could benefit all Monroe County residents through reductions in Medicaid and other health-related spending.

Current Health Conditions

As described in Chapter 2, we identified health outcomes of concern based on local health data and stakeholder input. We focused on conditions that were significant threats to public health, likely to be affected by changes in the waterfront, and/or unique to water-based exposures. Based on such considerations, we narrowed the assessed health outcomes to a suite of diseases related to physical activity (obesity, cardiovascular disease, stroke and diabetes), respiratory health, physical injury and death, mental health, and waterborne disease. This list was reviewed by City Planning and County Health Department staff, community leaders in southwest Rochester, and key informants. Below, we summarize available data on the prevalence of these conditions in Rochester. Where data is available, we provide information on their distribution among children, low income, minority, and older adult populations.

The City of Rochester does not have its own health department; rather, it is served by the Monroe County Department of Public Health. Most local health data is only available on a county-wide scale. Therefore, county-based health data must be interpreted with an understanding of how the city and waterfront populations compare to these larger units. Two exceptions are birth certificate data (low birth weight, very low birth weight, and premature birth) and Years of Potential Life Lost (YPLL), which are available by tract.⁸ Birth certificate data confirms that low-income census tracts also tend to have higher rates of low birth weight and higher YPLL (Table 3C). The Monroe County

⁸As noted above, census tracts with low population numbers were combined to allow accurate reporting of this health data.

Department of Public Health calculated YPLL by census tract based on resident address recorded on death records and an average life expectancy of 75 years. Health department staff report that the factors driving higher YPLL in many city neighborhoods are not only higher rates of infant mortality and homicide, but also the fact that residents are more likely to die from chronic diseases at younger ages than those living in other areas. The three neighborhood groups with the lowest mean household income (CUBE, 14621, and PLEX) are also among the top four for low birth weight rates and YPLL.

Geographic and demographic distribution of these health indicators provides insight into the likely distribution of other health problems among vulnerable populations and neighborhoods. According to 2008-2010 data from the New York State Department of Health (NYSDOH), Whites in Monroe County have a much lower rate of premature death (30%) than Blacks (70%) and Hispanics (68.2%) [17]. Premature death rates for minorities are also higher in Monroe County than statewide rates (60% for Blacks and 59.5% for Hispanics). The premature death rate for Whites in Monroe County is somewhat lower than the statewide rate (33.9%), suggesting greater health disparities by race within Monroe County than statewide [18].

NYSDOH provides health indicator data based on the Behavioral Risk Factor Surveillance System (BRFSS), an annual telephone survey designed by the U.S. Centers for Disease Control and Prevention (CDC) [19]. We have provided the most recently available data from the NYSDOH website. In addition to NYSDOH data, some of the data cited below are from the third (2006) Monroe County Adult Health Survey (MCAHS), a phone survey of 2,545 Monroe County adults conducted by the Monroe County Department of Public Health [16]. MCDPH conducted a 2012 Adult Health survey, but the information was not available in time for inclusion in this report. In addition, the MCDPH periodically issues "Report Cards" on Adult/Older Adult, Maternal/Child, Adolescent, and Environmental Health [20]. These reports are useful syntheses of how health conditions vary among different populations in Monroe County. Results of health-related surveys such as the 2011 Monroe County Youth Risk Behavior Survey (MCYRBS) are also reported as relevant [20].

Obesity, Cardiovascular Disease, Stroke, and Diabetes

Obesity, cardiovascular disease, stroke, and diabetes are interrelated health conditions with similar distribution within the population. While there are many genetic, environmental and social factors that contribute to these conditions, all may be reduced by increased physical activity and healthy eating. Together, they are the leading causes of death in Monroe County.⁹ We focus first on obesity because it is a common risk factor for these diseases.

⁹ Cancer is the leading single cause of death in the county (1,486 deaths in 2010), followed by heart disease (1,469), stroke (352), CLRD (238), and unintentional injury [21].

Table 3E: Local Health Indicators by Race, 2008-2010 [17,18]

Health Indicator	Non-Hispanic			Hispanic	Total
	White	Black	Asian/Pacific Islander		
Total Mortality (per 100,000, age-adjusted)					
New York State	662.8	681.3	332.0	518.8	662.8
Monroe County	667.4	877.7	333.2	608.4	706.0
Percent Premature Deaths (<75 years)					
New York State	33.9%	60.0%	49.5%	59.5%	40.0%
Monroe County	30.0%	70.0%	53.5%	68.2%	35.4%
Unintentional Injury Mortality (per 100,000, age-adjusted)					
New York State	24.2	15.9	10.0	17.9	22.4
Monroe County	23.2	23.7	13.3~	20.3	24.4
Unintentional Injury Hospitalizations (per 10,000, age-adjusted)					
New York State	57.9	54.3	26.7	49.3	64.5
Monroe County	57.9	61.0	20.8	46.2	60.9
Asthma Hospitalizations (per 10,000, age-adjusted)					
New York State	9.5	39.2	6.7	34.6	20.3
Monroe County	6.5	31.5	3.4~	28.9	11.5
Diseases of the Heart Mortality (per 100,000, age-adjusted)					
New York State	205.7	223.2	108.5	163.2	207.6
Monroe County	154.3	190.3	61.9	138.0	160.5
Chronic Lower Respiratory Disease/Chronic Obstructive Pulmonary Disease Mortality (per 100,000, 18+ Years)					
New York State	60.5	24.3	8.4	14.6	44.6
Monroe County	53.2	21.0	N/A	11.5~	45.5
Diabetes Mortality (per 100,000, age-adjusted)					
New York State	14.4	30.3	11.2	21.7	16.6
Monroe County	9.7	30.6	N/A	21.2~	11.9
Drug-related Hospitalizations (per 10,000, age-adjusted)					
New York State	18.6	44.9	2.6	29.0	27.2
Monroe County	12.5	35.2	2.5~	20.1	16.5
Suicide Mortality (per 100,000, age-adjusted)					
New York State	7.7	3.2	4.3	4.2	6.8
Monroe County	7.7	3.4~	N/A	9.0~	7.3

~ Rate is unstable because there are fewer than 20 events in the numerator

Sources: New York State Department of Health. *Monroe County health indicators by race/ethnicity, 2008-2010*. 2012; <http://www.health.ny.gov/statistics/community/minority/county/monroe.htm> and *New York State health indicators by race/ethnicity, 2008-2010*. 2012; <http://www.health.ny.gov/statistics/community/minority/county/newyorkstate.htm>

Obesity

Obesity contributes to health conditions including “heart disease, stroke, type 2 diabetes and certain types of cancer, some of the leading causes of preventable death” [22]. Obesity is also associated with risk of some kinds of cancer, as well as other diseases not within the scope of Healthy Waterways [23].

Because of these connections, obesity is a health indicator of great concern. An adult who has a BMI of 30 or higher is considered obese; a BMI between 25 and 29.9 is considered overweight. For children, obesity is defined as a BMI at or above the 95th percentile for children of the same age and sex.

Obesity among NYS adults increased from 17.7% in 2000 to 24.5% in 2010, just below the national median rate of 27.6% [24]. Statewide, men (25.7%) are slightly more likely to be obese than women (23.4%), and Blacks (35.4%) and Hispanics (25.7%) have higher rates than Whites (23.9%). The highest rates occur among those with a household income below \$15,000/year (36.1%). Between 2006 and 2009, Monroe County’s obesity rate climbed from 27% to 31.7%. The statewide rate in 2009 was 23.1 % [25].

Within Monroe County, the 2006 MCAHS shows that obesity rates in the city are slightly higher compared to the suburbs, but more people in the suburbs are overweight. Obesity and overweight rates are significantly higher among males, African Americans, and Latinos (Table 3F). Although the MCAHS does not report obesity by income, statewide data suggests rates are highest among those with very low income [24].

Childhood obesity is of particular concern because overweight children tend to remain overweight into adulthood. Obese children are also likely to have more severe obesity as adults [26]. The New York State Comptroller recently stated that New York “has a childhood obesity crisis,” affecting one in four children in the state [27]. According to the 2011 update of the Monroe County Maternal and Child Health Report Card, 14% of Monroe County children aged 2-10 years are obese; another 14% are overweight [28]. According to the report, the proportion of children who are overweight or obese is higher in the city (36%) than the suburbs (25%). Hispanic children (42%) and African American children (34%) are more likely to be obese or overweight than are White children (23%). Similarly, the Monroe County Adolescent Health Report Card reports that among 11-18 year olds, the prevalence rates of obesity and overweight are higher in the city (45%) compared to the suburbs (41%) [29].

Cardiovascular Disease and Stroke

Cardiovascular disease and stroke are two of the leading causes of death in the United States [30]. Statewide, age-adjusted mortality per 100,000 from heart disease (including stroke) is 207.6 per 100,000 [18] (Table 3E). Although the rate in Monroe County is much lower – only 160.5 – heart disease and stroke are the leading causes of death in the county. Rates for all ethnic groups are lower

Table 3F: Obesity and Overweight in Monroe County

	Monroe County ^a	Monroe County by Age Group		Monroe County Age 18+ by Race/Latino Origin			Monroe County Age 18+		Monroe County Age 18+	
	Age 18+	Age 18-64	Age 65+	African American, not Latino	White, not Latino	Latino	City	Suburbs	Male	Female
Obese (BMI ≥30)	27%	27%	24%	39% ^b	24%	37% ^b	28%	26%	28%	26%
Overweight (BMI ≥25 and <30)	35%	33%	44% ^b	28%	36% ^b	22%	32%	36%	41% ^b	28%
Overweight or Obese (BMI ≥25)	61%	60% ^b	68%	67%	60%	59%	59%	62%	69% ^b	54%

^a The 2010 Monroe County obesity rate goal was 15%

^b Significantly higher than rate for comparison group

Source: MCDPH, 2006 Monroe County Adult Health Survey Report, <http://www2.monroecounty.gov/health-healthdata.php>

in Monroe County than statewide, but mortality for Blacks (190.3) and Whites (154.3) is higher than for Hispanics (138.0) [17].

The MCAHS reports that eight percent of Monroe County adults have been told by a health professional that they had a heart attack or stroke, or that they have angina or coronary artery disease [16]. These conditions are far more common in older people, particularly men over age 65 (Table 3G).

Diabetes

Diabetes is a chronic disease in which blood glucose levels are above normal. Diabetes can cause heart disease, blindness, kidney failure, and lower-extremity amputations; it is the seventh leading cause of death in the U.S. [31]. People who are older, obese, have a family history of diabetes, or are physically inactive are at greater risk, as are African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Pacific Islanders. According to the CDC, 26 million Americans have diabetes, including over a quarter of the population over age 65 [32].

Table 3G: Proportion of Monroe County Residents with Heart Disease or Related Conditions [16]

	Under age 65			65+		
	Total	Male	Female	Total	Male	Female
Have had a Heart Attack or Stroke, or Have Angina or Coronary Artery Disease	4%	5%	2%	27%	39%	19%

Source: MCDPH, 2006 Monroe County Adult Health Survey Report, <http://www2.monroecounty.gov/health-healthdata.php>

In New York State, diabetes mortality is 16.6 per 100,000 (Table 3E). Rates are highest for Blacks (30.3) and Hispanics (21.7), and lowest for Whites (14.4) [18]. Although overall rates are lower in Monroe County (11.9), the diabetes mortality for Blacks in Monroe County (30.3) is not significantly lower than for Blacks statewide (30.6) [17].

In 2006, 10% of Monroe County adults reported in the MCAHS that they had been told by a medical professional that they have diabetes [16], double the rate in 2000 [16]. The most significant increases were among adults over the age of 30 [16].

Respiratory Health

Asthma

According to the CDC, asthma affects one in twelve Americans (9.5% of children and 8.2% of adults), and is one of the most common chronic diseases among children [33]. Asthma attacks may be triggered by allergies (to dust mites, mold, pets, etc.), tobacco smoke, outdoor air pollution, intense exercise, or other causes [34]. Although there is still uncertainty about how and to what extent air pollution affects asthma, it is widely accepted that air quality plays an important role in development of asthma and triggering asthma attacks [35,36].

Severe asthma attacks may lead to death; more commonly, asthma is a cause of hospitalizations, and indirectly contributes to many other health conditions. For example, asthma may keep a person from exercising enough to stay healthy. Asthma is also a common reason for missed school and work [34]. Asthma was the primary concern raised by stakeholders related to respiratory health in the waterfront area. BRFSS data indicates that asthma hospitalizations in Monroe County (11.5 per 10,000) are only half the statewide rate (20.3). However, there are concerns that asthma rates have been increasing over time, and that they are elevated among minority and low-income children in the city. The rate of asthma hospitalizations in Monroe County among Blacks (31.5) and Hispanics (28.9) is nearly five times that among Whites (6.5) (Table 3E). The MCAHS confirms that the number of adults living in the City of Rochester who reported having ever been told they had asthma (16%) was higher than suburban residents (12%).

In 2010, the Regional Community Asthma Network surveyed school nurses about asthma prevalence, and found nearly twice the reported rate in the city (15.7%) than the suburbs (8.6%) [37]. Rates were highest in zip codes clustered around the center of the city. This data supports stakeholder observations that problems related to asthma are most severe for low-income and minority children living within the City of Rochester.

Chronic lower respiratory diseases and chronic obstructive pulmonary disease (COPD)

Another concern mentioned by stakeholders was the impact of air pollution on people with ongoing breathing problems. Chronic lower respiratory diseases (CLRD), including chronic obstructive pulmonary disease (COPD), are the third leading cause of death in the country, affecting one in twenty adults [38]. COPD is associated with current or past smoking and it is most common among older adults.

The death rate from chronic lower respiratory diseases in Monroe County (45.5 per 100,000) is similar to the statewide rate (44.6), and is higher among Whites (53.2) than Blacks (21.0) or Hispanics (11.5) in the county (Table 3E). The American Lung Association reports that Caucasians experience significantly higher rates of COPD nationwide [39]. Although the MCAHS does not address CLRD/COPD directly, it does ask about smoking rates. In the 2006, 18% of adults reported smoking; in all age groups, smoking rates were highest among city residents, and lowest among those over age 65 (7%) [16].

Summary of Respiratory Health

Although there is limited data on prevalence of respiratory disease among different populations within the city, national data and medical research suggests that respiratory diseases are likely to be elevated among Black children (asthma) and older adults (CLRD) [33,40]. Physical activity helps prevent and reduce many problems related to respiratory disease. At the same time, it can be particularly dangerous to exercise vigorously in polluted air, especially for those with existing breathing problems like asthma and CLRD. Therefore, changes in the waterfront that affect physical activity and/or air quality may have implications for respiratory health.

Air quality in Rochester has significantly improved in recent years, reaching attainment of the U.S. EPA standards in all categories, with the exception that ground level ozone concentrations are at marginal non-attainment levels [41]. Ground level ozone can worsen chronic respiratory diseases such as asthma, bronchitis and emphysema [42]. Air quality is likely to be worse in areas of high traffic and during hot days when ozone concentrations are highest. Thus, some people's respiratory health may be impacted if waterfront development significantly increases automobile or marine traffic near trails and beaches, particularly on hot summer days.

Physical Injury and Death

Stakeholders expressed concerns about physical injury from violent crime, pedestrian or bicycle collisions, and the risk of drowning in waterfront areas. There is limited data about these types of injuries specifically within the LWRP boundary; however, general statistics provide some context for these risks. Examples of injuries related to the LWRP include unintentional injuries (such as those caused by motor vehicle crashes or drowning) and intentional injuries (such as violence).

Unintentional injury is a significant cause of hospitalization and mortality; it is the leading cause of death for New Yorkers between the ages of 1 and 44 [43]. Mortality from unintentional injury in New York State is 22.4 per 100,000; Monroe County's rate is somewhat higher (24.4), but the rate of unintentional injury hospitalizations (60.9 per 10,000) is lower than the statewide rate (64.5) [17,18]. Statewide, these rates do not vary greatly by race or ethnicity (Table 3E).

Motor Vehicle Collisions and Bicycle/Pedestrian Safety

Many unintentional injuries are from motor vehicle collisions, a large proportion of which involve bicycles or pedestrians. In 2010, pedestrians made up 13% of motor vehicle crash deaths in the US; bicyclists accounted for only 1.9% [44,45]. Interestingly, although most motor vehicle crashes occur at intersections, those involving pedestrian and bicyclist fatalities occur more often at non-intersections. In 2010, 72% of bicyclist and 73% of pedestrian fatalities occurred in urban areas [44,45]. Monroe County's transportation-related pedestrian death rate is 0.93 per 100,000 (48 deaths between 2000 and 2006) [46]. Although we were unable to determine the rate of motor vehicle injury within the LWRP boundary, studies show that rates of pedestrian and bicyclist injury and death are lower where these travelers are separated from motor vehicle traffic [47]. There is limited information about non-motor vehicle bicycle collisions and crashes. For LWRP elements that have the potential to alter traffic patterns, the impact on pedestrians and cyclists should be carefully considered and plans should be developed to minimize additional risks.

Drowning

According to the CDC, "drowning is the sixth leading cause of unintentional injury death for people of all ages, and the second leading cause of death for children ages 1 to 14" [48]. However, the number of deaths on Rochester's waterways is very low. In fact, beach managers have reported no drowning deaths at Ontario and Durand beaches while lifeguards were on duty. The Monroe County Department of Public Health documented that there were 3 drowning deaths in "natural water" (i.e. not pools) in the City of Rochester between 2007 and 2011 [49]. The health department does not have documentation about which waterbody (river, lake or canal) or the situation in which the deaths occurred (i.e. boat accident, fall, swimming, etc.). Confirmed suicides are not included in this number. While this data may be incomplete, it does suggest that drowning along Rochester's waterfront is rare.

Table 3H: 2012 Part I Violent Crime Rate of waterfront tracts compared to citywide

	1st Quintile (Highest Rates)	2nd Quin- tile	3rd Quin- tile	4th Quin- tile	5th Quintile (Lowest Rates)
Waterfront Tracts in Quintile^a	17%	10%	23%	30%	20%
Quintile comprised by Waterfront Tracts	31%	19%	44%	56%	38%

^a Excludes census tract 9801 (Durand Eastman Park) because of its low population.

Source: Rochester Police Department, 2012 Rochester Crime by Census Tract, provided by RPD staff in 2013 (rates are based on 2010 U. S. Census population data)

Violent Crime

Violent Crime is defined in this report as including murder, rape, robbery and aggravated assaults. These are classified as Part I Violent Crimes under the NYS Uniform Crime Reporting standards [50]. Some survey participants and stakeholders discussed fears related to violent crime and theft along the trails specifically. Although data is not available about the number/type of crimes that actually occur within the LWRP boundary (particularly on waterfront trails, beaches, and parks), staff at the Rochester Police Department noted that crime is generally low on the trails, and that the most frequent crime that occurs on trails is robbery (theft under the threat of violence). Table 3B includes 2012 violent crime and robbery-only rates for the neighborhood groups and citywide.

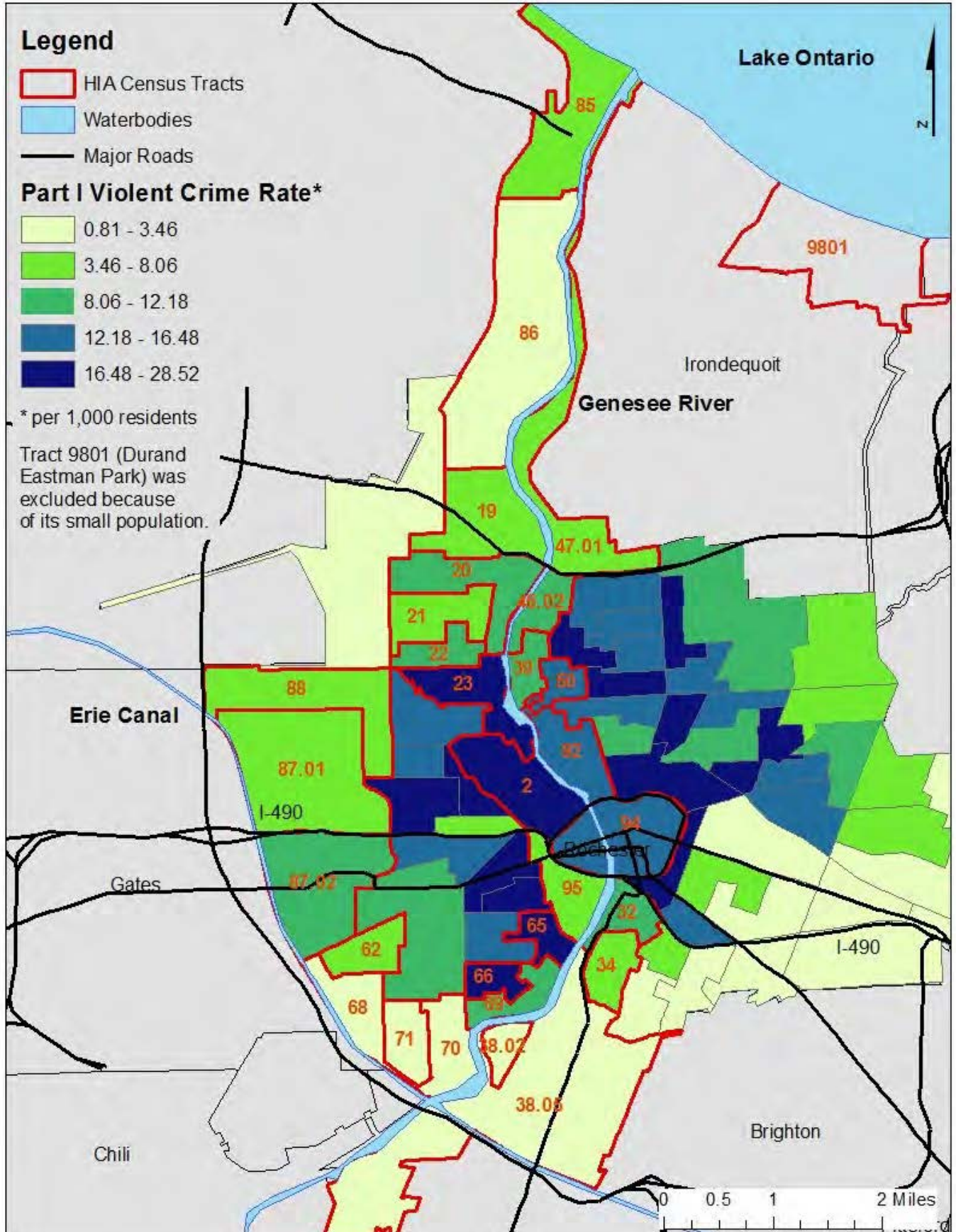
Overall, the violent crime rate within the waterfront neighborhoods was lower (7.94 per 1,000) than the citywide rate (9.19 per 1,000). However, some areas within the neighborhood groups had higher rates than others. For example, 17% of the 30 waterfront tracts were among the top 20% of all tracts in the city for violent crime (Table 3H; Map 3B). The highest violent crime rates were in CUBE (17.73) and PLEX (15.48), and the highest robbery rate was in CUBE (8.11, versus 3.81 citywide and 3.14 across all waterfront tracts). Because these are tract-wide rates, it is impossible to tell whether these crimes occurred within the LWRP boundary or elsewhere in that census tract.

As discussed below, there are significant stakeholder concerns about crime rates on waterfront trails. Perception of crime on trails may be related to respondents' experience with crime or violence in their neighborhoods or areas surrounding trails. Fears may also be related to personal experience or word-of-mouth regarding isolated events. It is also clear from the data, however, that crime is a real threat for some residents along the waterfront, particularly in PLEX and the CUBE neighborhood groups.

Summary of Unintentional Injury and Violence

Although crime, safety, and collisions are of concern to local stakeholders, there is limited data on their current distribution within waterfront geographies and populations. Although rates of pedestrian and bicycle collisions and drowning are currently low, stakeholders expressed concerns that future changes to the waterfront could increase these risks.

Map 3B – Violent Crime Rate by Census Tract (Quintiles)



Part I Violent Crime data provided by the Rochester Police Department

Mental Health

Mental health includes emotional, psychological, and social well-being, all of which may be impacted by social determinants including housing, economic stability, stress, and neighborhood safety. Poor mental health may prevent people from functioning in society (being able to work, maintain relationships, etc.). Conversely, good mental health is associated with improved physical health outcomes [51].

Stakeholders expressed concern about mental health problems, stress, and social cohesion in waterfront neighborhoods, as well as the potential of changes in the waterfront to affect residents' mental health (either positively or negatively). Measuring mental health is difficult, since there is no single indicator of individual well-being. Related indicators reported by the NYS Department of Health include substance abuse (drug-related hospitalizations) and suicide mortality rates. Monroe County's drug-related hospitalization rate (16.5 per 10,000) is well below the statewide rate (27.2), but is elevated for African Americans (35.2) [17,18] (Table 3E).

Suicide mortality in Monroe County (7.3 per 100,000) is slightly higher than the statewide rate (6.8). The suicide rate is highest among Latinos (9.0) and Whites (7.7), and is lowest among Blacks (3.4). However, the MCAHS, which asked respondents if they had made a plan to attempt suicide in the past year, paints a different picture. According to the survey, African Americans (1.6%) and Latinos (3.0%) were more likely to respond affirmatively than were Whites (0.5%).

The 2006 MCAHS provides additional insight into the mental health status of populations within Rochester. Twelve percent of city residents and 7% of suburban residents age 18-64 responded that they had "Frequent Mental Distress" (stress, depression, or emotional problems more than 14 of the past 30 days) [16]. African Americans (13%) and Latinos (20%) were more likely to report Frequent Mental Distress than were Whites (6%) and non-Latinos (7%) [16]. For most of the indicators of functional limitations due to mental health issues, City of Rochester residents were more likely to report problems than suburban residents, and African Americans and Latinos were more likely than Whites to report problems. In both the city and suburbs, a higher proportion of people reported functional limitations in 2006 than in 2000.

The Monroe County Adolescent Health Report Card summarizes additional information about mental health among youth, much of which is derived from the Monroe County Youth Risk Behavior Survey (MCYRBS). According to this report, suicide is the 3rd leading cause of death among Monroe County youth. Most of the suicides were among males (81%) and among suburban youth (67%). However, females were more likely than males to report mental health problems [29].

With a few exceptions, local data suggests that city residents and racial minorities have poorer overall mental health. Stakeholders agreed that stress and mental health problems are greatest

among low-income and minority residents in Rochester. This is consistent with research on mental health and income, which has generally found that economic stress, low education, exposure to violence, and poverty are associated with poorer mental health. Studies suggest that for those who are poor, moving to more affluent neighborhoods can improve mental health [52]. According to our southwest community survey, 22% of residents in southwest Rochester reported feeling stressed “often” and 45% felt stressed “sometimes.” Thus, changes in the waterfront that reduce stress and improve mental health may particularly benefit low-income and minority residents.

Waterborne Disease

Surface water quality is not often thought of as a determinant of health. However, people can become sick from swallowing water contaminated with harmful bacteria [53,54]. The primary indicator of concern is *E. coli*, a bacteria that can cause gastrointestinal effects, eye irritation, and rash, and may indicate the presence of other pathogens [55]. The Monroe County Department of Environmental Services currently monitors water quality for bacteria levels (weekly in the Genesee River and daily at the swimming beaches during swimming season).

MCDPH has not conclusively linked any human illness to waterborne pathogens in recent years. However, 6% of our beach survey respondents reported “getting sick after swimming.” Because the symptoms of most waterborne disease are similar to food poisoning, common viruses, and other illness, people seldom recognize or report water-borne illness. Likewise, because people often combine visits to the beach with other activities, it is difficult to confirm the source of illness when people report getting sick after swimming. Because of this, the best way to monitor human health threats is continued water quality monitoring.

An additional water quality concern is toxic cyanobacteria (blue-green algae) blooms, which have been increasing in Lake Ontario [56]. These have been observed near, but not in, Rochester waters in recent years. The health outcomes of human exposure to algal scum are unknown, but pet deaths have been reported [56,57]. The toxins in cyanobacteria blooms can affect the liver and nervous system, and can produce nausea, vomiting, diarrhea, skin or throat irritation, allergic reactions or breathing difficulties [57]. Cyanobacteria blooms may also contribute to Type E Botulism outbreaks, which have led to the deaths of thousands of fish and fish-eating birds in Lake Ontario [58,59]. To date, no human illness or deaths have been officially attributed to cyanobacteria blooms or Type E Botulism in the Rochester area, but this is a concern for the future [58,59].

Monitoring waterborne disease is complex because of the multiple pollutants, exposure routes, and non-specificity of symptoms. Although monitoring water quality is simpler, there is not a direct correlation between poor water quality and human health. That is, when water quality is poor, people who come in contact with the water may or may not get sick. Additionally, exposure may be modified by behavior in complex ways. For example, one study found that kayakers on waters rated

as cleaner were exposed to more bacteria than those boating on more contaminated waters because they were more likely to perceive the water as clean and to submerge and swallow water [55,60].

In addition to waterborne disease, water quality may affect human health in other ways. Excessive consumption of fish from water contaminated with toxic chemicals may contribute to long-term health problems.¹⁰ Bacteriological pollution may lead to beach closures, resulting in reduced physical activity opportunities. Several of these effects are referred to in Chapter 4, but a detailed assessment is beyond the scope of this report.

Summary of Current Health Conditions

Obesity, cardiovascular disease, stroke, and diabetes are significant causes of death for all populations in Rochester's waterfront. However, these health issues are of particular concern among low-income and minority residents in the City of Rochester. Asthma is also an important health issue for children living in the City of Rochester. Local mental health data is limited, but correlates with national data and research studies that suggest racial and ethnic minorities and low-income populations are disproportionately affected by poor mental health. Physical injury related to crime and pedestrian/bicyclist injury may have lower rates along trails than perceived by the public, but several waterfront neighborhoods have high violent crime rates compared to the rest of the city. Concerns about crime-related injury are more common in trails and parks adjacent to these neighborhoods. Drowning in local waters appears to be rare; however, stakeholders voiced concern about changes (such as promoting fishing, swimming, and boating) that might increase these risks. Finally, waterborne disease is difficult to monitor. However, the potential for disease exists, especially if waterfront changes result in increased direct- or limited-contact recreation in polluted waters.

The majority of this summary relies on national (CDC), state and county health department data, which are updated regularly. In addition, several community and interest groups regularly compile, analyze, and synthesize health data that may be useful for updating these assessments over time. For example, the Finger Lakes Health Systems Agency produces reports from Rochester's African American Health Coalition ("What's going on?") and Latino Health Coalition ("Nuestra Salud"). Updated reports, expected by June 2013, will provide additional information on the distribution of health conditions among minority populations in the Finger Lakes region.¹¹ In addition, several neighborhood groups maintain websites that may have additional information on health risks and impacts. For example, www.location19.org, a web site for southwest Rochester, maintains a list of interest groups and blogs on bicycling options, crime concerns, and many other local issues.

¹⁰ Current NYSDOH guidelines recommend that women younger than 50 years and children under 15 not eat fish from Lake Ontario or connecting waters due to PCB, Mirex and Dioxin contamination. Others are advised to not eat certain species, and to eat no more than one a month of the least contaminated fish.

¹¹ www.flhsa.org/Reports.html



Current NYSDOH guidelines recommend that women and young children not eat fish from Lake Ontario or connecting waters. Others are advised to not eat certain species, and to eat no more than one a month of the least contaminated fish. However, fishing is also an important recreational and/or cultural practice for many families in Rochester. Subsistence anglers also rely on locally caught fish as an inexpensive food source.

Chapter 4: Current Conditions – Waterfronts and Health

Introduction to Health Determinants

As noted in Chapter 2, stakeholders initially identified nine health determinants of interest related to the LWRP, from which four were identified as being most strongly connected with the health outcomes of concern: physical activity, water quality, health-supportive resources, and physical safety. This section provides an overview of the evidence linking the four key health determinants of interest to the priority health outcomes. Figure 2A depicts a simplified pathway outlining these connections.

It is important to note that many of these health determinants are interrelated. For example, improving perceived safety of an area may increase people’s use of opportunities for physical activity there. For each health determinant, this chapter summarizes its relationship to waterfront development, the current status of that health determinant in Rochester’s waterfront, and evidence (based on literature, local data, experience of other communities, and survey data) of its impacts on specific health outcomes. Where information is available, the five additional health determinants are briefly discussed. Chapter 5 builds on these health determinant descriptions by analyzing how different elements of the LWRP are likely to affect them in the future.

Physical Activity

Waterfronts and Physical Activity

Waterfront property is prime real estate for housing, restaurants and shops. In many communities, waterfronts are also the focus for public spaces and resources that promote walking (“walkability”), active transportation, and active recreation. For example, waterfront walking and biking trails, swimming at beaches, and other water-based recreation (kayaking, rowing, fishing, etc.) may also provide physical activity opportunities.

Current Physical Activity Resources Along Rochester’s Waterfronts

The Genesee Riverway Trail (GRT) offers access to biking, walking and other trail activities along the river from Genesee Valley Park north to Lake Ontario. While most of the trail is continuous, some portions require users to travel along roadways. At the lake, Ontario and Durand beaches provide access to swimming, beach volleyball, wind surfing, fishing, and other activities. The Genesee Waterways Center offers canoeing and kayaking in southwest Rochester.

Health Determinants

- Physical Activity*
- Water Quality *
- Health-supportive Resources*
- Physical Safety*
- Sun Exposure
- Air Quality
- Environmental Toxins
- Insect-borne disease
- Stress

*Denotes a key health determinant assessed in this chapter

Key Health Outcomes

- Obesity
- Heart disease
- Stroke
- Diabetes
- Cancer
- Respiratory health
- Physical injury and death
- Waterborne disease
- Mental health

There are many efforts in Rochester to promote physical activity among populations at high risk for diabetes, obesity, and heart disease. However, there are also many environmental barriers to physical activity, including crime and sense of security, accessibility, and lack of access to water-based physical activity.

Physical Activity and Health

Physical activity is an essential part of maintaining good health. The CDC recommends that adults engage in moderate exercise for at least 150 minutes per week, or in vigorous exercise for at least 75 minutes per week, plus muscle-strengthening exercises [61]. Physical activity helps maintain a healthy weight, strong bones and cardiovascular health [62]. Research has also shown that physical activity can reduce the risk of developing heart disease, high blood pressure, diabetes, and certain cancers, and can increase a person's overall lifespan [63]. Physical activity has been shown to improve mental health and improve children's performance in school [64-68]. Outdoor active recreation or exercising in groups may also help build social cohesion, which may contribute to good health in other ways [69].

Not only is physical activity important to prevent health problems, but it can also improve the health of people with chronic health problems such as COPD and asthma. People living with COPD are encouraged to increase their physical activity [70-73]. Individuals with asthma are advised to exercise regularly to reduce symptoms and improve their overall quality of life [74]. However, certain conditions such as poor air quality and allergens may trigger asthma during exercise, making it sometimes difficult to exercise outdoors [75].

Many factors affect the amount of physical activity a person engages in, including personal choice, nature of their daily work, access to exercise resources and the "walkability" of the community - proximity to destinations, sidewalks, aesthetics, parks and open spaces, etc. [76,77]. Given the current concerns about obesity in the U.S., there is increasing interest in how environmental factors can promote physical activity.

Current Status of Physical Activity Among Affected Populations

Physical inactivity, defined as participating in no or irregular physical activity, has been shown to be more prevalent among racial and ethnic minorities than among Caucasians [78]. The MCAHS showed that the percentage of adults reporting no leisure-time physical activity was 15% in 2006 [16]. This report showed the percent of respondents engaged in no leisure-time physical activity improved from the 2000 survey for all sub-populations except African Americans (34%) and Latinos (36%). The statewide rate for no leisure-time physical activity in 2007 was 24.4% [79].

Overall, 53% of MCAHS respondents reported engaging in the recommended amount of physical activity, but only 46% of African Americans and 42% of older adults [16]. Our survey of southwest community residents supports the racial disparity in physical activity; Black respondents were less likely to report meeting the physical activity guidelines than those of other races.

Summary

This overview highlights the importance of access to physical activity opportunities. Evidence of racial and ethnic differences in physical activity indicates that enhancing opportunities near neighborhoods with high minority populations may particularly benefit these individuals. Low-income residents, children, and older adults with limited transportation options are also likely to benefit from enhancement of free, nearby activity resources. Chapter 5 further discusses how changes within the waterfront may affect physical activity for specific populations.

Water Quality

Waterfronts and Water Quality

Water quality, people's recreational choices, and waterfront management interact in complex ways. Changes in the waterfront may improve (e.g. green infrastructure that reduces pollution from stormwater) or worsen (e.g. runoff from construction of additional paved surfaces) water quality. In addition, water quality affects how people use the water. For example, beach closings reduce opportunities for swimming, and noxious odors from decaying algae may drive users away. Finally, waterfront development may affect people's use of and exposure to water through changes to public access points, activities (e.g., boat rentals), lifeguarded beaches, etc.

Water Quality and Health

Water quality has the potential to impact health in several ways. Swimming and limited-contact water recreation activities such as boating may expose users to bacteria and other pollutants that can cause illness (see section on water-borne disease, Chapter 3). However, these activities help residents achieve recommended physical activity levels and cool off during the summer. Thus, there may be trade-offs between beach closures due to poor water quality and the health benefits of physical activity and reduced risk of heat stroke for some populations.

Current Conditions: Water Quality and Health

As noted in Chapter 3, there is little evidence that poor water quality has directly affected human health in Rochester through waterborne disease. However, beach closures or the perception of poor water quality may prevent people from participating in active water-based recreation. The New York State Department of Environmental Conservation (DEC) monitors water quality in the Genesee River and Erie Canal [80]. DEC classifies surface waters according to their "best uses" based on standards set forth in the federal Clean Water Act. The Genesee River is a Class B water (swimming, boating, and fishing) and Lake Ontario around the Rochester Embayment is Class A (same as Class B and also drinking water) [81]. Both are considered "impaired," which means that they do not consistently meet water quality standards needed to support their "best uses." The source of impairment listed for the Rochester Embayment (Lake Ontario shoreline) is pathogens from urban stormwater runoff; the Lower Genesee is impaired by excess phosphorus, pathogens, silt and sediment from multiple sources [82].

Water quality at Rochester’s bathing beaches (Ontario and Durand) is of particular concern. Water quality conditions sometimes require that beaches be closed to protect human health. Water clarity is primarily of concern for safety (lifeguards are unable to see swimmers), and high bacteria counts indicate a potential for water-borne disease.

Monitoring at the bathing beaches is used to determine when it is necessary to close beaches for swimming. Because bacteria tests take several hours to complete, the County bases closings for water quality off the prior day’s levels. In 2012, Ontario Beach was closed 44 out of 81 days; 70% of these closures were because of bacteria counts the day before. Durand Beach was closed 14 out of 72 days, 56% of which were due to bacteria levels the day before. Other possible reasons for beach closure include rainfall amounts, river flow, water clarity and algae.

It is difficult to quantify how the current condition – or perception – of water quality affects human health. Nearly 80,000 bathers were counted at Ontario and Durand Beaches in 2012.¹² If the beaches were never closed due to water quality problems, one might expect the total number of users to be over 100,000. In addition, stakeholder input and comments made on public surveys suggest that many people do not engage in water-based recreation in Rochester because they believe the water quality is unsafe.

Summary

Water quality interacts with other health determinants. Improved water quality may increase active (physical activity) or passive (health-supportive resources) use of the waterfront. These changes may be particularly important for low-income residents of waterfront areas who lack transportation to alternative resources. Water quality’s role as a health determinant is discussed in Chapter 5 under sections that relate to improving water quality (stormwater management) and water-based recreation.

Health-supportive Resources

“Health-supportive resources” is an umbrella term for the features of the built environment that contribute to individuals’ health by making available goods and services that are known to support good health. Although it is difficult to quantify how any one health-supportive resource contributes to health, research at the community level shows that the presence of accessible health-supportive resources is an important determinant of individual health [83-87]. In many cities, waterfronts are hubs for multiple activities and types of spaces, both public and private, many of which can be considered health-supportive resources. Civic spaces such as parks, schools and libraries can provide numerous health benefits, as can social and medical service outlets, and private businesses such as full-service grocery stores.

¹² This number is a tally of bathers observed each day – some users were certainly counted multiple times – but does not count people who did not swim or who used the beach when it was not officially open.

We focused on health-supportive resources that were emphasized by stakeholders during our scoping process. These include healthy retail (access to healthy food and limited unhealthy options), employment and economic opportunities, healthy and affordable housing, public gathering spaces, health care services, and educational opportunities. For each, we briefly describe the links to health outcomes (based on existing literature) and current status of that resource in Rochester’s waterfront. Trails, parks and beaches also provide active recreation opportunities; their roles as physical activity resources are addressed in the section on physical activity (above).

Current Conditions of Health-supportive Resources in Rochester’s Waterfront

Because these resources vary so much throughout the waterfront area, we briefly characterize their distribution in this section. Additional detail with respect to specific LWRP elements can be found in Chapter 5.

Healthy Retail

Certain kinds of commercial and retail services may undermine health, while others support healthy lifestyles. We use the term ‘healthy retail’ to describe a commercial environment which offers access to healthy food and limited fast food, alcohol and tobacco outlets [88]. For example, we refer to corner stores that sell tobacco products, alcohol outlets, and pawn shops as “unhealthy retail.” According to stakeholders, several neighborhoods in or adjacent to the waterfront, including PLEX, have high concentrations of unhealthy retail. In October, 2012, concerns about the cumulative effect of these establishments in many Rochester neighborhoods led City Council to redefine categories for retail sales and services, amend the zoning code to include a distance requirement between high-impact stores, and change the business permit process to encourage more face to face interaction with administrators and resident groups.

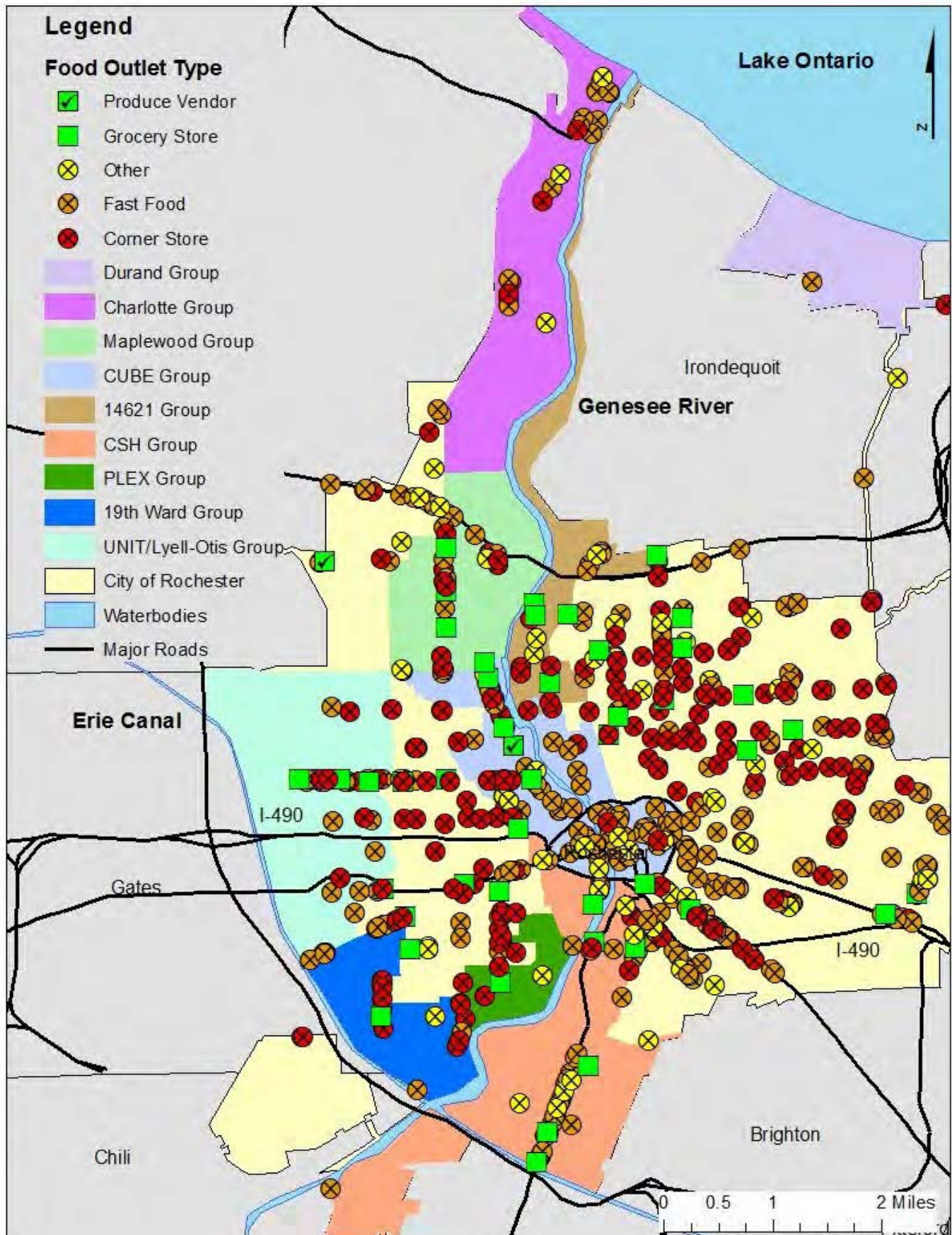
Among other social, cultural and environmental factors, access to healthy food has been associated with obesity [89]. Living in a “food desert” – an area characterized by low availability or high cost of healthy foods and/or high concentration of unhealthy food options – has been linked to higher rates of obesity [90]. Recent unpublished research from the University of Rochester showed that many neighborhoods in Rochester, including several adjacent to the waterfront, are food deserts [91].

The few grocery stores located in or near the waterfront boundary are concentrated in the central parts of the city (Map 4A). Farmers’ markets are available in five of the waterfront neighborhoods.¹³ Two of these markets operate year round. Southwest Rochester, in particular, lacks year-round access to produce. Community efforts including the Westside Farmers’ Market, produce stands operated by Food Link, and the Grow Green youth entrepreneurship program that sells produce and vegetable plants all help address the food desert problem during the growing season. Southwest community survey responses indicated that a full-service grocery store would have a strong positive influence on health.¹⁴ During community input forums related to the Vacuum

¹³ <http://www.snaptomarket.com/locations.php>

¹⁴ On a scale of 1 to 5 with “1” indicating the most positive effect on health, survey respondents ranked a full service grocery store at 1.6 (average rank). Refer to the Southwest Community Survey Report at <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html> for more information.

Map 4A: Food Outlets in the City of Rochester by Type



Neighborhood data provided by the City of Rochester. Food outlet data provided by Dr. Stephen Cook, University of Rochester Medical Center, Department of Pediatrics

Oil brownfield redevelopment in southwest Rochester, PLEX, Corn Hill (part of the CSH neighborhood group) and 19th Ward residents expressed a strong desire for a local retailer to provide fresh produce and other healthy foods at low cost and year-round. Residents saw a full service grocery as both an economic and health benefit. In response to this feedback, the brownfield development plan includes retail space for a full-service grocery store.

Employment and Economy

Economic status is correlated with a wide variety of health outcomes [92-95]. Opportunities for employment and economic security are therefore key to improving community health. Economic improvements brought by development may also lower stress. One study found that residential stability and affluence can also attenuate the negative health effects related to stress [96]. Some waterfront neighborhoods, such as Corn Hill, have experienced significant redevelopment recently. Nonetheless, some of the most attractive opportunities for development in Rochester are located along the waterfront, including the center city, PLEX and the Port of Rochester. The populations of many of these neighborhoods are economically stressed. As shown in Chapter 3 (Table 3B), many of the waterfront neighborhoods have mean incomes well below the citywide average. Unemployment ranges from 9 % to 21% among waterfront neighborhood groups. In addition to unemployment, other economic burdens include a high residential property tax rate, which has resulted from Rochester's declining corporate tax base. The 1999 LWRP focuses on the potential to increase tourism and economic development centered around Rochester's waterfront. Thus, waterfront development that improves the economics status of waterfront neighborhoods could positively impact health.

Healthy and Affordable Housing

Finally, numerous health problems ranging from lead poisoning to asthma can result from lack of healthy and affordable housing [97]. Housing in Rochester is less expensive than in many cities, with a median housing value of \$74,000 and a median gross rent of \$733 per month [98]. However, because of low incomes, many Rochester residents nonetheless pay more than 30% of their income for housing [99].

The city's system of periodic inspection of all rental units helps insure healthy housing, with a particular focus on finding and citing lead hazards. Between 2006 and 2011, 13% of inspected rental housing had an exterior lead hazard, and only 6% had deteriorated paint inside the unit [100]. The County's Healthy Neighborhoods Program conducts assessments and interventions in a limited number of city zip codes [101].

Rochester is generally considered to have excess housing, as evidenced by its vacancy rate. However, due to the desirability of waterfront property, there is the potential for upscale redevelopment near the waterfront to displace lower-income residents or make affordable housing locally unavailable.

Public Gathering Spaces

Public spaces can support passive recreation (fishing, picnicking, etc.) that can reduce stress and improve mental health [102]. Research in environmental psychology suggests that access to green and natural spaces improves the well-being of people living in urban neighborhoods [103-105].

In addition, public spaces can provide opportunities for people to interact with friends, families, and neighbors. Research has shown that, through providing such opportunities for interaction, the built environment can improve social networks, support, and trust [106]. Such connections contribute to what is sometimes called “social capital” or the “fabric of the community” [69]. Here we use the term “social cohesion” to refer to how strongly people feel connected to and trusting of their neighbors and community members. Social cohesion has been shown to be supportive of both mental and physical health [107,108]. Social cohesion may directly influence health by reducing stress, providing access to healthcare, or increasing social support [109,110]. Strong social networks may promote healthier behavior by, for example, facilitating the sharing of health information, establishing healthy norms (e.g., exercise or healthy eating), or exerting some control over unhealthy behaviors (e.g., drug use, crime, smoking) [111,112]. Conversely, researchers have shown that social isolation negatively impacts mental and physical health [109,113]. The literature on social cohesion contains varied definitions and explanations about how social connections impact health. However, the concept that people are healthier when they live in a community where people feel safe, trusting, supported, and well-connected reflects the input of our stakeholders and survey respondents.

The extensive waterfront trail and park system described above provides ample public gathering spaces in many parts of the waterfront. However, these resources are underutilized in some areas because of lack of awareness, limited access points, or concerns about crime. For example, recent development at Corn Hill Landing incorporates walkways, benches, and grassy areas that encourage social interaction. If these factors are not incorporated by design, private waterfront development has the potential to reduce actual or perceived public access to waterfront areas.

Health Care Services

Particularly for low-income people who may lack transportation or face other barriers, neighborhood access to health care and social services can improve health. Rochester has three hospitals, the largest of which (Strong Memorial) is adjacent to the waterfront in southeast Rochester. Other health services (clinics that serve low-income individuals) that are located within or near the LWRP boundary include Westside Health Services (northwest and southwest), Eastman Dental Center (northeast), and Clinton Family Health Center (northeast). Community survey respondents did not indicate a strong need for additional health services in their community.

Educational Opportunities

Educational attainment has been clearly linked to health outcomes for individuals. Education improves individuals’ likelihood of employment and income earning potential [114]. Independent of income, higher education may improve health because it improves access to preventive and health

care services, nutrition, likelihood of living in a health-promoting environment, and knowledge about healthy behaviors [115-118]. In addition, maternal education has been shown to influence children's health status [119,120]. These effects appear to be lasting, with higher-educated people being in better physical and mental health throughout their lives [121]. Prior analyses in Rochester indicate that educational attainment is generally correlated with income [122].

Rochester's public school system is consistently among one of the poorest-performing in the state, with a 46.1% graduation rate in 2011 [123]. Although waterfront changes are unlikely to affect access to high quality K-12 education, waterfront development may enhance the tax base, potentially providing additional funding for schools.

Additionally, Rochester's waterfront is itself a rich educational resource. The numerous parks and natural areas provide opportunities for learning about biology and geology. The historical significance of Rochester's waterfront includes pre-European trade routes, early settlement, the Underground Railroad, Civil War era encampments, and women's rights. Historic sites related to the lives of Susan B. Anthony and Frederick Douglass are located within the waterfront area (including their graves in Mt. Hope Cemetery), among many others [124]. There are many additional opportunities to interpret, communicate, and incorporate this history in community and school programming. There are also a number of ongoing efforts by government, private, and community groups to protect and promote waterfront cultural and historical resources in Rochester. Developing these educational opportunities may particularly benefit low-income and minority children living in the city by increasing their knowledge of and pride in their cultural, community, and neighborhood heritage.

Summary

Access to health-supportive resources varies greatly from one section of the waterfront to another. Changes in development, beaches, trails, and other aspects of the waterfront may significantly affect access to these resources. In many cities, waterfront-based revitalization has served as an economic engine, created common gathering places, and provided attractive housing options. However, there is also a potential to reduce some populations' access to these resources, for example through increased housing costs (gentrification), failure to plan for the needs of low-income residents (services, transportation, healthy and affordable food, etc.), or reduction of public access to waterfront areas.

Physical Safety

Waterfronts and Physical Safety

Many stakeholders noted concerns about physical safety. In this report, we refer to physical safety factors related to "unintentional injuries," such as traffic collisions and drowning, and to "intentional injuries" (violent crime). Several groups in Rochester, including PlayBEST (a multi-stakeholder group

coordinated by the Finger Lakes Health Systems Agency that addresses issues related to play, built environment, safety, and transportation), have identified crime as a significant barrier to physical activity, particularly in low-income neighborhoods. While physical safety hazards within the waterfront boundary affect a relatively small number of people, the perception of risk deters many potential waterfront users.

Physical Safety and Health

In initial scoping meetings, stakeholders expressed several concerns related to physical safety. First, they noted the potential of violent crime to result in physical injury and elevated stress among both victims and community members. Collisions involving pedestrians, cyclists, and motor vehicles can cause unintentional injury. These events are less likely to occur on dedicated trails than on roadways. Third, there were concerns that additional use of the waterfront for swimming, fishing, or boating could increase risks of death from drowning.

Social cohesion is associated with perceived safety. Other studies have shown that neighborhood social cohesion may have a positive influence on perceived and actual neighborhood safety [125]. This would likely influence physical activity, further improving community health [111]. Conversely, exposure to violence may have a negative effect on stress and mental health [126].

Current Conditions of Physical Safety Risks in the Waterfront Area

Local rates of intentional and unintentional physical injuries are detailed in Chapter 3. Many steps have been taken in Rochester to address these types of concerns in the community. For example, lifeguards have been stationed at Rochester's two beaches to protect swimmers from drowning. To date, no drowning has occurred in either swimming area while lifeguards have been on duty. With respect to injury prevention for bicyclists and pedestrians, the city has committed significant resources to improving traffic patterns, installing bike lanes and sidewalks, and generating a continuous, dedicated trail system. In 2011, the city adopted Complete Streets legislation aimed at improving safety for pedestrians, bicyclists, and people with disabilities [127]. Lastly, local community organizations have been working with the City of Rochester to reduce crime rates by increasing patrols, improving police-neighborhood relations through Neighborhood Service Centers, and by training local practitioners in Crime Prevention Through Environmental Design Principles (see additional detail in Chapter 5).

About a fifth of Southwest Community Survey respondents said they were affected by crime in the past year. Anecdotal information from key informant interviews suggests that many residents do not exercise outdoors because of fear of crime. In some parts of the city, these concerns are supported by crime data from the Rochester Police Department (Map 3B). Seventeen percent of census tracts within the LWRP boundary have violent crime rates in the top quintile in the city, comprising 31% of Rochester's sixteen highest violent crime rate tracts. Strategies to reduce crime and perception of crime should be part of redevelopment efforts throughout the LWRP, in particular those tracts experiencing the highest levels of violent crime.

Summary

As noted above, physical safety interacts with other health determinants, particularly physical activity and mental health. People living in waterfront neighborhoods with higher crime rates may be most affected. Additionally, waterfront trail and beach users may face particular safety issues (accidents at road crossings, drowning, etc.). We discuss safety issues as they relate to the LWRP elements in Chapter 5.



View of center city from Corn Hill Landing. Safety devices such as the ladder, at left, were installed as part of the Corn Hill Landing development to reduce the risk of drowning.

Photo credit: City of Rochester, Communications Bureau

Chapter 5: Findings – Impacts of Potential Local Waterfront Revitalization Program Elements

Based on discussions with city staff and review of the city’s previous LWRPs, we identified five potential areas in which changes in the waterfront could have significant impacts on health: waterfront trails, beach redevelopment and management, built environment, water-based recreation, and stormwater management (Table 5A). We refer to these as “plan elements” because, although the LWRP has not yet been written, we deemed them likely to be included in the final LWRP. In this chapter, we discuss the five elements in turn, detailing how each element links to the key health determinants discussed in Chapter 4. For each health determinant, we summarize evidence linking it to changes in that element, including literature, survey data, stakeholder input, and local data. Pathway diagrams are included to illustrate these connections.¹⁵

Throughout the assessment, we focused on whether changes are likely to have a disproportionate impact on the vulnerable populations identified in Chapter 3 (children, low-income, minority, and older adult residents). Changes likely to improve a condition, reduce disparities, and enhance equity are marked as positive (+). Waterfront changes that are not expected to have a major effect or for which information is not available are not rated. Changes that are likely to be particularly harmful to vulnerable populations are indicated as negative (-). The relationships between these elements and the four health determinants are discussed below as a foundation for the recommendations offered in Chapter 6

Table 5A: LWRP Elements and Related Health Determinants

Element	Health Determinants			
	Physical Activity	Physical Safety	Water Quality	Health-supportive Resources
Waterfront Trails Development	X	X		X
Beach Redevelopment and Management	X	X	X	X
Built Environment	X	X		X
Water-based Recreation Facilities	X	X	X	X
Stormwater Management			X	

¹⁵ For details on how pathway diagrams were developed, refer to the scoping summary in Chapter 2. The pathways development process helps to identify connections between health determinants (described in Chapter 4) and the plan elements listed here (not all four health determinants are affected by every plan element).

Waterfront Trails

Overview

In this section, we assess the status of Rochester’s waterfront trails and their current use. We then link trail use to the health determinants of physical activity, water quality, health-supportive resources, and physical safety, and summarize how future trail development might affect community health (Figure 5A). During scoping, transportation specialists at the city and other trails stakeholders informed project staff that there was no existing data on use of Rochester’s waterfront trails. To fill this gap, we conducted trail user counts and surveys to characterize current use and solicit opinions about future changes to the trails.¹⁶ This section relies on our trail survey data, literature review, and information provided by stakeholders, including the City of Rochester.

Table 5B provides a summary of changes in waterfront trails that may be addressed in the LWRP. These include improved connectivity so that the trail is continuous and does not travel along streets, and improved road crossings. Improved maintenance (trash collection, improved surface, plowing), added amenities (water fountains, restrooms, lights, signage, etc.), and additional access points to facilitate use by neighbors are also considered. Finally, the LWRP could propose communications and programming directed at increasing trail use.



Boardwalk trail at Turning Point Park



Directional signage on the Genesee Riverway Trail

¹⁶ For detailed survey methods and results, refer to the Trail Count and Trail Survey Report. <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>

Table 5B: Waterfront trails impacts on health determinants

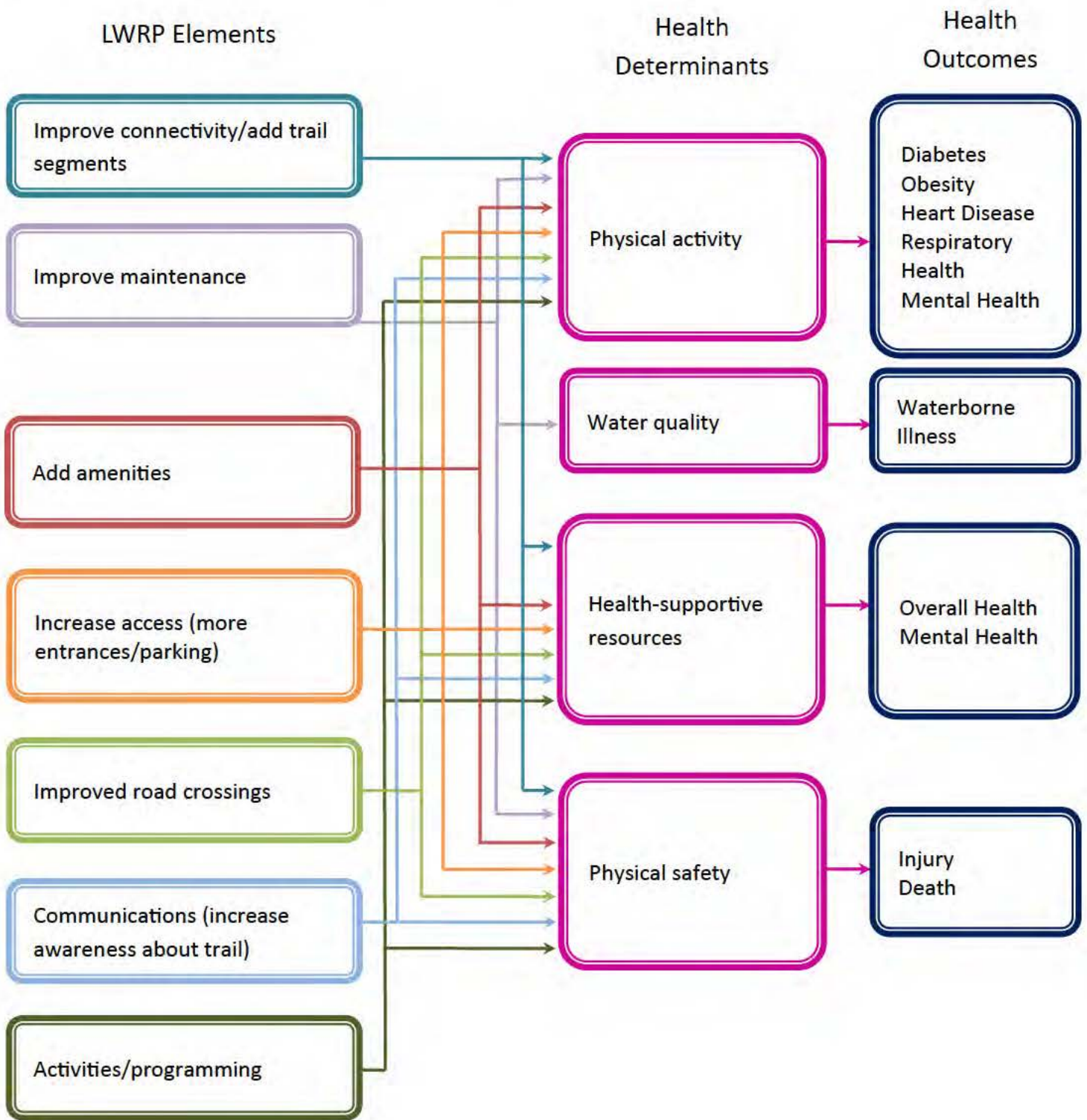
Waterfront Trails	Health Determinants				Equity Impacts?	Evidence type
	Physical Activity	Physical Safety	Water Quality	Health-supportive Resources		
Improve connectivity/ add trail segments	+	+		+	+	Literature Survey Stakeholders
Improve maintenance	+	+	+	+	+	Literature Survey
Add amenities Water fountains/ restrooms Lights/signage	+	+		+		Survey Stakeholders
Increase access (more entrances/parking)	+	+/-		+	+	Survey Stakeholders
Improved road crossings	+	+		+		Literature Survey
Communications (increase awareness about trail)	+	+		+	+	Survey Stakeholders
Activities/ programming	+	+		+	+	Literature

+ Positive impact on health determinant (leading to better health outcomes/reduced health disparity)

- Negative impact on health determinant (leading to worse health outcomes/increased health disparity)

+/- Could be positive or negative, depending on nature of the changes

Figure 5A: Waterfront Trails Health Determinant Pathway



Current Conditions of Waterfront Trails

The Genesee Riverway Trail (GRT) system includes 18 miles of paved trail (Map 5A). The southern portion of the trail passes through Genesee Valley Park, where it connects to the Erie Canalway Trail (which extends 365 miles from Buffalo to Albany) and the Genesee Valley Greenway Trail (which extends 90 miles south to Cuba, NY). The GRT continues north along the Genesee River to the NYS Seaway Trail (following Lake Ontario State Parkway in this area) and ends at Ontario Beach Park and the Port of Rochester. The trail includes six designated pedestrian bridges across the Genesee River.

El Camino trail, completed in summer 2012, runs parallel to the river several blocks east of the waterfront and connects with the Genesee Riverway Trail at its north and south ends. Signage and street markings guide trail users from the neighborhood to the GRT and vice versa.

Over the past 20 years, the city has made many improvements to the Genesee Riverway Trail system, many of which were included in the 1999 LWRP. For example, the 1999 LWRP supported construction of the boardwalk connecting Turning Point and Ontario Beach parks. However, the city's goal to develop a continuous corridor extending from Genesee Valley Park to Lake Ontario and Durand Beaches has not yet been achieved.

From 2002 to 2006, city staff coordinated the Friends of the Genesee Riverway, a group of stakeholders interested in promotion and development of the Genesee River as a municipal greenway and trail system. During that period the City completed a comprehensive trail sign system for the GRT and published Rochester's Genesee Riverway and Trail Guide, which has been updated and reprinted annually and is available on the City website.¹⁷ In 2006 the Genesee Riverway Trail was officially designated as a National Recreation Trail. Public participation in trail development continues on a project-by-project basis. This group is no longer active. A private-public effort called the "Garden Aerial"¹⁸ aims to develop trails and park spaces around High Falls; this is discussed further under "built environment" below.

While a majority of the GRT follows dedicated paved paths, several sections of the trail require users to travel along city streets. On the east bank of the Genesee River north of downtown, the trail runs along St. Paul Blvd. Along the west side of the river, the trail is marked along Plymouth and Lake Avenues, but is not continuous. Users must follow signs to navigate city streets that connect trail portions.

Signage and information kiosks are posted along the trail to help users with wayfinding and to note accessibility limitations. However, several stakeholders reported that the sections of trail that follow city streets are difficult to navigate. Comments from survey participants also reflect these

¹⁷ <http://www.cityofrochester.gov/article.aspx?id=8589936619>

¹⁸ <http://www.gardenaerial.org>

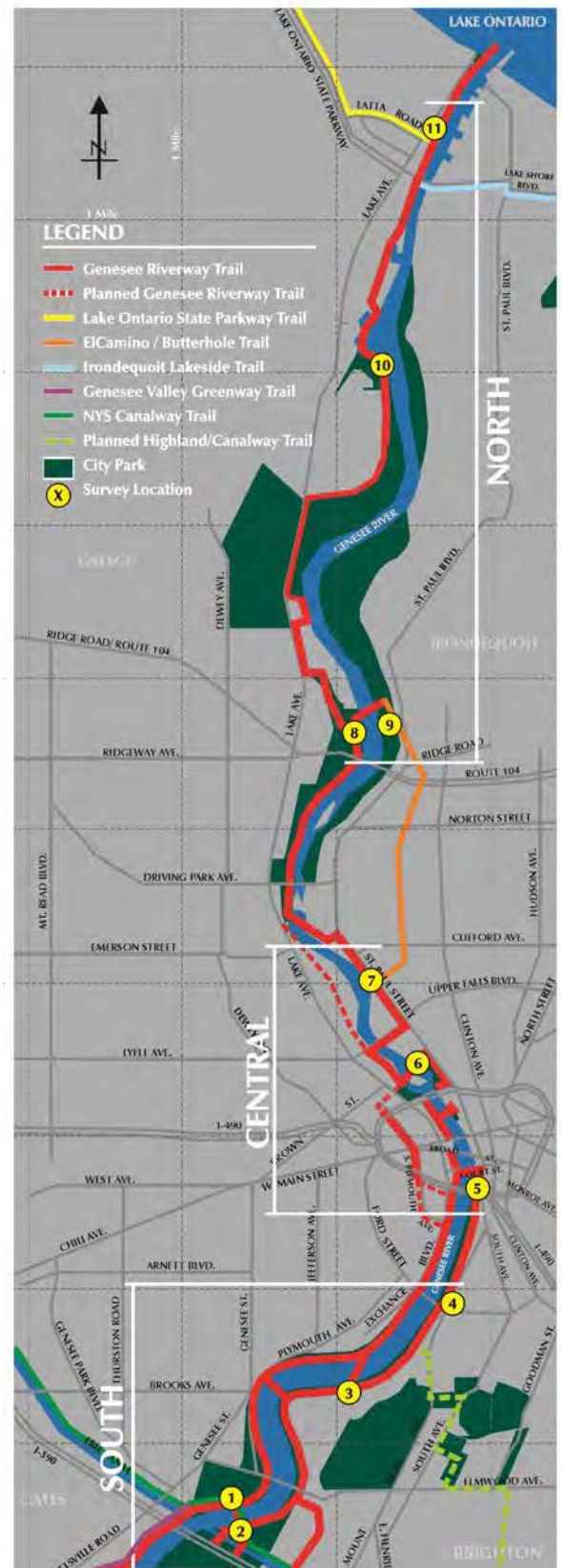
Map 5A: GRT Count and Survey Locations

difficulties. There are no dedicated facilities for trail users (i.e. bathrooms or water fountains), although the trail passes through several parks where these are available. Most portions of the trail are not lit at night, nor is the trail plowed in the winter. The GRT passes through diverse neighborhoods, downtown, and park areas.

We conducted GRT counts and user surveys to better understand use of this resource. The study team counted 2,019 trail users during 54 hours of observation. User 'density' (users per hour) was slightly higher during peak recreational hours than during commute times, and was nearly twice as high in the Southern sampling sites than in the Central sites. Fifty-seven percent of trail users were bicycling, 40% were walking, and 3% were doing other activities such as skateboarding or rollerblading. Seventy-four percent of the cyclists were male; 59% of the pedestrians were male. Stakeholders suggested that disproportionate trail usage by males (68% of all users) may be due to the popularity of biking among men and/or due to safety concerns of women. The vast majority of trail users were adults (94%).

There were clear differences in trail use between the North, Central and South GRT sections of trail (Table 5C). Locations near downtown Rochester (Central) are the least densely used. North and South sites were used more often on weekends, while Central sites were more heavily populated on weekdays. Many of the northern- and southern-most sites are located near parks and/or connected to other recreational trails along the Erie Canal and Lake Ontario.

A model designed for the National Bicycle and Pedestrian Documentation Project (NBPDP) estimates the total number of annual users based on collected count data. We applied the counts from our most and least dense count sites to estimate annual use.¹⁹ Using this model, we estimated that the GRT at Site 7 (Scrantom) is used about 24,510 - 53,571



Provided by the City of Rochester

¹⁹Due to limitations of our data, we were not able to apply the model as intended (averaging multiple count days) to obtain the most accurate predictions. For more accurate estimates, additional data should be collected.

times per year. Site 2 (Genesee Valley Park East) is estimated to have 238,971 – 372,768 users per year.

Two hundred sixty-five trail users completed the survey. Pedestrians were slightly overrepresented in the sample (pedestrians comprised 48% of survey respondents versus 40% of counted trail users). The majority of people were using the trails for exercise (57%) and recreation (55%). Most survey respondents reported using the trail regularly (57% used the trail 6 or more times each month); 19% reported “daily” use, and 34% reported year-round use. Thirty-eight percent of the respondents lived within half a mile of the trail.²⁰

The race and ethnicity of trail users surveyed does not reflect the demographic composition of surrounding neighborhoods or the Rochester population (Table 5D). Of those surveyed, 83% (204) were White, 12% (30) were Black, and 5% (13) were “Other.” Black residents represent 41% of the City of Rochester population (Table 3A). About 12% (17) of respondents were Hispanic or Latino, similar to the City of Rochester (16% Hispanic or Latino). Survey staff did not notice any differences in willingness to take the survey by race or ethnicity. Surveyed trail users had a higher income than city residents overall, with 68% (139) of respondents reporting a household income greater than \$35,000 each year, compared to 44% of city residents. These results may be due to the number of people who travel from the suburbs to use the trails in addition to users who live near the trail. A geocoded map of trail users shows that although a large number of users come from surrounding suburbs, many City of Rochester residents living near the river also make use of the trails, particularly in the southern part of Rochester (Map 5B).

Selected open-ended comments by survey users on trail improvements

“The crossing through downtown across one-way entrances to the highway is very dangerous”

“Connect the trails!”

“No trail downtown... have to bike on St. Paul. Make it continuous to the beach.”

“I'd like to be able to walk all the way to the lake.”

“Confusing areas near Lake and Seneca with different signs for bikers and pedestrians.”

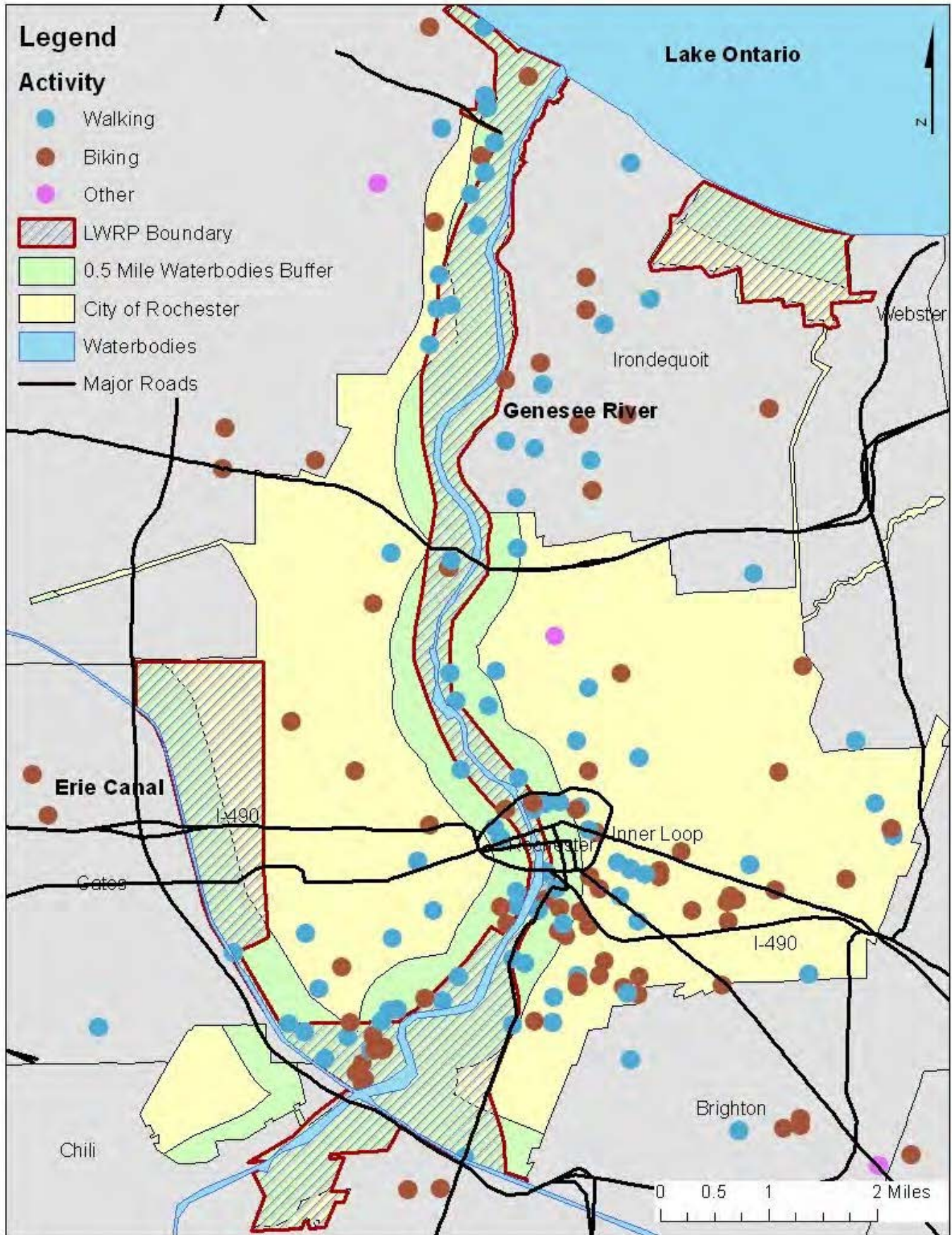
Table 5C – Trail Counts by Location

Site	Total	Weekday Total		Weekend Total		Trail Density
		#	%	#	%	
Sites 1-4 (“South”)	1,014	467	46%	547	54%	46.09
Sites 5-7 (“Central”)	329	185	56%	144	44%	27.42
Sites 8-12 (“North”)	676	250	37%	426	63%	33.8
Total	2,019	902	45%	1,117	55%	37.39

Source: Healthy Waterways 2012 Trail Counts

²⁰ Trail survey respondent addresses were geocoded and mapped in ArcGIS. We used the distance of these addresses from a waterbody (Erie Canal, Genesee River, or Lake Ontario) as a proxy for distance from the trail, since most of the GRT runs along a waterbody.

Map 5B: Geocoded Trail User Addresses



LWRP boundary provided by the City of Rochester.

Table 5D: Trail survey respondent demographics by activity and how far they live from the waterfront

	Total Surveyed N = 265*	All bikers N = 133*	All walkers N = 128*	Bikers >0.5 miles N = 89*	Walkers >0.5 miles N = 63*	Bikers ≤0.5 miles N = 38*	Walkers ≤0.5 miles N = 54*	Total City N = 211,457	Total County N = 742,783
Gender									
Male	69%	76%	61%	78%	64%	75%	58%	48%	48%
Female	31%	24%	39%	22%	36%	25%	42%	52%	52%
Race									
White	83%	90%	75%	94%	73%	81%	78%	46%	77%
Black or AA	12%	8%	16%	5%	16%	14%	14%	41%	15%
Other	5%	2%	9%	1%	11%	5%	8%	13%	9%
Ethnicity									
Hispanic or Latino	12%	8%	16%	9%	11%	5%	23%	16%	7%
Non-Hispanic	88%	92%	84%	91%	89%	95%	77%	84%	93%
Household Income									
\$35,000+	68%	75%	63%	88%	72%	52%	54%	44%	65%
<\$35,000	32%	25%	37%	12%	28%	48%	46%	56%	35%
Frequency of use during previous month									
Up to 5 times	43%	44%	42%	54%	54%	24%	24%	N/A	N/A
6-10 times	17%	16%	18%	16%	16%	8%	19%	N/A	N/A
11 or more times	40%	39%	40%	30%	30%	66%	57%	N/A	N/A
Distance from water									
≤0.5 miles	36%	30%	44%	-	-	-	-	41%	12%

* N = Total number of survey respondents in the category. N for individual demographic characteristics may differ based on survey responses; percentages for each are based on those who responded to each demographic question
Source: Healthy Waterways 2012 Trail User Survey

Further analysis of trail survey user data reveals important variations among trail users by user type and location. Table 5E suggests that there are differences in trail use patterns by section of the GRT. Dividing the survey locations into South, Central, and North regions, we found the lowest proportion of female users (18%) at Central sites. When combined with survey responses about safety, this supports the hypothesis that the perception that the trail is not safe may be a barrier to use by women.

Overall, trail survey respondents were more similar racially and economically to county residents than to city residents.²¹ However, a quarter of Central users were Black or African American; this is still below the proportion in the overall City population, but more than twice that among users surveyed in the South and five times that in the North sites. In addition, the income distribution (percent earning more than \$35,000) in the Central sites (51%) was closest to the citywide rate (44%); users from the South sites (69%) and in the North sites (84%) were more likely to earn more than \$35,000. The frequency of use patterns did not appear to differ by site, nor did the percentage of users living within half a mile of the water.

Table 5D shows that some of the disproportionately high trail use by males is due to the heavy gender imbalance among cyclists (76% male). Walkers who live less than half a mile from the trail are more likely to be female (42%) than any other group of users. Ethnicity follows a similar pattern – 23% of walkers who live close to the trail were Hispanic. Walkers were also more likely to be Black or African American (16%) than were bikers (8%). Overall, 14% of trail users living within half a mile of the trail were Black. Those trail users who lived more than half a mile from the trail were less likely (46%) to use the trail regularly (more than five times in the past month) than those who lived closer to the trail (74% of bikers and 76% of walkers). Interestingly, frequency of use did not vary greatly by survey location or use type (bikers versus walkers).

Thus, while overall survey responses suggested heavier trail use by wealthier residents from outside the waterfront area, Tables 5D and 5E show that over a third of trail users live within half a mile of the water; of these, about three-quarters use the trail regularly (more than once a week). Survey responses suggested trail improvements that could increase use. Although the survey response numbers were too low for meaningful statistical analysis, these differences suggest that regularly conducting trail surveys might reveal changes in demographics, use patterns, or opinions about the trail as improvements are made over time. For example, when asked why they were on that particular trail that day, most respondents (65%, 170) answered “Scenic Qualities”, followed by “Convenient Route” (45%, 118) and “No Cars” (35%, 92). When asked about what they would like to see improved along this trail, the most commonly selected were “Better Surface” (20%, 50) and “Better Maintenance” (20%, 50). Nearly a third of respondents (32%, 81) suggested “Other” improvements that were not listed in the survey, including bathrooms, water fountains, and trash cans. Repeating this survey with a larger number of users as trail improvements are made could

²¹ For more information, refer to the trail user survey white paper at <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>

Table 5E: Trail survey respondent demographics by survey site location

	Total Surveyed N = 265*	South users N = 116*	Central users N = 66*	North users N = 83*	Total City N = 211,457	Total County N = 742,783
Gender						
Male	69%	67%	82%	61%	48%	48%
Female	31%	33%	18%	39%	52%	52%
Race						
White	83%	82%	69%	94%	46%	77%
Black or AA	12%	11%	25%	4%	41%	15%
Other	5%	6%	7%	3%	13%	9%
Ethnicity						
Hispanic or Latino	12%	11%	14%	12%	16%	7%
Non-Hispanic	88%	89%	86%	88%	84%	93%
Household Income						
\$35,000+	68%	69%	51%	84%	44%	65%
<\$35,000	32%	31%	49%	20%	56%	35%
Frequency of use during previous month						
Up to 5 times	43%	39%	43%	48%	N/A	N/A
6-10 times	17%	18%	17%	16%	N/A	N/A
11 or more times	40%	43%	40%	45%	N/A	N/A
Distance from water						
≤0.5 miles	36%	38%	34%	34%	41%	12%

* N = Total number of survey respondents in the category. N for individual demographic characteristics may differ based on survey responses; percentages for each are based on those who responded to each demographic question

Source: Healthy Waterways 2012 Trail Counts

allow stakeholders to evaluate how trail use has been impacted, and how future changes could best promote community health.

The City of Rochester, local businesses, and nonprofits run organized events along all of Rochester's waterfronts. To capture 'typical use,' we avoided surveying during organized events such as festivals, organized walks, and running clubs that utilize waterfront trails. Thus, our survey data does not reflect programmed trail use. Special events on the trails include more than twenty walking/running races; triathlons; and weekly walk, run, bicycle and active boating programs hosted by MVP Health Care, private organizations, community groups, and the City of Rochester Department of Recreation and Youth Services. Also common are bicycling races or tours (including Roc the Bike Week hosted by the Rochester Cycling Alliance and Rochester Bicycling Club); regattas hosted by the Genesee Waterways Center and others; and numerous weekend-long recreational events, including Rochester River Romance. Although these events may not increase overall physical activity by area residents, they encourage awareness of the trails as an exercise and recreational resource and build social cohesion. These events may also improve the public's perception of safety on the trails.

Waterfront Trails and Health Determinants

Development of walking and biking trails has been promoted as a way to encourage physical activity through recreational use and active transportation in many communities. Research shows that access to recreational resources like trails may be an important factor in a person's overall physical activity [128-130]. Trails can also affect physical safety. Moving pedestrians and bikes off roadways onto trails may reduce motor vehicle accidents. It is unclear whether or how increased use of the trails could affect crime. For example, exposure to violent crime could increase if more people used trails in remote areas or where there are high crime rates; conversely, heavily populated trails could reduce opportunity for crimes. Finally, waterfront trails may serve as a health-supportive resource by providing links to public gathering spaces.

Physical Activity

Several factors determine how recreational trails promote physical activity, including: how many people use the trail; how much/how often they use it; and whether it increases their total amount of activity or replaces some other activity. Although it is impossible to quantify this impact, studies in other cities suggest that accessible, convenient, and safe outdoor recreational facilities such as trails may increase community members' active recreation and transportation [128,129].

Many studies have found a correlation between proximity to trails and higher levels of physical activity by residents, but there is disagreement about the extent to which new or improved trails increase total physical activity [128-133]. Some studies suggest that access to free and convenient trails may have a bigger impact on increasing physical activity among women and low-income users

[128,130]. Other studies note that proximity to convenient and connected trails may have a greater impact on active transportation than on recreational use [129,131]. Studies also note that other personal-level and environmental characteristics – such as crime, traffic, health status, time, and social circumstance – are important factors in determining physical activity and trail use [132,133]. One cost-benefit analysis shows the cost of construction, maintenance and travel to trails is outweighed by direct health benefits within 10 years [134]. Measuring impacts of trail improvements on behavior and producing generalizable results is challenging. While many emerging studies suggest a positive effect, others point out the need for more long-term research.

"If it wasn't for this trail, I would not exercise. I come right after work, and if I just went home, I'd never exercise."

– Respondent, trail user survey

Most pedestrians surveyed (57%) walked to the trail, suggesting that the GRT is a significant exercise resource for those living or working nearby. Sixty-two percent of pedestrians and 46% of bicyclists surveyed lived within one mile of the Genesee River, the Erie Canal or Lake Ontario. The high proportion of walkers living close to the trail suggests that the GRT could be an important resource for low-income city residents who lack transportation to reach other physical activity options.

The average reported trip time was 75 minutes for bikers and 60 minutes for walkers, both higher than the CDC's recommended daily minimum for exercise. About 25% of users reported using the trails at least 21 times the previous month, and over a third reported using the trails year round. Thus, we concluded that trails are a significant physical activity resource for many current users. Table 5D suggests that this is particularly true for people living near the waterfront/trail, three-quarters of whom reported using the trail more than five times a month.

Survey responses suggested that more trail entry points would improve potential users' access to the trails. Walkers traveled an average of 1.21 miles to the trails they were using. This is more than twice the "usershed" distance of about half a mile transportation professionals typically use when predicting use of public spaces by community residents. This suggests that the Genesee Riverway Trail is a destination for many users who are willing to travel relatively long distances to access its scenic qualities for recreation, and that streets within a mile or so of the trail are currently walkable. At the same time, some potential users may avoid visiting the trail because of distance from access points.

In the central parts of the city, a lack of connectivity along the trail prevents some users from traveling north-south by trail. Improved connectivity of dedicated pedestrian/cycle trails might increase use and, therefore, physical activity. Nearly 10% of survey respondents answered that better connectivity to places they want to go would lead them to use the trails more often. Many respondents cited concerns ranging from difficulty navigating the on-road portions of trails to physical danger from cars.

Programming is also important to promoting use of resources like trails. As noted above, the city's Department of Recreation and Youth Services partners with many organizations around one-time and regular walking, biking, and interpretive events on the trails. In addition, Rochester Walks! has organized walking clubs in several waterfront neighborhoods, one of which currently uses the GRT as part of its mapped walking route [135].

Water Quality

Improved trail maintenance may improve water quality by reducing waste that could otherwise end up in the river. However, the impact of litter or runoff from the trails on overall pollution in the river is very small. Thus, changes made along trails are unlikely to significantly affect water quality.

Health-supportive Resources

As described in Chapter 4, health-supportive resources in the community are influenced by a number of factors. Trail development can increase health-supportive resources by providing access to destinations, serving as a source of passive recreation, and boosting economic development. As active transportation corridors, trails can also provide access to health-supportive resources in other neighborhoods.

Healthy Retail

The city's Brownfield Redevelopment plans for southwest Rochester include the addition of retail services such as shops and restaurants, with direct access to these amenities via the GRT. Changes to the GRT in southwest Rochester may increase access to these services. For example, improved connectivity along the trail may draw residents from other areas, supporting economic development (see Built Environment, below).

Employment and Economy

Trails serve as economic drivers for many communities, in particular through increased tourism. According to Parks and Trails New York (PTNY), bicycle tourists are attracted by scenery, rural areas, historic sites and parks, and culture and uniqueness [136]. Similarly, our Beach and Trail Surveys clearly indicated that these natural resources attract visitors from a wide geographic area. Rochester's rich history of involvement in the Civil War, Underground Railroad, and women's rights creates a unique destination for tourists.

For bicycle tourists, these attractions can be easily accessed along the GRT and the Erie Canalway Trail. The PTNY guide notes that cyclists will travel farther to use multi-use trails than they will to cycle on roads. Thus, developing a safe, continuous multi-use trail that connects the Erie Canal to the Port of Rochester may attract new tourists to the City of Rochester. Through a review of case studies in other communities, PTNY determined that cyclists on long-distance, multi-day trips will spend between \$100 and \$300 dollars per day in the communities they visit, serving as a potentially major source of tourism income for

these areas. PTNY is currently conducting a detailed study of the economic impacts of tourism along the Erie Canalway Trail.²²

Public Gathering Spaces

Development of trails may increase opportunities for passive recreation. For example, the GRT provides river access in many locations, increasing opportunities for fishing. Improved connectivity of the GRT also increases access to parks, beaches, recreation centers and other community assets. Many survey respondents reported they would use the trail more often if it were better connected and they could access more places they wanted or needed to go.

Changes to trails may help build social cohesion among community members through an increase in access to gathering spaces and other community resources. In turn, neighborhood social cohesion can have a positive influence on physical activity, further improving community health [111].

Educational Opportunities

Stakeholders expressed a desire for more signage that highlights Rochester's rich history. Extending this idea further, signs highlighting historical sites, describing geological features, and identifying local flora and fauna along the GRT could create a rich educational destination for schools, residents, and tourists.

Physical Safety

Trail developments that affect risk of injury from crime, motor vehicles, or physical hazards affect the physical safety of users. About 22% (57) of the respondents selected "Personal Safety" as at least one of their reasons for using a particular trail, though this answer may relate either to crime or injury risk. Most trail users (76%, 201) rated the safety and security along the section of trail they were on as "Good" or "Excellent."

The primary unintentional injury concern related to trail use is motor vehicle accidents, although some survey respondents noted concerns about broken glass. Some survey comments and anecdotal remarks from trail users noted that sections where the trail ends or runs along the road are very dangerous because of traffic. The World Health Organization's "World Report on Road Traffic Injury Prevention" identifies the presence of a "vulnerable road user" (pedestrian or cyclist) in urban and residential areas as a risk factor for crashes [137]. The report concludes that physical separation of pedestrians and cyclists from motorized vehicles is safest, followed by marked paths on shared roads with speeds below 30mph. Several participants emphasized the need to separate cyclists and pedestrians from traffic through center city, suggesting that they and others might use the trail more often if there were a safer route through downtown.

²² When completed, this report will be available online at <http://www.ptny.org/publications/>

Crime is another significant safety concern for Rochester residents. Anecdotal reports from community members regarding crime in certain neighborhoods suggest that safety and security limit current trail use. For example, one respondent noted she “had a negative safety experience...near the PLEX neighborhood” and now avoids the area. Many others suggested adding lights and conducting more frequent police patrols to prevent crime. When discussing a lack of physical activity in some Rochester neighborhoods, community members frequently report that it is not safe to exercise in their neighborhoods because of crime. Conversations with the Rochester Police Department (RPD) suggest that although there are high crime rates in certain waterfront neighborhoods, safety along trails may be less of a concern than perceived. For example, although crime rates in the PLEX neighborhood are relatively high, officers working in the southwest quadrant anecdotally noted that crime along the trail itself is low. However, there is limited information about crime rates along the trails, so it is unknown whether safety along the trails reflects these perceptions. The City of Rochester Police, Fire, 911, and Environmental Services departments have initiated a 911 Emergency trail address system, adding signs along the trail with a trail section code and “address” that will direct emergency personnel to specific trail locations [138]. RFD, RPD and 911 rode the trail together to identify and prioritize sign locations. Figure 5B depicts sample sign markers. To date, signs have been installed in the Charlotte neighborhood and in the most remote trail sections. Funding to complete the rest of the trail system has been proposed but not yet approved. The new address system may help produce trail-based crime statistics in the future.

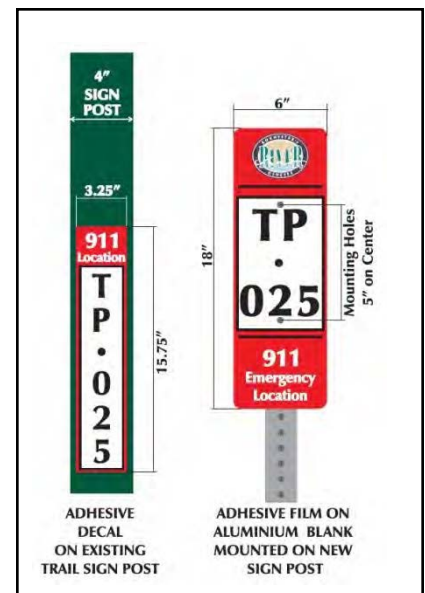


Figure 5B: Example of a 911 Emergency Trail Marker

Geographic differences exist in crime-related safety concerns. More users in the Central and North sites described the safety along the trail as being “fair” or “poor” than users in the South sites. We counted fewer female trail users at the Central and North sites than at the South sites, which could also reflect safety concerns. In stakeholder meetings, southwest residents frequently reported concerns about safety and security when discussing trail use. The Brownfield Redevelopment section of the 1999 LWRP proposes alleviating some of these concerns by trimming dense vegetation to improve visual access to the river and users’ surroundings.

The perception of safety has been identified elsewhere as important factor influencing neighborhood health [125]. Crime and neighborhood disorder have been shown to limit physical activity [139]. In 2007, Stafford et al. also demonstrated a positive association between neighborhood disorder and obesity. One study expanded the connection between physical activity and outdoor recreational resources to emphasize that seeing other people exercise also increases an individual’s own physical activity [140]. While the authors do not discuss in detail the reason that seeing other people exercise may encourage others to do so, seeing others exercise may result

in improved perceptions of safety. Thus, improvements in perception of physical safety on trails may also promote physical activity.

Beach Redevelopment and Management

Overview

Table 5F summarizes potential changes at Rochester’s beaches that might fall within the scope of the LWRP. These include improving existing facilities (bathrooms/bathhouses) and better maintenance of the facilities and park areas. We assessed the impacts of potential new amenities that stakeholders have suggested for the Ontario Beach area, including a pool or spray park and additional commercial development. Stakeholders also suggested that improving communication about the beach should be considered, while comments from survey respondents emphasized reducing crime and improving water quality.

As a result of longstanding efforts to improve water quality at the beach, the County has plans to install an algae pump to remove algae from the beach area and improve water quality. Monroe County and the City of Rochester piloted the algae pump system at Ontario Beach during the summer of 2011. Winds on Lake Ontario are commonly from the west, and can blow algae along the surface of the lake. The pier along Ontario Beach traps near-shore algae, collecting it in the swimming area. The pump system will remove algae from the swimming area to the Genesee River, which pushes the algae further off shore into the lake. The 2011 pilot test of this system demonstrated high levels of success in reducing algae at Ontario Beach. A permanent system has been funded and is expected to be installed within the next two years.

Below, we describe the current physical conditions and use of Rochester’s two beaches. We then link beach use to the health determinants of physical activity, water quality, health-supportive resources, and physical safety (Figure 5C). This summary provides a foundation for projecting how changes around Rochester’s beaches could affect community health in the future. As noted above, city and county agencies have limited data about beach use. We supplemented this information by conducting beach user surveys in July and August 2012.²³ This section synthesizes the literature review, beach survey data, and information provided by stakeholders, including the City of Rochester Department of Parks and Recreation, and the Monroe County Department of Public Health.

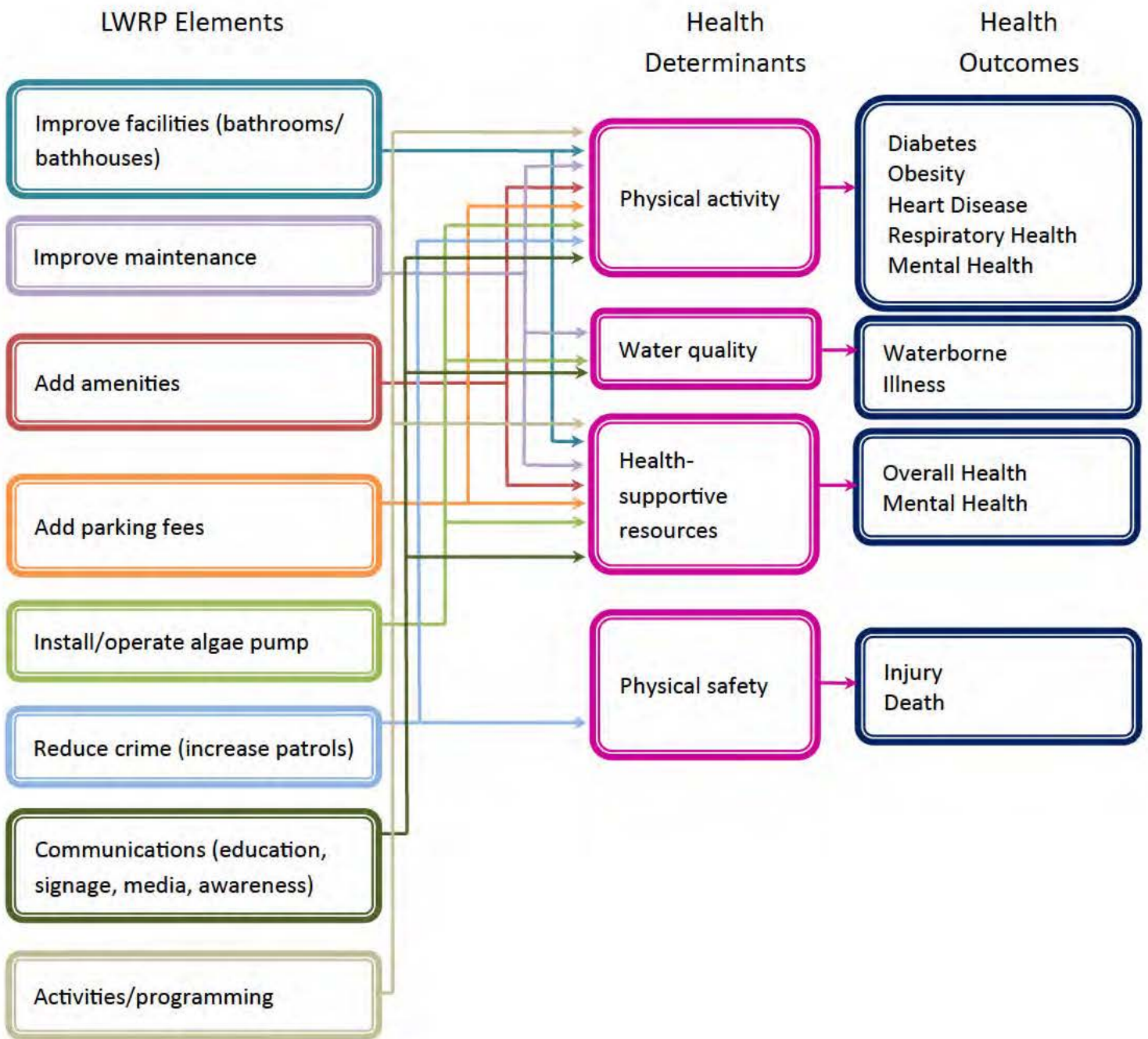
²³ For more information, see the beach user survey report at <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>

Table 5F: Beach redevelopment impacts on health determinants

Beach redevelopment	Health Determinants				Equity Impacts?	Evidence Type
	Physical Activity	Physical Safety	Water Quality	Health-supportive Resources		
Improve facilities (bathrooms/bathhouses)	+			+		Survey Stakeholders
Improve maintenance	+		+	+		Survey Stakeholders
Add amenities Pool/spray park Shops/retail/vendors	+ +/-			+ +/-	+/-	Survey Stakeholders
Add parking fees	-			-	-	Survey
Install/operate algae pump	+		+	+		Literature Survey Stakeholders Local Data
Reduce crime (increase patrols)	+	+		+		Survey
Communications (education, signage, media, awareness)	+		+	+		Survey Stakeholders
Activities/programming	+			+	+	Literature

- + Positive impact on health determinant (leading to better health outcomes/reduced health disparity)
- Negative impact on health determinant (leading to worse health outcomes/increased health disparity)
- +/- Could be positive or negative, depending on nature of the changes

Figure 5C: Beach Redevelopment and Management Health Determinant Pathway



Current Conditions of Beaches

Rochester's waterfront assets include two seasonally lifeguarded sand beaches: Ontario, which is owned by the City of Rochester and operated by Monroe County; and Durand, which is owned and operated by the City of Rochester. The two beaches vary greatly by geography, amenities, uses and number of visitors.

Ontario Beach Park lies west of the Genesee River where it flows into Lake Ontario at the Port of Rochester. The park marks the northern end of the Genesee Riverway Trail. The Charlotte pier, a popular fishing and walking site, separates the swimming area from the mouth of the Genesee River. In addition to swimming, other physical activity opportunities at the park include beach volleyball, basketball and pickleball. Park amenities include bathhouses and restrooms, a playground, picnic tables and pavilions, and a historic carousel. The park is also adjacent to the Charlotte neighborhood and the Port of Rochester, where many local restaurants, several marinas, and other water-dependent businesses operate. Free parking is readily available and the area is served by a regular city bus route.

The entire half-mile sand beach is lifeguarded during the day in summer. Beach managers estimate that there were about 54,000 non-unique water users in 2012, counting only those who entered the water on days Ontario Beach was open for swimming (Table 5G).²⁴ Visitors are not allowed to access the water when there are no lifeguards or the beach is closed due to water quality concerns.

Durand Beach is a mile-long narrow sand beach located within Durand Eastman Park. The beach is separated from the rest of the park by Lakeshore Blvd, has its own parking, and runs along the Irondequoit Lakeside Multi-Use Trail. Since 2006, this beach has been operated by the City of Rochester under a variance from MCDPH. The variance is based on the city's plans to upgrade facilities (e.g., provide permanent bathrooms) to meet state standards for bathing beaches. A small portion of the sand beach (about a quarter mile) is designated for swimming. Parking is free, although there have been proposals to charge for parking at the swimming beach to help offset the cost of lifeguards. There is no public transportation to the beach.

Lifeguards patrol the full mile of beach during the summer, but are stationed on the swimming section. Although it is prohibited, people frequently swim during closed times and outside of the designated swimming areas at Durand. Durand Beach has a more natural setting than Ontario Beach; the only amenities available are portable toilets and picnic tables. The lifeguard station operates in a mobile trailer during the open season. In 2012, beach managers counted 24,951 non-unique water users on days the water was open for swimming (Table 5G).²⁶

²⁴ These counts are based on numbers reported by beach managers to the New York State Department of Health. Reports for Ontario and Durand were provided by Monroe County and City of Rochester staff. Total visitors to Durand beach were estimated at 119,000 in 2012. For more information about Durand Beach, visit <http://www.cityofrochester.gov/durandeastman/>; for Ontario Beach information, visit <http://www.monroecounty.gov/parks-ontariobeach.php>

Table 5G: Beach Use Statistics, 2012

	Ontario Beach	Durand Beach
Bather count	54,000	24,951
Number of days beach scheduled to be open:	81	72
Percent of these days beach closed due to poor water quality	54%	19%
Percent of those surveyed who said they would use the beach more if the water quality were better	91%	65%
Percent of beach users who planned to swim during their visit	32%	53%

Source: Monroe County and City of Rochester staff

The bather counts provided by beach managers suggest that Rochester’s beaches are a significant waterfront asset, providing free leisure time activities for many Rochester residents and visitors. They do not, however, provide information about how people use the beach, how often, or what might change their use. In July 2012, we surveyed 202 beachgoers at Durand and Ontario Beaches. The Beach User Survey asked about the frequency, duration, and type of use, as well as reasons for visiting that particular beach. Although the number of surveys and sampling was too limited to generalize to overall beach users, this data provides some insight as to the characteristics, behaviors, and opinions of beach users.²⁵

Table 5H summarizes the demographics of beach survey respondents. Most people surveyed at both Ontario and Durand were non-Hispanic (88%, 92), and most (89%, 169) were White; there was not a significant difference between the two beaches. However, survey respondents at Durand Beach were more racially diverse than those surveyed at Ontario Beach, with 17% (13) of respondents identifying as Black or Other at Durand compared to only 6% (7) of respondents at Ontario. We did not observe a difference in race nor ethnicity between those who chose to take the survey and those who did not, with the exception of a handful of people who could not take the survey because of a language barrier. Stakeholders noted that Ontario Beach visitors are more racially diverse in the evening and on weekends, times that we were unable to survey.

Household income was also similar at both beaches, with nearly three quarters of respondents reporting an income of \$35,000 or more. The income profile of survey respondents was more similar to Monroe County than to the City of Rochester, which may suggest that beach goers come from all over the Greater Rochester area. Alternatively, higher-income city residents may be more likely to visit the beach, or we may not have captured the demographics of all beach users because of our limited sampling times.

²⁵ For a detailed report of survey methodology and results, visit <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>

Table 5H: Beach User Survey Demographics

Demographic	Total N = 202*	Ontario Beach N = 119*	Durand Beach N = 83*	Total City N = 211,457	Total County N = 742,783
Gender					
Male	34%	29%	40%	48%	48%
Female	66%	71%	60%	52%	52%
Race					
White	89%	94%	83%	46%	77%
Black	7%	5%	10%	41%	15%
Other	4%	2%	7%	13%	9%
Ethnicity					
Non-Hispanic	88%	86%	91%	84%	93%
Hispanic/Latino	12%	14%	9%	16%	7%
Household Income					
\$35,000+	72%	72%	73%	44%	65%
<\$35,000	28%	28%	27%	56%	35%

* N = Total number of survey respondents in the category. N for individual demographic characteristics may differ based on survey responses; percentages for each are based on those who responded to each demographic question

Sources: 2011 American Community Survey 5-year, <http://factfinder2.census.gov>; Healthy Waterways, 2012 Beach User Survey

A majority of respondents at Ontario Beach reported they were sunbathing (76%, 91); the next most commonly reported activity was swimming (32%, 38). Most survey respondents reported they visited Ontario Beach 1-4 times in 2011 (41%, 48). At Durand, swimming was the most commonly reported activity (57%, 47). Sunbathing (47%, 39) and walking (24%, 20) were also common activities. About one third of survey respondents reported they visited the beach 5 or more times in 2011; 8% of Ontario Beach and 11% of Durand Beach respondents visited 21 or more times in 2011.

We did not survey people involved in organized events at the beach, such as volleyball tournaments. Some local fitness instructors even use the waterfront to conduct classes, including Sunday morning yoga at Durand Beach. Other events that draw people to Ontario Beach include free concerts during the summer. These activities and events involve large numbers of beach users who were not captured in our survey.

Beach Redevelopment and Health Determinants

Beaches, like other waterfront parks, are community resources for active (physical activity) and passive (health-supportive resource) recreation. However, water-based recreation, like swimming and some kinds of boating, may involve risks such as exposure to waterborne disease (water quality) or drowning (physical safety). Development of the beach area influences how and by whom the beach is used. As discussed in Chapter 4, changes in the use of beaches has the potential to affect health in three different ways: 1) who uses the beach; 2) how often people use the beach; 3) how they use the beach (i.e. what they do when they are there). Each of these strategies is described below.

1. *Attracting more users to the beach:* Beach developments might induce new people to start using the beach. The general community survey conducted at the Rochester Public Market explored this possibility. Anecdotal remarks and open-ended responses from that survey indicate that crime and perceptions about poor water quality are the primary factors preventing more widespread beach use. One respondent postulated that “the two main reasons that people don't visit the area are water quality and crime. If those were to improve the area would definitely be abundant with people.”

Beach user survey results indicated that the addition of parking or other fees for beach use would be a strong deterrent, and people would likely visit less often. Adding parking fees could decrease the number of users, and might particularly deter low-income users. In 2012, the city attempted to institute parking fees at Durand Beach to help offset the cost of lifeguards, but had ongoing issues with vandalism of parking meters so this was not implemented.

2. *Increasing the frequency of current users' visits:* Both the beach user and general public surveys asked respondents whether certain potential changes might lead them to visit the beach more often. The list of potential changes was derived from components of the 1999 Draft LWRP, and conversations with city staff and stakeholders. The most popular changes at Ontario Beach were better water quality, better maintenance, and more shops/vendors. Durand users said they were more likely to visit more often if there were better facilities, better water quality, and better maintenance (Table 5I). Ninety-one percent of those surveyed at Ontario and 65% of those at Durand said they would use the beach more often if the water quality improved. It is important to note that although “better facilities” was seen as desirable at both beaches, “more development” was rated more positively at Ontario than at Durand, where users valued the natural state of the park. Similarly, when asked whether more shops, vendors and restaurants would lead them to use the beach more, Ontario users responded more positively than those at Durand. For some people, development of more than basic facilities at Durand might deter use by interfering with the natural setting that attracts many users. Features likely to attract more users to Ontario beach include more shops and/or vendors and improvements to the current facilities. Thus, although many users are happy with the beaches as they are, many beach user respondents suggested changes that might increase their frequency of beach use and noted that parking fees would decrease their use.

Table 5I: Changes that May Impact Frequency of Beach Use (“I would visit the Beach More If...”)

Reason	Ontario Beach					Durand Beach				
		Disagree	Neutral	Agree	Rating ^a		Disagree	Neutral	Agree	Rating ^a
Better Maintained	N=117	7%	32%	62%	3.88	N=80	11%	41%	48%	3.60
Safer	N=113	11%	45%	44%	3.50	N=78	21%	35%	45%	3.38
Open More Often	N=114	10%	46%	45%	3.51	N=79	16%	39%	44%	3.43
Better Facilities	N=114	10%	32%	58%	3.75	N=79	10%	18%	72%	4.00
Better Water Quality	N=117	3%	7%	91%	4.64	N=77	8%	27%	65%	3.94
More shops, vendors	N=115	10%	29%	62%	3.83	N=79	30%	20%	49%	3.25
Nothing	N=108	40%	43%	18%	2.65	N=73	26%	32%	42%	3.21
Spray Park or pool	N=110	17%	31%	52%	3.65	N=78	38%	28%	33%	2.87

^a Calculated by averaging Likert responses ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Source: Healthy Waterways Beach User Survey.

Source: Healthy Waterways, 2012 Beach User Survey

Physical Activity

Beaches are a public resource for physical activity. As noted above, visitors to Rochester’s beaches may engage in a range of water-based (swimming) or land-based (volleyball, walking, etc.) physical activities. There is little literature specifically on how beaches contribute to physical activity levels, although presumably the effects are similar to those of trails and parks. There is growing evidence that many people use public spaces for recreation involving physical activity, but it is difficult to quantify whether their proximity, accessibility, or quality affects the total physical activity of a population. Active transportation to the beach (biking or walking) also provides physical activity. Swimming at beaches is unique, however, in that it is affected by water quality.

It is not clear whether Rochester’s beaches currently promote significant additional physical activity through swimming. Although swimming was the most commonly reported activities at both

beaches, use patterns varied. Only about a third of Ontario Beach survey respondents said they were swimming and a majority of survey respondents reported that they visited the beach only 1-4 times in a year. Durand Beach survey respondents were more active (more than half of survey respondents reported they were swimming there). At both beaches, there were a small number of people who visit regularly and for whom the beach may be an important exercise resource. The small sample size limits our ability to extrapolate from survey results. However, results suggest use patterns vary between the beaches. Beach managers also informed us that most bathers do not actively swim or play in the water, but instead more typically use it to cool off.

Land-based physical activity at the beaches may also be important. Stakeholders familiar with both beaches regularly see people walking or jogging at Durand Beach. Walking dogs in the mornings when the beach is not open for swimming is particularly popular. As noted above, beach redevelopment strategies have the potential to increase physical activity in many ways. We focus here on developments that would contribute directly to increased physical activity.

Survey respondents and stakeholders frequently referred to water quality as a barrier to swimming at the beach. Because of the smell, water quality may also be a barrier to land-based physical activity and recreational uses. Survey responses suggest that if algae were reduced at Ontario Beach, there would be an increase in swimming. There would also be fewer closure days, presumably resulting in increased physical activity [141].

Adding a spray park or pool was included in the list of potential changes because of ongoing local discussions of whether to build this type of facility at Ontario Beach. As noted above, water quality problems deter many visitors from swimming, and prevent others from using the water as frequently as they would like. Some users reported frustrations with arriving at the beach for a day of swimming only to find the water closed. A spray park was mentioned as one option to provide consistent, safe, water-based recreation. Access to a water-related activity may help users be more active when the water is closed because of poor water quality, particularly on hot summer days. On the other hand, however, the City of Rochester operates eight spray parks throughout the city. It is unclear whether the addition of a facility at Ontario Beach would increase use by individuals overall, replace use of another facility, or result in no change.

Water Quality

Changes in beach development might affect health by altering exposure to polluted water. These impacts depend on both water quality and whether users are exposed to polluted water. Significant development of parking lots, additional structures, etc., has the potential to negatively impact water quality through an increase in surface runoff (see Stormwater Management, below). Users are protected from exposure to poor water quality by beach management

Remarks about water at beaches from survey respondents
“Water smells.”
“Charlotte smells bad.”
“Algae invaded water.”
“Just for walking. Water is gross.”
“Nasty water.”
“The water is absolutely horrible.”

policies that prohibit swimming when water quality does not meet standards established by the state. Although many news stations report when the beach is closed and the county operates a hotline with closure information, fewer than half of survey respondents reported that they check to see if the water is open for swimming before heading to the beach.

“[Ontario Beach is] beautiful and just needs to have the water issue resolved.”

– Beach survey respondent

In addition, efforts such as the proposed algae pump may improve water quality. One goal of the algae pump would be to increase the number of days the water is open for swimming. The proposed algae pump will only run on days that the beach is closed due to high bacteria counts or heavy algae. Its goal is to remove algae and reduce the number of days closed per bloom. Thus, it may improve water quality, but is not likely to eliminate beach closures.

As previously discussed, peoples’ perceptions of water quality at the beach are strongly tied to their willingness to visit the beach and use the water. These opinions correlate with sensory perceptions, particularly sight and smell of algae. Surveys collected at the public market support the idea that many people avoid visiting the beach because of water quality concerns or because the smell leads to an unpleasant experience. Interestingly, although many residents appear to understand that Rochester faces water quality issues and that exposure to polluted water may lead to illness, understanding of the specific risks and health concerns vary significantly. While some may underestimate risks and swim even when the water is closed, others fear any contact with the water even when it is open for swimming. There also appears to be misperception of contamination sources, as most Monroe County residents still believe a majority of the pollution is industrial [142]. While many water quality concerns in Lake Ontario do relate to legacy chemicals from historical industry, current concerns are primarily urban and agricultural surface runoff bringing bacteria and nutrients to the lake [80]. Industrial chemicals, which accumulate in high concentrations in fish, pose a threat to people who eat locally caught fish. However, they do not pose a significant threat to swimmers. Bacteria such as E. coli, however, may be unintentionally ingested and lead to illness, or cause irritation or other dermatological effects [55]. To protect human health, the beach is closed at times of high bacteria counts. Large amounts of algae in the water (which occurs when there are too many nutrients) contribute to these high counts by providing a place for bacteria to grow [141]. In discussing algae blooms as a health concern, many people think of “toxic” cyanobacterial algae, which produces toxins that are dangerous to humans and animals. Although Rochester has not experienced a toxic bloom, other parts of Lake Ontario and connecting waters have [56,143]. Bacteria can also be associated with algal blooms. E. coli is most common; however, algae blooms also support the production of Type E Botulism, which can affect humans and animals [59]. However, botulism cases from consumption of locally caught fish are rare, and swimmers are generally not at risk [59].

“You can get so many diseases [from the water] – Pneumonia, Chlamydia...they should do something about it.”

– Anecdotal remark from beach user at Ontario Beach

Health-supportive Resources

Changes in beach development could support healthy lifestyles by providing more public gathering spaces, passive recreation opportunities, economic development, and healthy retail. Beaches are a prime resource for public gathering and passive recreation, the health benefits of which are discussed in Chapter 3. Survey data show that most users visit Rochester’s beaches with family or friends. Although many current users spend time sunbathing and relaxing on the beach, the number of users enjoying these benefits may be limited by water quality and safety concerns. Similarly, these locations are potentially valuable places to promote community activities and build social capital.

The Port of Rochester is a key area for development and growth [9]. While this development is likely to increase the city’s tax base, economic impacts on current neighborhood residents are unclear. More retail and food services near Ontario Beach Park have the potential to generate local jobs and increase tax revenue. Census Tract 85, which contains Ontario Beach Park and the Charlotte neighborhood, has an unemployment rate of 13.2%, compared to 12.3% in the City of Rochester and 8.1% statewide [144]. New retail and restaurants can provide local residents with gainful employment close to their homes. On the other hand, residents who are not involved in this economic development could experience negative impacts from increased housing costs (See Waterfront Development, below). Additionally, the potential of non-healthy retail (alcohol sales, etc.) to reduce health should be acknowledged.

Physical Safety

Physical safety refers to unintentional and intentional injuries. Unintentional injuries at Rochester’s beaches include risks related to physical activity and swimming, including drowning. In this regard, Rochester’s beaches are considered to be very safe. Few injuries are reported each year, and no deaths from drowning have occurred during lifeguarded hours. However, there may be potential for an increase in unintentional physical injuries if more people begin to use the beaches. If changes along the waterfront draw more visitors to the beaches each year, the city and county may need to employ additional lifeguards to accommodate a greater number of swimmers. Our survey results indicate that a perception of violence and high crime rates at both Ontario and Durand beaches prevents many people from using these resources. Thus, efforts to reduce crime and public campaigns that improve the perception of the beach as a safe area may increase use.

Remarks about safety concerns at beaches from survey respondents
“Too many fights.” “Fights, aggressive behavior.” “Crime.”
“People are sketchy.” “Better human behavior [would make me more willing to visit].”
“The beaches could be made more safe.” “Too many thugs.”

Other Health Determinants

In our scoping, several stakeholders expressed concerns about additional health determinants, including sun exposure, air pollution, and heat-related illnesses. It was beyond our scope to assess these fully; however, they are briefly addressed here.

Given current use patterns, it is unlikely the beach is a significant source of excess sun exposure for many visitors. However, if use patterns change and more people visit the beaches more often, there is potential for unhealthy amounts of sun exposure during summer months, contributing to long-term risks for skin cancer. Educational reminders about safe sun exposure might reduce these risks.

The City of Rochester's overall air quality has improved in recent years. However, local air quality may vary significantly, for example around bus stations and other heavy traffic areas. An increase in the number of visitors and frequency of beach use could significantly increase vehicle traffic and congestion at the Port of Rochester and in surrounding neighborhoods, which could negatively impact air quality. The risk of worsening air quality could be mitigated by increasing public transportation to the beach.

Although not part of the LWRP, a parallel planning process for the Port of Rochester includes a new marina and harbor development, which is also likely to impact air quality from marine sources. Marine diesel engines produce more air pollution than do cars; on the other hand, wind- and human-powered vessels do not contribute to air emissions. The port development/marina plan is not addressed in this report as it is outside the scope of the LWRP.

Beach managers reported that many people use the water at Lake Ontario to cool off during hot summer months. Improvements to water quality or the addition of other resources to avoid the heat will help residents escape heat stress on more days (through fewer beach closures each year or by providing easily accessible alternatives when the water is closed).

Built Environment

Overview

Waterfront development changes the natural and built environments in ways that can affect human health. Built environment components of the LWRP that have particular significance for community health include: Vacuum Oil Brownfield redevelopment plans; city Community Improvement Projects; downtown riverfront updates, including Erie Harbor Park, the new Marina Development Project, and High Falls area redevelopment; and new private development along the river.

The LWRP has the opportunity to incorporate existing knowledge about health-promoting design of the built environment into the development of Rochester's waterfront. Table 5J and Figure 5D summarize the health determinants affected by each of these features. Because different design features may affect different health determinants, we have grouped them into the following categories:

- Mixed use/healthy retail
- Safe and affordable housing
- Public access and gathering spaces
- Walkability
- Public recreational facilities and programming
- Reduced crime

The relationship between the built environment and community health has been explored from a wide range of perspectives and is supported by a well-established and growing evidence base within health, community planning, and design fields. Although the research on health-promoting community design does not specifically address waterfront development, the same general principles apply. However, the challenges of balancing economic, equity and public interests are increased in waterfront areas by the high value of access to, views of, and proximity to surface water for multiple uses.

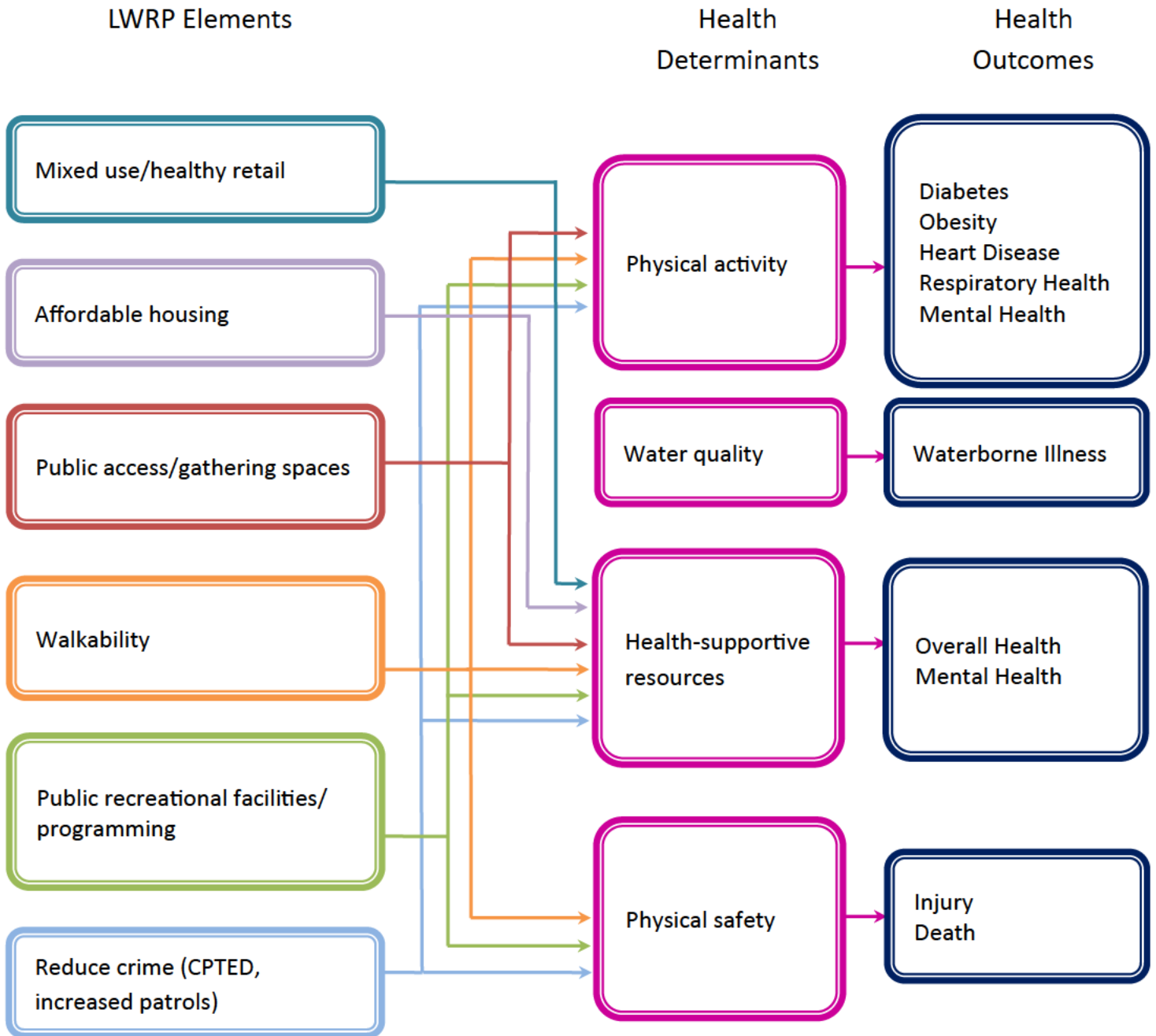
Several agencies have synthesized lessons learned about healthy development into planning and design research, principles and goals. For example, the Center for Disease Control’s (CDC) Healthy Community Design initiative aims to improve public health by linking public health surveillance with

Table 5J: Built environment impacts on health determinants

Built Environment	Health Determinants				Equity Impacts?	Evidence type
	Physical Activity	Physical Safety	Water Quality	Health-supportive Resources		
Mixed use/healthy retail				+	+	Literature Survey Stakeholders Local Data
Affordable housing				+	+	Literature Stakeholders
Public access/ gathering spaces		+		+	+	Literature Stakeholders
Walkability	+	+		+	+	Literature
Public recreational facilities/programming	+	+		+	+	Survey Local Data
Reduce crime (CPTED, increased patrols)	+	+		+	+	Literature Stakeholders

+ Positive impact on health determinant (leading to better health outcomes/reduced health disparity)
 - Negative impact on health determinant (leading to worse health outcomes/increased health disparity)
 +/- Could be positive or negative, depending on nature of the changes

Figure 5D: Built Environment Health Determinant Pathway



community design decisions, conducting research to identify the links between health and community design, and educating decision makers on the health impacts of community design [145]. Similarly, the U.S. Health and Human Services Healthy People 2020 plan includes a goal to create social and physical environments that promote good health for all [146], and the American Planning Association’s adopted definition of smart growth identifies the promotion of public health and healthy communities as a critical element [147]. The American Institute of Architects (AIA) issued a

brief in 2003 entitled, *Public Health and the Built Environment, How Architects Can Design for Better Public Health* [148]. Communities throughout the US and beyond are examining the potential health impacts of proposed development and redevelopment decisions through HIAs. Although none have focused specifically on a waterfront context, a few relevant examples are included in Text Box 5A.

Text Box 5A: Examples highlighting the study of community design in HIA

- Baltimore, MD [168] - This HIA evaluated the potential health effects of the City of Baltimore's comprehensive zoning code rewrite (known as TransForm Baltimore). This assessment was one of the first to examine a major revision of a municipal zoning code in the U.S. and presented an opportunity to shape an evolving conversation about land use.
- Hapeville, GA [169] – This HIA focused on redevelopment plans for the 122- site of the former Hapeville Ford Assembly Plant in Hapeville, GA. The HIA indicated that the Aerotropolis redevelopment had the potential to impact health through active living, injury, air quality, social capital, crime, access, noise and gentrification.
- East Bay Greenway, Oakland/Hayward, CA [170] - This report found the proposed greenway project could lead to a number of benefits, including: increased physical activity as residents would have more opportunity to walk or cycle; more opportunity for neighbors to interact and get to know each other, which has been shown to increase community safety and lower crime rates; reduced stress; and reduced motor vehicle use contributing to cleaner air.
- Portland, OR [8] – The City of Portland updated its comprehensive plan update to create 20-minute neighborhoods along the SE 122nd Ave corridor. This HIA developed a set of recommendations to help inform the City's update of land use, transportation, connectivity and development design plans.

Current conditions of Rochester's Waterfront Built Environment

This section describes existing housing, commercial and industrial development, and natural landscapes along the city's waterways.²⁶ The waterfront currently features a mix of uses including housing, open spaces, recreational facilities, and commercial/industrial enterprises. Refer to Chapter 3 for additional information on current development in the waterfront.

Along with these varying land uses is a diverse mix of income levels and employment status that could be influenced by development changes along the waterfront. For example, Charlotte and Maplewood residents have higher mean household incomes compared to 14621, PLEX, and other waterfront neighborhood groups. Unemployment rates also vary greatly both within and among waterfront neighborhoods. All but one of the neighborhood groups (UNIT-Lyell Otis) has at least one tract whose unemployment rate is higher than the City of Rochester's unemployment rate (12%). However, many of these groups also contain tracts with relatively low unemployment rates (4%-5%). PLEX and the CUBE neighborhoods are the only groups in which unemployment exceeds 12% for all tracts; the overall unemployment rate is 21% in both groups (Table 3B).

²⁶ To avoid overlap with previous elements in this chapter, this discussion about waterfront redevelopment does not address trails.

Because the LWRP is so broad, we focused our efforts on one neighborhood adjacent to the LWRP in southwest Rochester, the PLEX neighborhood. Residents of PLEX have direct visual and physical access to the Genesee River. There has been little recent development along the waterfront near PLEX, while other nearby neighborhoods (Corn Hill, South Wedge, 19th Ward) have seen significant changes to waterfront land use over the past decade. Significant plans for waterfront redevelopment in PLEX will be part of the LWRP through the Vacuum Oil Brownfield redevelopment plan. As part of that planning process, the city has conducted several community forums, and the PLEX neighborhood hosted a Charrette in June 2012 to develop a community vision for the neighborhood. Given the brownfield plan and population characteristics in southwest Rochester, we believe that residents of PLEX and other southwest neighborhoods are likely to be affected by the LWRP in the near future.

Built Environment and Health Determinants

As noted above, a growing body of experience has defined characteristics of development that provide a health-promoting environment. One primary goal is community design that promotes physical activity (e. g. walkability). In addition, development patterns can determine residents' access to a wide range of health-supportive resources, including jobs (economics), healthy retail, safe and affordable housing, and public gathering spaces. Design can also affect physical safety related to traffic accidents and crime. The LWRP addresses the potential for development of commercial, residential, and industrial areas in many sections. The sections below discuss how the LWRP recommendations for development of these areas could affect health determinants.

Physical Activity

Future development within the LWRP may affect residents' and visitors' physical activity. For vulnerable populations that depend on public transportation, well-designed public and private spaces can provide convenient access to transportation services and promote walking to and from the facilities. The way that housing and commercial/retail establishments are designed can affect people's ability to be physically active by walking to destinations that are part of their daily lives ("walkability"). The size and location of buildings, distance between buildings, presence of sidewalks, street lighting and other physical design elements will impact whether people walk in a particular area. For example, compact development patterns and well-connected sidewalks provide easy pedestrian connections among key destinations. An important element of walkability is the actual and perceived safety of an area. The walkability of a neighborhood has been shown to have an effect on physical activity. Adults living in walkable neighborhoods or regions are less likely to be overweight or obese compared to those living in less walkable areas [77,149]. Walkability varies greatly among neighborhoods in Rochester. While some waterfront neighborhoods – Central Business District, Brown Square, South Wedge, and Upper Falls – are among the most walkable neighborhoods, others rate lower – PLEX, Highland, Maplewood, UNIT, Lyell-Otis and Charlotte [150].

Water Quality

Changes in the waterfront built environment could affect health by impacting water quality. Although there is no evidence that brownfield sites are currently leaching chemicals into surface waters, several stakeholders expressed concern about this possibility. In the long run, remediation measures (such as removal or bioremediation of contaminated soil) taken as part of brownfield redevelopment should reduce risks of exposure to toxins in air, soil, or water. However, there is a risk of mobilizing chemicals into the air or stormwater runoff when soil is disturbed during redevelopment. Careful implementation of stormwater runoff and erosion controls can mitigate these risks. Baseline and ongoing monitoring of ambient air and water quality and reporting results to community members may address concerns about the potential for exposures. Also, as noted elsewhere, direct health risks from accidentally ingesting surface water are minimal. There may be longer term concerns about buildup of chemicals in fish that are consumed by humans.

Features of the built environment that control stormwater runoff are further discussed in Stormwater Management, below.

Access to Health-supportive Resources

Waterfront redevelopment may affect access to health-supportive resources, including a healthy retail environment, employment and economy, healthy and affordable housing, and public gathering spaces. The two primary ways it might impact access are by 1) spurring real estate development that could potentially support the addition of resources to neighborhoods along the waterfront, and 2) by improving transportation options via trail and walkability improvements that would make it easier for some residents to access current and future resources. The primary health supportive resources that relate to the built environment are healthy retail, economy, housing, and public spaces.

Healthy Retail

Several locations in the study area are prime locations for mixed-use development. If healthy retail, such as food markets, pharmacies and health related services (medical care) are located in these developments, residents will have improved access to health-promoting services and goods. Development can affect residents' access to health-supportive resources such as grocery stores, pharmacies, and healthcare. As redevelopment occurs, there is an opportunity to improve availability of nearby health-supportive resources. For example, access to supermarkets has been linked to many health benefits in addition to job promotion and neighborhood stability. Generally, supermarkets have lower prices than other stores and carry healthier foods. Studies have found that walking distance to supermarkets is the greatest food access barrier for all income groups, with or without a vehicle, and in urban or rural areas [151]. Thus, a full service grocery store in the waterfront area would increase access to healthier food options.

At the same time, there are planning and policy tools that can limit unhealthy retail. The City of Rochester recently amended its zoning code in an effort to limit the density and negative community and health impacts of corner stores in its neighborhoods.

Another change that may result from waterfront redevelopment is increased access to the water, including increased opportunity for fishing. If residents supplement their diets with locally caught fish, there could be both positive (low-fat protein) and negative (chemical contamination) health implications as previously discussed.

Employment and Economics

Unemployment rates are high in certain areas of the waterfront. Redevelopment in the lowest income areas (PLEX, 14621 and the CUBE neighborhoods) may be particularly important because of its potential to impact economic conditions and residents' financial wellbeing. As discussed in Chapter 4, negative health outcomes are often associated with poverty and unemployment. Redevelopment of the waterfront in low-income neighborhoods such as PLEX and CUBE may generate new businesses and industries, therefore expanding employment opportunities for residents. Waterfront neighborhoods will benefit most if efforts are made to employ local residents, businesses and services in the redevelopment projects.

Healthy and Affordable Housing

Development can also cause changes in housing availability and affordability. Waterfront property is considered prime real estate for high-end housing. Several residents in southwest Rochester expressed concerns during community presentations about plans for waterfront housing in the PLEX neighborhood as part of the Vacuum Oil Brownfield redevelopment project. Residents fear that changes in property taxes and housing costs resulting from construction of new units will drive low-income residents out of the neighborhood. Discussions with stakeholders, however, revealed that some believe the abundance of low-cost housing in these neighborhoods significantly reduces such risk. The city should consider such impacts on existing communities when discussing options for housing development along the waterfront.

Public Gathering Spaces

Waterfront development can contribute to social cohesion by providing public gathering spaces and areas for passive recreation where neighbors can interact. The design and condition of the built environment may also contribute to neighbors' sense of pride in the community. The Southwest Community Survey asked residents about how proud they were to live in their neighborhoods, and how much they felt their neighbors cared about the community. Overall, 49% of respondents believed their neighbors care a great deal about the neighborhood, and 56% stated that they were very proud to live in their neighborhood. However, sense of pride varied by neighborhood within the southwest. Only 38% of PLEX residents responded that they were very proud to live in their neighborhood, and only 36% thought their neighbors care a great deal about the neighborhood.

Development in waterfront communities may influence social cohesion in many ways. For example, redevelopment and improved maintenance of existing structures may increase a sense of pride in the neighborhood and bring neighbors together. Similarly, new developments that include community recreation centers and other opportunities for social activity could promote the development of neighborhood social circles [152]. Southwest Community Survey comments indicated that in addition to recreational opportunities for teens and youth, the health of community members would benefit from more social support and events in general. Eight respondents specifically noted that providing youth activities, encouraging parents and communities to be active in kids' lives, and more exposure to the arts would all benefit health in the community.

"Healthi Kids," a program of the Finger Lakes Health Systems Agency that promotes physical activity and healthy eating among children in Rochester, has developed "neighborhood playability plans" with several communities in Rochester, some of which are located within waterfront neighborhoods. This approach could be expanded in waterfront neighborhoods to help promote physical activity and safe public spaces for children and families. The "Garden Aerial" is an effort to develop public spaces around the High Falls district; this project would include additional waterfront access, a new pedestrian bridge to create a loop around the falls, and redevelopment of a former industrial site.²⁷ Both of these efforts are examples of community/private/public efforts to improve public spaces and promote social cohesion near the waterfront.

Physical Safety

Physical design elements such as street lighting, façade transparency, proximity to activity and level of community interaction will impact actual and perceived physical safety within the waterfront. The connection between built environment and safety has been examined extensively by Crime Prevention Through Environmental Design (CPTED) advocates [153]. CPTED is a multi-disciplinary approach to deterring criminal behavior through environmental design. For example, clear distinctions between public and private spaces, lighting, and improved maintenance to indicate ownership are commonly used CPTED principles [153]. In addition to these built environment factors, CPTED principles also emphasize the importance of social cohesion and community connectedness [154]. Locally, the Health Engagement and Action for Rochester's Transformation (HEART) initiative includes a focus on CPTED design principles. Through this initiative, City of Rochester staff and representatives from neighborhood organizations serving some of the city's most vulnerable communities were trained in CPTED principles. Ensuring design with safety in mind will be critical to creating and maintaining walkable neighborhoods as redevelopment occurs.

²⁷ <http://www.gardenaerial.org/>

Other Health Determinants

Crime, economic hardship, and lack of social cohesion can also contribute to long-term stress levels and poorer mental health of residents. Thus, focusing on development strategies that reduce crime, improve residents' economic status, and help build neighborhood social cohesion may reduce stress. In addition, stress can also be influenced by the presence of hazardous waste sites, noise, and high traffic volumes [102]. Focus on the Vacuum Oil Brownfield redevelopment program has raised awareness of the brownfield for some residents. In one stakeholder interview, we discovered that some community members who live near brownfield sites worry that they might be exposed to chemicals through the air, that chemicals may leach through the soil to their property, or that water in the Genesee River may be contaminated from the nearby brownfield. These residents' concerns suggest that more communication about living near brownfields (current knowledge about contamination, remediation plans, protections during cleanup, and ongoing monitoring), may also help residents better understand their risks, and potentially reduce some of these concerns.

Water-based Recreation

Overview

Water-based recreation includes boating, swimming, and fishing. These activities can contribute to healthy lifestyles, but they can also put participants at risk of exposure to waterborne contaminants or drowning. Swimming is currently limited to the Lake Ontario beaches and is discussed in the section on beachfront development; it is unlikely that swimming will be promoted in the Genesee River in the near future due to poor water quality. Therefore, this section focuses on fishing and boating along the river and canal.

Changes in the waterfront could affect water based recreation in many ways - positively or negatively, directly or indirectly, and intentionally or unintentionally. Changes in the waterfront that could affect community health are summarized in Table 5K and Figure 5E. Specific LWRP considerations that might affect water-based recreation include:

- More public access points for fishing and launching boats
- New water-based recreation businesses such as canoe/kayak rentals
- Public recreational facilities and programming
- Additional waterfront safety measures (ladders, fences, etc.) to prevent drowning
- Communication about water-based recreation opportunities and safety considerations

We have not found previous HIAs on water-based recreation, but literature on other forms of active and passive recreation provide some insights into the health impacts of changes in these opportunities. In addition, stakeholders – including groups currently operating water-based recreational facilities and community groups interested in waterfront redevelopment – provided useful information for this section.

Current Conditions of Water-based Recreation

The north end of the Genesee River runs through a gorge and the central portion (near downtown) is characterized by waterfalls and steep banks. Thus, most recreational access to the river is south of downtown and along the canal, with the exception of fishing sites at the Charlotte pier, Turning Point Park, and Seth Green Drive. There are no designated fishing piers or locations south of the falls, but people are regularly seen fishing at informal fishing spots along the river and canal.

The Genesee Waterways Center (GWC), located in Genesee Valley Park (southwest), is a nonprofit organization offering canoe and kayak rentals, rowing and sculling, and various other water-based programs throughout the year such as regattas and family programs. GWC operates under the motto “bringing people to water.” The University of Rochester rowing team also uses this facility. The Genesee Rowing Club, located in the same park on the Southeast side of the river, is a nonprofit rowing club which has recently built a boathouse.

Stakeholders noted that opportunities for water-based recreation could be further developed. Although current facilities are open to the community, rowing is a high-cost sport that is not accessible to many community members. Likewise, the one nonprofit canoe and kayak rental facility in the far southern end of the city cannot adequately serve all residents, particularly those with limited transportation. GWC and its wide array of programs throughout the year remains a “hidden treasure” in Rochester.

Table 5K: Water-based recreation impacts on health determinants

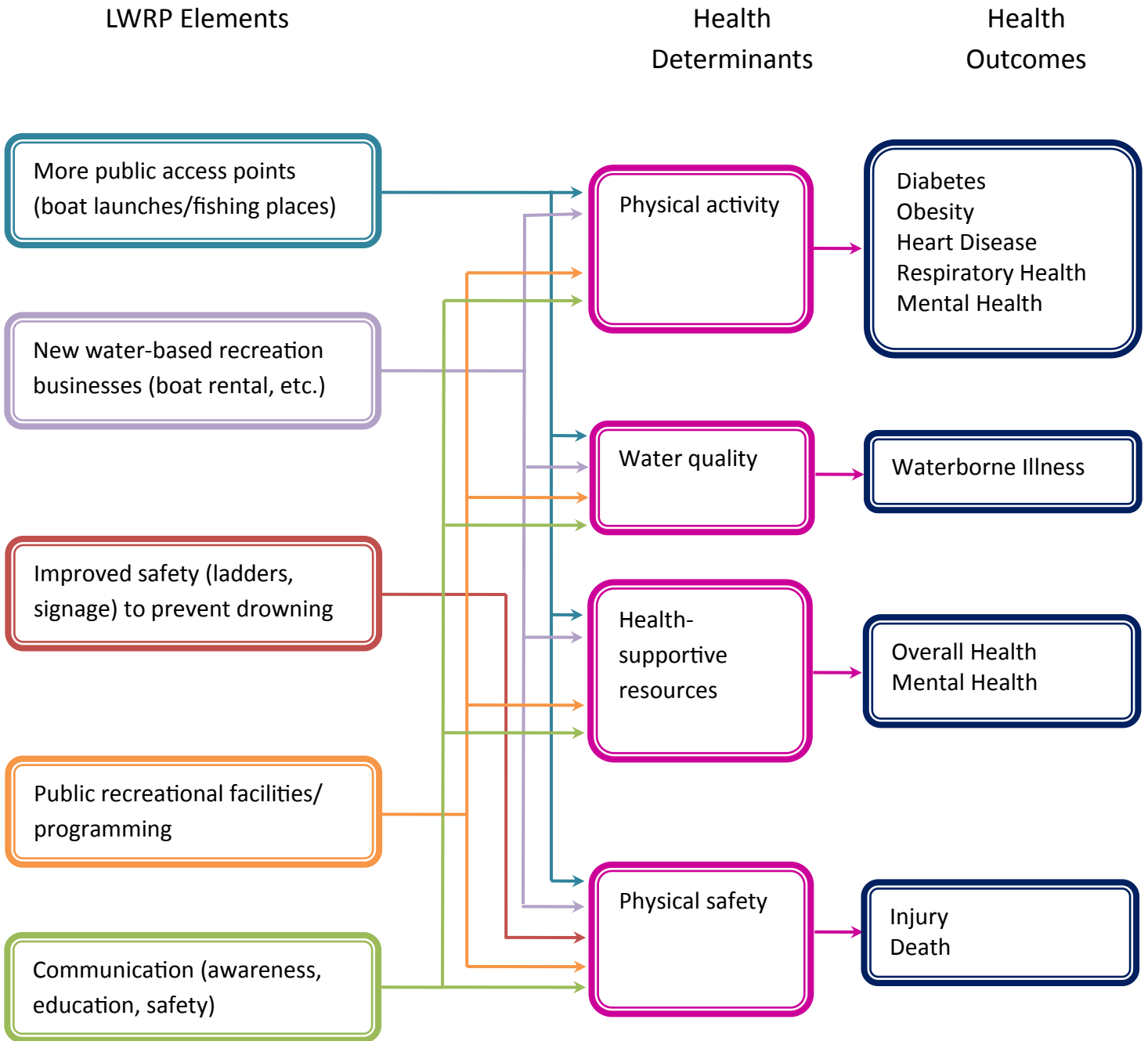
Water-based recreation opportunities	Health Determinants				Equity Impacts?	Evidence type
	Physical Activity	Physical Safety	Water Quality	Health-supportive Resources		
More public access points (boat launches/fishing places)	+	-	-	+	+	Survey Stakeholders
New water-based recreation businesses (boat rental, etc.)	+	-	-	+		Stakeholders
Improved safety (ladders, signage) to prevent drowning		+				Stakeholders
Public recreational facilities/programming	+	+/-	-	+	+/-	Stakeholders
Communication (awareness, education, safety)	+	+	+/-	+	+	Stakeholders

+ Positive impact on health determinant (leading to better health outcomes/reduced health disparity)

- Negative impact on health determinant (leading to worse health outcomes/increased health disparity)

+/- Could be positive or negative, depending on nature of the changes

Figure 5E: Water-based recreation health determinant pathway



Genesee Waterways staff estimate 150-200 people rent canoes and kayaks each week during the summer. Special events such as the Diversity Regatta bring thousands more to the waterfront each year. According to staff, however, users are primarily middle- to upper-income, largely due to the expense of rowing. Ongoing programs at the center aim to increase both the total number and diversity of users, and the center has begun to assess its “place in the community” as part of these outreach strategies. Partnerships with Cross Currents (a non-profit youth rowing organization), the YMCA, and the city provide guided tours, kayaking and swimming lessons, and other community

events. The center hopes to continue and strengthen these relationships to raise awareness for more residents.

The City of Rochester also partners with Kayak Adventures of Rochester to offer free whitewater kayaking lessons for city residents. This program had a weekly attendance of about 125-150 kayakers in 2012. Other boating recreation opportunities along the river include cruises on the historical Mary Jemison tour boat, which operates out of Corn Hill Landing. This recent Corn Hill development included free public docking space for personal boats.

Water-based Recreation and Health Determinants

The most significant positive impacts of additional water-based recreation opportunities would be on physical activity and passive recreation. Active forms of boating (particularly canoeing, rowing, kayaking, and sailing) may contribute to physical activity. Fishing and boating are also widely described by community members as stress-reducing forms of passive recreation that are accessible to people of varied abilities. Boating may be cost-prohibitive to some, but fishing is relatively affordable. It should also be noted that both of these activities might pose risk of exposure to water-borne contaminants or safety hazards.

Specific ideas for water-based recreation discussed during the PLEX Charrette and other stakeholder meetings include opportunities for canoeing/kayaking along the river. Others suggested the addition of fishing facilities, or mentioned that increased access to the water would encourage people to fish. In response to this feedback, the City of Rochester plans to construct a new kayak launch along the GRT during the initial phase of the South Genesee River Corridor brownfield redevelopment project [155]. In addition to fulfilling community desire for these recreational opportunities, such facilities are also likely to affect health. Southwest Community Survey participants responded that more recreation on the Genesee, more playgrounds/parks for children and more recreation facilities for youth would all have a positive impact on their own health.

“... nine out of ten people who get out on the water say ‘I didn’t know it was here!’”
– GWC staff

“Youth need activity to keep them occupied.”
– Comment from southwest community survey respondent

Physical Activity

Although we were unable to find studies specifically examining the impact of expanding opportunities for active water-based recreation, the patterns are likely to be similar to beach and trail development. That is, development of additional opportunities may support recreational physical activity. One caveat is that water-based recreation activities often require rental fees or other expenses, which may limit participation by low-income residents.

While it is clear that many residents desire more access to the Genesee River for active water-based recreation, limited resources prevented the study team from quantifying how many people are likely

to use new facilities or programs, and the extent of impact on physical activity. However, anecdotally, GWC staff noted that outreach programs and events often result in an influx of new users, suggesting that many residents simply do not know about water-based resources. Increasing water-based recreation events and improved communication about opportunities may help spread awareness of the resource.

Water Quality

Involvement in water-based recreation increases the potential for exposure to polluted water. There have been no reports of water-borne disease transmitted to boaters or others using the water in Rochester. However, there is the potential for participants to be exposed to pathogens. In fact, one study found that limited-contact water recreation such as boating increased risk of illness from water-borne disease, regardless of water quality [55].

Health-supportive Resources

Increased direct access to the water also creates opportunities for passive recreation, most notably through fishing. Stakeholders and anglers interviewed throughout the City of Rochester during a 2009 Fish Consumption Study reported that fishing is a stress reducing activity [14]. That study noted, and stakeholders confirmed, that people fish wherever there is access to the river. Therefore, increasing access has the potential to increase the frequency at which individuals fish, or may enable more individuals to fish by removing transportation and other access barriers.

Fishing may also have nutritional implications if anglers who use new fishing facilities consume the fish they catch. The 2009 study found that about half of local anglers eat their catch, and that many of these individuals reported eating locally caught fish more than once per week (40% of those who eat locally caught fish); about 19% of community members surveyed also reported consuming the fish they catch. The sample size for the angler study was small; however, these results suggest that local fish consumption supplements the diet of a significant number of Rochester residents. The study also found that more Black and African American participants ate locally caught fish, and Latino respondents who eat local fish tend to eat it more often.

Although fish is an important source of protein and omega-3 fatty acids, there are also health concerns associated with local fish consumption. Anglers' knowledge and perception of the safety of locally caught fish may not reflect reality. For example, some anglers perceive that fish caught in the Genesee River south of Upper Falls are less healthy to consume, because the water appears to be dirtier. In actuality, fish caught upstream of the falls are generally safer to consume, because contaminants of concern are in higher concentrations in fish caught in Lake Ontario and connecting

Remarks about local fish consumption from 2009 Fish Consumption study

"[I'd] rather have fish out of [Lake Ontario] than store bought, because I know where it comes from."

"I would expect to see the warnings on a sign [if there were anything wrong with eating the fish]."

"[It's] hard to say when you're hungry."

waters. Thus, increasing fishing access to the Genesee River above Lower Falls may increase access to less contaminated fish, though it is unclear to what extent.

Physical Safety

The study team did not hear any new concerns regarding crime or violence throughout discussions of new water-based recreational facilities. However, reports from the General and Trail User Surveys identified crime concerns in Genesee Valley Park where most current opportunities are based. One stakeholder noted she had heard of people avoiding water-based recreation in the park because of fear of crime. This stakeholder also noted that increased visitors and public activities have led to a decrease in crime over the years.

Some stakeholders also expressed concerns that increased access to the water may pose a physical injury risk. Specific concerns related to community members who cannot swim falling into the water. The Genesee is a large river with strong currents, and many community members do not know how to swim. In addition, hardened shorelines (cement walls built for flood protection) make it difficult to climb out of the river in certain sections. Although there have been very few drownings connected with water-based recreation in Rochester, several stakeholders noted that in some cases fear of drowning may prevent people from using the resource (particularly residents of waterfront neighborhoods). Some suggested that increased availability of swimming lessons might help reduce this risk.

Stormwater management

Overview

Stormwater runoff refers to the amount and quality of water that runs off the land into surface waters. Because stormwater carries nutrients, bacteria, sediment, and chemicals, it is a major source of non-point source pollution. Statewide, non-point source pollution is the primary cause of nonattainment of water quality standards in surface waters [156]. In general, it is suspected that agricultural runoff and other sources in the upper watershed are a primary source of the bacteria and nutrient pollution that leads to algal growth and beach closures. However, urban and suburban runoff, Combined Sewer Overflow (CSO) events, and other sources also contribute to this problem. Sediment pollution in Lake Ontario is attributed to a lack of riparian cover along streams and steep slopes [157].

The LWRP encompasses recommendations that may affect stormwater management in several areas. Construction has the potential to increase sediment and other contaminants in stormwater runoff. Additional “hardening” (paved/non-permeable surface) in the watershed would increase stormwater (both total quantity and pollution levels). Conversely, development of ‘green infrastructure’ options such as permeable pavement, implementing additional stormwater retention and filtering areas, and reducing paved areas could reduce the quantity and improve the quality of stormwater. With climate change, severe storms and associated stormwater problems are likely to increase [158]. While many parts of the city are served by a CSO abatement program to capture and redirect runoff to the wastewater treatment plant, runoff in other areas drains directly to local waterbodies.

A number of LWRP recommendations could change stormwater management in ways that affect health determinants. Aquatic habitat stressors such as marinas and recreational boating, shoreline extensions, and shoreline hardening are likely impacts of LWRP elements such as waterfront redevelopment. For instance, the plan will include an extensive marina plan for the Port of Rochester that includes construction of 118 new boat slips. The marina plan also includes 280-430 new residential units and new commercial and retail space [9]. Along with these improvements, increased vehicle traffic could worsen local air pollution and require additional parking, resulting in more hardening of the shoreline. Healthy Waterways did not address the marina plan because it has already been finalized. However, the marina and other developments around the Port of Rochester may influence water quality. For example, green infrastructure projects such as wetlands or infiltration areas could reduce the negative impacts of stormwater. Table 5L and Figure 5F connect these potential management practices to associated health determinants.

In considering the impact of changes to stormwater management in the waterfront area, it should be noted that water quality in Lake Ontario is a function of activities throughout the watershed, not just the Genesee River or coastal areas. Thus, while changes in the City of Rochester could affect local water quality, there are limits on how much effect stormwater management within the narrow LWRP boundary, or even the City of Rochester, can have on this health determinant. In particular, fish advisories (which are based on legacy contaminants) will not be affected by changes in stormwater management in Rochester. However, in the long term, monitoring and management of chemicals of emerging concern may be important to population health [159].

Current Conditions of Stormwater Management

Eutrophication and undesirable algae, caused by excess nutrients in the water, are a threat to the beneficial uses of Lake Ontario in and around Rochester [160]. Although large volumes of nitrogen, phosphorus and sediment enter from farmlands and steep banks along the Genesee River south of Rochester, stormwater from the City of Rochester also affects pollution [161]. Ongoing monitoring by the Monroe County Department of Environmental Services and others aims to determine how much pollution enters the river from local stormwater runoff. Regardless of source, these pollutants pose potential health risks for people using the water recreationally, contribute to beach closures, and affect drinking water. Stormwater management is therefore an important consideration for the LWRP, particularly for new developments that are likely to increase surface runoff.

The City of Rochester and Monroe County have had great success reducing stormwater runoff over the past 20 years. In 1993, Monroe County Pure Waters completed a CSO abatement program in the Rochester District by adding 175 million gallons of overflow storage capacity [162]. Since then, Monroe County and the City of Rochester have invested millions in green infrastructure projects, including green roof and porous pavement demonstration projects [163,164]. The county's stormwater management permit requires stormwater mitigation in new development over half an acre and the DES encourages mitigation in redevelopment and

retrofits. Voluntary efforts to reduce runoff from existing structures, such as green roofs and permeable parking, have recently been undertaken on several city properties. Given the health and environmental implications associated with stormwater runoff, reductions and mitigations should be emphasized in all redevelopment of existing structures and new construction. Health-related concerns should also be highlighted along with environmental considerations.

Stormwater Management and Health Determinants

Changes in stormwater management have the potential to impact human health, primarily through affecting exposure to polluted water. If water quality improves, the disease risk for people engaged in water-contact recreation might decline. However, there is limited evidence that water-borne illness is of local concern. Reduced stormwater, coupled with better maintenance of waterfront parks, trails, and beaches (i.e. cleanup/trash collection) may also reduce the amount of litter washed into the river and onto the shoreline. As noted above, water quality improvements may have secondary impacts on physical activity and access to health-supportive resources if it contributes to water quality improvements that increase swimming, boating, fishing, or other water-based uses. Implementation of green infrastructure such as construction of swales that are dry except during storm events can provide additional open spaces for physical activity or public gathering.

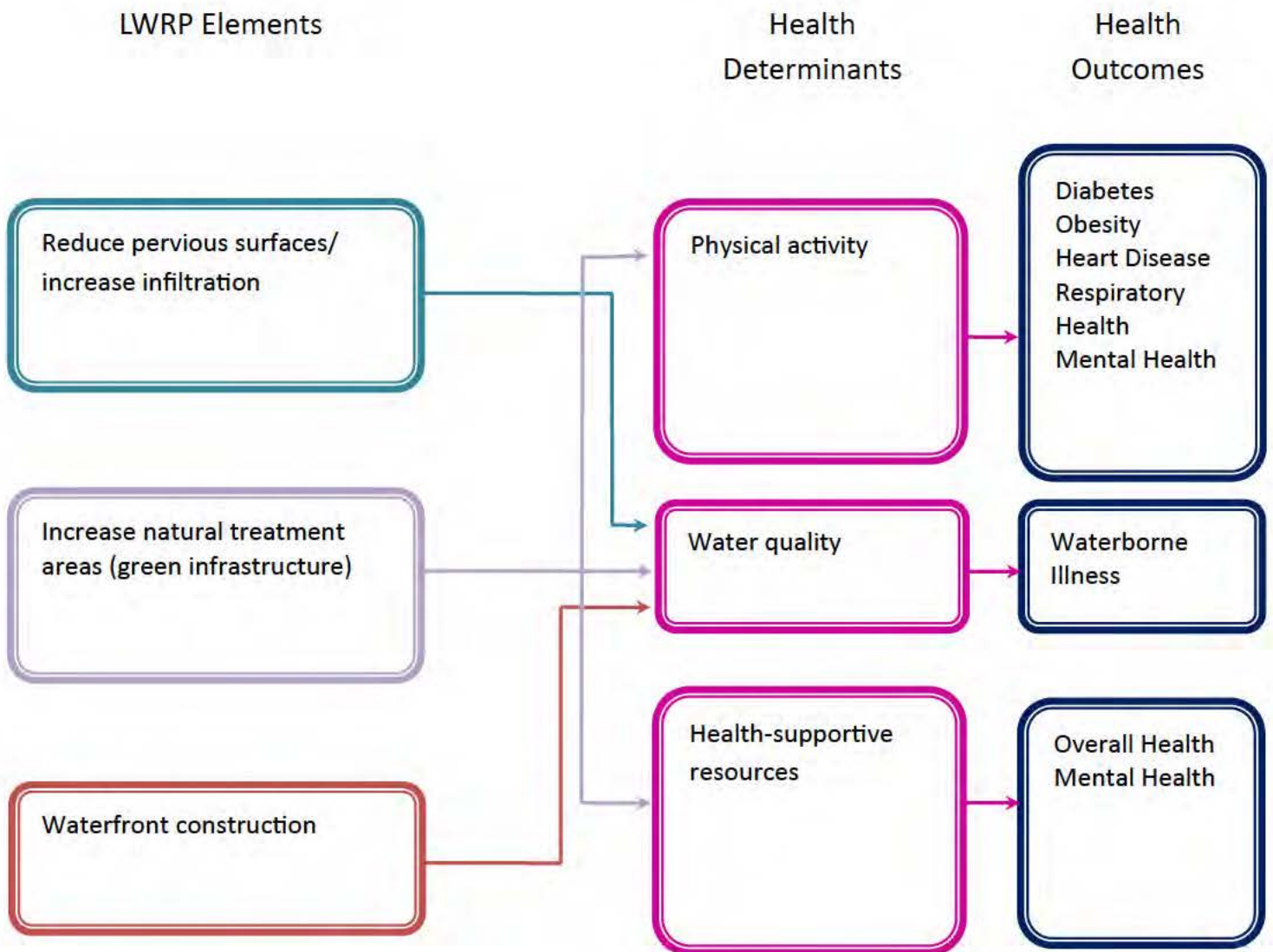
In addition to pathogens, nutrients, and litter, stormwater may carry toxic chemicals into surface waterbodies. As noted above in the section on built environment, several community members expressed concern about the impact of management and redevelopment of brownfields on water quality. We were not able to find any information on the current contribution of former industrial

Table 5L: Stormwater management impacts on health determinants

Stormwater management	Health Determinants				Equity Impacts?	Evidence type
	Physical Activity	Physical Safety	Water Quality	Health-supportive Resources		
Reduce pervious surfaces/ increase infiltration			+			Literature Local Data
Increase natural treatment areas (green infrastructure)	+		+	+		Literature Local Data
Waterfront construction			-			Literature

- + Positive impact on health determinant (leading to better health outcomes/reduced health disparity)
- Negative impact on health determinant (leading to worse health outcomes/increased health disparity)
- +/- Could be positive or negative, depending on nature of the changes

Figure 5F: Stormwater Management Health Determinant Pathway



sites to pollution of waterbodies in Rochester. Regardless, good stormwater management practices should minimize runoff of toxic chemicals during redevelopment of these areas. In addition to legacy toxins, the USGS has begun to monitor “chemicals of emerging concern” entering the watershed through stormwater, as well as household, industrial, agricultural and other sources. It is highly unlikely that humans would experience health effects from contact with surface water concentrations of these chemicals in the near term. However, there are concerns that over time such chemicals could pose a threat to drinking water quality or consumption of fish from the Great Lakes [159].

One additional health concern related to some forms of green infrastructure, particularly construction of wetlands, is the potential for increased insect populations. If human exposure to mosquitoes, ticks, or other insects increases, the incidence of vector-borne diseases like West Nile Virus may also increase. However, local stormwater management experts believe that natural predators (insects, birds, amphibians, etc.) attracted by properly-designed systems result in no net increase – or even decreases – in biting insects [165-167].

Chapter 6: Recommendations

Introduction

This chapter provides recommendations to be considered in updating and implementing Rochester’s LWRP. The recommendations relate to the overall vision for Rochester’s waterfront, specific plan elements, implementation, and evaluation of the LWRP.

We developed these recommendations by reviewing the Chapter 5 assessment findings with stakeholder teams. Recommendations address future policies, projects, programs, communication efforts, and monitoring the five plan elements we assessed.

Our stakeholder engagement and scope of assessment were limited by time, available data, and resources. Our recommendations should be considered in light of these limitations. In particular, we did not quantify the economic costs or benefits of the recommendations.

Overarching Recommendations

Vision

The 1999 LWRP defines a vision and goals for the waterfront. Many aspects of the “vision” are compatible with promoting public health (Text Box 6A). However, the LWRP does not focus explicitly on promoting the health of local residents, regional populations, or visitors. Our assessment shows that there are also many opportunities within the LWRP to promote public health. The assessment also indicates that some potential changes could negatively impact residents’ health. Focusing on the implications for vulnerable populations, particularly of low-income, minority, and older adult residents (e.g. increased housing costs, parking fees, or reduced public access) may allow planners to mitigate any potentially negative impacts. To

Text Box 6A: 1999 LWRP Waterfront Vision [1]

Rochester’s Waterfront will be:

“A DESTINATION” It will function as a tourist destination for travelers.

“A UNIQUE ENVIRONMENT” It will provide interest and variety for visitors by including three extremely distinct water resources: Lake Ontario, the Genesee River, and the Erie Canal.

“A GATEWAY” It will function as a gateway to a full range of attractions, services and amenities within the city and the region.

“FULLY CONNECTED” It will provide user-friendly, thematic, and exciting linkages that connect attractions, services, and amenities to each other and to the surrounding neighborhoods.

“HIGHLY RECOGNIZED” It will be locally, regionally, and nationally recognized as a unique resource and attraction and will put Rochester ‘on the map’ as a tourist destination community.

“DRAMATIC AND DIVERSE” It will contain dramatic and diverse built, historic, and natural environments offering a wide variety of attractions and amenities to a broad spectrum of visitors.

RECOMMENDED ADDITIONAL VISION STATEMENTS:

“A HEALTHY PLACE TO LIVE, WORK, AND PLAY” It will promote physical activity, safety and access to other resources that support the health of waterfront neighborhood residents and visitors.

“INTEGRATED WITH THE FABRIC OF THE COMMUNITY” It will bring communities together to illuminate the unique character of each waterfront neighborhood.

encourage consideration of community health throughout planning and implementation, we recommend explicitly including health as part of the city’s vision for the future of its waterfront.

Goals

Similarly, the 1999 LWRP “Waterfront Development Goals” do not include promoting the health of communities living along the waterfront, area residents, or visitors (Text Box 6B).

We recommend that the LWRP include a goal statement that highlights the importance of waterfront development for community health, such as “To promote the health and safety of waterfront neighborhood residents and the population of the greater Rochester area.” This goal statement would highlight the importance of considering the nature and distribution of health impacts on residents throughout the LWRP. We also recommend that the Waterfront Development Goals emphasize Rochester’s waterfront as a valuable natural resource for the city and its residents.

Text Box 6B: 1999 LWRP Waterfront Goals [1]

- To increase regional tourism in Rochester
- To improve image of Rochester and improved quality of life for Rochesterians
- To leverage market-driving, private tourism development and to increase job creation
- To protect and enhance environmental, historic, and cultural resources along our waterfront

RECOMMENDED GOALS for 2013 revision:

- *To promote the health and safety of waterfront neighborhood residents and the population of the greater Rochester area.*
- **To increase regional and local tourism in Rochester**
- **To promote improved quality of life for Rochesterians and improve Rochester’s image**
- **To leverage market-driving, private tourism development and to increase job creation for residents**
- **To protect and enhance environmental, historic, and cultural resources along our waterfront**

LWRP Inventory and Analysis

The LWRP provides a comprehensive inventory of natural resources, land use, and other physical features of the waterfront. We recommend adding available data on the communities, current use patterns, and health status of the people who live in or near the waterfront. As laid out in Chapters 3 and 4 of this report, this information helps focus attention on the diverse populations living within this area and assessment of potential impacts of the plan on their health and wellbeing. It also provides a foundation for considering impacts on health disparities and the vulnerabilities of different populations.

LWRP Development and Implementation

Throughout this project, we reached out to many community, government, and technical stakeholders with interests in waterfront revitalization. Very few of these stakeholders outside of city government were involved in, or even aware of, the LWRP – how it is developed, what it includes, or how it can be used to promote healthy waterfronts.

The current effort to revise Rochester’s LWRP includes opportunities for stakeholder engagement, including a broad-based Waterfront Advisory Committee (WAC) and several public meetings. These efforts will increase awareness and understanding of the program. We encourage the city, its

consultants, and the WAC to highlight potential health impacts of the LWRP during this public outreach. Demonstrating the importance of waterfront development to the health goals of diverse community groups, recreational users, and agencies may increase their engagement in the process.

The city and other government agencies have noted the importance of the LWRP in shaping ongoing development of Rochester's waterfront. Relevant community and agency stakeholders are regularly engaged during implementation of specific projects in the waterfront (i.e. new park resources, brownfield redevelopment, transportation projects, trail improvements, etc.). However, there is no existing mechanism for ongoing coordination, monitoring, and communication about implementation of the LWRP as a whole after its approval by the state. We recommend that the WAC be reconvened (and repopulated as necessary) on an annual basis to review progress, needs, and future implementation of the LWRP.

LWRP Policies

As discussed in Chapter 1, the NYS Department of State specifies 44 broad "Coastal Policies" that the LWRP must address. Although none of these explicitly address protection of human health, several of them impact health determinants assessed in this report. We recommend that the Department of State consider revising its LWRP policies to include health. This could be accomplished by adding health to Policy 18: "To safeguard the vital economic, social, environmental, *and public health* interests of the state and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards which the state has established to protect valuable coastal resource areas" (phrase in italics added). Public health could also be included in the descriptions of additional policies and guidelines for conducting the LWRP.

Health in All Policies

Many of our findings and recommendations are applicable to the entire city, not just the waterfront area. Conversely, many city- or county-wide policies and programs (including zoning laws, transportation decisions, and development plans) outside the scope of the LWRP affect the health of people living near or visiting the waterfront. Thus, consideration of health in all local decision-making processes is essential to effectively promote the health of waterfront residents and visitors. Some possibilities include:

- A review of all city policies to identify gaps in promoting development that supports health
- Joint city-county mapping and data exchange to identify vulnerable populations
- Increased emphasis on community health in SEQRA review of projects in the city
- A commitment to consider distribution of health impacts of local decisions on vulnerable populations (e.g. children, Environmental Justice communities, older adults, etc.)

Some projects may have significant enough impacts to merit a full Health Impact Assessment. However, much could be gained by examining gaps and opportunities in existing local policies, facilitating communication and data sharing between city and county decision makers, and standardizing a process for consideration of health.

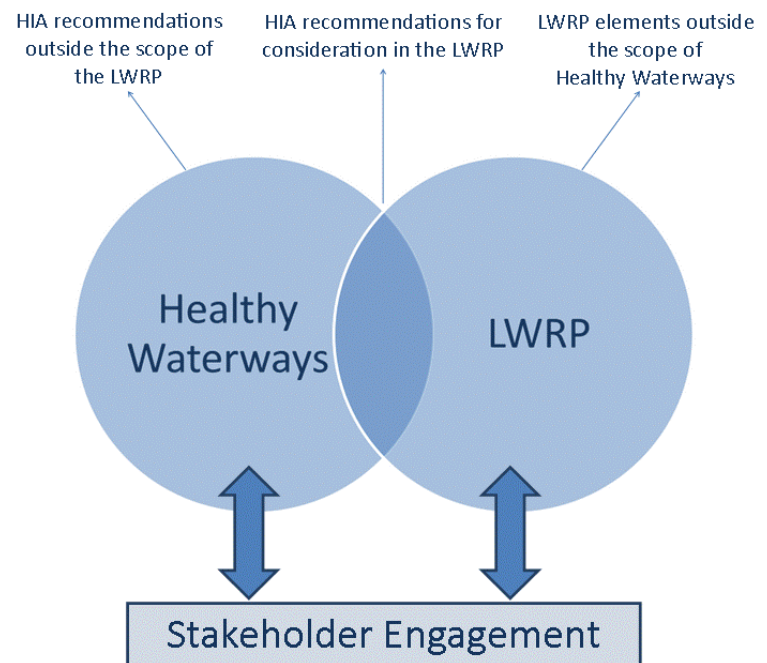
Below, we present recommendations for each of the plan elements assessed by the HIA. Some of these recommendations may be integrated directly into the 2013 LWRP. However, others may be outside the scope of the LWRP, but are offered for consideration in other city and county decision-making processes and by

communities, interest groups, private developers, and businesses (Figure 6A). Additionally, because of the broad scope and limited resources of this HIA, several recommendations highlight the need for further study. The recommendations that follow fall into five categories:

- *Policies*: Guidelines for consideration in new/amended policies, prioritization of projects, implementation, or planning processes that will promote health, particularly for vulnerable populations
- *Projects*: Specific projects and design considerations to promote health or minimize negative impacts
- *Programs*: Ongoing programs and operations that support health determinants
- *Communication*: Education, outreach, or media programs related to waterfront activities that promote safe and healthy use of the waterfront
- *Monitoring*: Specific monitoring, data collection, analysis, or reporting to track impacts of changes and plan for future implementation of health-promoting uses of the waterfront

While the majority of recommendations refer to maximizing the health benefits of LWRP plan elements, other recommendations propose mitigating negative impacts of waterfront changes that could impact the health of certain populations.

Figure 6A: Healthy Waterways and the Local Waterfront Revitalization Program



Summary of Overarching Recommendations

- Add community health to the 2013 LWRP Vision Statement
- Add community health to the 2013 LWRP Goals
- Include information on health and demographics in the LWRP background and inventory
- Incorporate community health into the Department of State's policy guidelines for all LWRPs
- Promote HIA in future city and county decision making processes



The following recommendations were informed by literature reviews, existing local data, and new data collected through surveys at Ontario and Durand Beaches, twelve sites along the Genesee Riverway Trail, and various southwest Rochester locations.

Above: Healthy Waterways interns Kriti Thapa and Sandeep Sandhu surveying at a health fair in the PLEX neighborhood.

Waterfront Trails

The city’s existing plans to expand and improve the Genesee Riverway Trail (GRT) are likely to improve health by promoting physical activity. To maximize these impacts, it is important that concerns about physical safety be addressed in all trails-related decisions. Positive health benefits would be maximized by improving accessibility for and use by waterfront neighborhood residents.

Table 6A: Waterfront Trails Recommendations

Policies
Develop an advisory committee or “Friends of the Genesee River Trail” group for promoting the development, maintenance and use of the GRT.
Prioritize trails development in areas of the city with high concentrations of low-income and minority populations.
Prioritize linkage of bike lanes, trails and amenities to enhance connectivity of existing (universities, employers, healthy retail, and other trail systems) and new destinations.
Clarify jurisdictional responsibilities (e.g., who is responsible for management of GRT sections).
Adopt policies that remove barriers to trail use and strive for access for users of all abilities.
Projects
Add amenities to the trail including water fountains, restrooms, lighting, additional signage, benches, bicycle racks, and exercise infrastructure as appropriate to increase safe trail use.
Improve road crossings to reduce potential for trail user/ motor vehicle collisions.
Improve actual and perceived trail safety (e.g. improve signage, expand 911 emergency trail markers, improve the trail surface, trim vegetation to improve visibility, clarify system for reporting hazards).
Implement plans for a continuous dedicated trail, especially through downtown.
Design trails in ways that avoid use conflicts (for example between pedestrians and cyclists).
Programs
Develop an annual maintenance schedule to ensure sustainable, safe, and increased trail use (surface condition, trash collection, winter maintenance, etc.).
Increase walking clubs and other programming to encourage use of the trails, particularly among current non-users, neighborhood residents, and vulnerable populations (including children, older adults, minorities, and low-income residents).
Coordinate with the Rochester City School District and community partners to develop programs that highlight historical, cultural, and environmental resources along the trails, encourage physical activity, and educate about safe trail use.
Improve policing to control negative behavior (criminal activity, motor vehicles on trails, other safety concerns).

Table 6A: Waterfront Trails Recommendations (Continued)

Communication
Integrate trails into Safe Routes to School programs.
Compile and maintain a list of community organizations that should be involved in efforts related to the GRT.
Promote interconnectivity between trails and neighborhoods: <u>On the trail</u> : include information on distance and approximate walking time to neighborhood destinations such as recreation centers, libraries, historical sites, retail, other trails, etc. <u>In neighborhoods</u> : increase the number of signs to direct residents to the GRT and other local amenities.
Conduct and maintain a public outreach and media campaign to increase local and regional awareness of the GRT, particularly among waterfront communities.
Expand uniform signage to help residents recognize GRT signs. Consider various types of signs (natural treatments, lit or reflective signs, etc.), electronic links, and multilingual text.
Include messages about personal safety on signage.
Monitoring
Conduct periodic trail user surveys to characterize changes in use patterns, users, and desired improvements over time. Analyze and report findings to City Council, interest groups, neighborhood groups, and general public.
Collect, analyze, and report data on number of organized trail-based recreation programs and participants (including demographics, when feasible).
Consider replicating Erie Canalway Trail's Economic Impact Survey with GRT users.
Encourage National Bike and Pedestrian Documentation (NBPD) volunteers to include GRT sites or implement automatic use counters to document changes in use over time.
Conduct localized crime assessments to track perception and reality of safety in waterfront neighborhoods and on trails; train law enforcement officers to record locations of incidents on trails to facilitate analysis by location.
Monitor use seasonally to inform decisions about appropriate winter maintenance.

Beach Redevelopment and Management

Beaches can provide an opportunity for active and passive recreation. However, there are also risks, including exposure to poor water quality and safety issues. The following recommendations are aimed at ensuring that beach development proceeds in a way that increases healthy and safe use by a wide range of local, regional, and visitor populations.

Table 6B: Beach Redevelopment and Management Recommendations

Policies
Encourage projects that promote physical activity at beachfront areas.
Ensure that future development provides access for people of all ages, abilities, and income levels.
Monitor, promote, and coordinate efforts by city, county, community, and private groups to enhance safe and healthy use of beach resources.
Projects
Develop and Implement land-based recreation and physical activity resources adjacent to the beach, such as a pool, spray park, or exercise equipment at Ontario Beach.
Improve beach transportation options to insure accessibility to people of all ages, abilities, and income levels (parking shuttle, bus service, bike trail links, boat slips).
Improve facilities to increase beach use (e.g. bathrooms at Durand and more retail options at Ontario).
Implement local projects to improve water quality (e.g. algae pump, bacteria sponge, septic system improvement).
Programs
Expand programming to attract new, more frequent, multi-season visitors, and promote safe and healthy beach use.
Implement policing, lighting, and other crime prevention efforts to improve actual and perceived safety appropriate to new use patterns.
Ensure that lifeguarded beach times and resources keep pace with changing beach use over time.
Communication
Promote beach as a safe and healthy destination.
Improve communication about timing and causes of beach closures due to water quality.
Promote safe and healthy beach use (messages about sun safety, swimming, water quality, etc.).
Monitoring
Expand and repeat beach user surveys annually; analyze and report to track change over time.

Built Environment

Many of the process (community input, etc.) and design standards (walkability, access, etc.) already included in the city’s zoning codes and planning programs promote healthy neighborhoods. Based on our assessment, the following recommendations highlight policies and design standards that have been identified as particularly important to maintaining a healthy built environment.

Table 6C: Built Environment Recommendations

Policies
Support development that engages community residents and reflects the culture and desires of affected neighborhoods.
Review zoning codes to ensure they promote mixed use, healthy retail, public access, and affordable housing along the waterfront.
Promote a healthy retail environment (access to healthy food, minimize unhealthy options) in waterfront developments.
Consider impacts of development in the waterfront boundary on communities living within half a mile of the waterfront in terms of housing affordability, public access, walkability, and retail environment.
Coordinate development to enhance public access, trail continuity, and healthy use of the waterfront throughout its length (for example, distance between physical access points).
Integrate LWRP plans with other efforts in city neighborhoods to meet the needs of residents for access to healthy food and other health supportive resources.
Integrate health planning with sustainability efforts (“walkable waterfront,” active transportation, green infrastructure, etc.).
Increase physical and visual access to the water.
Projects
Enhance waterfront gathering spaces with benches, picnic tables, grills, etc.
Incorporate CPTED (Crime Prevention Through Environmental Design) principles in development plans to maximize real and perceived safety in waterfront areas. Consider EMS/fire access in new/retrofit development.
Increase public access (both visual and physical) to the waterfront for people of all abilities.

Table 6C: Built Environment Recommendations (Continued)

Programs
Improve policing and PACTAC (Police and Citizens Together Against Crime) patrols to enhance actual and perceived safety of waterfront areas.
Coordinate county, city, community and private crime prevention and security programs in waterfront areas to enhance real and perceived safety.
Communication
Improve signage along the waterfront for wayfinding, public access locations, and emergency contact information/resources (blue light/panic button).
All communications should be multilingual (including ASL and Braille).
Increase communication about safety resources through PSAs, GPS/smart phones, news, and media communication groups.
Monitoring
Monitor and report on air and water quality around brownfields to ensure that residents are not exposed to harmful chemicals and are aware of environmental conditions.
Conduct annual report/presentations for community groups regarding progress on waterfront development plans and future priorities.
Regularly assess retail environment for LWRP residents and integrate with other city programs to promote community access to healthy food and minimize unhealthy options.
Conduct localized crime assessments to track perception and reality of safety in waterfront areas.

Water-based Recreation

Waterfronts provide many opportunities for active and passive water-based recreation. Although these uses have expanded in recent years, the waterfront is still underutilized. In particular, there are many opportunities to expand participation by low-income residents. Development of these opportunities must be balanced with the costs inherent in many types of water-based recreation, and with the health and safety risks. The following recommendations offer suggestions for prioritizing development of water-based recreation along Rochester’s waterfront in ways that maximize health benefits.

Table 6D: Water-based Recreation Recommendations

Policies
Assure physical access to the water that supports water-based recreation, particularly in low-income neighborhoods.
Encourage and support water-dependent businesses such as bait and tackle shops, boat rentals, etc.
Monitor, promote, and coordinate efforts by city, county, community, and private groups to enhance safe and healthy recreational use of waterfront resources.
Projects
Develop public fishing sites along the river south of upper falls.
Develop public boat launches for canoes and kayaks in appropriate locations; include space for trailer and vehicle parking.
Install safety features where appropriate; examples include life rings, ladders, and grab wires.
Expand the Genesee Waterways Center to support more visitors and/or promote other boat rental businesses along the river corridor.
Programs
Expand and support swimming lessons at schools and public pools to reduce drowning risk.
Expand programming to encourage people of all abilities and income levels to participate in water-based recreation.
Increase outreach, coordination, and programming with RCSD and community groups to enhance water based recreation by youth.
Communication
Include public education about water safety in all projects/programs that promote use of the river.
Provide multilingual signage about fish consumption advisories at fishing sites.
Monitoring
Encourage public, private, and community groups to report to the Parks Advisory Committee the number and nature of events, programs, and participants involved with water-based recreation (including demographic information where feasible); publicly report findings annually.

Stormwater Management

Stormwater management is the primary local tool for improving water quality. Water quality is considered a health determinant both in terms of harmful bacteria in polluted water, and the benefits of clean water for promoting water-based recreation and beach use. In addition, many types of ‘green infrastructure,’ such as swales, can have additional public health benefits as open space.

Table 6E: Stormwater Management Recommendations

Policies
Continue to provide incentives to encourage stormwater control measures such as green roofs and permeable pavement in new construction.
Review zoning and building codes to better promote green infrastructure in new development and rehabilitation.
Promote projects with multiple benefits for water quality protection, public access, and physical activity.
Projects
Retrofit existing amenities and developments to improve stormwater control using features such as permeable pavement, rain barrels, and swales.
Implement existing city plans to construct swales and water retention ponds.
Install bat/barn swallow boxes near retention ponds and other standing water to help control insect populations.
Programs
Sustain or enhance clean-up programs (e.g., Clean Sweep, Coastal Cleanup, and Pick up the Parks) to reduce the amount of litter entering waterbodies.
Communication
Increase public outreach and education about the function of green infrastructure; importance of stormwater management to water quality.
Provide public education about protection from insect bites and risks of insect-borne disease around wetland areas.
Educate developers/planning consultants, residents, neighborhood residents about green infrastructure.
Monitoring
Share data on green infrastructure development with MCDOPH and monitor health data on incidence of insect-borne disease.

Recommendations Summary

Overall, our assessment showed that plans to revitalize Rochester's waterfront will produce health benefits. However, some potential changes could negatively impact health, particularly for vulnerable populations living near the waterfront. Attention to avoiding or mitigating unintended negative health impacts during plan implementation could further improve the community's health. In addition, there are many ways to leverage the LWRP to support health. Several common themes emerged from the recommendations on the five plan elements we assessed, including:

- Maintain or improve access from adjacent neighborhoods to the waterfront
- Improve safety and security for people using the waterfront area
- Increase public awareness among area residents and visitors of how to access Rochester's diverse waterfront resources in ways that support health
- Improve coordination among agencies and between jurisdictions (city/county/neighboring towns) responsible for managing different areas of the waterfront
- Monitor, analyze, and report progress, challenges, and opportunities in implementing these goals and recommendations

These ideas relate to policies, projects, programs, communication, and monitoring of nearly every aspect of the LWRP we assessed. Focusing on how waterfront development impacts health provides the opportunity to better coordinate waterfront revitalization efforts in ways that benefit the entire community.

Chapter 7: Reporting – Dissemination, Evaluation, and Monitoring

Dissemination

We used a variety of strategies to disseminate draft findings and recommendations of this assessment. As noted in Chapter 2, engagement efforts included discussion of the process, initial data, and findings with a wide range of stakeholder groups.

This report will be shared with stakeholders who were involved in the process as well as the general public. The final report will be posted on our web site.²⁸ Recommendations will be presented to the WAC to encourage their consideration as the LWRP progresses.

In addition, we will prepare presentations and short summaries for our stakeholders regarding the relevance of the LWRP to their group’s particular health interests, and how they can get involved in development and implementation of the LWRP. We will also distribute these recommendations at the public meetings organized by the city as part of the LWRP planning process.

Evaluation

To date, we have accomplished the Healthy Waterways objectives as originally set forth. Several changes were made in the timeline; in particular, the time devoted to assessment was extended due to the decision to collect new data (summer 2012 community surveys). In addition, because in scoping we decided to focus on southwest Rochester, direct community engagement with groups in other parts of the waterfront was not as extensive.

Between publication of this report and June 30, 2012, we will conduct a brief evaluation of the HIA process. This self-assessment of the Healthy Waterways

Text Box 7A: Evaluation questions for Healthy Waterways Stakeholders

- How effectively did Healthy Waterways provide local and national data to inform recommendations that maximize health benefits of future waterfront uses outlined in the LWRP?
- Did the Healthy Waterways project increase your understanding of how elements of the LWRP might impact the health of various populations in Rochester?
- Did/will Healthy Waterways enhance community engagement in the LWRP by identifying and communicating potential health implications of the program? How can it best contribute to this in the future?

²⁸ <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/projects/HIA/HealthyWaterways.html>

process will address the analytic methods used, the ways in which stakeholders were engaged, challenges and opportunities for improvement, effectiveness of the training and technical assistance, and lessons learned. We will also survey the key stakeholders involved in the project to assess the success of the HIA in accomplishing the goals described in Chapter 1, any additional impact of the HIA, and the impact of the HIA on the LWRP up to that time (Text Box 7A).

We will also remain active members of the WAC throughout LWRP development. Through this process, we will document whether and how the health perspective introduced by this project is incorporated in the LWRP. This documentation will be used to address how successfully the project met its final objective: to “partner with the City of Rochester, its Consultant, and the Waterfront Advisory Committee (WAC) to integrate health considerations into LWRP recommendations.”

Monitoring

Throughout our stakeholder engagement efforts, we heard a common theme: better coordination and communication among those involved in Rochester’s waterfront could lead to better outcomes. This observation was the basis for our recommendation that the Waterfront Advisory Committee (WAC) be reconvened on an annual basis to review progress, challenges, and priorities for the future of Rochester’s waterfront. Many of the health-specific recommendations listed above support this idea. In particular, the “monitoring” recommendations under each element will provide data that should be reviewed annually.

As members of Rochester’s Health Impact Assessment learning group, the Healthy Waterways team will continue to track the implementation of the recommendations and whether this project contributes to increased use of HIA in Rochester in the future.

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