RUTGERS
Edward J. Bloustein School
of Planning and Public Policy

2015 Fall Studio

HEALTHIER NEW BRUNSWICK

New Downtown Park: Healthy Options for Use & Access

ACKNOWLEDGEMENTS

The project team would like to extend a special thank you to the studio instructors, Karen Lowrie and Maria Pellerano for their knowledge and guidance throughout this process. We would also like to thank the various speakers and faculty who participated in the planning process including:

Jaymie Santiago, New Brunswick Tomorrow
Glenn Patterson, City of New Brunswick
Peter Bilton, Keep Middlesex Moving
Jennifer Senick, Rutgers University
Leigh Ann Von Hagen, Rutgers University
Jay Watson, D & R Greenway Trust
Richard Alomar, SEBS, Rutgers University
Laura Lawson, SEBS, Rutgers University
Paul Gleitz, Monmouth County Planning

Project Team:

Deanna Moran	MCRP/MPP, 2016
Jacob Labutka	MCRP 2016
Megan Loeb	MCRP/MPP, 2016
Eric Zimmerman	MCRP/JD, 2017
Jennifer Buison	MCRP, 2016
Whitney Miller	MCRP, 2016

ABOUT THIS REPORT

This report is the result of a semester-long studio project conducted by six graduate students at the Edward J. Bloustein School of Planning and Public Policy. The goal of this report is to highlight health considerations for a proposed 1.12 acre urban park, located on Neilson Streer between Bayard and Liberty Streets in downtown New Brunswick, NJ. The approach to this project was to collect and analyze baseline data about the city and the proposed site and make recommendations about both linkages and access to the site and design features. However, this was not a design-focused studio. This report is intended to lay a foundation for further park planning and community engagement efforts. The goal of the report is to analyze components through a health lens to better understand the health impacts of a new park within the context of the New Brunswick community.

The report is organized into six sections. Section 1 consists of a review of current literature on the determinants of health, health disparities in vulnerable populations, public health and urban parks, and the role of health impact assessments. Section 2 is a baseline analysis of both the City of New Brunswick and the studio-determined study area, including demographics, socio-economic characteristics, and land use profiles. Section 3 analyzes the opportunities and challenges of linkages and access for the proposed site including vehicle and pedestrian safety, walkability, and wayfinding. This section also includes data collected during a field survey of roadways and circulation patterns surrounding the proposed park as well as profiles of potential user groups and their cataloged needs. Section 4 examines the health impacts of different features to be included in the park. Proposed features include a water feature, a staging/ event area, a children's play area, and a dog run. Section 5 summarizes findings and next steps for the city.

The findings of this report are intended to serve as a basis and tool for the city to utilize during the park planning process. The main focus of this study is to evaluate health and access implications of the proposed park with less emphasis on physical design recommendations. The park design features included in this report were evaluated for both positive and negative effects in order to provide a comprehensive menu of options. It would be beneficial to evaluate these features further by soliciting community input.

EXECUTIVE SUMMARY

Executive Summary

Earlier this year, Middlesex County purchased the aging Wolfson Deck from the New Brunswick Parking Authority with plans to locate a downtown park in the center of New Brunswick. The County has owned the 525-car parking garage several times before, and this time it acquired the deck from the city for $4.1 million. Closure of the Wolfson Desk was delayed two years due to protests from the neighboring churches and businesses; however, county and city officials are now ready to move forward with planning the future park. The Trust for Public Land (2011) recommended New Brunswick improve park spaces in the urban core, particularly by ensuring they are sufficiently-sized and well-developed. The goals would be to improve unequal access to parkland and promote urban redevelopment.

Image 1: Wolfson Parking Deck, New Brunswick

Image source: Studio Team, 2015

New Brunswick, New Jersey, is one of the densest cities in Middlesex County, second only to Perth Amboy. Its 55,275 residents live within 5.8 square miles. New Brunswick residents are primarily white and ages 18-24. However, since 2000, the number of Hispanic residents has increased by nearly 60 percent. The city's population almost triples during regular business hours because it is the county seat and home to major institutions including Robert Wood Johnson University Hospital, Saint Peter's University Hospital, Johnson & Johnson, and Rutgers, The State University of New Jersey. The city includes a variety of land uses, but the amount of residential and mixed land use in the city's core is increasing. This is especially true near the Wolfson Deck area, which is a 1.12 acre site. New Brunswick already has a better than average amount of public and park space. Unfortunately, Monument Square Park and Boyd Park, the facilities closest to the new park site, have access and use issues stemming from size and location. Improving access and use issues is key to ensuring all residents benefit from the downtown park.

The main focus of this report is public health benefits, which include improvements in physical, mental and social, and environmental health. First, physical health is addressed through increased options for physical activity. Obesity is linked to a myriad of other health concerns including cardiovascular disease, stroke, type 2 diabetes, and certain cancers. These are some of the most preventable deaths. Second, urban parks can help improve mental health, cognitive learning, and social cohesion, all of which fall under mental and social health. These

Figure 1: Health Benefits of Public Parks

Physical	Mental and Social	Environmental
• Combat Obesity and related diseases	• Decreased stress and depression levels	• Decreased pollution
• Saves direct health care $ spent on treatment	• Less potential for mental fatigue	• Mitigate stormwater runoff
• Saves indirect costs of lost productivity	• Symptom alleviation for ADD, Alzheimer's and Dementia	• Provide cooling winds
	• Fosters learning, alertness, imagination, creativity	• Protect biological diversity
	• Reinforces social ties	

benefits include decreased levels of depression and mental fatigue, increased imagination and creativity, and more meaningful relationships. Finally, environmental health benefits include disease prevention and the creation of health-supportive environments. Examples include better air quality and decreased incidences of waterborne diseases in stormwater runoff. Populations at risk of health disparities shaped by individual behaviors, social and economic conditions, and the physical environment could benefit most from public health improvements. These groups include: low income residents, African Americans, Hispanic and Latinos, seniors, the disabled, and children.

Linkages and Access

Linkages were assessed to recommend how to maximize access to the downtown park. The populations at risk of health disparities were considered along with the general population to create the following user groups: (1) immediately adjacent users, (2) non-adjacent outer users, (3) daytime users, (4) children, and (5) seniors. Vehicle and pedestrian safety crash statistics helped identify thoroughfares to the park that experience high concentrations of bicycle and pedestrian crashes. This was combined with analyses of walkability and street condition to determine the following: (1) where individuals are most likely to walk from, and (2) the conditions experienced along the street route. Wayfinding is discussed as a necessary component of any improvements to linkages and access. A system that includes on ground transfers, handheld maps, directional signs, and heads up maps help ensure all residents can navigate their way through the city to the downtown park.

Based on these analyses, linkage and access recommendations are the following:

(1) Address pedestrian safety in high access areas;
(2) Prioritize sidewalk and crosswalk improvements near the intersection of New and Neilson Streets;
(3) Prioritize sidewalk and crosswalk improvements in the residential neighborhoods south of New Street;
(4) Consider redesigning the wayfinding network to direct visitors to downtown green space, and;
(5) Create a uniform wayfinding system that integrates city and county wayfinding signage, and employs the use of maps and multi-lingual signage at transitional points.

Park Design

Optimizing use of the park is critical to improving health outcomes for New Brunswick residents. The design guidelines first included a recommendation to create three tiers at the site. This approach both addresses the dramatic slope of the site and maximizes the available space. The following uses would be situated on the site: (1) an event/staging area, (2) a play area with playground, (3) a dog run, (4) a seating area, and (5) a water feature.

An event/staging area that accommodates concerts, farmers' markets, outdoor movie nights, a Christmas tree lighting, and exercise classes would improve physical and mental and social health. Environmental health would be addressed through use of a porous surface that decreases stormwater runoff. A play area with playground could decrease obesity levels for, and promote, social interaction among children. Again, a porous surface would address stormwater runoff concerns. A dog run addresses a unique need for the immediately adjacent user group, may facilitate physical activity for dog owners who usually do not travel far to exercise their dogs, and encourages socializing among dog owners. A seating area with tables large enough for small groups provide physical and mental relaxation. Individuals on a walk or out running errands would have a place to stop and rest. Seniors and other daytime users could take in the natural beauty of the park while having lunch or playing a board game. Lastly, a water feature further aids with mental recharge. It also provides a natural way to filter air pollutants.

Carefully selected elements throughout the site would enhance these recommended uses. Elements include: fencing, seating, shading, lighting, and sanitation. Populations at risk of health disparities that are currently underserved within the community may experience the greatest magnitude of public health benefits. In addition to uses and elements that meet their needs, these populations can be encouraged to use the park through programming designed for their diverse user needs.

The health impacts on design and development can be better assessed by viewing the park within a healthy lens early in the process.

The findings from this report are the following:

(1) The new downtown park would have significant physical, mental and social, and environmental health benefits;
(2) Vehicle and pedestrian safety, walkability and street conditions, and wayfinding present linkage and access challenges for all user groups;
(3) A park design that considers recommended uses, tailored programming, and key elements can maximize health benefits for all residents, particularly underserved populations;

Recommended next steps based on the findings include:

(1) Collect more local health data;
(2) Engage stakeholders on park design;
(3) Sustain the park through community involvement, and;
(4) Explore partnerships with local organizations and the university to further develop programming.

SECTION 1: HEALTH LITERATURE

Health Literature Review

Understanding how urban parks can improve health outcomes requires a review of existing literature. In recent decades, much research has been done to evaluate comprehensive approaches to public health, including consideration of external influences on health outside of health care services, specifically, which populations are disproportionately burdened and why. The concept of health equity is an essential component of this.

Determinants of Health

Over the past decade, public health concerns have received an increasing amount of cross-disciplinary attention. This has largely been a result of wide recognition that health care services are not the only factor in determining individual health. There are a variety of health "determinants" that are equally influential. One of the most notable outcomes of this increased attention has been the creation of Healthy People 2020. The program is a national effort, under the Centers for Disease Control and Prevention (CDC) that is dedicated to improving health outcomes for all Americans through a ten-year agenda developed by experts from several federal agencies. The agenda includes the following overarching goals:

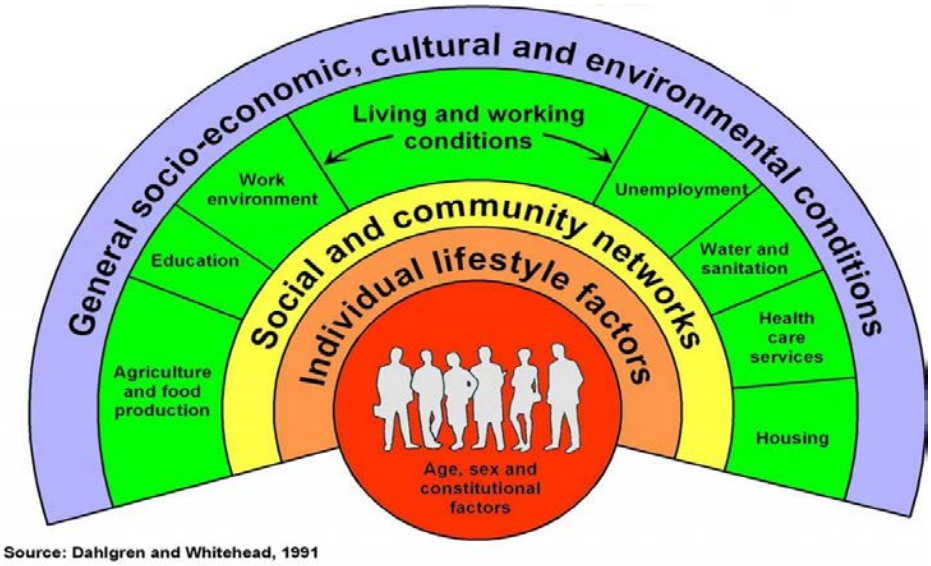
- "Attain high-quality, longer lives free of preventable disease, disability, injury, and premature death.
- Achieve health equity, eliminate disparities, and improve the health of all groups.
- Create social and physical environments that promote good health for all.
- Promote quality of life, healthy development, and healthy behaviors across all life stages." [1]

This initiative emphasizes valuing all health equally, by avoiding inequalities, historical and contemporary injustices, and eliminating disparities.[2] This approach to public health is reinforced elsewhere, including the World Health Organization (WHO), which focuses on creating healthy conditions for entire populations and not on individual circumstances. The WHO emphasizes this system-wide approach when describing the three main measures intended to "prevent disease, promote health, and prolong life among the population as a whole" including: (1) assess and monitor community health and at-risk populations to identify health problems and priorities, (2) form public policies designed to solve local and national health problems and priorities, and (3) ensure that all populations have access to appropriate and cost-effective care, including health promotion and disease prevention services.[3]

The first measure, assessing and monitoring the health of at risk populations, is the most relevant to this analysis. Populations at risk for health disparities include those vulnerable due to race and ethnicity, socio-economic status, geography, gender, age, disability

status, risk status related to sex and gender, and other characteristics.[4] In addition, individual behaviors, social and economic conditions, and the physical environment shape the determinants of health. These characteristics can have a greater impact on health than commonly associated influences such as access to health care services.[5] The socio-ecological model below highlights the interaction among individual, relationship, community, and societal factors and helps identify interventions. Even though the categories broaden away from the inner ring, all interactions among and within factors are considered equally.[6] Health interventions that consider all factors may have longer lasting impacts.

Figure 1: Socio-ecological Model



Source: Dahlgren and Whitehead, 1991

Health Disparities and Underserved Populations

Lower Income

Socioeconomic status is one of the most established determinants of health. For example, research shows that lower birth-weight babies, who are often born to lower-income mothers, are more susceptible to chronic conditions such as asthma, heart, and digestive disorders. Children in lower-income families are also around seven times more likely to be in poor or fair health compared to their counterparts in families with incomes at or above 400 percent of the federal poverty level. In general, lower-income adults report fair or poor health and are more likely to suffer from chronic illnesses.[7] Further, a 2012 Gallup poll found that impoverished Americans are more likely to say they have been diagnosed with depression. Although it is unclear if poverty leads to depression or depression leads to poverty, impoverished Americans are twice as likely to suffer from this debilitating mental health condition.[8] In a 2009 report, the Robert Wood Johnson Foundation analyzed the many factors that influence health other than

health care. Their analysis of metropolitan cities showed large health disparities in short geographical distances. For example, babies born to mothers in Montgomery County, MD, and Fairfax and Arlington Counties, VA, had life expectancies six to seven years longer than comparable babies in Washington, DC.[9]

African Americans

African Americans are also among the underserved populations impacted by health disparities. They are at a higher risk for, and disproportionately impacted by, various diseases and health conditions. For example, African American adults are 60 percent more likely to have diabetes, 40 percent more likely to be obese, and 30 percent more likely to die from heart disease.[10] These conditions are themselves concerning but may also lead to an increased prevalence of related health conditions and an overall decreased life expectancy. African Americans also have more than twice the infant mortality rate when compared with Caucasian newborns.[11] Although African Americans and non-Hispanic whites share 8 out of 10 leading causes of death, African Americans are exposed to more risk factors that result in a greater incidence of morbidity and mortality rates.[12] This results in greater incidence, morbidity, and mortality rates.[13] For example, heart disease is a leading cause of mortality for both African Americans and Caucasians but African American adults are 30 percent more likely to die from heart disease than their Caucasian counterparts.[14] Exacerbating this further, there are a greater proportion of African Americans without health insurance (17.2%) when compared to non-Hispanic whites (10.4%). Lack of health insurance is a barrier in obtaining preventative primary health care. However, disparities in employment may partially explain the higher rate of uninsured due to health insurance often being linked to employment. Approximately ten percent (10%) of African Americans are unemployed compared to about five percent (5%) of Caucasians.[15]

Hispanics and Latinos

Hispanic or Latino residents are another underserved population that experiences pronounced health disparities. In 2013, 17 percent of the total U.S. population was Hispanic or Latino, and this number is expected to grow to 31 percent by 2016. According to the CDC's 2013 Health Disparities & Inequalities Report- United States (CHDIR), health disparities prevalent in Hispanic populations include obesity, diabetes, periodontitis, and HIV. Hispanics are 15 percent more likely to be obese, 65 percent more likely to have diabetes, and twice as likely to suffer from asthma. Hispanic populations have also been found less likely to control their blood pressure, receive colorectal cancer screenings, and get influenza vaccinations. Lastly, teenage birth rates are highest for this group.[16] Hispanic health is also affected by factors such as language and cultural barriers due to a lack of bilingual staff and materials in Spanish at health and community facilities.[17] Hispanics are less likely to have health insurance coverage. In 2012, 29 percent of Hispanics lacked health insurance compared to 10 percent of the

non-Hispanic white population.[18] The disparities in employment may help explain the higher rate due to the link between health insurance and employment. Approximately 6.5 percent of Hispanics are unemployed compared to 4.5 percent of non-Hispanic whites.[19,20]

Seniors and Disabled

With age comes a higher risk of developing chronic illnesses and related disabilities. As a result, seniors (individuals ages 64 and over) are disproportionately impacted by some health conditions. For example, seniors are at increased risk for diabetes, arthritis, and congestive heart failure.[21] They can also suffer from physical and mental health ailments such as depression and obesity due to a sedentary lifestyle. Seniors are likely to have increased levels of stress, which cause the brain to release cortisol. This can decrease learning ability and memory, and increase the risk for dementia.[22] The ability to complete basic daily activities decreases with age due to physical and cognitive limitations. Early prevention and physical activity can help prevent these declines. Unfortunately, less than 20 percent of older adults engage in sufficient physical activity. Seniors of a minority background often have even lower rates of physical activity.[23] Seniors are also more likely to live alone or face some level of social isolation, which can lead to early death.[24] Many seniors also suffer from age-related disabilities, which put them at a higher risk for additional injury from accidental falls. Injuries from falls lead to fear of falling, sedentary behavior, impaired function, and lower quality of life.[25]

Disabled individuals are more likely to be overweight or obese and have higher blood pressure than non-disabled individuals. They are also more likely to experience psychological symptoms of distress and are less likely to engage in fitness activities.[26] Approximately 38 percent of people with disabilities are obese compared to 24 percent of those without disabilities.[27] The 2010 census found that 54 million Americans — nearly 20 percent of the population — is living with a disability. People with disabilities are significantly more likely to report being in fair or poor health compared to those without disabilities.[28] In particular, disabled individuals are more likely to be overweight or obese, use tobacco, and have high blood pressure. Those that are cognitively disabled are more likely to die of pneumonia or influenza and to die at a younger age.[29] Disabled individuals are also more likely to experience psychological symptoms of distress.[30] Most importantly, disabled individuals may delay getting health care. They are sometimes deterred from seeking preventative care because of problems accessing health care facilities. Disabled individuals may have difficulty accessing physician offices and hospital buildings. They may also require accommodations when using medical equipment such as exam tables, mammography machines, or infusion chairs that are frequently inaccessible.[31]

Children

In 2011, 23 million children were overweight or obese in the U.S. This is an issue across

the board racially and socioeconomically. However, obesity is more prevalent among children who are low income or of a minority background.[32] African American children are 3 times more likely to die from asthma, compared to non-Hispanic white children, and 73 percent more likely to become obese.[33] Hispanic children are 35 percent more likely to be obese and twice as likely to have asthma as non-Hispanic white children.[34] Given the physiology and size of children, they are more vulnerable than adults to environmental hazards.[35] One of the most prevalent risks to neonatal health is smoking during pregnancy, which is associated with higher risks of low birth-weight, preterm birth, and infant death. Children exposed to second-hand smoke are at increased risk of developing respiratory illnesses such as asthma. Low-income children are more likely to have asthma than higher-income children (18% compared to 13%). Additionally, they are more than twice as likely to live in a household with someone who smokes in the home (32% vs. 12%).[36] Uninsured children are three times more likely to have an unmet health need than privately insured children. One out of every six poor children (16%) lack health insurance coverage, which is double the number of non-poor children (8%).[37]

Figure 2: Hispanic and Latino Causes of Death

Leading Causes of Death - Hispanics and Latinos (2010)
1. Cancer
2. Heart Disease
3. Unintentional Injuries
4. Stroke
5. Diabetes
6. Chronic Liver Disease and Cirrhosis
7. Chronic Lower Respiratory Diseases
8. Alzheimer's Disease
9. Nephritis, Nephrotic Syndrome, and Nephrosis
10. Influenza and Pneumonia

(Adapted from Centers for Disease Control and Prevention (CDC), Hispanic and Latino Populations - Chart 10)

Urban Parks and Public Health

Given the variety of factors that influence individual health, and the pronounced health disparities among underserved populations, towns and cities are investigating ways to promote public health through more comprehensive means. The focus is no longer solely on health care services. One avenue for promoting public health that falls into the local government wheelhouse is the development of green space and urban parks. According to the American Planning Association (APA), "…parks can also provide measurable health benefits, from providing direct contact with nature and a cleaner environment, to opportunities for physical activity and social interaction."[38]

While physical activity is the benefit most commonly associated with parks, there are mental, social, and environmental health implications of park space as well. The APA has identified three key ways that urban parks promote health. First, parks promote mental and social health by connecting people with nature, which has been shown to confer certain health benefits like lower cholesterol and lower levels of stress and depression.[39] Second, the presence of parks increases the opportunity for physical activity and fitness, which helps to combat obesity, reduce the potential for co-morbidities, and decrease non-routine medical checkups. Third, park resources promote environmental health by mitigating climate, air and water pollution.[40]

History of Urban Parks

In recent decades, urban parks have been redefined to emphasize healthy living. City Parks Alliance, a membership based organization dedicated to urban park creation, revitalization, and sustainability, describes urban parks as "green engines to help address nearly every critical urban need from health to housing, to education and environmental justice, and countering sprawl to combating crime."[41] The four historical models developed by University of California at Berkeley Professor of Architecture Galen Cranz help explain how urban parks became tools to advance social and environmental causes. During the Pleasure Ground period, which lasted from 1850 until 1900, parks were on the edge of cities and resembled pastoral landscapes. From 1900 to 1930, the Reform Park focused on the needs of working class individuals and children with emphasis on social reform. The third period, Recreational Facilities, existed from 1930 until 1965, and was characterized by efforts to facilitate athletic activities. Finally, after the mid-1960s the definition of urban parks was expanded in the Open Space System. Pocket areas such as crosswalks, rooftops, and waterfronts were now considered for their recreational value. The fifth model, the Sustainable Park, began in 1990 and is characterized by human and ecological health. These parks mainly exist in corridors, and emphasize recreation and ecological restoration.[42] This collection of urban parks accommodates the needs of more total users and also represents the values of more varied users.

Physical Health Impacts

One of the most direct benefits of park space is the promotion of physical activity. In the United States, obesity rates are an alarming 33 percent for adults and 17 percent for children. Further, obesity is linked to a myriad of other health issues including cardiovascular disease, stroke, type 2 diabetes, and certain cancers.[43] These are among some of the most preventable deaths. Addressing the prevalence of obesity not only benefits individuals by increasing longevity, but also saves direct health care dollars spent on treatment and indirect costs associated with loss of productivity. The estimated total medical cost of obesity in the U.S. was $147 billion 2008 dollars with obese individuals costing around $1,429 more in medical costs than individuals of a normal weight. Vulnerable populations are most susceptible to being overweight or obese. According to the CDC, non-Hispanic blacks have the highest rate (47.8%) followed by Hispanics (42.5%), non-Hispanic whites (32.6%), and non-Hispanic Asians (10.8%).[44] Among children, Hispanics and non-Hispanic blacks have the highest rates of obesity.[45] Fan and Jin (2013) studied the link between neighborhood parks, playgrounds, and BMI levels and found that the benefits of parks and playgrounds were particularly noticeable among female children, adolescents 10-13 years old, and non-Hispanic whites. Children from low-income households experienced the greatest magnitude of impacts.[46]

Superkilen Park in Copenhagen, Denmark, is one example of a healthy urban park that promotes physical activity. This 335,000 square foot park was designed with considerable input from the neighboring community, which is one of the most ethnically and economically diverse populations in the city. A portion of the park known as Red Square includes areas for sports, cultural activities, and a weekly market. Another area, Black Square, is an urban living room that promotes social activities such as playing chess or backgammon. The Green Park has grass, a playground, and room for group sports including hockey, basketball, running and badminton.[47] Other features that support physical activity include swings, monkey bars, a boxing ring, slides, punching bags, skateboard ramps, and a bicycle lane. Many of the features in each area are painted the respective colors, including the bike lane. Small islands of vegetation and plants are located throughout the park and also differ in color depending on the area. This park is part of an ongoing effort to reorganize bicycle and bus paths to create new linkages. Superkilen Park features promote physical activity while appealing to the interests and diverse backgrounds of the neighborhood and the entire city.

Mental and Social Health Impacts

Urban parks are associated with improvements in mental health, cognitive learning, and social cohesion. Some mental health benefits include symptom alleviation for ADD, Alzheimer's, and Dementia, decreased stress and depression levels, and less potential for mental fatigue.[48] Additionally, mental disorders, especially depressive disorders, are strongly tied to the occurrence and treatment of chronic diseases.[49]

The WHO predicts depression will become one of the leading causes of the global burden of disease, second only to ischemic heart disease, by 2020.[50] Mental relaxation and restoration can help combat each of these conditions.[51] Parks can provide cognitive learning experiences, particularly for children, by fostering inquisitiveness, alertness, imagination, and creativity.[52] These skills are useful for improving emotional, psychological, and social well-being, which are the three indicators of mental health.[53]

Holt-Lunstad, Smith, and Layton (2010) found that a lack of social relationships is comparable to alcohol and tobacco use as a risk factor for mortality and is even more influential than risk factors like obesity and physical inactivity.[54] Although park space has the ability to foster mental and social health improvements, park access and design strongly influences the level of this impact. Bratman, et. al. (2015) studied nineteen participants who took 90-minute walks through a natural environment to test the connection between nature and rumination, which is repeated negative thoughts of oneself. When compared to nineteen control participants who walked through an urban setting, they found lower levels of rumination and reduced neural activity in the part of the brain associated with mental health illnesses.[55]

Crime prevention through environmental design (CEPTED) is one mechanism for promoting positive mental and social health. According to the National Recreation and Park Association, “time spent in natural surroundings relieves mental fatigue, which in turn relieves inattentiveness, irritability, and impulsivity, recognized by psychologists as the precursors to violence.”[56] CEPTED promotes positive behaviors by providing fewer opportunities for criminal activity.[57] The emphasis is on changing the built and social environment to deter potential offenders. Design element recommendations include: (1) locating activities and concessions near the entrance or perimeter, (2) creating sightlines in all parts of the park, (3) improving lighting, (4) using clear signage, and (5) providing several entrances and exists.[58] One of the greatest benefits of CEPTED is the realization that small changes can have large positive impacts on mental and social health.[59]

Environmental Health Impacts

Environmental health is another key component in promoting comprehensive public health efforts. The WHO defines environmental health as the physical, chemical, and biological factors external to a person and all related behavioral factors that affect health. Controlling environmental factors helps prevent disease and creates health-supportive environments.[60] Populations particularly vulnerable to the ill effects of poor environmental health include children, the elderly, and individuals with disabilities.[61] Globally, almost 25 percent of all deaths and of the total disease burden can be connected to environmental conditions. This rises to slightly more than 33 percent of the global disease burden for children.[62] Healthy People 2020 includes the following environmental risk factors: hazardous substances in air, water, soil, and food, natural and technological disasters, physical hazards, nutritional deficiencies, and the built

environment. Emerging environmental issues include: climate change, disaster preparedness, nanotechnology, the built environment, exposure to unknown hazards, and blood lead levels.[63] The EPA provides a litany of resources communities can use to collect data on environmental risks, mobilize, and apply for grants and technical assistance.[64]

Urban parks contribute to environmental health by providing green space and preventing developments that would contribute to environmental burdens. Tree canopies reduce air temperatures, which helps to offset the effects of urban heat island effect.[65] Additionally, the cool air created by trees and other vegetation that circulates throughout surrounding areas is known as the park breeze.[66] Trees contribute to better air quality by filtering, removing, and trapping pollutants such as carbon dioxide, ozone, and particulate matter. Trees and open space also help reduce precipitation anomalies and provide extra rainwater with less stormwater flooding. Preserving open space in watersheds protects source water.[67] All of these measures help lower rates of mortality and morbidity, specifically due to heat stroke, respiratory diseases, and water-borne diseases. Urban parks can also help restore and protect biological diversity of plants and animals if they are designed and managed with this in mind. However, a lack of adequate sanitation measures can have adverse environmental health impacts including an increased presence of water-borne diseases.[68]

The Philadelphia Water Department (PWD) has implemented city-wide measures to reduce stormwater runoff in its parks. Rain gardens, stormwater tree trenches, and porous paving are used to capture runoff for absorption into the soil. The opportunity exists for the over 11,000 acres of city parkland to decrease combined sewer overflows and keep waterways clean.[69] PWD focuses on green infrastructure in parks because "in addition to protecting our water supply and improving the health of our creeks and rivers, green stormwater management can help improve our air quality, alleviate the urban heat island effect by reducing air temperatures, and provide free outdoor space for recreation." [70] PWD requests residents nominate their park to become a Green Park.[71] Alternatively, community members can adopt their park by receiving a grant to maintain the site, report activities, and promote community engagement.[72] Parks that already or will soon include stormwater management projects include: Cliveden Park, Liberty Lands, Mill Creek Playground, Shissler Playground, Waterview Rec Center, Ralph Brooks Park, Cobbs Creek Park, Smith Playground, Herron Playground, Venice Island Rec Center, and Saylor Grove. As an example, Cliveden Park, located in the Mount Airy section of Philadelphia, includes terraced stormwater detention basins. Runoff from adjacent streets collects in the existing wetland where it is treated and combined sewer system flows are reduced, which is most helpful during short storms with heavy rainfall due to the increased potential for combined sewer overflows.[73]

Economic Benefits

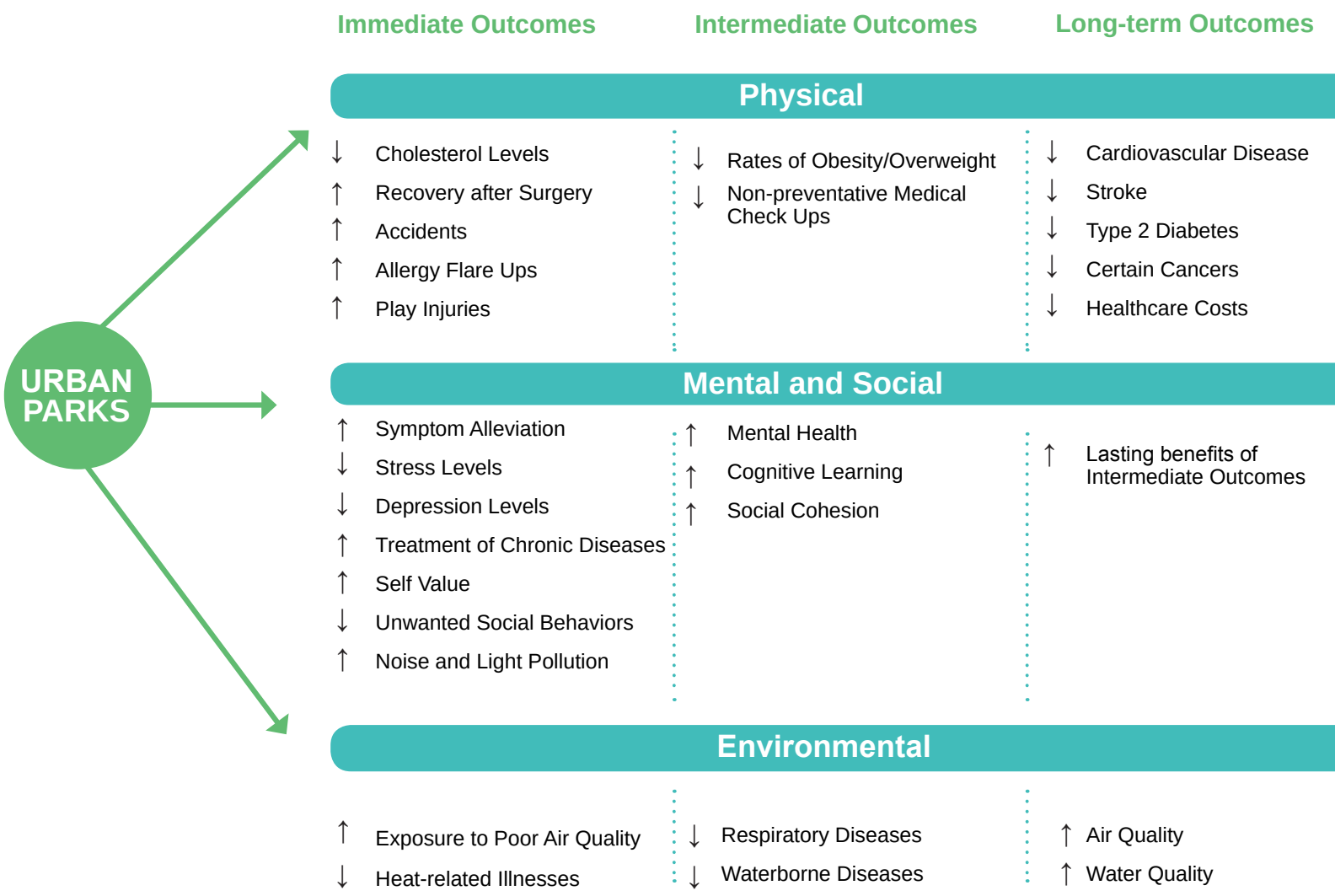
Urban parks also have quantifiable public benefits. The Trust for Public Land

determined the economic value for seven park features—property value, tourism, direct use, health, community cohesion, clean water, and clean air. The benefits are divided into direct income, direct savings, and environmental savings. Property value provides direct income dependent on proximity to and quality of the park. For example, in 2006, additional tax revenue of just under $7 million was collected in Washington, DC, due to parks. Tourist dollars are another source of direct income. Park tourism is usually an educated guess because visitor information is not collected at all parks. For example, it is estimated that just over $40 million was collected in 2006 in San Diego, CA, due to park-based day and overnight tourism by just under 5 percent of all tourists. Direct use value leads to direct savings through recreation or pleasure visits that are free of charge. By looking at the private costs of similar activities, Boston's 2006 direct use value was calculated to be over $350 million from 131,284,922 visits. Health values are direct savings from increases in physical activity. In 2006, health care savings in Sacramento, CA, amounted to just under $20 million. Community cohesion generates social capital investments in parks. Time and money invested by residents in parks was estimated for Philadelphia at $8.6 million in 2007. Managing urban stormwater runoff, an environmental savings, is an issue due to the accumulation of pollutants in runoff and the potential to spill household sewage in pollution control facilities. The 2007 economic benefit in Philadelphia of stormwater management through capturing rain and/or slowing runoff was estimated to be just under $6 million. Air pollution removal by vegetation is another environmental savings. An analysis of park coverage and types of pollutants revealed the 2005 savings for Washington, DC, was just over $1 million. Although economic valuation of parks is in its infancy, these preliminary assessments provide insight into how parks benefit urban areas and their inhabitants.[74]

Identifying Park Users

Information on park users can help identify community-wide needs and manage park assets effectively. The Urban Institute notes the benefits of conducting user surveys include helping managers decide which actions to implement, discovering which community members are excluded, determining investment strategies, designing outreach materials, and resolving conflicts among user groups. Survey methodologies include counting, observation, close-ended questions, open-ended questions, and focus groups.[75] For example, New Yorkers for Parks counted and interviewed park users in New York City to assess strategies for deploying staff and designing spaces and programming. From 2010 to 2011, this study was conducted in ten similarly designed parks during each season. Researchers counted the number of adults and children and some adults were asked to participate in a five to seven minute survey. They found playgrounds were an important resource, the benefits were particularly high for low-income households, and there is large variation in perceptions regarding upkeep and personal safety. Based on the data collected, "park administrators, public officials, advocates and everyday users can track the use of such spaces and deploy utilization data to support well-maintained, adequately programmed, safe and accessible play spaces."[76]

Urban Parks and Health Pathway Diagram



HIAs & Health Measurements

As interest in promoting all aspects of healthy lifestyles—physical, mental, social, and environmental—has grown, so has the interest in evaluating baseline conditions and impact. One of the most common forms of assessment that has emerged is the Health Impact Assessment (HIA). A traditional HIA measures baseline conditions and predicts health outcomes related to proposed laws, regulations, programs, and projects.[77]

The goal of an HIA is to determine how to effectively maximize benefits and eliminate risks associated with land use, transportation, housing, education, energy, and agriculture.[78] According to the Center for Community Health and Evaluation, HIAs have a range of outcomes from direct contributions to the decision-making process to amplifying and consolidating the voices of community members.[79] As such, HIAs can serve to promote health equity by collecting data on the burden of negative health impacts and ensuring vulnerable populations are empowered through the community engagement process.[80]

HIAs include the following steps:

1. Screening- determines utility of an HIA
2. Scoping- identifies affected populations, health implications, and research methodology
3. Assessment- provides baseline health conditions and predicted outcomes due to proposal
4. Recommendations- proposes design alternatives or actions to maximize benefits and minimize risks
5. Reporting- communicates findings and recommendations of HIA
6. Monitoring and Evaluation- tracks adoption of HIA elements and changes in health conditions when new policy or program is implemented [81]

This report is not a complete HIA, but it loosely follows the scoping, assessment, and recommendation steps to provide baseline health conditions, define and analyze health determinants for affected populations, and recommend healthy options for access and use of the new Downtown Park. Specific alternatives were not assessed given the park is still in the initial planning stages; however, the health impacts on design and development can be better assessed by viewing the park within a health lens early in this process.

REFERENCES

1. Office of Disease Prevention and Health Promotion. (2015). About Healthy People. Retrieved from http://www.healthypeople.gov/2020/About-Healthy-People

2. Office of Disease Prevention and Health Promotion. (2015). Disparities. Retrieved from http://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities

3. World Health Organization. (2015). Public Health. Retrieved from http://www.who.int/trade/glossary/story076/en/

4. Centers for Disease Control. (2014). Other At Risk Populations. Retrieved from http://www.cdc.gov/minority health/populations/atrisk.html

5. World Health Organization. (2015). The Determinants of Health. Retrieved from http://www.who.int/hia/evidence/doh/en/

6. Violence Prevention Alliance (WHO). (2015). The Ecological Framework. Retrieved from http://www.who.int/violenceprevention/approach/ecology/en/

7. Robert Wood Johnson Foundation. (2011). Issue Brief #4: Exploring the Social Determinants of Health. Retrieved from http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2011/rwjf70448

8. Brown, A. (2012, October 30). With Poverty Comes Depression, More Thank Other Illnesses. Gallup, http://www.gallup.com/poll/158417/poverty-comes-depression-illness.aspx?utm_source=alert&utm_medium=email&utm_campaign=syndication&utm_content=morelink&utm_term=All%20Gallup%20Headlines

9. Robert Wood Johnson Foundation. (2013). Metro Map: Washington D.C. Retrieved from http://www.rwjf.org/en/library/infographics/washington-dc-map.html

10. Families USA. (2014). African American Health Disparities Compared to Non-Hispanic Whites. Retrieved from: http://familiesusa.org/product/african-american-health-disparities-compared-to-non-hispanic-whites

11. Centers for Disease Control. Minority Health. (2015). Black or African American Populations. Retrieved from http://libguides.gwumc.edu/c.php?g=27779&p=170345

12. Centers for Disease Control. Office of Minority Health and Health Disparities. White Populations. Retrieved from http://www.cdc.gov/omhd/populations/White.htm

13. Centers for Disease Control, *supra* at 11

14. Families USA, *supra* at 10

15. United States Department of Labor. Bureau of Labor Statistics.(2015). Table A-2. Employment status of the civilian population by race, sex, and age. Retrieved from http://www.bls.gov/news.release/empsit.t02.htm

16. Centers for Disease Control and Prevention. (2015). Hispanic or Latino Populations. Retrieved from http://www.cdc.gov/minorityhealth/populations/REMP/hispanic.html

17. American Academy of Family of Physicians. American Family Physician.(2013). Retrieved from http://www.aafp.org/afp/2013/0101/p48.html

18. United States Department of Health and Human Services. Office of Minority Health. (2015). Hispanic/Latino Americans. Retrieved from http://www.minorityhealth.hhs.gov/omh/browse.aspx?lvl=3&lvlid=64

19. United States Department of Labor. Bureau of Labor Statistics.(2015). Table A-3. Employment status of the civilian population by race, sex, and age. Retrieved from http://www.bls.gov/news.release/empsit.t03.htm

20. *Ibid.*

21. Office of Disease Prevention and Health Promotion. Older Adults. http://www.healthypeople.gov/2020/topics-objectives/topic/older-adults

22. Brozen, M., Levy-Storms L., and Loukaitou-Sideris A. (2014). Place Making for an Aging Population Guidelines for Senior-Friendly Parks. Los Angeles, CA: UCLA.

23. Office of Disease Prevention and Health Promotion. (2015). Older Adults. http://www.healthypeople.gov/2020/topics-objectives/topic/older-adults

24. UCLA Complete Streets Initiative. (2014). Placemaking for an Aging Population. Retrieved from: http://www.lewis.ucla.edu/wp-content/uploads/sites/2/2015/04/Seniors-and-Parks-8-28-Print_reduced.pdf

25.*Ibid.*

26. Office of Disease Prevention and Health Promotion. Disability and Health. Retreived from: http://www.healthypeople.gov/2020/topics-objectives/topic/disability-and-health

27. Centers for Disease Control and Prevention. (2009). Obesity and People with Disabilities. Retrieved from http://www.cdc.gov/ncbddd/disabilityandhealth/documents/obesity-tip-sheet-_-phpa_1.pdf

28. *Ibid.*

29. Human Services Research Institute and National Association of State Directors of Developmental Disabilities Service. Exploring Health Disparities Among People with Intellectual and Developmental Disabilities. Retrieved from http://www.nationalcoreindicators.org/upload/presentation/FINAL_NASDDDS_2014_Health_Disparities.pdf

30. Office of Disease Prevention and Health Promotion. Disability and Health. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/disability-and-health

31. McGreevey, S.(2011). Health care disparities for disabled. Harvard Gazette. Retrieved from http://news.harvard.edu/gazette/story/2011/10/health-care-disparities-for-disabled/

32. Active Living Research.(2011). Do All Children Have Places to Be Active?. Retrieved from http://activelivingresearch.org/files/Synthesis_Taylor-Lou_Disparities_Nov2011_0.pdf

33. Families USA, *supra* at 10

34. Families USA. (2014). Latino Health Disparities Compared to Non-Hispanic Whites. Retrieved from http://familiesusa.org/product/latino-health-disparities-compared-non-hispanic-whites

35. Population Reference Bureau. Children's Environmental Health Risks and Remedies. Retrieved from http://www.prb.org/Publications/Reports/2002/ChildrensEnvironmentalHealthRisksandRemedies.aspx

36. Isakson, E. and Seith, D. (2011). Who Are America's Poor Children?. National Center for Child Poverty. Retrieved from http://www.nccp.org/publications/pdf/text_995.pdf

37. *Ibid.*

38. American Planning Association. (2003). City Parks Forum Briefing Papers #07: How Cities Use Parks to Improve Public Health. Retrieved from https://www.planning.org/cityparks/briefingpapers/physicalactivity.htm

39. *Ibid.*

40. *Ibid.*

41. City Parks Alliance. (N.D.). Why Urban Parks Matter. Retrieved from http://www.cityparksalliance.org/why-urban-parks-matter and City Parks Alliance. (N.D.). Mission and Vision. Retrieved from http://www.cityparksalliance.org/about-us/mission-and-vision

42. Cranz, G., Boland, M. (2004). Defining the Sustainable Park: A Fifth Model for Urban Parks. Landscape Journal, 23(2-04) 102-119. http://www.academia.edu/3678879/Defining_the_Sustainable_Park_A_Fifth_Model_for_Urban_Parks

43. Centers for Disease Control and Prevention. (2015). Adult Obesity Facts. Retrieved From http://www.cdc.gov/obesity/data/adult.html

44. *Ibid.*

45. Centers for Disease Control and Prevention. (2015). Childhood Obesity Facts. Retrieved from http://www.cdc.gov/obesity/data/childhood.html

46. Fan, M., Jin, Y. (2013). Do Neighborhood Parks and Playgrounds Reduce Childhood Obesity? American Journal Agricultural Economics, 96(1), 40. doi: 10.1093/ajae/aat047

47. Center for Active Design. (2013). Superkilen Urban Park. Retrieved from http://centerforactivedesign.org/superkilen/

48. Wolf, K., Flora, K. (2010). Mental Health & Function. University of Washington: Green Cities: Good Health. Retrieved from https://depts.washington.edu/hhwb/Thm_Mental.html

49. Centers for Disease Control and Prevention. (2013). Mental Health Basics. Retrieved from http://www.cdc.gov/mentalhealth/basics.htm

50. Wolf and Flora, *supra* at 48

51. World Health Organization. (2001). The World Health Report 2001. Retrieved from http://www.who.int/whr/2001/en/whr01_en.pdf?ua=1

52. Wolf and Flora, *supra* at 50

53. Centers for Disease Control and Prevention. (2013). Mental Health Basics. Retrieved from http://www.cdc.gov/mentalhealth/basics.htm

54. Holt-Lunstad, J., Smith, T., Layton, J. (2010). Social Relationships and Mortality Risk: A Meta-analytic Review. PLoS Med, 7(7), e1000316. doi: 10.1371/journal.pmed.1000316

55. Bratman, G., Hamilton, J., Hahn, K., Daily, G., Gross, J. (2015). Nature Experience Reduces Rumination and Subgenual Prefrontal Cortex Activation. PNAS, 112(28), 8567. www.pnas.org/cgi/doi/10.1073/pnas.1510459112

56. National Recreation and Park Association. Issue Brief: Creating Safe Park Environments to Enhance Community Wellness. Retrieved from https://www.nrpa.org/uploadedFiles/nrpaorg/Grants_and_Partners/Recreation_and_Health/Resources/Issue_Briefs/Park-Safety.pdf

57. International CEPTED Association. Welcome to the International CEPTED Association. Retrieved from http://www.cpted.net/

58. National Recreation and Park Association, *Supra* at 56

59. International CEPTED Association. *Supra* at 57.

60. World Health Organization. (2015). Environmental Health. Retrieved from http://www.who.int/topics/environmental_health/en/

61. Centers for Disease Control and Prevention. (2015). National Center for Environmental Health. Retrieved from http://www.cdc.gov/nceh/

62. World Health Organization. (2006). Quantifying Environmental Health Impacts. Retrieved from http://www.who.int/quantifying_ehimpacts/publications/preventingdisease/en/

63. Office of Disease Prevention and Health Promotion. (2015). Healthy People 2020: Environmental Health. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/environmental-health

64. U.S. Environmental Protection Agency. (2015). Environmental Health Resources for Community Members. Retrieved from http://www2.epa.gov/communityhealth

65. *Ibid.*

66. American Planning Association. (2003). City Parks Forum Briefing Papers #11: How Cities Use Parks for…Climate Change Management. Retrieved from https://www.planning.org/cityparks/briefingpapers/climatechange.htm

67. American Planning Association. (2003). City Parks Forum Briefing Papers #07: How Cities Use Parks to…Improve Public Health. Retrieved from https://www.planning.org/cityparks/briefingpapers/physicalactivity.htm

68. American Planning Association, *supra* at 65

69. Philadelphia Water. (2015). Green Parks. Retrieved from http://www.phillywatersheds.org/what_were_doing/green_infrastructure/programs/green-parks

70. *Ibid.*

71. *Ibid.*

72. Philadelphia Water. (2015). Soak It Up Adoption. Retrieved from http://www.phillywatersheds.org/what_were_doing/community_partnerships/programs/soak-it-adoption

73. Philadelphia Water. (2015). Cliveden Park. Retrieved from http://www.phillywatersheds.org/what_were_doing/green_infrastructure/projects/cliveden_park

74. Harnik, P., Welle, B. (2009). Measuring the Economic Value of a City Park System. The Trust for Public Land. Retrieved from http://cloud.tpl.org/pubs/ccpe-econvalue-parks-rpt.pdf

75. Walker, C. (2004). Understanding Park Usership. The Urban Institute and The Wallace Foundation. Retrieved from http://www.lisc.org/files/8235_file_understanding_park_usership.pdf

76. New Yorkers for Parks. (2013). Understanding Playground Utilization. New Yorkers for Parks. Retrieved from http://www.ny4p.org/research/other-reports/PlaygroundUtilization.pdf

77. Bourcier, E., Charbonneau, D., Cahill, C., Dannenberg, A. (2014). Do health impact assessments make a difference? A national evaluation of HIAs in the United States. Seattle: Center for Community Health and Evaluation.

78. *Ibid.*

79. *Ibid.*

80. Heller, J., Malekafzali, S., Todman, L., Wier, M. (2013). Promoting Health Equity Through the Practice of Health Impact Assessment. PolicyLink.

81. The National Academy of Sciences. (2011). Improving Health in the United States: The Role of Health Impact Assessment. www.nap.edu

SECTION 2: BASELINE STUDY

Baseline Analysis of New Brunswick

A new downtown park is being considered for the city of New Brunswick, New Jersey. New Brunswick is a mid-sized city of about 55,275 residents located in central New Jersey. The city is approximately 5.8 square miles in area.[1] It is also the county seat of Middlesex County, and home to several key institutions including Robert Wood Johnson University Hospital, Saint Peter's University Hospital, Johnson & Johnson and Rutgers, The State University of New Jersey. As such, it is a major employment center and has large transient and student populations. The baseline analysis for this area is divided into two parts: (1) a city-wide analysis that looks at the city as a whole and (2) a study area analysis that focuses specifically on the 15 blocks immediately surrounding the 1.12 acre downtown park site.

City-wide Analysis

Population and Demographics

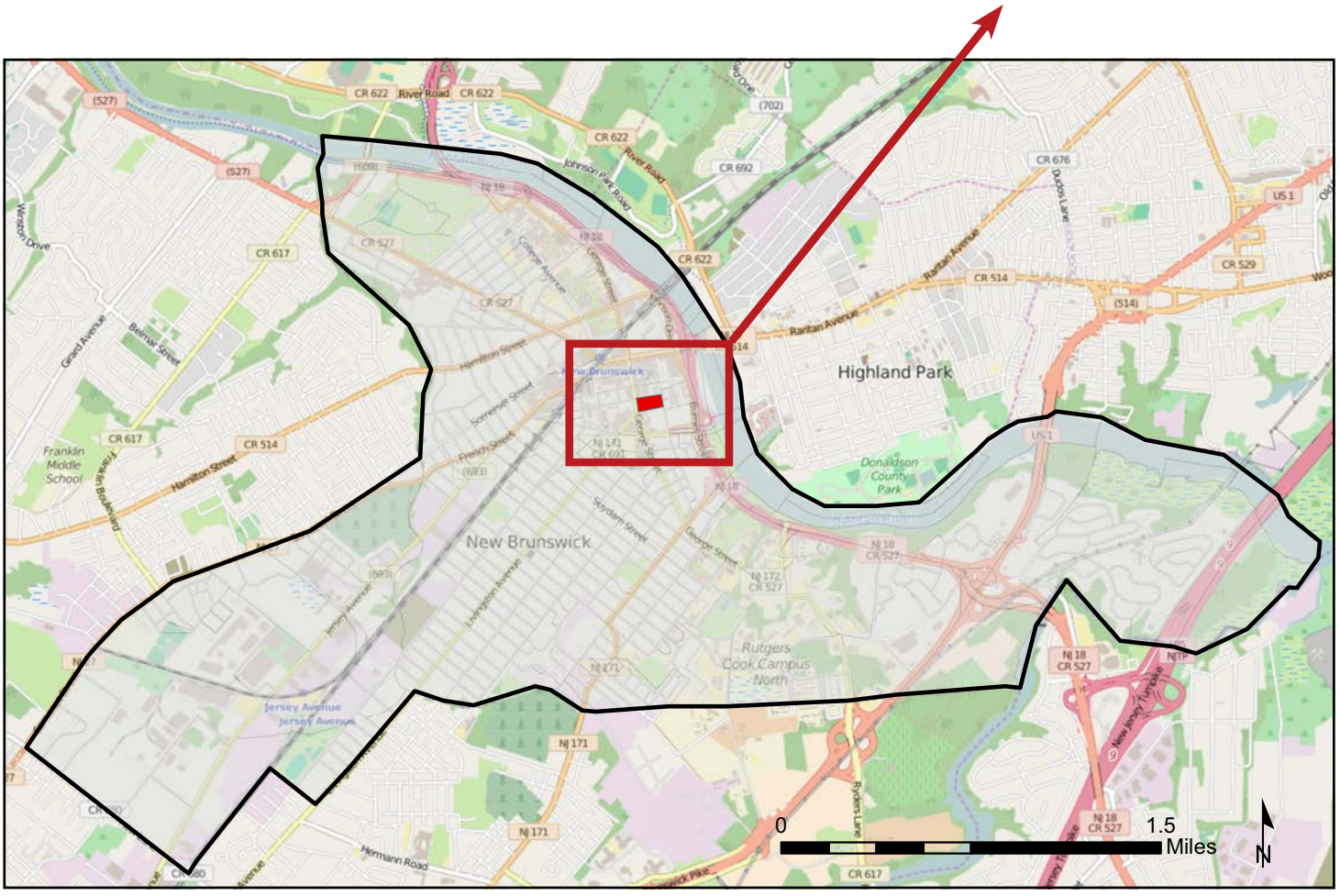
Census data shows that since 2000, the population of New Brunswick has increased by approximately 14 percent. In accordance with this increase in population, city demographics have changed as well. For example, the number of children (under the age of 5 and under the age of 18) has steadily increased while the number of senior citizens (ages 64 and older) has decreased slightly. There has also been an increasing number of white residents and Asian residents, while those identifying as African-American has decreased. Most drastic has been the rise in Hispanic residents, with the population increasing by nearly 60 percent since 2000.[2] When compared to Middlesex County and the State of New Jersey, New Brunswick has a higher proportion of African American residents and Hispanic residents, while the proportion of senior citizens is significantly lower than both the county and state. New Brunswick residents are primarily white and ages 18 to 24.[3] However, there is a greater proportion of Hispanic whites (46.4%) than non-Hispanic whites (22.4%). The majority of households in New Brunswick are family households (59.4%), however, a significant proportion of these families are single head of households (31.3%). Although New Brunswick is home to Rutgers University, only 20 percent of the population holds a bachelor's degree or higher. Nearly 40 percent of the population has less than a high school education.[4]

Land Use and Park Space

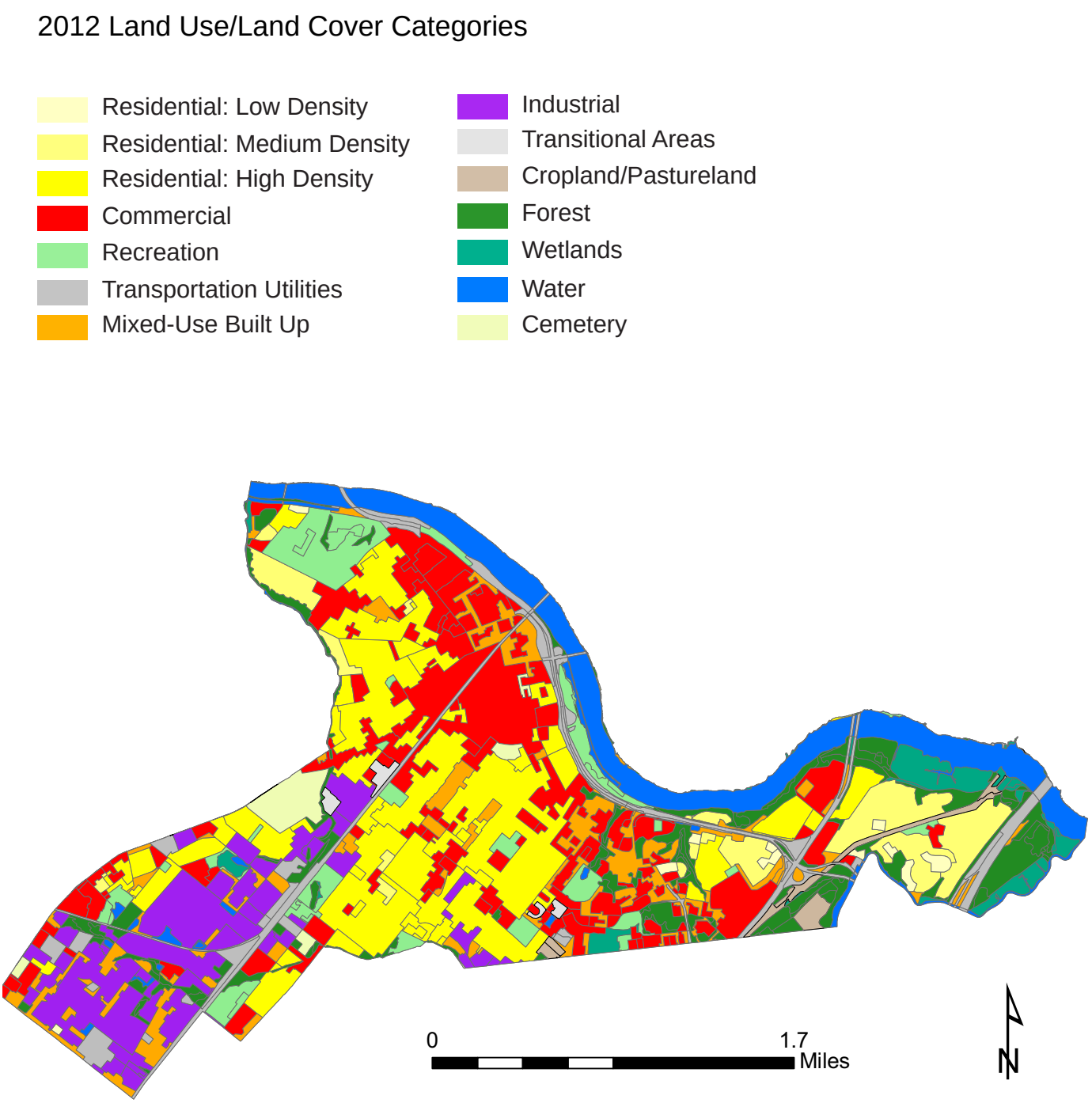
Although there is a diverse mix of land uses in New Brunswick, 2012 land use data from the New Jersey Department of Environmental Protection (NJDEP) shows that certain land uses dominate different sections of the city. For example, the southwestern area is dominated by industrial land uses while south central New Brunswick is primarily residential. The downtown area surrounding the park site was primarily commercial in 2012. However, infill development within the last few years has increased the presence

Map 1: Proposed Site, Context

View from Bayard Street toward Neilson Street



Map 2: New Brunswick Land Use/Land Cover



Data sources: New Jersey Department of Environmental Protection (NJDEP), 2012;
New Jersey Office of Information Technology (NJOIT)

of residential and mixed land use in the city's core. Land uses in the city already include a fair amount of public and park space. The Trust for Public Land reports that the city has a better-than-average amount of parkland, with about 5.7 acres of parkland per 1,000 residents.[5]

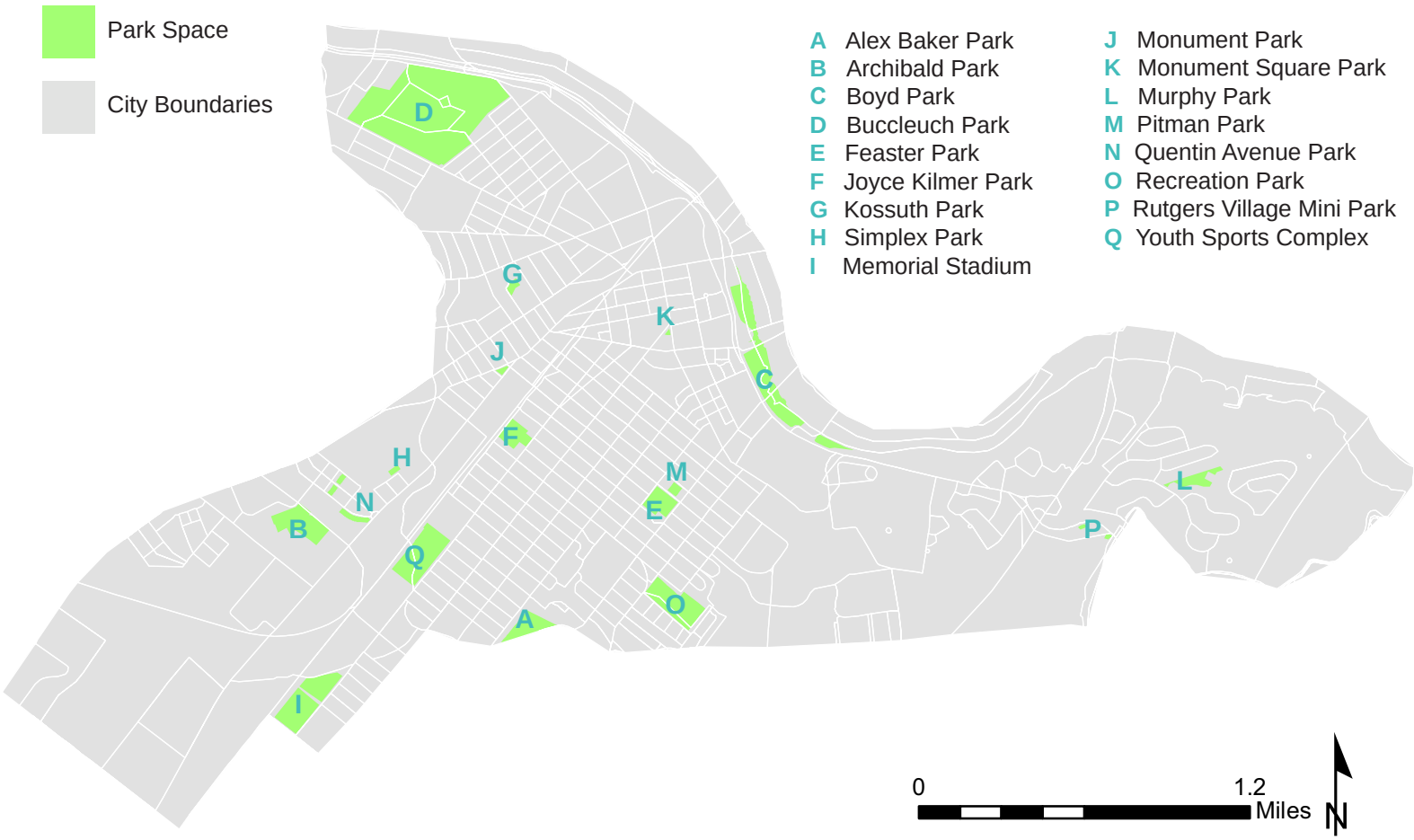
Table 1: Population - 2000, 2010, and 2013

	2000 Decennial	2010 Decennial	2013 ACS (5-Year)
Total Population	**48,573**	**55,181**	**55,275**
Age			
Under 5	3,394 (7.0%)	3,954 (7.2%)	4,336 (7.8%)
Under 18	9,729 (20.1%)	11,621 (21.2%)	12,337 (22.3%)
64 and Older	3,146 (6.5%)	2,853 (5.2%)	2,555 (4.6%)
Race			
White	23,701 (51.0%)	25,071 (47.5%)	37,578 (69.2%)
Black	11,185 (24.0%)	8,852 (16.8%)	8,254 (15.2%)
Asian	2,584 (5.6%)	4,195 (8.0%)	4,410 (8.1%)
Other	9,044 (19.4%)	14,639 (27.7%)	4,089 (7.5%)
Ethnicity			
Hispanic	18,947 (39.0%)	27,553 (49.9%)	29,606 (53.6%)
Non-Hispanic	29,626 (61.0%)	27,628 (50.1%)	25,669 (46.4%)

Source: United States Census Bureau, Decennial Census 2000 and 2010, American Community Survey, 2013 5-year estimates

There are currently 17 publicly owned park spaces in the City of New Brunswick.[6] The two main park spaces that are most well-known to residents, and offer the most amenities, are Buccleuch Park located in the northwestern tip of the city and Recreation Park near the southern border. Buccleuch Park is the city's most expansive park space at about 78 acres.[7] Although about 95% of the city population lives within a quarter mile of a park (over 80% of census blocks), this figure includes residents living near Monument Square Park and Boyd Park. Both of these parks border the proposed downtown park site. Monument Square Park is one of the smallest parks in the city and consists only of a water feature and limited seating. Boyd Park has significant access issues because it is bordered by the Raritan River and Route 18. It is somewhat disconnected from the rest of the city and particularly difficult for residents to access. When these two park sites are excluded, the percentage of the city population within a quarter mile of park decreases by 12 percent.[8] This leaves a gap in the downtown area where the proposed site is located, suggesting that the placement of a park at the proposed site would fulfill a current need.

Map 3: Existing Park Space in New Brunswick



Inventory of Park Amenities

	A	B	C	D	E	G	H	I	L	M	N	O	Q
Athletic Fields	X	X		X				X	X			X	X
Picnic Area	X	X		X	X	X			X	X		X	
Fitness Loop				X	X					X		X	
Walk Path or Track			X	X				X					
Playground	X	X		X	X	X	X		X	X	X	X	
Basketball or Tennis Courts	X	X		X	X		X	X	X	X		X	
Fishing & Boating			X										
Restrooms		X	X	X				X				X	X

Data sources: New Jersey Department of Environmental Protection (NJDEP), 2013; Middlesex County Department of Planning; NJ Office of Information Technology (NJOIT) Park Amenity Inventory adapted from New Brunswick Parks and Gardens Brochure, 2015

Employment

The city employs approximately 35,752 people.[9] New Brunswick city officials state that the population of the city nearly triples during the business day with all of its commuting students and daytime employees.[10] Job density is primarily clustered in the northern and central portions of the city, with the Downtown/City Market districts and the Rutgers College Avenue Campus area being two particular hot spots. These areas include the largest employers in the city, which are the following: Rutgers University, Johnson & Johnson, Saint Peter's Hospital and Robert Wood Johnson Hospital. The areas in the periphery of the city's boundaries have much lower employment density.

Table 2: Population Characteristics - City, County, and State, 2013

	New Brunswick	Middlesex County	New Jersey
Total Population	**55,275**	**817,026**	**8,832,406**
Age			
Under 5	7.8%	6.1%	6.1%
Under 18	22.3%	22.6%	23.2%
64 and Older	4.6%	12.6%	13.8%
Race			
White	69.2%	63.7%	70.9%
Black	15.2%	9.8%	13.9%
Asian	8.1%	22.8%	8.8%
Other	7.5%	3.7%	6.4%
Ethnicity			
Hispanic	53.6%	18.8%	18.2%
Non-Hispanic	46.4%	81.2%	81.9%

Source: United States Census Bureau, American Community Survey, 2013 5-year estimates

City and County Health Conditions

Health data in New Jersey is difficult to obtain at the municipal level, with the majority of publicly accessible health statistics provided at only the state or county level. This makes it difficult to establish a baseline health assessment for New Brunswick. Some of

the statistics analyzed here are out of date given these data collection obstacles. However, they help provide a context for the health of city residents and provide important insights for how public park space can improve overall health conditions. Additionally, health statistics at the county level were evaluated to contribute to the understanding of health conditions in the city.

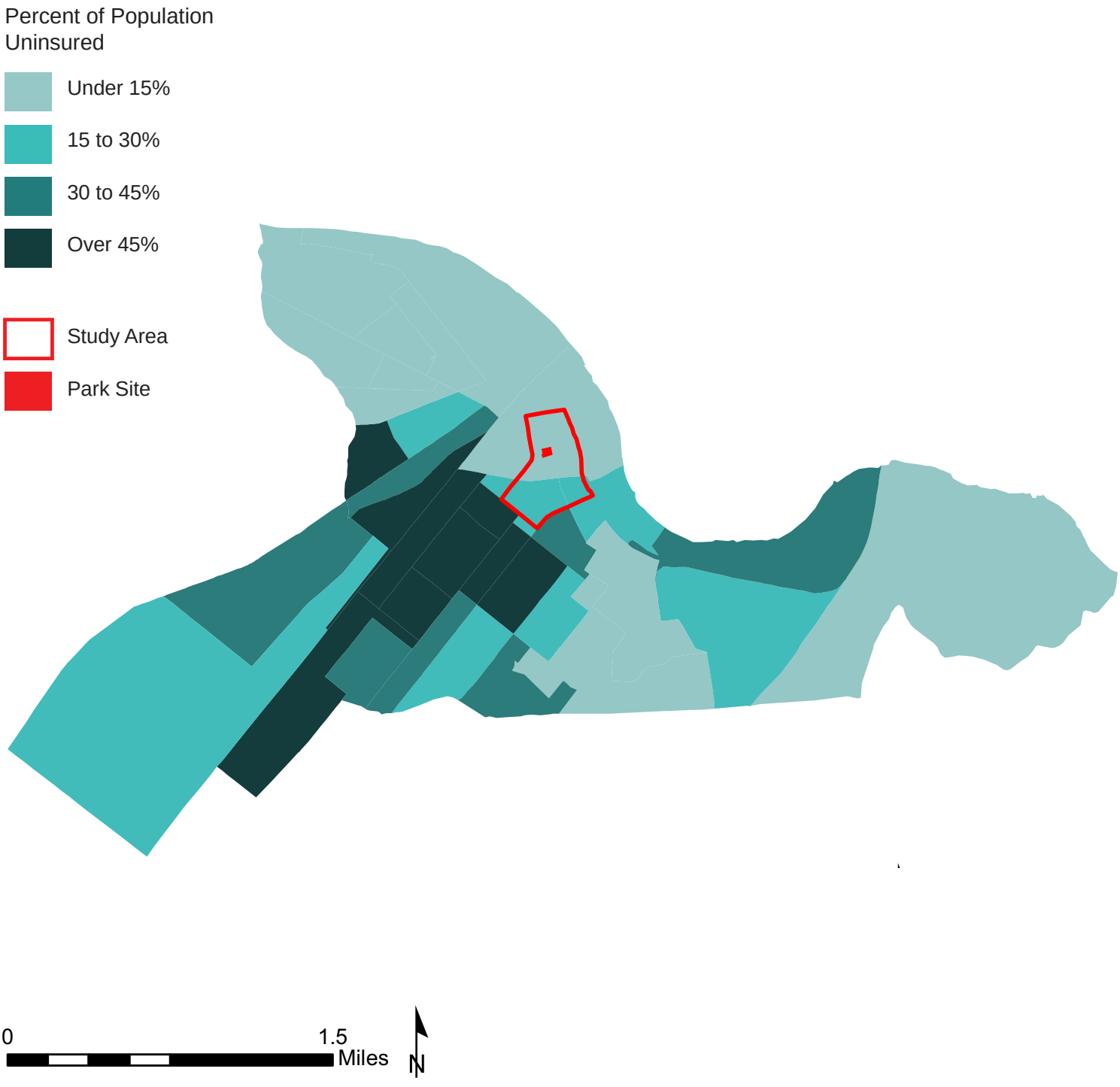
One important source of county-level health data is the CDC's Community Health Status Indicators, which reports age-adjusted rates for a variety of indicators in quartiles compared to the national average. Obesity, coronary heart disease, and diabetes are all chronic illnesses that have been tied by the literature to physical inactivity. Middlesex County has a higher age-adjusted rate (per 100,000) of diabetes than the national average, with the highest rates among those 65 years and older, males, and African Americans. Similarly, the county's age-adjusted rate (per 100,000) of coronary heart disease is moderate in comparison to the national average but well above the CDC's Healthy People 2020 target rate. The highest rates of heart disease were in non-Hispanic whites, males, and seniors. In terms of adult diabetes and overall health status, Middlesex County had rates in the least favorable quartile when compared to the national average.[11]

Another important source of information is the 2010 New Jersey Childhood Obesity Survey published by the Rutgers Center for Health Policy. This survey identified four important trends in New Brunswick childhood obesity: (1) children in New Brunswick are more likely to be overweight or obese than nationally, (2) obesity was particularly prevalent in younger, Hispanic children, (3) nearly all children do not meet the daily recommended 60 minutes of physical activity, and (4) many children do not use the park facilities available to them due to barriers like traffic, sidewalk conditions, crime, and pleasantness of neighborhoods. Approximately 55 percent of New Brunswick children ages 3 to 18 have two or less days at school each week that involve some type of physical activity. The study concluded that an effective intervention should include new opportunities for physical activity.[12]

Health Insurance Coverage

Although health data was generally difficult to find at the granular level, data on health insurance coverage is available at the census block group level.[13] Health insurance coverage is an indicator of employment and socio-economic status, which has been linked to health status. Residents with health insurance are also more likely to seek preventative care than their uninsured counterparts. Throughout New Brunswick, the rate of uninsured residents varies significantly. The highest uninsured rates are in the block groups along the Livingston Avenue corridor; over 45 percent of residents here do not have health insurance. Within the downtown area immediately surrounding the park site, insurance rates are split between the northern (under 15% uninsured) and southern (15 to 30% uninsured) block groups.

Map 4: New Brunswick Health Insurance Coverage



Data sources: United States Census Bureau, Tiger Files, 2013; NJ Office of Information Technology (NJOIT); U.S. Census Bureau, American Community Survey, 2013 (5-year estimates)

Study Area Analysis

The 'study area' is defined as a 22 census block area (corresponding to about 15 city blocks) immediately surrounding the proposed park site. This area was delineated based on first-hand knowledge of the city and its neighborhoods as well as field work conducted by the project team. It is important to understand the dynamics of how the downtown park will function in the immediate surroundings in addition to the city as a whole. The residents most impacted and served by the new space will likely be those living directly around the site and it is therefore important to understand the demographics of these potential users.

Population and Demographics

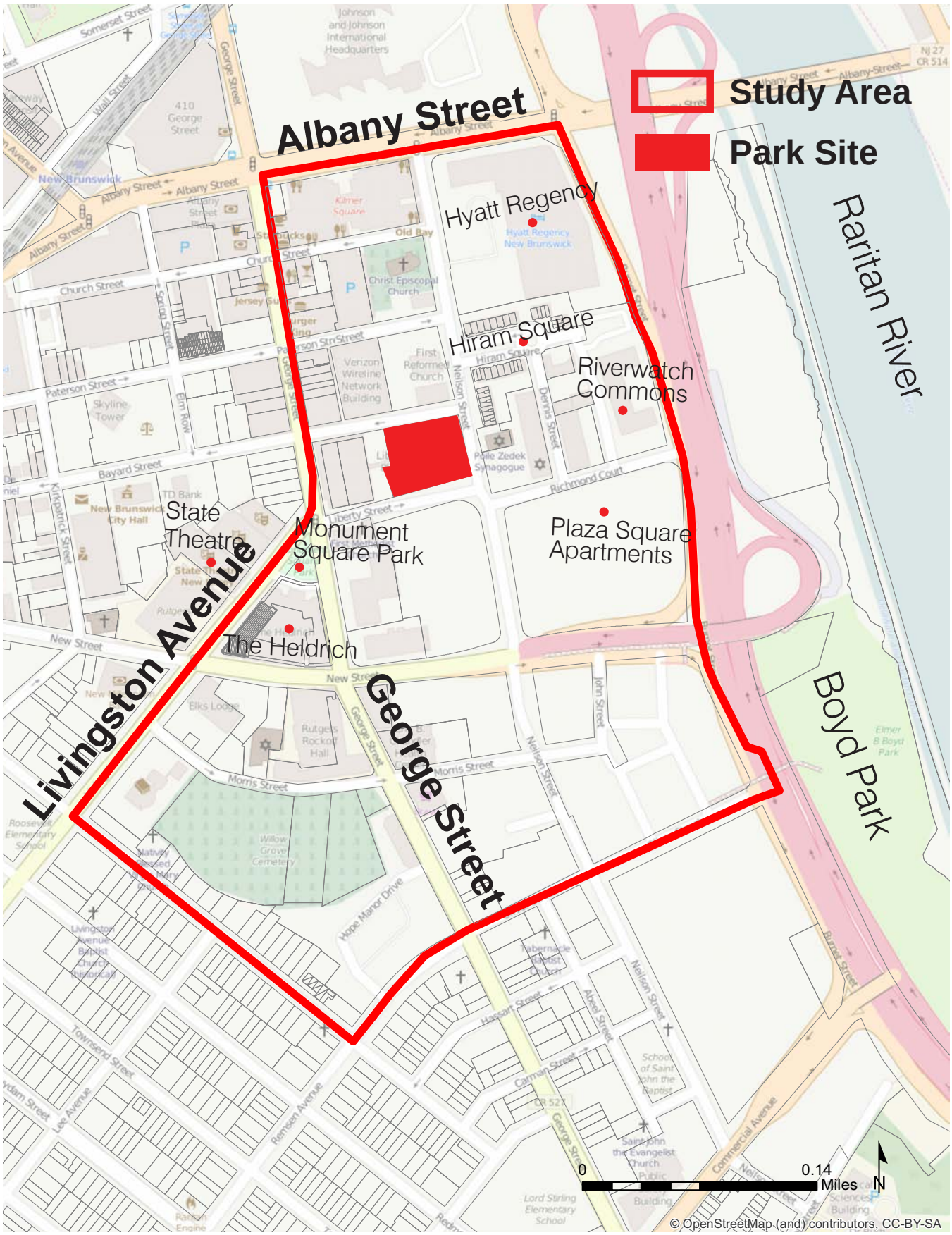
There are approximately 2,628 residents living within the study area.[14] This number is expected to grow as infill residential development continues at a fast pace in downtown New Brunswick. For example, there is currently a 417-unit luxury apartment complex under construction at the corner of Neilson and New Streets—directly adjacent to the proposed park site.[15]

The socio-economic makeup of the study area is similar to that of the city as a whole. However, there are a few key distinctions. First, the area is predominately white and has a much lower Hispanic/Latino population than the rest of the city. Second, it has a higher concentration of individuals ages 20 to 34 (56%) than the city average (42%) and a higher concentration of seniors ages 64 and older (12% in comparison to city average of 5%). In accordance with the higher concentration of young adults and senior citizens, the study area has a much smaller proportion of children under 18 (11%) than the city average (21%).[16] Notes taken during field studies of the area indicate that the majority of the population in this area is young, working professionals.

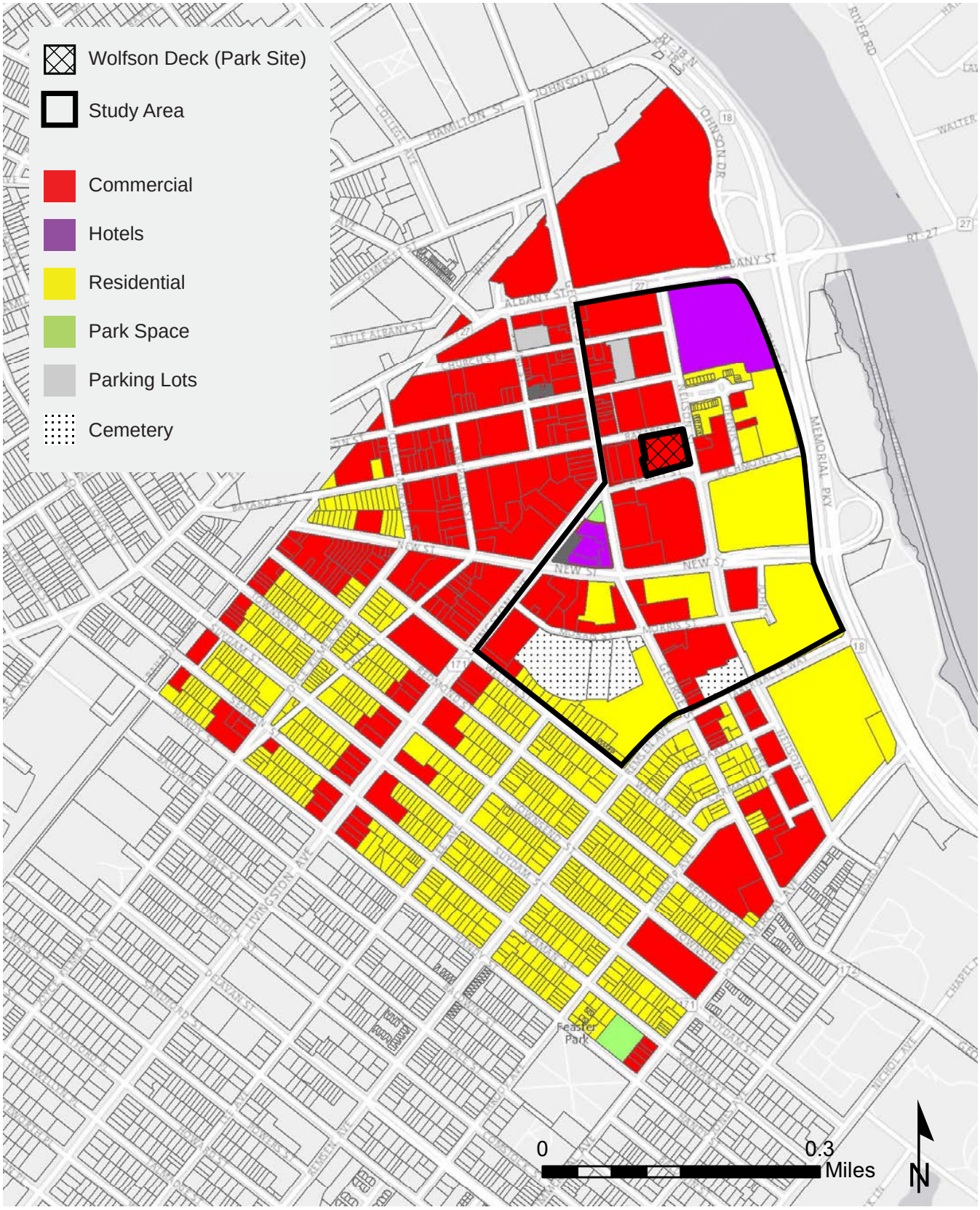
Land Use and Park Space

The predominant land use in the study area is commercial with some residential land use adjacent to and across from the site. The majority of residential use is clustered in the southwestern corner of the study area outlined in map 5. Residential land use near the site is primarily apartment complexes and townhouses rather than single-family homes. However, there is a non-adjacent, peripheral community of single and multi-family homes that may also be interested in utilizing the park space. As previously mentioned, the two main park spaces located within close proximity to the proposed park site are Boyd and Monument Square Parks. Due to size and accessibility issues, it is believed that these parks are not currently fulfilling the needs of local residents.

Map 5: Study Area Boundaries



Map 6: New Brunswick Land Uses Near Site



Data sources: New Jersey Department of Environmental Protection (NJDEP), 2013;
Middlesex County Department of Planning; NJ Office of Information Technology (NJOIT)

Table 3: Population Characteristics - City and Study Area*

*Decennial census estimates are used here because this is the most recent data available at the block level.

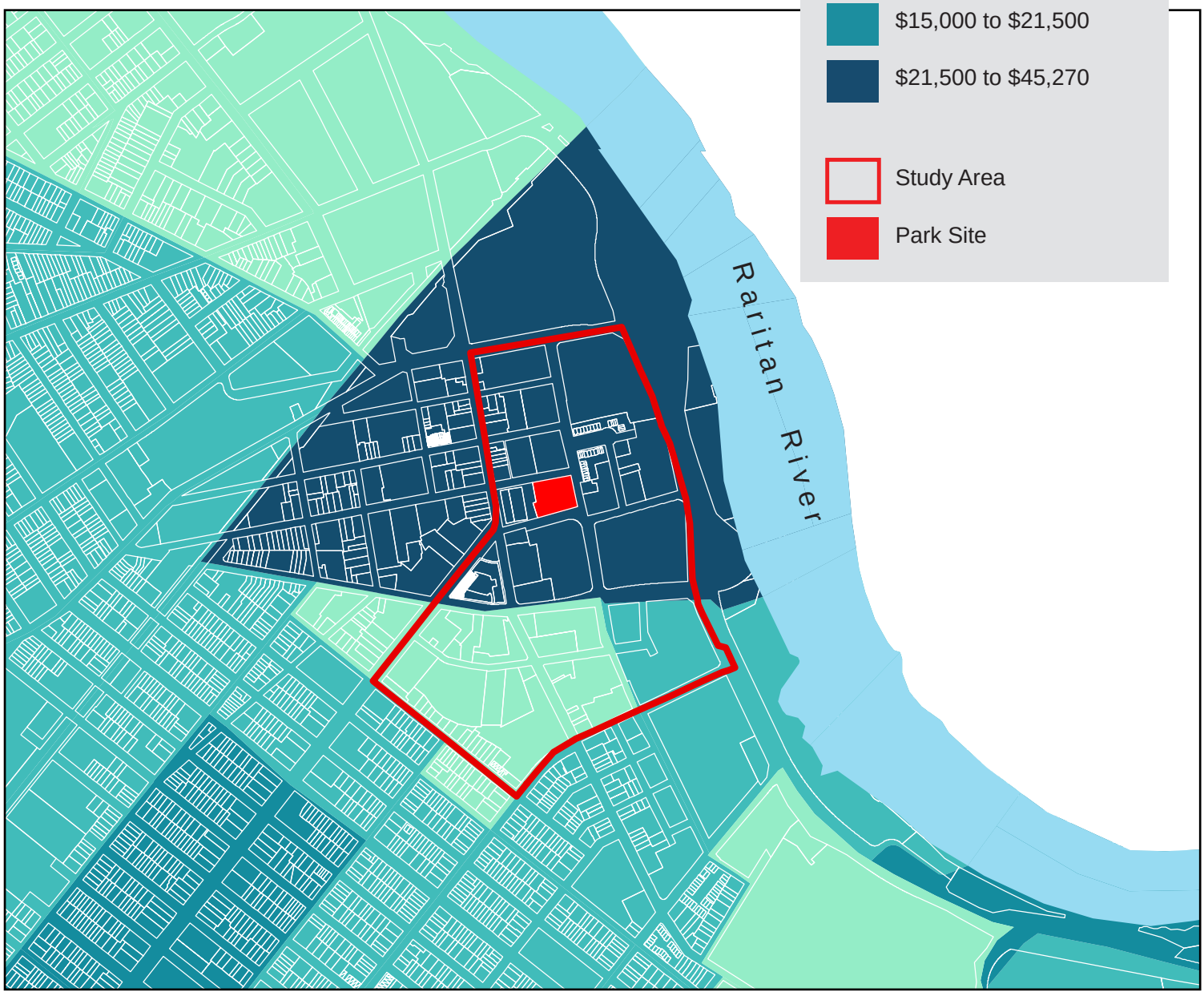
	New Brunswick	Study Area
Total Population	**55,181**	**2,628**
Age		
Under 5	7.2%	3.6%
Under 18	21.2%	10.8%
64 and Older	5.2%	11.8%
Race		
White	47.5%	47.3%
Black	16.8%	21.6%
Asian	8.0%	18.5%
Other	27.7%	12.6%
Ethnicity		
Hispanic	49.9%	23.0%
Non-Hispanic	50.1%	77.0%

Source: United States Census Bureau, Decennial Census 2010

Employment

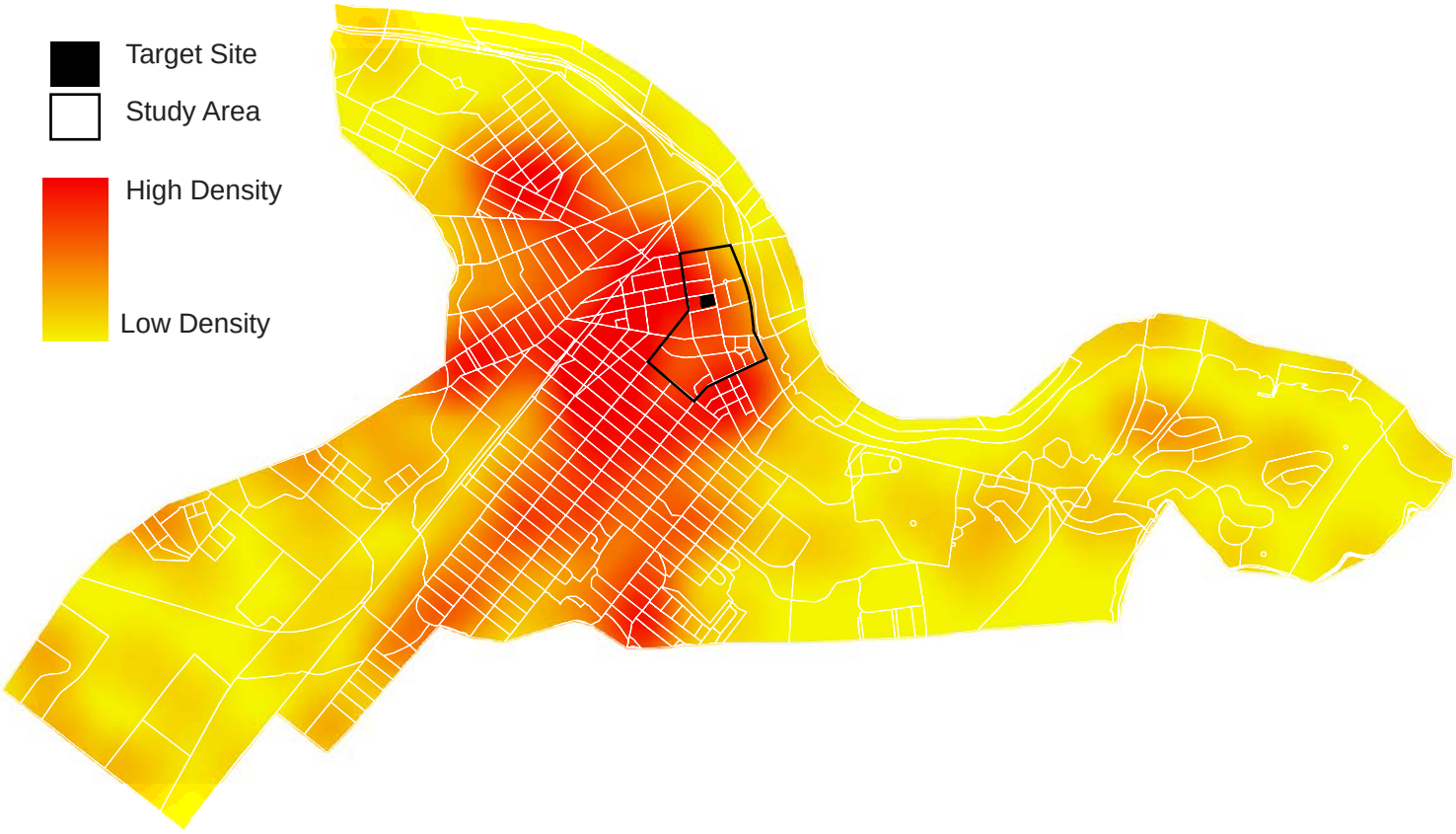
The study area is also located directly within New Brunswick's employment hot spot. It is nearest to Johnson & Johnson, and is in close proximity to other major employers including the university and the hospitals. There are approximately 4,190 jobs in the study area, representing about 12 percent of all employment in the city.[17] This is a significant percentage given that the size of the study area is only 15 city blocks and comprises about 2 percent of the city's land area (about 0.13 of 5.8 square miles). In addition, the commercial corridor that lines that study area is home to several notable food locations including Starbucks, Chipotle, Jersey Subs, World of Beer, and others. These establishments attract both lunch and dinner crowds during the business day.

Map 7: Study Area Per Capita Income



Data sources: New Jersey Geographic Information Network; Google Maps; U.S. Census Bureau, ACS 5-year estimates

Map 8: Job Density in New Brunswick



Note: "high density" is 348 jobs per square mile and "low density" is less than 40 jobs per square mile.

Data sources: NJ Office of Information Technology (NJOIT); U.S. Census Bureau, "On the Map" Longitudinal Employment Data, 2012

REFERENCES

1. U. S. Census Bureau. (2010). American FactFinder: Decennial Census, New Brunswick, New Jersey. Geographic Level: Block Level.

2. U. S. Census Bureau. (2000, 2010, 2013). American FactFinder: Decennial Census, American Community Survey (5-year estimates). Geographic Levels: State (New Jersey), County (Middlesex), County Subdivision (New Brunswick).

3. U. S. Census Bureau. (2013). American FactFinder: American Community Survey (5-year estimates), New Brunswick, New Jersey.

4. *Ibid.*

5. The Trust for Public Land (2011). *The Park System of New Brunswick, New Jersey*. Retrieved from: http://cloud.tpl.org/pubs/ccpe-NewBrunswick-web-optimized.pdf

6. New Brunswick Envrionmental Commission (2015). Parks and Gardens of New Brunswick, NJ. Retrieved from: https://content.sakai.rutgers.edu/access/content/group/3110a577-5b30-41d6-b4d3-dd38060929c9/New_Brunswick_Resources/Parks-and-Gardens-April-2015-Final-Brochure.pdf

7. The Trust for Public Land, *Supra* at 5

8. U. S. Census Bureau, *Supra* at 1

9. U. S. Census Bureau. (2012). On the Map, Longitudinal Employment Statistics. New Brunswick, New Jersey.

10. City of New Brunswick (2015). Website for Downtown New Brunswick, About section. Retrieved from: http://www.newbrunswick.com/content.php?content=About_block

11. Centers for Disease Control and Prevention (CDC) (2015). Community Health Status Indicators (CHSI). Middlesex County, New Jersey. Retrieved from: http://wwwn.cdc.gov/CommunityHealth/profile/currentprofile/NJ/Middlesex/

12. Lloyd, K., Ohri-Vachaspati, P., Brownlee, S., Yedidia, M., Gaboda, D., and Chou, J. (2010). New Jersey Childhood Obesity Survey Chartbook: New Brunswick. New Brunswick, N.J.: Rutgers Center for State Health Policy. Retrieved from: http://www.cshp.rutgers.edu/downloads/8660.pdf

13. U. S. Census Bureau, *Supra* at 1

14. U. S. Census Bureau, *Supra* at 1

15. Rabinowitz, R. (2013). New Brunswick Today. *New Luxury Building Secures Property Tax Abatement from City but Fails to Qualify for State Tax Credits*. Retrieved from: http://newbrunswicktoday.com/article/new-luxury-building-secures-property-tax-abatement-city-fails-qualify-state-tax-credits

16. U. S. Census Bureau, *Supra* at 1

17. U. S. Census Bureau, *Supra* at 9

SECTION 3: LINKAGES & ACCESS

Linkages and Access

Understanding how to create linkages to the park that maximize access is an important aspect of park planning. Some linkages and access considerations include the condition of streets and sidewalks, American Disability Act (ADA) compliance, and bicycle and pedestrian safety. Four key analyses were conducted with regard to linkage and access issues: (1) identifiying park user groups, (2) evaluating vehicle and pedestrian safety, (3) assessing walkability, and (4) wayfinding. Vehicle and pedestrian safety is analyzed on a city-wide basis whereas all other assessments are conducted at smaller geographic levels such as the study area. Identification of potential park user groups informs all other sections of the analysis.

Park User Groups

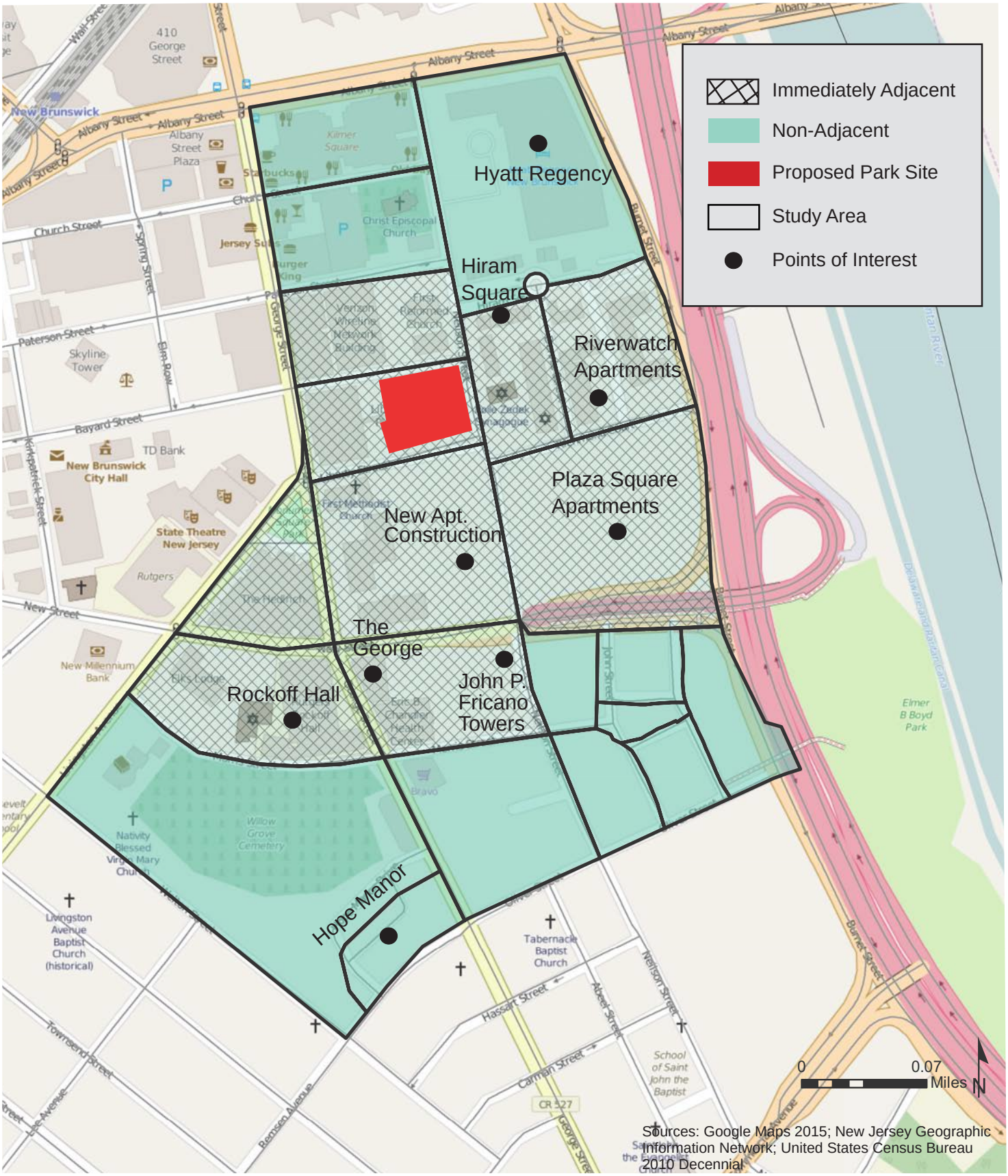
Park user groups were determined based on a combination of factors including geographic location, time of day preferences, and demographic characteristics. Five key park user groups are presented here, including: (1) immediately adjacent users, (2) non-adjacent or outer users, (3) daytime users, (4) children, and (5) seniors. The project team understands that some residents may fall into one or more of these categories, but believes that the majority of potential park users are captured and best understood using this categorization.

Immediately Adjacent

The immediately adjacent user group contains the residents that live directly across from and adjacent to the proposed site. The surrounding residents live almost exclusively in apartment complexes and townhomes. This includes Plaza Square Apartments, The George, Riverwatch Commons, and Hiram Square. The majority of these residents are young, higher income, and white. There are very few young children (1.4% under 5 years old) in this user group. John P. Fricano Towers is a senior apartment building that is included in this user group, however, these residents face an additional barrier because of their location relative to the intersection of New and Neilson Streets. This intersection is heavily trafficked due to the on ramp for Route 18. However, this is the most direct route to the park. This senior population is particularly unique because the majority of residents are Russian-speaking.

This immediately adjacent user group is important to consider because they have direct access to the site and are likely the easiest group to attract. In addition, their day-to-day lives will be impacted by the development and operation of the park due to their close proximity. It is expected that this group will utilize the park most often in the early morning, evening, and weekend hours. It is suspected that a significant portion of the user group are dog owners, which may be another driver for park use.

Map 1: Immediately Adjacent and Non-Adjacent Users



Sources: Google Maps 2015; New Jersey Geographic Information Network; United States Census Bureau 2010 Decennial

Non-adjacent or "Outer"

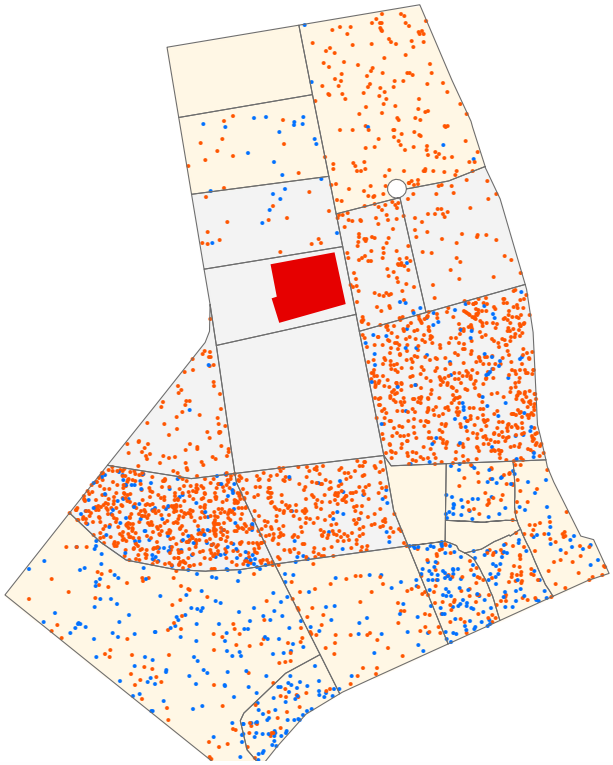
This user group does not live immediately adjacent to the proposed site but is within close proximity. The majority of the group lives near the southern border of the study area and has a significantly higher proportion of family households (50.4%) in comparison to the immediately adjacent user group (28.5%). There are also significantly more children under 18 in this user group (27.1%) than the immediately adjacent user group (2.6%) and the area is comparably lower income. A higher proportion of residents in this user group are Hispanic or Latino (45.2% compared to 11.7% in the immediately adjacent group).[1] Despite being within close proximity to the site, these users may have more limited access in comparison to the immediately adjacent users because they are separated from the site by the heavy traffic on New Street where it meets the ramp to Route 18. This group may be harder to attract to the park given this access issue. As such, this user group may be more infrequent users than the immediately adjacent or other user groups. They are likely to visit the park on the weekends and during school breaks like spring and summer vacations.

Table 1: Demographics of Immediately Adjacent and Non-Adjacent Users

	Immediately Adjacent	Non-Adjacent	Citywide
Total Population	**1,744**	**884**	**55,181**
Age			
Children (under 18)	2.6%	27.1%	21.2%
Seniors	14.9%	5.7%	5.2%
Young Adults (18-24)	40.5%	17.3%	33.9%
Race			
White	56.6%	28.7%	47.5%
Black	14.9%	34.8%	16.8%
Asian	24.3%	7.1%	8.0%
Other	4.1%	29.4%	27.7%
Ethnicity			
Hispanic	11.7%	45.2%	49.9%
Non-Hispanic	88.3%	54.8%	50.1%
Households			
Family Households	28.5%	50.4%	54.9%
Single-head of	14.8%	60.0%	25.8%
Non-Family Households	71.5%	49.6%	45.1%

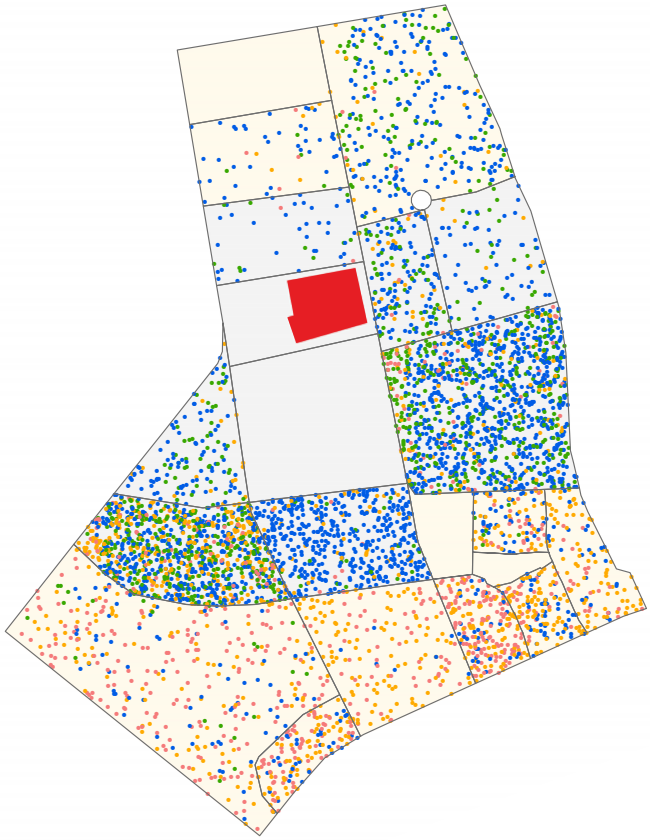
Source: U.S. Census Bureau, 2010 Decennial Census, Block Level Data.

Map 2: Racial Composition of Study Area



Study Area Ethnic Composition

- Non-Hispanic
- Hispanic or Latino
- Proposed Park Site
- Immediately Adjacent Users
- Non-adjacent Users



Study Area Racial Composition

- Black
- White
- Asian
- Other
- Proposed Park Site
- Immediately Adjacent Users
- Non-adjacent Users

0 0.1 Miles N

Sources: New Jersey Geographic Information Network; United States Census Bureau 2010 Decennial

Daytime

Another important user group is the daytime population. As previously stated, New Brunswick's population nearly triples during the business day due to commuting students and daytime employees.The daytime user group is expected to be primarily employees working in the area and students who commute into the city during the weekday. This population is expected to be limited users of the park, seeing as they will use the park primarily during lunchtime hours. For this population it is expected that seating will be an incredibly attractive feature considering the very limited outdoor public seating available in the Downtown/City Market district. New Brunswick employs approximately 35,752 people, 12 percent of which work in offices within the boundaries of the study area.[2] It is hard to determine whether the park will draw daytime employees and students from outside of the study area given the location of other parks, like Buccleuch, and the variety of campus green spaces.

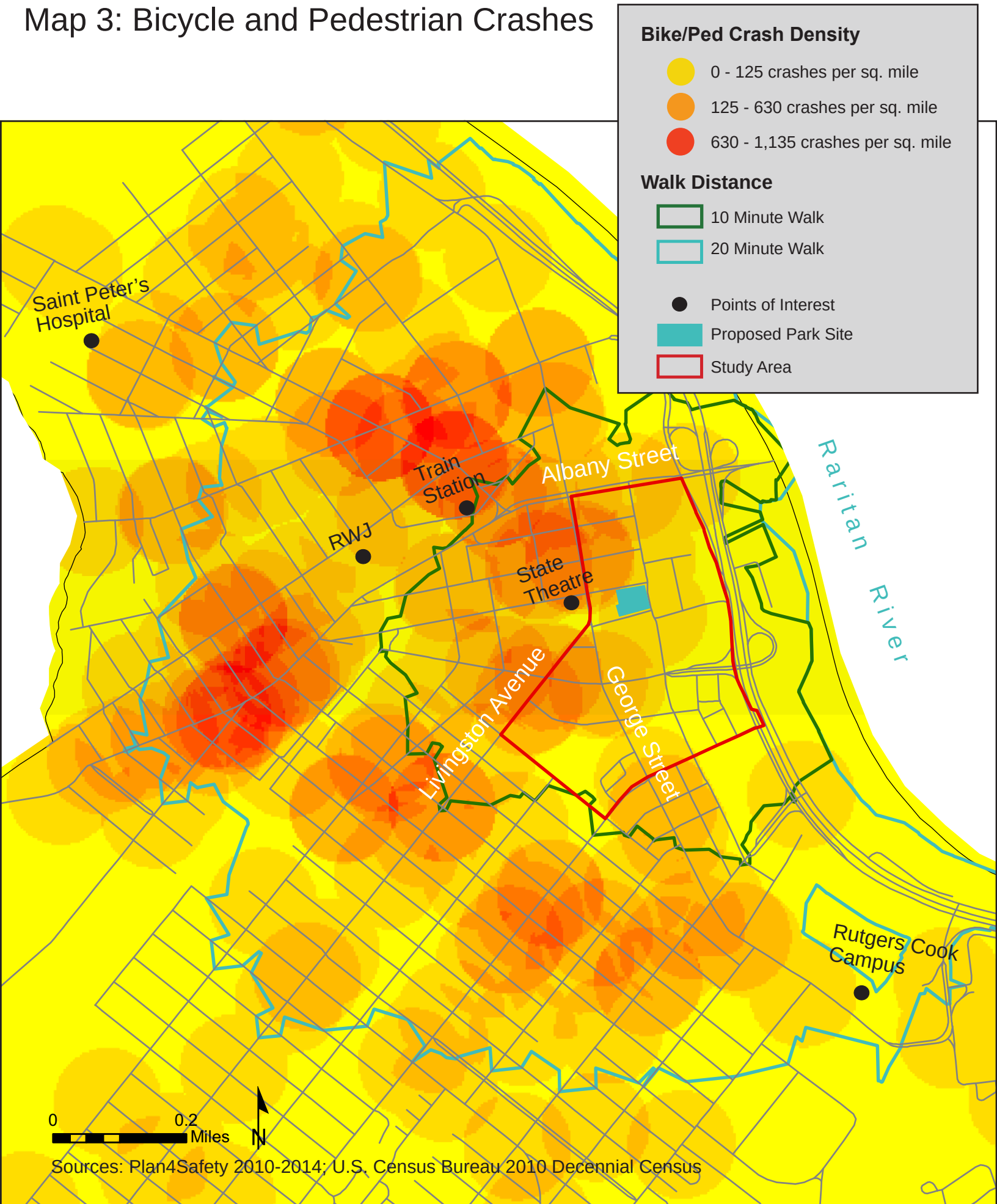
Children

In addition to proximity and time of day, another consideration is demographics. Children are one group that is likely to be drawn to the new space, especially considering the lack of recreational facilities in the downtown area. There are more children under 18 in the non-adjacent user group (27.1%) than the immediately adjacent user group (2.6%). The former may have difficulty accessing the park due to heavy traffic on New Street. This user group is most likely to utilize the park on weekday evenings, weekends, and during spring, summer, and holiday recesses. While desired features may vary by age group, this user group will likely use amenities that promote physical activity.

Seniors

Seniors are another non-location based user group that may fall into other user groups. In particular, there is a high concentration of seniors in the immediately adjacent user group, most of whom live in John P. Fricano Towers. Seniors are a unique user group because they have very specific needs with regard to access. It is likely that this user group will be easily deterred by factors like: confusing paths, limited wayfinding, unsafe street conditions, and crossing barriers. In particular, seniors with disabilities such as limited mobility, deafness, or poor eyesight could have added difficulty reaching the park. Of primary concern is crossing New Street, which is necessary for all seniors living in John P. Fricano Towers. This crossing is long, traffic congested, dimly lit and may be intimidating for many seniors. Seniors may also require specific accommodations including seating, which will need to be made available both in the park and along the route to the park. They may be deterred by the presence of other user groups in the park including children (both young and adolescent). It is less clear what the time of day and use hours will be for this user group and whether or not they will be difficult to attract to the park.

Map 3: Bicycle and Pedestrian Crashes



Sources: Plan4Safety 2010-2014; U.S. Census Bureau 2010 Decennial Census

Vehicle and Pedestrian Safety

While there are several problem intersections near the proposed site, the intersection at New and Neilson Streets (where there is an interchange for Route 18) is a concern for almost all of the potential park users groups. In particular, it acts as a barrier for much of the senior population as well as families living in the non-adjacent communities. While it will be easier for more centrally located individuals (like daytime employees and residents living directly across from or adjacent to the park) to reach the park, they are likely to face vehicle and pedestrian safety issues of their own. Given the traffic volume in downtown New Brunswick, pedestrian safety issues are a serious consideration throughout the study area.

Vehicle and Pedestrian Crash Statistics

To evaluate vehicle and pedestrian safety, statewide crash data was obtained from Plan4Safety for the years 2010 to 2014. Crashes for these years are pre-aggregated to yield a more accurate analysis. Middlesex County accounts for 10.71 percent of total vehicle miles traveled (VMT) in the state. In accordance, 10.26 percent of all statewide vehicle crashes occur in Middlesex County.[3] Vehicle crashes in the county are proportional to VMT. However, bicycle and pedestrian crashes are slightly smaller in proportion to VMT, at 7.01 percent.[4] Middlesex County has a lower rate of bicycle and pedestrian crashes than the state; however, New Brunswick has crash rates that are nearly three times that of Middlesex County and over double that of the state.

Table 2: Total Crashes and Bike-Ped Crashes, 2010-2014

Geography	VMT	VMT%	Total Crashes	Total Crash %	Bike-Ped Crashes	Bike-Ped Crash %
New Jersey	205,085,987	-	1,435,207	-	38,403	-
Middlesex County	21,960,709	10.7%	147,195	10.3%	2,692	7.01%

Sources: Plan4Safety 2010-2014

Table 3: Bike-Ped Crashes per Population, 2010-2013

Geography	Population	Bike-Ped Crashes	Bike-Ped Crashes Per Population
New Jersey	8,832,406	38,403	0.43%
Middlesex County	817,026	2,692	0.33%
New Brunswick	55,275	506	0.92%

Sources: Plan4Safety 2010-2014, Population counts from U.S. Census Bureau ACS, 2013 (5-Year Estimates)

Population density is most likely a contributing factor to the increased rates of bike and pedestrian crashes, with New Brunswick being one of the densest municipalities in Middlesex County, second only to Perth Amboy.[5] In addition to population density, another contributing factor may be the lack of car ownership, which increases the frequency of cycling or walking. In New Brunswick, 34.3 percent of households do not have access to a vehicle as compared to 4.8 percent of Middlesex County households and 6.7 percent of New Jersey households.[6]

When the density of bicycle and pedestrian crashes is mapped, the highest volume of crashes can be found along French Street and Easton Avenue. Other areas with heavy concentrations of bike and pedestrian crashes are: (1) between Hale Street and Bayard Street, (2) along French Street and Mine Street, and (3) at the intersection of Albany Street and Easton Avenue.

Walkability Assessment

Walkability was assessed using two mechanisms: (1) an evaluation of the number of residents who live within walking distance from the site, and (2) a street and block condition assessment based on original fieldwork. These two pieces allow for a better understanding of access challenges and opportunities and compliment the vehicle and pedestrian safety analysis.

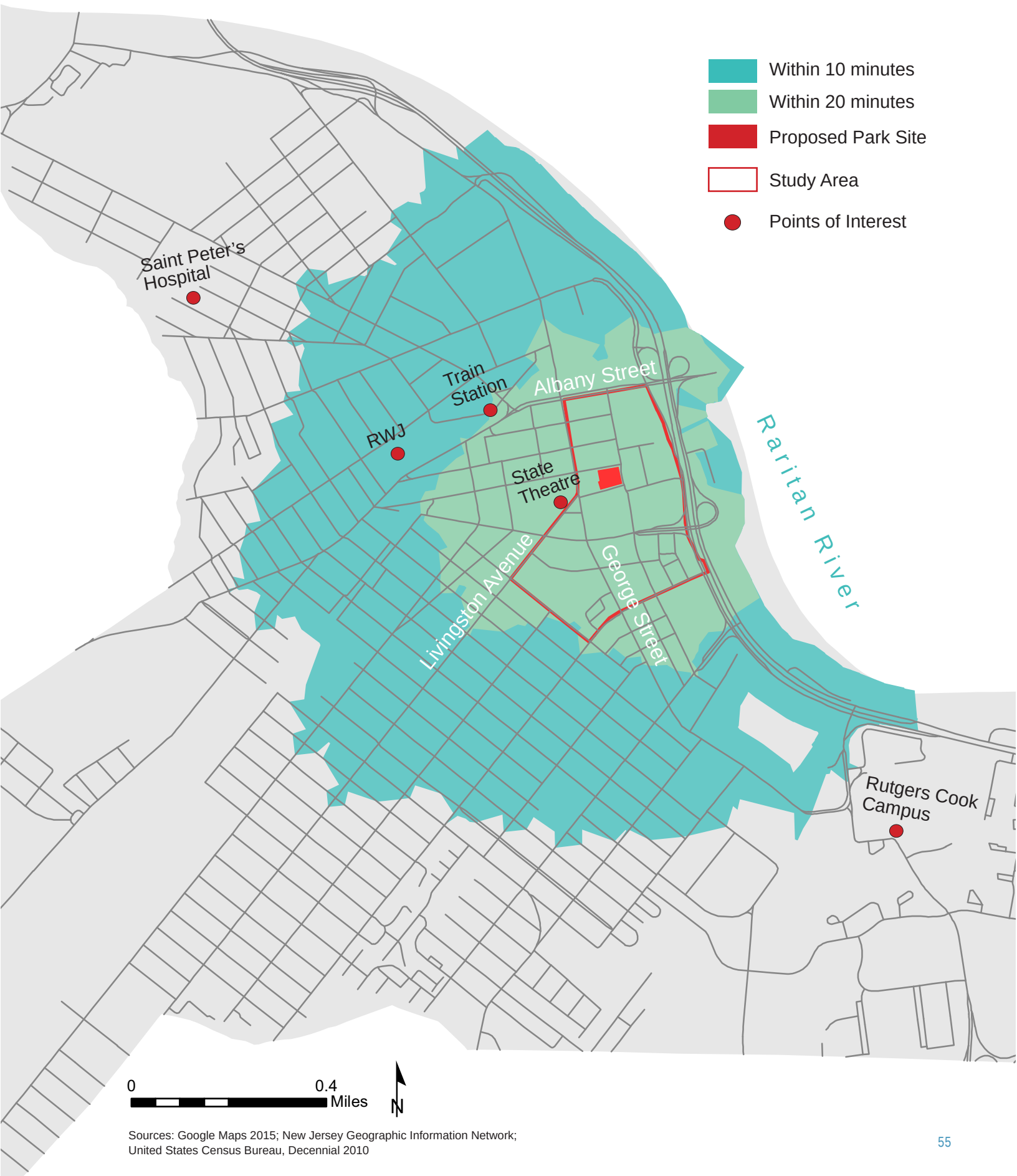
Distance from Site

The distance of potential park users from the site was analyzed using two methods. The first method involved calculating walk time along the street network for residents in a given location around the city.[7] Mapping software generated walking paths and times. There are an estimated 23,447 residents living within a 20 minute walk of the site. This is a large portion of all city residents. This estimate does not include the individuals working near the site. To avoid double counting, employees were not included here because it is unknown what proportion of employees are also residents. Ultimately, it is more likely that the primary park users will come from areas within a 10 minute walk. Most of the New Brunswick downtown core and nearly all of the study area fall within this range. An estimated 4,579 residents live within a 10 minute walk of the site.

Another method for determining distance was to calculate the number of residents living within a certain radius of the proposed site. This was calculated using three common distances: one mile, one-half mile, and one-quarter mile. Knoblauch et al. (1996) found that it takes the average person approximately 5 minutes to walk a quarter-mile, 10 minutes to walk a half-mile, and between 10 and 20 minutes to walk a full mile.

While it is reasonable to assume that residents living within each of these three

Map 4: Walk Time to Park Site



Sources: Google Maps 2015; New Jersey Geographic Information Network; United States Census Bureau, Decennial 2010

distances will have adequate access to the park space, it is expected that the majority of users will come from the quarter- and half-mile groups. There are approximately 3,653 residents living within a quarter-mile distance of the proposed site location, accounting for 7 percent of the total city population. There are an additional 13,011 residents living within a half-mile distance, accounting for an additional 24 percent of the population. This is a total of 31 percent of all city residents living within a half mile. Over 50 percent of the residents living within this half-mile radius are Hispanic or Latino and 14 percent are African American. It is also noteworthy that 22 percent are children under the age of 18. When the residents living within a mile of the site are taken into consideration, the total number of residents within walking distance rises to 89 percent. These calculations suggest that the proposed site for the park is ideally situated to reach a large majority of city residents and that potential park users are young and from diverse backgrounds.[8]

It is important to note that this estimate is larger than the one generated in the previous method. This difference arises because the first method calculates distance based on the street network, while the second method calculates the shortest distance between two points. Using the street network to calculate distance presumes that residents will not cross fields or other non-street paths to get to their destination. The shortest distance method described here does not make this assumption. Therefore, the most accurate estimate is likely somewhere between these two.

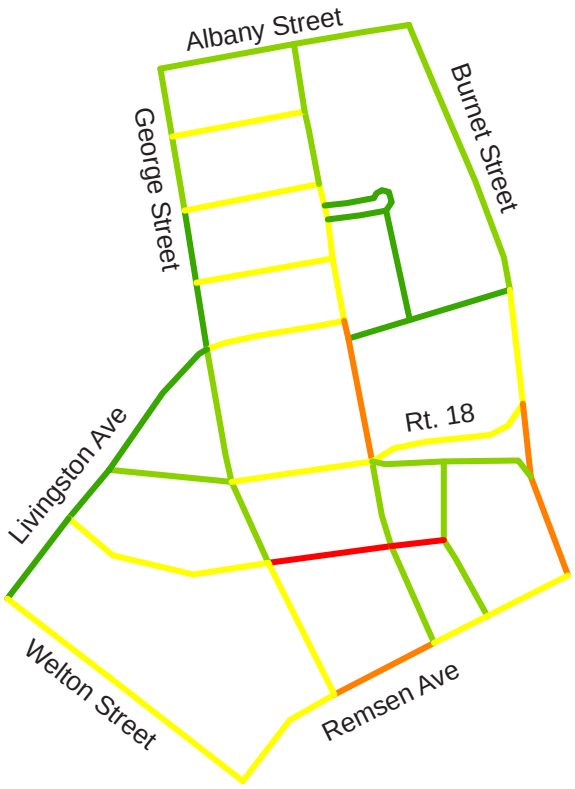
Street and Block Condition

The studio team developed an original methodology for assessing street and block conditions within the study area. The methodology was informed by techniques used in several other street and walkability audits.[9] The assessment involved original field work, conducted by the studio team, to evaluate the conditions of the streets and sidewalks around the proposed site. This information was used to better understand the linkage and access challenges of certain park user groups. There are several access conditions that can decrease users' traveling speeds or prevent users from walking to the park altogether, particularly children, seniors, and disabled individuals. These conditions include confusing paths, limited wayfinding, lack of continuous sidewalks, and lack of seating.

For this analysis, streets were evaluated based on eight characteristics:

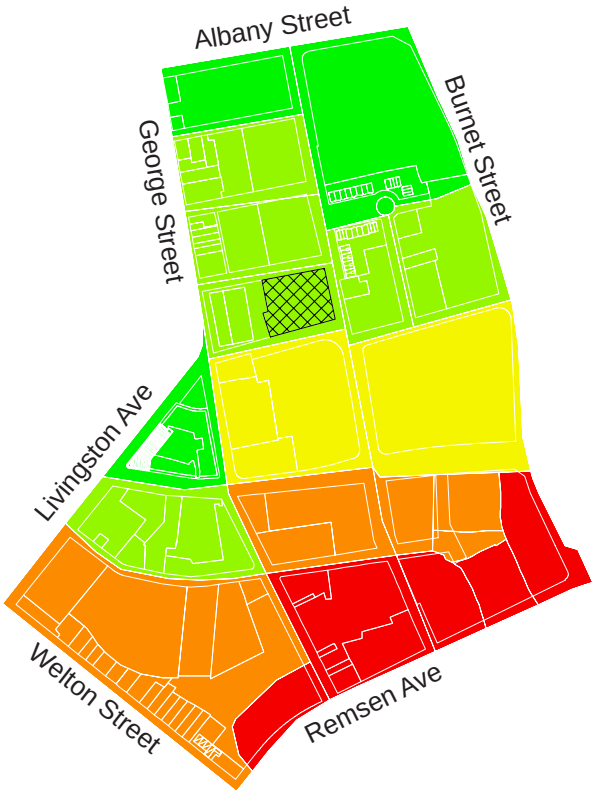
1. Sidewalks
2. Lighting
3. ADA compliance
4. Obstructions
5. Speed limit
6. Cyclist accommodations
7. Seating/amenities
8. Landscaping

Map 5: Block and Street Rankings



- Grade A (18 - 21)
- Grade B (13 - 17)
- Grade C (9 - 12)
- Grade D (5 - 8)
- Grade F (0 - 4)

Street scores were determined based on field work conducted by the project team looking at eight key components: sidewalks, lighting, ADA compliance, obstructions, speed limit, cyclist accommodations, seating/amenities, and landscaping. Street grades were subsequently determined based on composite scoring.



- Strongest
- Strong
- Moderate
- Weak
- Weakest

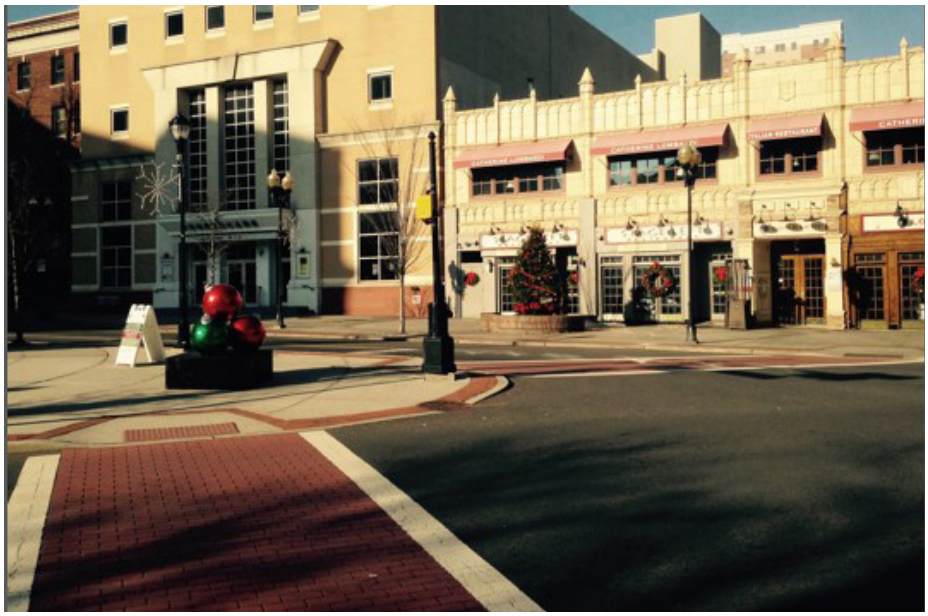
Block ranks were determined using an interpolation of street scores. ArcGIS was used to convert streets into points and interpolate values using the Kriging method. Zonal statistics were used to calculate the relative strength of each block and categories were chosen based on quantiles.

0 0.2 Miles

N

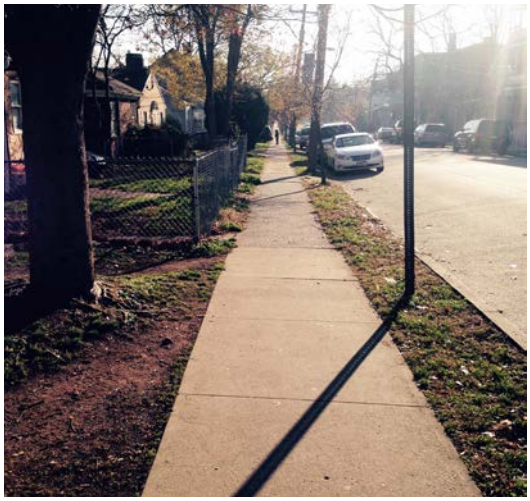
Data sources: Project team field work, 2015; Middlesex County Department of Planning; NJ Office of Information Technology (NJOIT); New Jersey Geographic Information Network (NJGIN)

Image 1: Livingston Avenue Grade



Street	Grade	Block Condition
Livingston Ave. (Between George & Welton Streets)	A	Strong

Image 2: Welton Street Grade



Street	Grade	Block Condition
Welton Street (Between Livingston & Remsen Avenues)	C	Weak

Image 3: Morris Street Grade

Street	Grade	Block Condition
Morris Street (Between George & John Streets)	F	Weak/Weakest

Image sources: Studio team, 2015

Walkability

When determining the grades for each street segment, we looked at characteristics that might promote or obstruct pedestrian traffic.

Image 1 shows a strong street condition, with wide sidewalks, vibrantly stripped crosswalks, ADA compliant curb cuts, and adequate lighting.

Image 2 shows two sides of a street. The image on the left shows a wider sidewalk but one that has cracks and uneven surfaces. The image on the right shows a sidewalk in better condition, but one that is narrow.

Image 3 shows an obstruction in the sidewalk that makes it near impossible for a wheelchair or stroller to get by. In addition, the sidewalk is narrow and in semi-poor condition with cracks and uneven surfaces.

Each characteristic was evaluated on a weighted scale and assigned a value (see Appendix). The weights for each characteristic were determined based on the significance of the access limitation. These values were summed to determine a composite street score for each of the approximately 41 individual street segments. The composite scores were converted into a street grade ranging from A – F, with an A grade representing streets with good linkage and access to the park and an F grade representing weaker conditions. It is important to note that street segment were averaged to include both sides of the street. In some instances, the two sides of the street were in vastly different condition. These composite scores were interpolated to create a grid of estimated values for the study area. The estimated values within each of the 22 census blocks were averaged to produce a mean score for each block. The blocks were ranked by quintile, lowest value (weakest condition) to highest value (strongest condition).

These analyses revealed that the condition of streets and blocks in the study area is stronger directly around the proposed site and degrades as you move south of the site. Unfortunately, this appears to correspond with the per capita income of the area, with streets and blocks in poorer condition being in areas of lower income and vice versa. This has several implications for linkage and access. First, it is likely that immediate neighbors will face little to no obstacles when accessing the park. Second, non-adjacent residents, particularly those living south of the New and Neilson Street intersection, will have greater difficulty accessing the park due to the poorer condition of streets and blocks. A higher proportion of residents in these communities are children, minorities, and low income. Therefore, linkage and access issues in these communities could discourage park use by the most vulnerable populations in the study area, who are more likely to be impacted by health disparities than those living in closer proximity to the site.

Wayfinding

Wayfinding is an essential component of adequate linkage and access. While a full-scale wayfinding study is beyond the scope of this report, some key components should be considered in context to a downtown park. A well-designed wayfinding system not only promotes health and wellness, but also highlights connections to other parts of the city, reinforces a common community identity, and creates an easy way of navigating downtown. In evaluating the wayfinding network of New Brunswick, this analysis focused on streets within and adjacent to the site. Future analyses should

Image 4: Healthcare Signage on Albany St.

Image source: Studio team, 2015

evaluate the city's wayfinding network more comprehensively to ensure that it is uniform and complete.

Image 5: Downtown Signage on Easton Ave.

Image source: Studio team, 2015

Design of wayfinding networks

Wayfinding networks are commonly used in urban areas to help residents and tourists find major attractions and amenities. There are a variety of ways to address the wayfinding needs of an area. In Toronto, the "Wayfinding System for Parks and Trails" is a standalone planning document that creates guidelines for wayfinding infrastructure throughout the entire city.[10] Louisville, KY, included wayfinding as an element in their Master Plan. They believe that the development of a complete wayfinding system promotes health and wellness by encouraging residents to walk throughout their community.[11]

Circulation Assessment of Downtown New Brunswick

The class conducted a walking assessment of the areas in and around Easton Avenue and George Street to document the existing wayfinding network. The majority of signage was located at or near the New Brunswick train station and was oriented towards parking, business, government, theater, transit, and healthcare locations. In general, there does not appear to be sufficient wayfinding signage. The Downtown/City Market districts have less wayfinding signage than other parts of the city – particularly the areas around each of the Rutgers campuses. Where signage is present, it is predominately dedicated to wayfinding for the State Theatre and the university. There is little to no wayfinding present for public spaces including existing park space. Also notable is that there are no directory maps in the city that give locational context to wayfinding. Wayfinding is particularly important in New Brunswick given that over 30 percent of residents do not have vehicle access and 57.5 percent of residents speak a language other than English at home.[12]

Image 6: On the ground transfer Heidelberg, Germany

Image source: A Best Pracitice Pedestrian Wayfinding System (2015)

Signage appears to follow two styles, an older two post sign with non-reflective backing and an updated single post sign with reflective backing, similar to traffic signage. While both types of signs have their purposes, there are three main considerations for determining the appropriate style and material for new signage.

These include: (1) implementation budget, (2) material durability and visibility, and (3) maintenance and updatability. The extent to which these three components are considered is dependent on the needs of individual places.[13] The most prominent issue currently facing New Brunswick's wayfinding system is the clustering of signage. This could be due to jurisdiction issues. For example, if the county paid for a sign and the city paid for a similar, newer sign within close proximity, it is not always logistically easy to integrate these.

Another way that New Brunswick can improve their wayfinding system is by diversifying their signage. Some different types of signage include:

• On ground transfers – these are decals painted onto sidewalks and streets that promote walking and show the direction to major destinations. They are relatively low cost, easy ways of implementing additional wayfinding.[14]

• Handheld maps – handheld maps and transportation access guides can help show people how to access destinations by various forms of transportation. While many

Image 7: "Heads Up" Map Kiosk, NYC

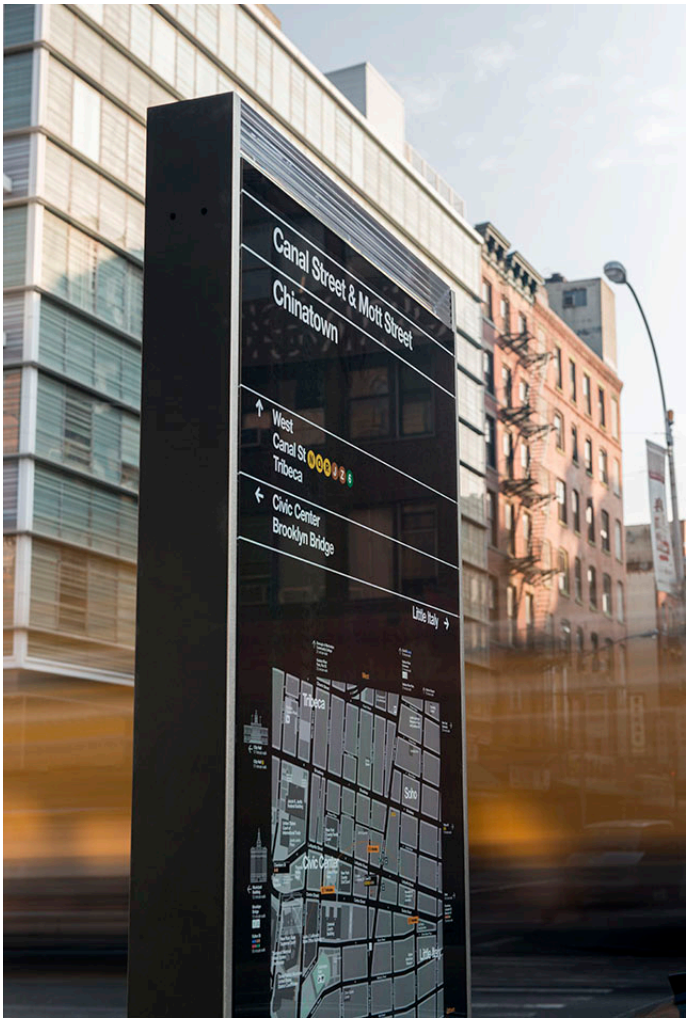


Image source: The Professional Association for Design, 2014

Heads Up Map Kiosks

The New York City Department of Transportation (NYCDOT) recently introduced walkNYC, which is a program that includes a network of pedestrian maps intended to encourage walkability in the city. There are several kiosks with heads up maps conveniently located along the network.[16]

residents now have access to these types of directions on their smartphones, this wayfinding option ensures that individuals (like children, seniors, and low-income residents) without access to smartphones and advanced technology are accomodated.[15]

• Directional signs – these are a series of signs that lead residents to a particular location, typically with arrows, that guide them in the appropriate direction. This is the majority of New Brunswick's current signage. One example is the directional signage for the hospitals.

• Heads up maps – kiosks with "heads up" maps are similar to the directory maps found in malls. They include a visual representation of an individual's location, including a "you are here" marker. This type of wayfinding can be useful for a variety of different users, particularly non-English speakers.[17]

Incorporating a variety of signage types into the wayfinding system will help address the diverse needs of all user groups and ensure all residents can easily navigate the city to reach the park site.

Serving Bilingual Community Members

In the context of public spaces, the role of wayfinding signage has two functions: (1) facilitate access by relaying information, and (2) create a welcoming environment. For non-English speaking community members, achieving these goals can present a challenge. Alire and Ayala (2007) describe a series of strategies that can be employed to target a Latino or Hispanic community. Their strategies include:

- Bilingual signage directing people to the park
- Bilingual signage at the park entrance
- Bilingual signage inside the park
- Culturally appropriate art displays (posters, advertisement)
- Convenient park hours for the Latino community[18]

For New Brunswick, recognizing the wayfinding needs of non-English speaking community members is particularly important considering the racial and ethnic makeup of the city. In particular, the city should consider the Hispanic/Latino and the Russian-speaking senior populations. Table 2 below demonstrates the language diversity of the city and the need for inclusive wayfinding signage.

Table 4: Language Spoken at Home and English Proficiency, 2013

Language Spoken At Home	Percent of total Population	Percent that speak English less than "very well"
English Only	42.6%	
Spanish	49.9%	71.5%
Russian	0.7%	79.9%
Chinese	1.3%	41.1%
Other Asian	1.1%	36.6%
Other or Unspecified	4.5%	24.9%

Source: U.S. Census Bureau, American Community Survey, 2013 (5-year estimates).

Linkage and Access Recommendations

Based on the analyses performed for linkages and access, the following recommendations could help improve linkage and access to the proposed downtown park.

1. Address pedestrian safety in high accident areas.

Within the study area, the streets of most concern are George Street and Livingston Avenue. These streets are located close to the proposed park site and are areas with a high density of bicycle-pedestrian crashes. Streets beyond the study area that require attention are French Street and Easton Avenue. These areas were also identified as high density crash areas. Both French Street and Easton Avenue are commercial corridors with residential neighborhoods immediately surrounding them. Commercial destinations draw both pedestrians and motorists which also increases the likelihood of vehicle-pedestrian accidents.

2. Prioritize sidewalk and crosswalk improvements near the intersection of New and Neilson Streets.

This crossing is particularly challenging for pedestrians because the north side of the intersection faces the north and southbound entrance ramps to NJ Route 18. The crossing is wide, making it visually imposing, and heavy traffic flow makes the intersection loud and affects perceptions of safety. Installing traffic calming measures as well as streetscape improvements can help reduce the visual and auditory stimuli to pedestrians. Additionally, crossing times should be tested to ensure that small children, elderly, and disabled pedestrians can cross safely.

3. Prioritize sidewalk and crosswalk improvements in the residential neighborhoods south of New Street.

The residential neighborhoods south of New Street, specifically down George Street, are primarily multifamily and single family homes with a high concentration of children and families. In general, this area is lower income and has a higher concentration of African Americans and Hispanic residents. Special attention should be paid to crossings and sidewalks in this area to ensure that they are as equally safe and maintained as other parts of the city. This will help encourage underserved populations to visit the park. Crash data show that pedestrian accidents are fairly equally distributed throughout these neighborhoods, therefore, systemic improvements to slow traffic or enforce traffic laws may be beneficial.

4. Consider redesigning the wayfinding network to direct visitors to downtown green space.

The existing wayfinding network focuses on five downtown amenities; business (commercial), government, the theatre district, transit (New Brunswick train station), and health care buildings. Signage directing residents and visitors to green spaces would promote usage. If the space was used to host events or activities, wayfinding signage would boost attendance, and help coordinate event related needs, such as parking.

5. Create a uniform wayfinding system that integrates city and county wayfinding signage, and employ the use of maps and multi-lingual signage at transition points.

In general, the city should consider developing a wayfinding master plan, either as a part of its current master plan or a standalone document. The city should also coordinate with the county and state to reduce current clustering of signage to make the wayfinding system smoother. Installing maps and multi-lingual signage at key transition points (train station, Robert Wood Johnson Hospital entrance, George Street and Livingston Avenue) would also help a wider group of users navigate the city, especially those with low English proficiency.

REFERENCES

1. U. S. Census Bureau. (2010). American FactFinder: Decennial Census, New Brunswick, New Jersey. Geographic Level: Block Level.

2. U. S. Census Bureau. (2012). On the Map, Longitudinal Employment Statistics. New Brunswick, New Jersey.

3. New Jersey Department of Transportation (NJDOT). (2010-2014). Plan4Safety, Vehicular, Bicycle, and Pedestrian Crash Data.

4. *Ibid.*

5. U.S. Census Bureau, *supra* at 1.

6. U. S. Census Bureau. (2013). American FactFinder: American Community Survey (5-year estimates), New Brunswick, New Jersey.

7. A conservative estimated walking speed of 2.8 mph was used.

8. U.S. Census Bureau, *supra* at 1.

9. Kids Walk Coalition. (2011). *Stepping to School: An Assessment of Neighborhood Walkability and Solutions for a Safer, Healthier New Orleans.* Retreived from: http://prc.tulane.edu/uploads/kidswalk_coalition_web_final-1305305697.pdf and;

Greater New Orleans Pedestrian and Bicycle Program. (2009). *Auditing Neighborhoods, Streets, and Intersections for Pedestrian Safety.*

10. City of Toronto. (2014). *Toronto Parks and Trails Wayfinding Strategy.* Retreived from: file:///C:/Users/dem184/Downloads/Toronto_Wayfinding_Phase1.pdf and;

11. City of Louisville. (2012). *Wayfinding Master Plan: A Master Plan for Navigating the Louisville Loop.* Retreived from: https://louisvilleky.gov/sites/default/files/parks/planning_and_design/wayfindingmasterplandocument.pdf

12. U.S. Census Bureau, *supra* at 6.

13. Metropolitan Washington Council of Governments. (2007). *A Best Practice Pedestrian Wayfinding System.* Retreived from: https://www.mwcog.org/uploads/committee-documents/t1dZW1k20070516090831.pdf

14. *Ibid.*

15. *Ibid.*

16. AIGA, The Professional Association for Design. (2014). *Case Study: WalkNYC Pedestrian Wayfinding*. Retreived from: http://www.aiga.org/case-study-walknyc-pedestrian-wayfinding/

17. *Ibid.*

18. Alire, Camila A.Ayala, Jacqueline. (2007) Serving Latino communities :a how-to-do-it manual for librarians. New York : Neal-Schuman Publishers

SECTION 4: PARK DESIGN

Park Design and Concepts

Design Scope

This section uses existing literature on health, baseline conditions for New Brunswick, and best practices to create a starting point for design recommendations that maximize health benefits. These recommendations target identified user groups and underserved populations that may access the downtown park. This is not intended to be an extensive or complete design proposal. The approach to this analysis was threefold: (1) to consider the slope of the site to maximize the space, (2) to identify key park uses and complimentary programming, and (3) to incorporate park elements that enhance usage. The five key recommended uses include: (1) an event and staging area, (2) a play area with playground, (3) a dog run, (4) a seating area, and (5) a water feature. These uses would be aided by the inclusion of programming that appeals to underserved populations. The five key park elements include: fencing, seating, shading, lighting, and sanitation. Collectively, these recommended uses and elements will promote the physical, mental and social, and environmental health of New Brunswick residents.

Topography of the Site

The key consideration when determining how to design for optimal use of the space is addressing the steep incline of the site. Slope was used to assess the incline users would experience traveling from Neilson Street to George Street. After considering several design layouts, a three-tier system was the preferred choice. This style can maximize the available space and also create a mechanism for separating user groups. The three tiers could be rectangular shaped with a contoured slope at each step. In this example, the rectangular spaces were made equal sizes and shapes. Creating a contoured step system throughout the site would enable park users to easily access each space. This simple design layout was selected so that the recommended uses and elements are the focus of the proposal. The creation of equal size spaces allows for the fullest discussion without giving preference to any one recommended use. Further analysis could find that a different design layout is better suited.

The severe grade of the site should be addressed with two considerations in mind. The first is the need to comply with ADA standards.[1] This will require properly leveled surfaces and truncated domes at all corners to ensure disabled users can access the site without limitation. Second, the extreme grade of the site may exacerbate stormwater runoff. Instead of using a water allocation system that directs water into a drain or storm water structure, the site could include on-site surfacing or vegetation to address this issue. Controlling stormwater runoff will help prevent combined sewer overflows and mitigate the negative impacts of untreated sewage and stormwater on biodiversity and environmental health.

Image 1: Slope of Proposed Park Site, View from Liberty Street

Image Source: Studio Team, 2015

Image 2: Designs for Accomodating Slope

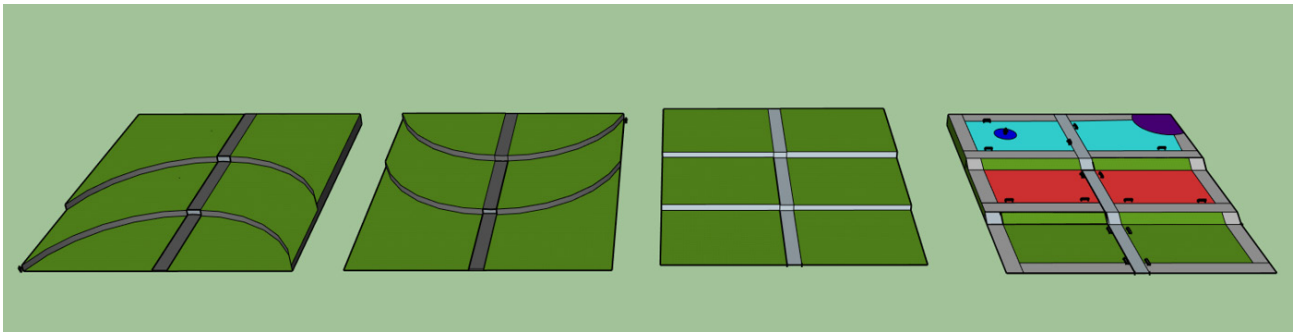


Image 3: Front View, Three-tiered Design Concept for Slope

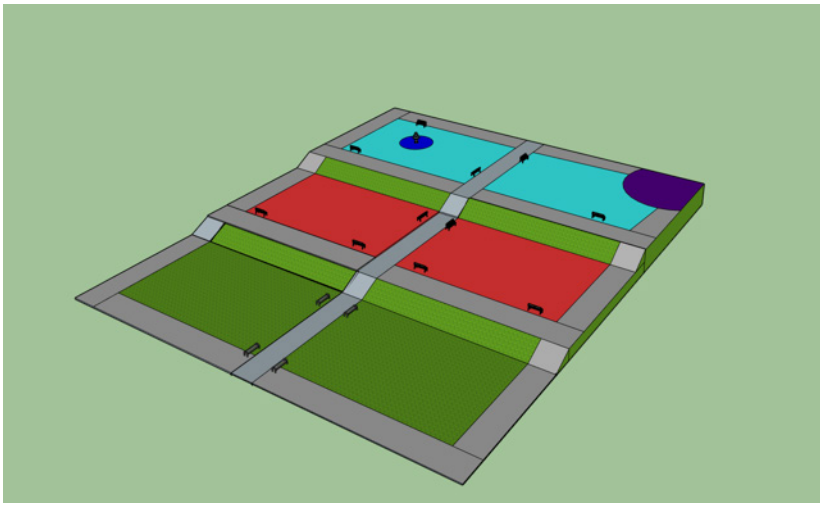
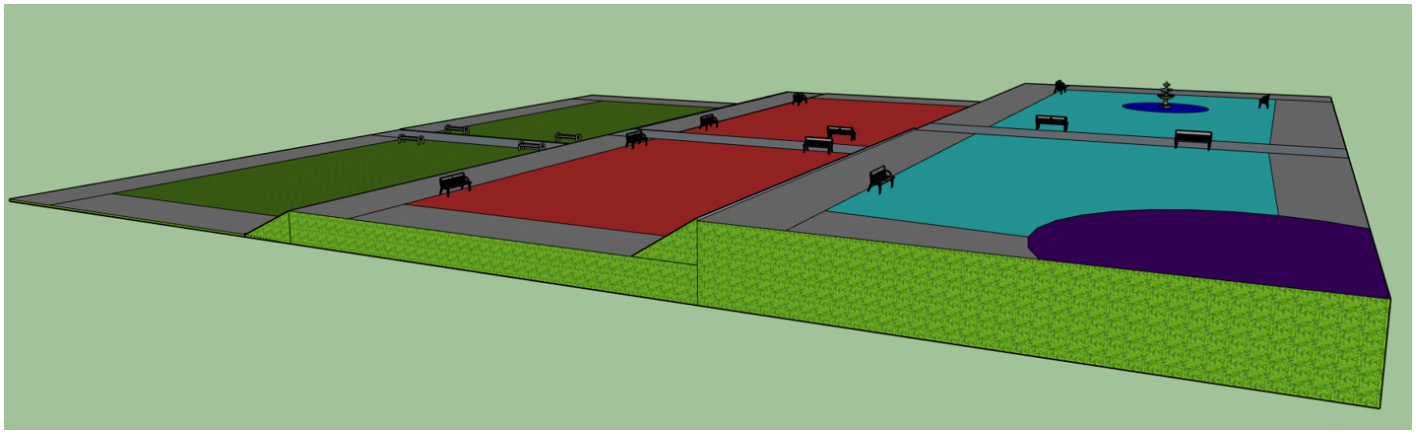


Image 3: Side View, Three-tiered Design Concept for Slope



Recommended Uses

Staging and Event Area

One of the most important and versatile spaces recommended for the park is a staging and event area. This area could include seating and a stage that can accommodate a range of uses including concerts, farmer's markets, outdoor movie nights, a Christmas tree lighting, and exercise classes. Locating the staging and event area at the lower corner of the park would have the added benefit of creating a natural amphitheater for concerts and other musical events. The permanent stage in Hackley Park in Muskegon, MI, includes relevant design features for the downtown park. The stage floor is 30 inches off the ground and made of limestone. It can be accessed by both stairs and a ramp. It also has a slanted black metal roof.[2] A similar look would fit in with the area surrounding the downtown park. Movable and adjustable seating is recommended to accommodate the variety of programming events and the diverse user needs.

Creating unique and tailored programming at the staging and event area will help maximize health benefits for key user groups. For example, physical health can be addressed through programming like farmers' markets and exercise classes. Healthy eating and exercise help lower obesity rates, which have been linked to other health ailments including cardiovascular disease, stroke, type 2 diabetes, and certain cancers. This is particularly important for Hispanic and African American residents because obesity and diabetes is more prevalent in these populations. To encourage use of the space by underserved populations that are at greater risk for these health conditions, programming should be low cost, held at convenient times, and interactive. For example, it has been found that time, money, and lack of companionship deter African Americans from using parks.[3] Partnerships with local organizations, such as New Brunswick Tomorrow (NBT) and the university could help attract diverse users. Fitness is also an important consideration for disabled individuals due to increased susceptibility to heart disease, obesity, and stress. Participation in these activities could be encouraged through partnerships with organizations such as the Joseph Kohn Training Center, the Douglass Developmental Disabilities Center, and the City's Recreation Department. The key for encouraging seniors to participate in group exercise activities is providing classes that accommodate all levels of mobility. In addition to classes like Zumba and yoga, classes tailored to seniors could include Tai chi, aerobics and chair yoga. Seniors may be more likely to participate in these opportunities as a group. Partnering with the New Brunswick Senior Citizen Resource Center may encourage seniors to attend these programs.

Exercise classes serve a dual purpose by not only encouraging physical activity, but promoting mental relaxation and social interaction as well. Benefits include

Image 4: Permanent Staging Area in Hackley Park, Michigan

Image Source: Hackley Park, Muskegon MI. Michigan Live article (2015)

decreased stress and depression. They may also lead to increased mental relaxation and decreased mental fatigue. Events with an educational component, such as the showing of a documentary movie, would provide cognitive learning experiences. This form of mental stimulation is particularly beneficial for children and seniors. Lastly, the porous surface for the staging/event area promotes environmental health by reducing stormwater runoff. It is particularly important to include a porous surface here because runoff will pool at the lower tier of the site.

Play Area with Playground

Including a play area with playground equipment could attract children from across New Brunswick. While there are fewer children living directly around the proposed park site, children living near the southern border of the study area would benefit from this use. Playground equipment could include a combination slide, swing, and a gym area with youth and toddler equipment. The entire play area could be covered with a soft and porous surface. The play area and playground should be located in the center of the site to allow for maximum accessibility; however, it should also include a separate street entrance to limit the need for children to walk through the other activity areas, specifically the dog run.

The variety of physical activity options could help lower obesity rates and promote social interaction in children of all ages. It is critically important for children to enjoy

exercising early in life so that they maintain good health behaviors as they grow older. The presence of parks, open space and other recreational facilities has been linked to increased physical activity among children. In general, children who are more active have a lower risk of obesity, diabetes and have higher academic performance. For example, a New Orleans study found that African American children in grades 2 through 8 increased their physical activity when new playgrounds were opened and properly maintained. Additionally, less time was spent watching television or playing video games.[4] Playgrounds are also a good place for small children to practice motor skills. Interactions with nature can reduce levels of ADD in children, improve cognitive ability, and reduce aggressive behavior.[5]

However, a potential negative health impact of the playground is an increased risk of play injuries. This could be addressed by providing equipment that is safe for all ages and using soft surfaces. Environmentally, the porous surface of the play area can help reduce toxins in surface water. This is particularly beneficial for children, because they are more susceptible to waterborne diseases.[6] All of these health benefits can be realized through design alone, and do not require specific programming.

Dog Run

An all grass dog run area would benefit the dog owners in the area by providing a space that fosters socialization, encourages walking, and provides an opportunity for fresh air. This space would be located on the lowest tier of the site to minimize the interaction

Image 5: Playground Equipiment in Borough of Lincoln Park, New Jersey

Image Source: Borough of Lincoln Park, New Jersey http://www.lincolnpark.org/345/Parks-Playgrounds

between dogs and other users including children and seniors. These users would also be separated by a small interior fence around the dog run. The fencing should include a double-gate to ensure that users can get in and out of the dog run without other dogs escaping. If space allows, it is preferable to provide separate areas for small and large dogs.[7] The area should include sanitation receptacles to minimize the negative health impacts associated with dog excrement.

The inclusion of a dog park on the site will encourage pet owners to travel to the park with their dogs. This may facilitate additional physical activity for individuals who do not usually travel far to exercise their dogs. It also fosters socialization by providing opportunity for dog owners to interact with one another. Bonding over a shared interest might help address feelings of social isolation or depression. Additionally, stress levels can decrease from enjoying the natural scenery while taking the dog out as compared to going for a walk around the block. Many of the dog owners are adjacent users, and the hope is that the dog park would both increase social cohesion among this group and encourage mixing with other groups. Potential negative health impacts may arise depending on how dog excrement is handled. Dog excrement must be properly disposed of to alleviate environmental health concerns about water quality.

Seating Area

A designated seating area would accommodate a variety of needs for a range of passive users. Professionals and daytime users would have seating options for lunch, while seniors could sit throughout the day and play board games. It would be ideal if the tables were large enough to accommodate small groups of three or more for

Image 6: Dog Park at Tompkins Square Park in New York City

Image Source: NYC Parks, Tompkins Square Park http://www.nycgovparks.org/parks/tompkins-square-park/

social lunch gatherings, and board game users. Tables could include a solid top with a checkers or chess imprint. The chairs should be comfortable enough for seniors to sit on for a few hours. It is highly recommended that this space utilize movable furniture, which has been proven to be an effective placemaking tool. Movable and adjustable furniture encourages social interaction and allows for different activities throughout the day.[8] The area would be located on the highest level because it is easiest to access from heavily trafficked George Street.

Proximity to the natural surroundings within the park may help decrease stress and depression levels among users. Mental and social health benefits could also be realized from passive uses. For example, immediately adjacent users may have a view of the park from their doorstep or windows. Additionally, they may frequently walk across it to reach their destination. Certain daytime users would benefit physically by having a place to stop and rest during a long walk or excursion. Other daytime users, such as workers on their lunch break, would benefit mentally and socially by eating lunch with coworkers outside of the office. Seniors are most likely to use the tables for board games, which provides mental stimulation and cognitive learning opportunities. Both help combat Alzheimer's and dementia. However, it is important to keep in mind that older adults are not a homogenous group and may have unique needs based on socio-demographic and cultural characteristics.[9] Children would benefit socially by the inclusion of another hangout space. Lastly, programming intended to attract large audiences such as board game tournaments would help peripheral users experience the benefits of social cohesion and mental stimulation.

Image 7: Movable Furniture

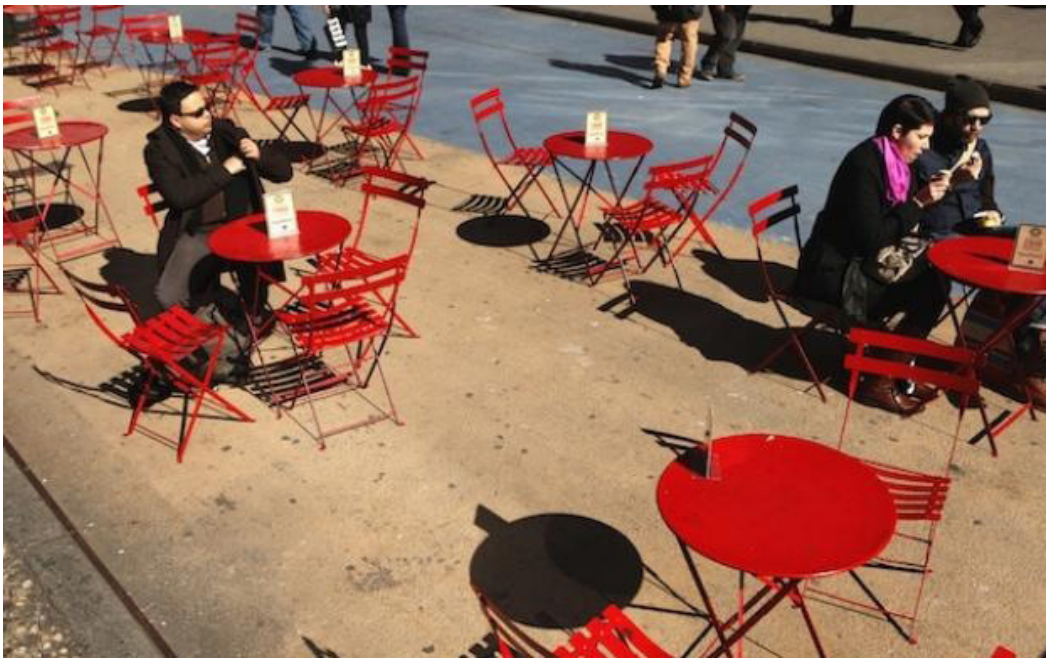


Image Source: City Lab (2012) http://www.citylab.com/design/2012/10/power-movable-chair/3520/

Water Feature

A water fountain could provide relaxing interactions with nature and a soothing background noise for all users. The ideal water feature would include a simple spout and trough design. Any form of sculpture could be implemented depending on the theme of the park design. The most important consideration with regard to the water feature is runoff. The slope of the site makes it especially important to contain and reuse the fountain water. If the water feature is interactive and will be used by individuals, particularly children, it should have a water filtration system. The water feature could be placed anywhere on the site but may be most beneficial if placed in the seating area. Because this area is already passive, it would allow users of the space to enjoy the additional benefit of the water feature and it would not obstruct active uses.

A water feature, like a fountain, would promote the mental and social health of park users through the facilitation of mental recharge and decreased stress levels. This relaxing environment can also encourage meaningful and contemplative dialogue among friends. These interactions maximize emotional, psychological, and social well-being, which are the indicators of good mental health.[10] The water should be contained within the feature to minimize environmental harms. The two biggest concerns surround unintentional consumption and runoff into waterways. Both increase susceptibility to waterborne diseases. One environmental benefit of the water fountain is that it provides natural air filtration by drawing in dust and allergens from the air.[11] This component would appeal most to seniors, immediately adjacent users, and daytime users.

Image 8: Fountain in Brooklyn Botanical Gardens

Image Source: Brooklyn Botanic Garden, NYC Fountains, Wired New York
http://wirednewyork.com/fountains/

Placement of Uses

Locating the dog run at the bottom of the site would allow for easy access by users and may draw individuals into the downtown park. The bottom tier of the site could also include the staging/event area. Locating it on the bottom tier would create a natural amphitheater for concerts and musical events. This area would also encourage community interaction. The play area could be positioned in the middle tier of the site. This allows for separation from the older users accessing the bottom of the site, and for supplying a permeable surface by which the flow of water would be reduced. A seating area and water feature at the top of the site could create a reflection area, secluded and separated from the other activities. This would allow for a calm quiet space to promote mental and social health. The installation of a wide walking path may be beneficial as it would enable all users to access and traverse the site.

Table 1: Health Impact of Park Uses and Programming

Uses & Programming	Potential Benefits	Potential Issues
Childrens Play Area	• Physical activity • Cognitive learning • Motor skills development • Reduced aggression • Reduced stormwater runoff	• Increased play injuries • Exposure to vehicle emissions • Exposure to heavy traffic
Dog Park	• Physical activity • Decreased depression • Decreased stress • Decreased social isolation • Increased social cohesion	• Dog excrement - sanitation • Injuries (dog bites)
Water Feature	• Air filtration • More meaningful social interaction • Decreased stress • Decreased mental fatigue	• Sanitation
Staging/Event Area	• Physical activity • Healthy food options • Decreased depression • Decreased stress • Cognitive learning • Reduced stormwater runoff	• Noise pollution • Liter • Crowding
Seating	• Cognitive learning • Decreased depression • Decreased stress • Decreased social isolation • Increased social cohesion • Mental stimulation	• Liter • Pests • Loitering

Recommended Elements

Carefully selected design elements throughout the site could enhance the recommended uses. Some of the most essential elements include: fencing, seating, shading, lighting, and sanitation. These features can help to both maximize the physical, mental and social, and environmental health benefits of the recommended uses and provide benefits on their own.

Table 2: Health Impacts of Park Elements

Park Elements	Potential Health Benefits
Fencing	• Mental recharge • Feeling safe and secure
Seating	• Physical activity • Physical relaxation • Mental relaxation • Feelings of seclusion • Decreased social isolation
Shading	• Decreased heat-related illnesses • Feelings of seclusion • Mental recharge • Improved air quality • Reduced stormwater runoff
Lighting	• Increased public safety • Feeling secure
Sanitation	• Reduced potential for poor water quality • Reduced potential for soil contamination

Fencing

Fencing could create the illusion of seclusion and separation from the surrounding city as well as provide a separation among user activities. A large fence along the perimeter would create a barrier between the park and the surrounding areas. This style of fencing could be combined with vegetation to make the park feel like an urban oasis. A main entrance at the center of the site would create a sense of intimacy between a park user and the park. It can also create a sense of ownership over the site. When walking through a main entrance, users can feel as though they are within

a facility that is all their own to use. However, an entrance can be located anywhere on the site. The primary concern would be how the site is viewed by individuals entering it.[12] Any option that helps users feel mentally recharged when entering the site is beneficial. A locked entrance may be desirable for discouraging use of the park outside of operating hours. This would require staff (volunteer or paid) to open and close the park.[13] A locked entrance is a CEPTED component that decreases opportunities for undesirable activities at night. A fence also creates the perception of safety during all times of day. Feeling safe and secure in public is critical for emotional stability.

Image 9: Steel Fencing

Image source: Steelway Steel Fencing System Galleries, http://www.steelway.co.uk/fensecure-steel-fencing/galleries/heritage-fencing

Seating

In addition to the designated seating area, seating options could be made available throughout the park. Arm rail benches and flat bench seating may be most appropriate given the recommended uses and user groups. The first seating style would provide the opportunity for individuals to sit for long periods of time without thinking they are taking up the entire bench. Families in the play area may prefer this option because the arm rails create the perception of security. Arm rails are also a physical and mental comfort to those seeking to stop and relax for a while. Examples include resting after an exercise class or prolonged sun exposure. Flat benches accommodate large groups and can be very versatile. Providing this option near the staging and event area could foster a sense of community and encourage group conversations. They can also be used after exercise classes for stretching. Combined these seating options accommodate a range of uses and user groups and provide physical and mental and social health benefits.

Image 10: Outdoor Park Chess Boards

Image source: Outdoor Park Chess Boards and Equipment (2014)
http://www.chess.com/forum/view/chess-equipment/outdoor-park-chess-boards-and-equipment

Shading

Shading options should be considered in areas that are exposed to a lot of sunlight. Trees along the perimeter can provide shade while not interfering with the recommended uses. Park user numbers may even increase if there are trees along the perimeter with seating away from the park's primary activities.[14] This could also add to the feeling of seclusion.[15] Trees provide shading and cooling, which can decrease the incidence of heat-related illnesses. Additionally, the feeling of seclusion may provide a mental recharge. Trees filter and remove air pollutants and help decrease stormwater runoff. Both environmental impacts are important given the park is surrounded by commercial truck routes and situated on a steep hill. Trees are less expense than a manmade structure, but their effectiveness varies based on the season and the health of the particular tree.

Lighting

This site would need very little lighting if it is closed at dusk. However, pillar or ground lighting should line walkways to ensure the slope is visible when the sun begins to rise or set. The ground lighting can include anything from spotlights laid into the ground to small spot lighting lining the walking paths. Both options would help ensure individuals do not lose their bearings when traversing the park by increasing visibility of gradations, other site elements, and entrances and exits. Seniors with limited eyesight, individuals with disabilities, and children may benefit most from this element.

Lighting has received increased attention due to the dichotomy of views. Proponents extol the safety benefits whereas opponents lament the negative effects of light pollution. The Summer Night Lights initiative receives public and private funding to install lights and add programming to parks throughout Los Angeles. Since the program started, there has been a 40 percent decrease in gang activity and a 57 percent reduction in gang related homicides. Although these improvements are not fully attributed to lighting, it certainly helps people feel safer.[16] The recommended illumination styles are not above street level, which may alleviate light pollution concerns by neighboring residents. As seen in Los Angeles, use of these lights throughout the night would increase feelings of safety and deter individuals from using the park after hours.

Image 11: Ground Lighting

Image source: Landscape Ground Lighting by Allscape (2009-2015)
http://allscape-landscape-lighting.com/allscape-GROUND-lighting-systems.html

Sanitation

The anticipated number of users and programmatic events at the park requires sanitation be part of any design. Trash receptacles should be located throughout the site. Special bins for dog waste that include collection bags could be located in the dog park. The seating area should have more trash bins than the other areas. Recycling bins could also be located throughout the park, especially in the seating area. Drinking fountains would be an ideal amenity given the long periods of time users may spend at the park. It is fairly easy to install drinking fountains because it would not require as in depth drainage and or electricity as more complex amenities like bathroom facilities.[17] Sanitation is critical to ensuring waterways are free of bacteria and diseases. Proper collection of litter and recyclables will also help ensure soil contaminant levels do not increase.

The recommended uses and design elements promote positive physical, mental and social, and environmental health for all New Brunswick residents. Programming is critical to ensuring the underserved populations experience these benefits equally. According to Lovasi et al. (2009), inability to access physical activity areas such as parks and open space impacts obesity rates for vulnerable populations.[18] This is crucial to understanding the value of replacing the Wolfson Deck with the downtown park. The two closest parks do not provide similar opportunities. Monument Square Park is a small and mostly concrete facility that is not conducive to physical activity. Boyd Park is difficult to access and it does not include amenities and elements conducive to the recommended uses. The downtown park is located in a racially diverse census block group, and only 10-25 percent of individuals are below the poverty line.[19] However, disadvantaged subgroups tend to experience greater magnitudes of benefits when new resources are provided equally to all groups. Therefore, the downtown park may actually increase health disparities unless disadvantaged groups are given special consideration.[20]

REFERENCES

1. American Trails. (2010). *Resources and Library: Accessible Trails.* Retrieved from http://www.americantrails.org/resources/accessible/DOJ-power-mobility-July2010.html

2. Moore, L. (2015, June 5). Hackley Park Permanent Stage Ready for First of Parties in the Park. *Michigan Live*. Retrieved from http://www.mlive.com/news/muskegon/index.ssf/2015/06/hackley_park_permanent_stage_r.html

3. Pease, J. (2011). *Parks and Under-served Audiences: An Annotated Literature* Review. Ames, Iowa: Iowa State University. Retrieved from http://www.nps.gov/hfc/services/interp/interpPlanning/literatureReview.pdf

4. Active Living Research (2011). *Do All Children Have Places to Be Active?*. The Robert Wood Johnson Foundation. Retrieved from http://activelivingresearch.org/files/Synthesis_Taylor-Lou_Disparities_Nov2011_0.pdf

5. The Trust for Public Land. (2011). *From Fitness Zones to the Medical Mile: How Urban Park Systems Can Best Promote Health and Wellness*. Retrieved from http://cloud.tpl.org/pubs/ccpe-health-promoting-parks-rpt.pdf

6. Centers for Disease Control and Prevention. (2014). *Water-related Diseases and Contaminants in Public Water Systems.* Retrieved from http://www.cdc.gov/healthywater/drinking/public/water_diseases.html

7. *Establishing a Dog Park in Your Community.* American Kennel Club. Retrieved from http://www.akc.org/pdfs/GLEG01.pdf

8. Cho, I., Heng, C., Trivic, Z. (2015), Re-Framing Urban Space: Urban Design for Emerging Hybrid and High-Density Condtions, Singapore: Routledge.

9. Brozen, M., Levy-Storms L., and Loukaitou-Sideris A. (2014). *Place Making for an Aging Population Guidelines for Senior-Friendly Parks.* Los Angeles, CA: UCLA. Retrieved from http://www.lewis.ucla.edu/wp-

10. Centers for Disease Control and Prevention. (2013). Mental Health Basics. Retrieved from http://www.cdc.gov/mentalhealth/basics.htm

11. Fountain People- A PlayCore Company. (N.d.). Traditional. Retrieved from http://fountainpeople.com/gallery/traditional/

12. Furuto, A. (2012, January 5). Velayat Park Entrance Gate Proposal / Ali Ghorbani, Ali Kashfi, Hosein Shirazian. *ArchDaily*. Retrieved from http://www.archdaily.com/196910/velayat-park-entrance-gate-proposal-ali-ghorbani-ali-kashfi-hosein-shirazian

13. NOTCOT. (2015). 72U *Venice Pop Up Park - Fence Tables.* Retrieved from http://www.notcot.com/archives/2015/08/72u-venice-pop-up-park---fence.php

14. City of Houston Office of Sustainability. (2015). *Trees and Plants*. Retrieved from http://www.greenhoustontx.gov/tree.html

15. Finley, C. (2015, October 16). Two Final Design Concepts Purposed for Rachel Revere Park: Which One Do You Like Better? [Poll]. *North End Waterfront*. Retrieved from http://northendwaterfront.com/2015/10/two-final-design-concepts-purposed-rachel-revere-park-one-like-better-poll/

16. Harnik, P., Donahue, R., Thaler, J. (2011). *Safer Parks After Dark: New Night-Lighting Methods Help Provide Answers for Dark-Sky Advocates.* The Trust for Public Land. Retrieved from http://cloud.tpl.org/pubs/ccpe-lightinginparks-2012.pdf

17. Moeller, J. (1965, January). Standards for Outdoor Recreational Areas. American Society of Planning Officials. Retrieved from https://www.planning.org/pas/at60/report194.htm

18. Lovasi, G., Hutson, M., Guerra, M., & Neckerman, K. (2009). Built Environment and Obesity in Disadvantaged Populations. *Epidemiologic Reviews*, 31. doi: 10.1093/epirev/mxp005

19. Ohri-Vachaspati, P., Tulloch, D., Petlick, N., & Yedidia, M. (2010, August). *New Jersey Childhood Obesity Study- New Brunswick: Physical Activity Environment*. New Brunswick: Center for State Health Policy, Rutgers University.

20. Lovasi, G., Hutson, M., Guerra, M., & Neckerman, K. *supra* at 18

Findings

This park can be a healthy destination that impacts a diverse range of user groups. Overall, investigation of the park site and surrounding area led to several major findings: (1) the new downtown park can have significant physical, mental and social, and environmental health benefits; (2) vehicle and pedestrian safety, walkability and street conditions, and wayfinding present linkage and access challenges for all user groups; and (3) a park design that considers recommended uses, tailored programming, and key elements can maximize health benefits for all residents, particularly underserved populations.

1) The new downtown park can have significant physical, mental and social, and environmental health benefits. Creating a park within the New Brunswick core provides a space for residents to engage in activities that improve physical, mental and social, and environmental health. This is an unmet need because the existing parks closest to the downtown park have access and use issues stemming from size and location. Physical health can be improved by providing options for physical activity that appeal to all user groups. Decreased levels of depression and mental fatigue, increased imagination and creativity, and more meaningful relationships are all potential mental and social health benefits. Examples of environmental health benefits include clean air and water.

2) Vehicle and pedestrian safety, walkability and street conditions, and wayfinding present linkage and access challenges for all user groups. Vehicle and pedestrian safety data was used to identify areas that experience high concentrations of vehicle, particularly bicycle, and pedestrian crashes. An analysis of walkability and street conditions within the 15 city block study area revealed access challenges and opportunities to compliment the vehicle and pedestrian safety analysis. Wayfinding was assessed highlight the importance of using signage to direct individuals, especially non-English speakers, to the downtown park.

3) A park design that considers recommended uses, tailored programming, and key elements can maximize health benefits for all residents, particularly underserved populations. A three tiered approach is the simplest way to highlight the recommended uses while addressing the dramatic slope of the site and maximizing the available space. The following uses would be located at the downtown park: (1) an event and staging area, (2) a play area with playground, (3) a dog run, (4) a seating area, and (5) a water feature. When combined with programming that attracts underserved populations to the downtown park, these recommended uses maximize physical, mental and social, and environmental health benefits for all residents. Design elements that enhance these positive impacts include: fencing, seating, shading, lighting, and sanitation/utility.

Recommended Next Steps

This report provides a foundation for the city to move forward with the park site in a way that maximizes health benefits for all residents. The recommended next steps will help ensure the health lens developed herein continues to be used throughout the design and development process. They include: (1) collect more local health data; (2) engage stakeholders on park design; (3) sustain the park through community involvement; and (4) explore partnerships with local organizations and the university to further develop programming.

1) Collect more local health data. Finding local health data was a consistent challenge for the project team. Health data at granular levels were either inaccessible to the research team or nonexistent. Next steps should include obtaining local datasets and collecting new, neighborhood level health data.

2) Engage stakeholders on park design. Engagement with residents and small, neighborhood level organizations could help better assess the unique needs of all user groups, especially underserved populations. The local businesses and institutions surrounding the downtown park may also have valuable input on recommended uses, programming, and design elements.

3) Sustain the park through community involvement. Once the site is developed, continued stakeholder and residential involvement will be necessary to sustain the park. A volunteer group could be formed to oversee park operations and ensure the facility is maintained. Members should represent all the user groups, especially underserved populations. One funding mechanism for the volunteer group and any additional amenities is corporate sponsorship.

4) Explore partnerships with local organizations and the university to further develop programming. Partnering with local organizations and the university could expand the programing options at the park to ensure the needs of all user groups are met. Local groups with strong connections the community should be contacted for programming recommendations and partnership opportunities. Joint programming would create advertisement opportunities for the organizations while increasing the number of park users.

APPENDIX

TABLE 1: STREET SURVEY FIELD WORK NOTES

Team Member	Street Name	Sidewalk (0 - 5)	Lighting (0 - 4)	ADA Compliance (0 - 3)	Obstructions (0 - 3)	Speed Limit (0 - 2)	Cyclist Accomodations (0 - 1)	Seating/ Amentites (0 - 1)	Landscaping (0 - 1)	SUM
Jake	George (Albany - Church)	4	3	1	2	1	1	1	0.5	**13.5**
Jake	George (Church - Patterson)	5	3	3	2	2	0	1	1	**17**
Jake	George (Patterson - Bayard)	5	3	3	3	2	1	1	1	**19**
Jake	George (Bayard - Liberty)	5	4	3	3	2	0	1	1	**19**
Megan	George (Bayard - Liberty)	5	3	3	3	1	0	1	1	**17**
Average	George (Bayard - Liberty)	5	3.5	3	3	1.5	0	1	1	**18**
Megan	George (Liberty-New)	5	4	3	3	1	0	0	0	**16**
Jen	George (New - Morris)	4	3	1	2	2	0	1	1	**14**
Jen	George (Morris - Oliver)	3	3	1	1	2	0	0	1	**11**
Jake	Neilson (Albany - Church)	4	3	2	2	1	1	0	0.5	**13.5**
Deanna	Neilson (Albany - Church)	5	3	2	3	1	1	1	1	**17**
Average	Neilson (Albany - Church)	4.5	3	2	2.5	1	1	0.5	0.75	**15.25**
Jake	Neilson (Church - Patterson)	3	2	3	2	1	1	0	0	**12**
Deanna	Neilson (Church - Patterson)	5	3	3	3	1	1	0	1	**17**
Average	Neilson (Church - Patterson)	4	2.5	3	2.5	1	1	0	0.5	**14.5**
Jake	Neilson (Patterson - Bayard)	4	1	2	1	1	1	0	0	**10**
Deanna	Neilson (Patterson - Bayard)	4	2	3	3	1	1	0	1	**15**
Average	Neilson (Patterson - Bayard)	4	1.5	2.5	2	1	1	0	0.5	**12.5**
Jake	Neilson (Bayard - Liberty)	0	0	0	1	1	1	0	0	**3**
Deanna	Neilson (Bayard - Liberty)	4	2	3	2	1	1	1	1	**15**
Average	Neilson (Bayard - Liberty)	2	1	1.5	1.5	1	1	0.5	0.5	**9**
Megan	Neilson (Liberty - New)	1	2	0	0	0	0	0	0	**3**
Deanna	Neilson (Liberty - New)	4	2	2	2	1	0	1	1	**13**
Average	Neilson (Liberty - New)	2.5	2	1	1	0.5	0	0.5	0.5	**8**
Eric	Neilson (New - Morris)	5	4	3	3	2	1	1	1	**20**
Whitney	Neilson (New - Morris)	2	2	1	0	2	0	0	1	**8**
Average	Neilson (New - Morris)	3.5	3	2	1.5	2	0.5	0.5	1	**8**
Eric	Neilson (Morris - Oliver)	5	5	2	3	2	1	0	0	**18**
Whitney	Neilson (Morris - Oliver)	3	3	0	1	2	0	0	1	**10**
Average	Neilson (Morris - Oliver)	4	4	1	2	2	0.5	0	0.5	**10**

TABLE 2: STREET SURVEY FIELD WORK NOTES CONTINUED

Team Member	Street Name	Sidewalk (0 - 5)	Lighting (0 - 4)	ADA Compliance (0 - 3)	Obstructions (0 - 3)	Speed Limit (0 - 2)	Cyclist Accomodations (0 - 1)	Seating/ Amentites (0 - 1)	Landscaping (0 - 1)	SUM
Deanna	Burnette (Albany - Richmond)	5	2	3	3	0	0	0	1	**14**
Deanna	Burnette (Richmond - New)	4	3	2	2	0	0	0	1	**12**
Whitney	Burnette (New - Oliver)	3	3	0	0	0	0	0	0	**6**
Jen	Morris (Livingston - George)	3	2	0	0	2	0	1	1	**9**
Eric	Morris (George - Neilson)	1	2	0	0	1	0	0	0	**4**
Jen	Remsen/Oliver (Welton - George)	1	1	1	1	2	0	0	0	**6**
Eric	Oliver (George - Neilson)	4	0	0	0	1	0	0	0	**5**
Whitney	Oliver (Neilson - Burnett)	3	2	1	2	2	0	0	1	**11**
Jen	Welton (Remsen/Oliver - Livingston)	2	2	1	1	2	0	0	1	**9**
Jen	Livingston (Welton - New)	5	4	3	3	2	0	1	1	**19**
Megan	Livingston (New - Liberty)	5	3	3	3	1	2	1	1	**19**
Megan	Liberty (George - Nielson)	4	0	2	3	1	1	0	0	**11**
Jake	Liberty (George - Nielson)	3	1	1	1	2	1	0	1	**10**
Average	Liberty (George - Nielson)	3.5	0.5	1.5	2	1.5	1	0	0.5	**10.5**
Deanna	Richmond	5	3	3	3	2	1	0	1	**18**
Deanna	Hiram Sq	5	4	3	3	2	0	1	1	**19**
Jake	Bayard (George - Nielson)	3	2	1	1	2	1	0	0	**10**
Jake	Albany (George - Nielson)	5	2	3	2	0	0	0	1	**13**
Deanna	Albany (Nielson - Burnette)	5	4	2	2	1	1	1	1	**17**

TABLE 3: STREET SURVEY FIELD WORK NOTES CONTINUED

Team Member	Street Name	Sidewalk (0 - 5)	Lighting (0 - 4)	ADA Compliance (0 - 3)	Obstructions (0 - 3)	Speed Limit (0 - 2)	Cyclist Accomodations (0 - 1)	Seating/ Amentites (0 - 1)	Landscaping (0 - 1)	SUM
Jake	Church (George - Nielson)	3	3	2	0	2	1	0	0	**11**
Jake	Paterson (George - Nielson)	3	2	2	1	2	1	0	0	**11**
Megan	New (Livingston - George)	4	3	2	3	1	1	0	0	**14**
Jen	New (Livingston - George)	4	4	2	3	2	0	0	1	**16**
Average	New (Livingston - George)	4	3.5	2	3	1.5	0.5	0		**14.5**
Megan	New (George - Neilson)	3	2	0	0	0	1	0	0	**6**
Eric	New (George - Neilson)	5	4	2	2	0	0	0	0	**13**
Average	New (George - Neilson)	4	3	1	1	0	0.5	0	0	**9.5**
Whitney	New (Rt 18 Ramp)	5	3	3	3	0	0	0	0	**14**
Deanna	New (Rt 18 Ramp)	3	3	1	1	1	0	0	1	**10**
Average	New (Rt 18 Ramp)	4	3	2	2	0.5	0	0	0.5	**12**
Whitney	John	4	4	2	3	2	0	0	1	**16**
Deanna	Dennis	5	3	3	3	2	1	0	1	**18**

Score	Street Condition
5	Sidewalk
4	Lighting
3	ADA Compliance
3	Obstructions
2	Speed Limit
2	Cyclist Accomodations
1	Seating/Amentites
1	Landscaping

TABLE 4: USER GROUP NOTES - USES AND ACCESS CONSIDERATIONS

	User Groups	Activities	Programming	Linkages	Positive Health Impacts	Negative Health Impacts	Opportunities/Policy recommendations
1	**Immediately adjacent** - dog walkers, morning/afternoons - young professionals - visual proximity - joggers	dog walking Market, Musical Event) coffee/reading jogging sitting	poop bag station area fencing water stations lighting (winter) trash cans seating lawn path cut through benches	cross walks bike lanes random crossings sidewalks	physical activity mental health social opportunites	poop problems pedestrian accidents	enforce city ordinace (dog poop) enforce leash law outside fenced area improve wayfinding infrastructure improve intersection crossings
2	Workday users Event/out of town users Students Employees	walking Thinking, Relaxing	shade trees food trucks	random crossings sidewalks cross walks	Mental Stress Relief physical activity postive social groups	pedestrian accidents	improve wayfinding infrastructure improve intersection crossings
3	Children School aged children (teens/tweens) Young Children (Under 5)	playing, running learning kid friendly performances	play environment (lawn) rain gardens, bio swales educational signage tot lot splash pad after school programming	sidewalks cross walks	physical activity cooling off postive social groups	exposure to poor air quality allergies play injuries water quality issues	reroute delivery trucks plant appropriately to reduce pollen
4	Seniors Russian speaking mobility issues	sitting dogs accessibility	benches tables + chairs (chess) bathrooms reduce grade change universal design signage (large print) lighting	mobility to park on route seating traffic light cycle time	social opportunites (intergenerational) physical activity Mental Stress Relief	pedestrian accidents	improve wayfinding infrastructure improve intersection crossings
5	Non-Adjacent Users kids limited open space families	playing games eating area	outdoor reception after school programming	sidewalks cross walks	Mental Stress Relief physical activity postive social groups	pedestrian accidents play injuries	improve wayfinding infrastructure improve intersection crossings