Greening Far Rockaway A Community Forestry Management Plan





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Executive Summary

Overview

This document is a guide to the greening of Far Rockaway and the adjacent neighborhoods of Arverne, Edgemere, and Bayswater, an area with few trees and higher than average rates of asthma among children. These communites are located in southeastern Queens in New York City. The New York City Department of Parks & Recreation (Parks) developed this plan with a vision of a greener, healthier neighborhood. The plan aims to use the positive effects of greening, primarily through street trees, to address some of Far Rockaway's public health concerns. It is informed by a detailed inventory of every existing street tree and all potential planting locations on the streets and in parks. Focusing on the community's greening needs, Parks developed a strategy for increasing the tree cover in the Far Rockaway study area. The two primary goals are to 1) increase the number of street trees from 3,779 to 9,148—or 100% stocked—in ten years and 2) establish a Friends of Trees group.

In April 2007, Mayor Bloomberg announced PlaNYC, a sustainability plan aimed at targeting five key issues of the city's environment: land, air, water, energy, and transportation. As part of his plan, Mayor Bloomberg announced the MillionTreesNYC Initiative.¹ This initiative calls for planting one million trees within the next ten years and coincides with the Mayor's goal and subsequent funding to increase the city's street tree stocking level from 73% to 100%. As a result, this plan serves as a practical guide to future activities and stewardship efforts in conjunction with the Mayor's tree planting goals.

About Far Rockaway

To maximize the goals of this project, the Far Rockaway study area was extended to include the neighboring communities of Arverne, Edgemere, and Bayswater. These communities were chosen because of their proximity to the target neighborhood of Far Rockaway and a shared need for greening. While the project refers to the study area as Far Rockaway, it is important to note that this includes these other smaller neighborhoods.

The Far Rockaway study area is in the southeastern corner of the borough of Queens. It starts from the western boundary of Beach 59th Street and runs eastward to the Long Island Nassau county line. Far Rockaway consists of older residential beach bungalows and single-family homes combined with new, affordable housing complexes and market-rate beachfront developments. These transformations are a concern, with many larger projects slated to begin in the coming year.

Planting trees is an important way to combat environmental health-related issues such as asthma. While asthma hospitalization rates for adults in the entire Rockaways region has decreased in the past five years, asthma-related hospitalizations for children have increased. Also, obsesity and diabetes has continued to increase in this region, with the rate of adult obesity above New York City levels.²

Inventory Results

In 2005, Parks conducted a complete inventory of all 3,779 street trees in the Far Rockaway study area. Sixtyeight different species were identified, with the London planetree (25%), honeylocust (19%), and Norway maple (10%) together comprising over one half of the population. Twenty-nine percent of Far Rockaway's trees had diameters of six inches or less, and 31% had diameters between 6.5 and 12 inches. Nearly all (87%) of the trees were in good or excellent condition, although 22% displayed some form of trunk damage. In addition, 662 trees were enumerated in Far Rockaway's parks and playgrounds.

Every street in the study area was also surveyed for tree planting opportunities. In total, 5,369 street tree planting opportunities were identified. Based on the total number of trees and the total number of tree planting opportunities, the community was found to be 41% stocked.

Recommendations

The core recommendations are detailed in the first three parts: Tree Planting, Stewardship, and Education. Two other categories, Policy Recommendations and Evaluation and Monitoring, are included to respond to the influences of other city agencies on urban forestry and to track the implementation of this plan.

Part 1 – Tree Planting

GOAL: Plant all street tree pits using appropriate species prioritizing neighborhoods with the most need.

- Parks will plant at least 1000 street trees in Community Board 14 each year until the streets are fully stocked.
- Parks will investigate creative solutions to finding tree planting opportunities and overcoming narrow sidewalk and infrastructure obstacles.
- Analyze Parks' open lawn space to determine capacity for additional trees.
- Prioritize tree planting sites by neighborhood stocking level and population density.
- Plant in areas where there are extablished community groups interested in becoming tree stewards.
- Limit the planting of London planetree and honeylocust to avoid the perils of monoculture.
- □ Create the largest possible tree pits.
- Use urban soil mix under paved areas where feasible.

Part II – Tree Protection

GOAL: Increase tree survival.

- U Verify 217 trees marked as threatened, and place those that are confirmed on Parks' rescue contract.
- Partner with New York Restoration Project (NYRP) to protect at least half of all newly planted trees with tree guards.
- Create a tree protection plan for the 44 largest trees, including installing tree guards and improving tree pits.
- Parks will remove 98 dead trees identified through the 2005/2006 Street Tree Census.

Part III – Education and Stewardship

GOAL: Establish programs that increase the community's appreciation for street trees.

- Parks will hold at least one stewardship training in the community each year.
- Parks will supply irrigation bags in areas with active stewards.
- □ Parks will reach out to community organizations with the help of partner organizations at the beginning of each planting season to distribute information, hold workshops, and increase school involvement.
- Promote tree awareness and appreciation through community activities such as street stenciling, planting demonstrations, and group walks.
- Remind the community board and local elected officials to report threatened trees and arborcide to 311.
- Distribute print materials describing street tree benefits and Parks' services.
- D Publish four street tree press stories each year.
- □ Identify program partners in local schools and after-school programs.
- Establish street tree education curricula in every school by the end of 2008 through currently available programs.
- Train two local Citizen Pruners each year.

Part IV – Policy Recommendations

GOAL: Identify and implement policies that influence the urban forest.

- Parks and the Department of Buildings will implement stree tree planting requirements for new buildings.
 - □ Initiate new development reviews to minimize construction conflicts.

Part V – Evaluation and Monitoring

GOAL: Track progress on the overall vision and action items specified in this plan.

- Track tree planting changes including planting, mortality, and permitted removals.
- **D** Encourage other entities to track their tree planting changes in Parks' tree database.
- U Work with USDA Forest Service to assess canopy cover through digital satellite imagery every ten years.
- □ Work with EPA to determine the best methods for measuring air quality.
- Seek partnerships with local colleges and universities to further an understanding of the relationship between canopy cover, air quality, and other health indicators.

Introduction

Trees for Public Health (TPH) is a program that addresses the connection between the outdoor environment and human health. The goal of the program is to increase tree canopy cover in neighborhoods with fewer than average trees and higher than average public health burdens. Potential positive outcomes include improved air quality, community empowerment, and neighborhood beautification.

In 2005, Parks selected five neighborhoods—one in each borough of New York City—as initial targets for TPH. Neighborhoods were chosen based on two variables: street tree stocking level and asthma hospitalization rates for children aged 0 to 14. Areas with fewer than average street trees and higher than average asthma rates were given priority. Asthma was selected as a health indicator because it is a significant health concern throughout New York City, and because poor air quality worsens asthma symptoms. Far Rockaway was the community selected in Queens.

TPH builds on a project begun in 2001 in Hunts Point, in the South Bronx. Parks partnered with Greening for Breathing (GFB), a community group that formed in response to the alarmingly high rates of asthma in Hunts Point. Their mission is to increase the tree cover in Hunts Point, improve air quality, and positively impact asthma rates in their community. Parks worked with GFB to develop a management plan for greening the community. Since completing the plan in 2003, the agency and community groups have worked together to meet their stated objectives, resulting in more, and better cared for, trees. This project represented a new step for Parks in taking a proactive, rather than a reactive, approach to tree planting.

This community forestry plan lays the groundwork for increasing the tree canopy cover in Far Rockaway. The recommendations proposed are a result of interviews with key community informants from various sectors of the study area. Key informants and Parks' forestry staff developed a vision for the neighborhood, based on information about the area's current green resources, and proposed strategies for realizing that vision. *This plan serves as a practical reference to guide future activities and fundraising efforts*.

The main focus of this plan is planting curbside trees and training stewards to care for young trees so they live long enough to provide benefits. Street trees, however, are only one piece of the urban forest. Forest resources on private property, in parks, and in other open spaces are also integral to the expansion of Far Rockaway's tree canopy.

The Parks Department

All trees growing in the public right-of-way—along streets and in parks—are under the jurisdiction of the Department of Parks and Recreation. The department provides a number of basic services for New York City's nearly 600,000 street trees and thousands of park trees. These include removing dead trees within 30 days of notification, pruning all trees on a seven-year cycle, responding to storms and other emergencies, and assisting with the control of invasive pests such as the Asian longhorned beetle. Together with Partnerships for Parks, a group that works to increase community support for and involvement in parks throughout New York City, Parks provides training and tools for citizens who commit to caring for young street trees.

Parks is also responsible for planting trees on city streets and in parks. Parks plants thousands of trees each year and has traditionally planted upon request on a first-come first-served basis. Since the introduction of Mayor Bloombergs's sustainability plan, PlaNYC, in April 2007, Parks initiated a block planting program targeting neighborhoods with the greatest need for trees, including Far Rockaway. This planning effort represents a new planting approach—one that is based on emerging data demonstrating the community and public health benefits of trees.



Tree Benefits and Public Health

Many people appreciate the trees in their neighborhood simply because they add greenery to an otherwise gray landscape. However, a tree's value goes well beyond its aesthetic appeal. Trees provide many critical services to our communities. They improve water quality by filtering water and diverting storm

water run-off. Trees increase property value and draw people into commercial areas, encouraging them to spend more for the products and services offered. They slow traffic, filter highfrequency noises, create a sound barrier, and provide habitat for wildlife. In addition, trees impart a wealth of tangible benefits that contribute to improved community health, such as energy conservation and increased outdoor recreational opportunities.



Oceanfront homes in Far Rockaway.

The most notable public health service trees provide is air quality improvement. Urban trees can significantly reduce the presence of many air pollutants that cause serious health problems. Ground-level ozone, particulate matter, and nitrogen and sulfur oxides are all known to trigger asthma attacks,³ permanently affect

respiratory development in children,⁴ and increase mortality⁵ (See Appendix I for more information on pollutants). Trees help reduce human exposure to these compounds by filtering the air, lowering air temperatures, and reducing energy use. In fact, a recent New York City-based study has shown that areas with more street trees are positively correlated with a lower prevalence of early childhood asthma.⁶ Trees can also negatively impact air quality through the release of pollen and VOCs, although the benefits outweigh these impacts.

Trees Filter the Air

Some gaseous pollutants, like sulfur oxides and ozone, are taken up directly through the tree's leaves. Other pollutants, such as particulate matter, are captured by deposition on the tree's leaves, stem, and bark. Although these pollutants may then wash to the ground after a rain or become resuspended into the air by the wind, this sort of filtering still results in a net positive effect on air quality. New York City's trees remove 2,202 tons of air pollutants a year at a \$10.6 million value.⁷

Trees Reduce Energy Use

Trees indirectly clean the air by reducing energy use. City temperatures measure ten degrees Fahrenheit higher than surrounding rural areas because urban areas have less vegetation, reduced air circulation, and more paved surfaces, which absorb the sun's energy. Known as the "urban heat island effect," this temperature increase contributes to as much as 8% of the electricity used for cooling.^{8,9} By shading buildings and lowering daytime temperatures, urban street trees play a critical role in reducing electricity demand in the summer, thereby minimizing the release of air pollutants from power plants. In New York City, this reduction amounts to an energy savings of about \$27 million dollars each year.¹⁰

Trees Lower Air Temperatures

Trees reduce daytime air temperatures by as much as two to ten degrees Fahrenheit by shading sunlight and by releasing water from leaf surfaces through a process called evapotranspiration. A 1% tree canopy cover increase can reduce maximum mid-day air temperatures by as much as 0.4 degrees Fahrenheit.⁹ Lower temperatures discourage the formation of ozone and other temperature-dependant pollutants. Shading parked cars also reduces the release of pollutants from gas tanks.

Trees Release Pollen and Volatile Organic Compounds (VOCs)

For some people, tree pollen may cause seasonal allergic reactions that can exacerbate asthma symptoms and trigger asthma attacks. However, allergy sufferers may find their symptoms alleviated rather than aggravated with the prescence of more trees throughout the city over a given year. Each tree only produces pollen for two to three days a year in the spring. During the rest of the growing season (May through October), a tree's leaves are filtering the air of particulates, carbon dioxide, ozone, mold, dust-mites, and the pollen of other plants. The pollen-triggered allergies that people experience during the rest of the spring, summer, and fall comes from other plants, such as shrubs, flowers, and grasses. It is also important to note that, when compared to other cities across the United States in varying geographic regions, pollen count in New York City is considerably lower.¹¹

In addition to pollen, some tree species such as oak, sweetgum, sycamore, and poplar are high VOCemitters and may contribute to an increase in ozone formation. The significance of these releases to overall VOC concentrations is not well understood. Some studies have demonstrated that the potential for these trees to generate a net increase in VOCs is less of a concern in areas with high ambient VOC concentrations, such as New York City.¹² However, because research into this issue is still ongoing, mitigating these negative impacts through careful tree species selection and placement should be considered.

Other Public Health Benefits

Encouraging people to increase their physical activity and the amount of time they spend outdoors is an important goal for this project. Increased outdoor activity impacts a major public health concern in Far



View of the Manhattan skyline from a fishing pier in Rockaway Community Park.

Rockaway: diabetes. Increasing activity level lowers obesity rates, which is a precursor to diabetes. Existing research also supports the idea that greenery provides social and psychological benefits to individuals and communities^{13, 14,15,16,17,18,19} and that the built environment can influence recreational behaviors.^{20,21,22,23,24} However, no studies specifically address the connection between greening the streets and recreational behaviors. A better understanding of the relationship between a greener built environment and residents' likelihood to recreate outdoors will help to inform future greening projects.

About Asthma...

People with asthma experience lung inflammation and episodes of airway tightening that cause symptoms such as wheezing, coughing, chest tightness, and shortness of breath. A period of acute symptoms is referred to as an asthma attack.

It is still unclear why people develop asthma. Regardless of this, the factors that exacerbate asthma symptoms are well understood. Indoor airborne irritants such as tobacco smoke, mold, and pet dander are common asthma triggers. In addition, outdoor air pollutants, especially ozone, can trigger asthma attacks. Although the situation is complex, improved outdoor air quality is one important component of a larger plan to relieve communities of this public health burden.



Community Description

Study Area

The Far Rockaway study area is located in Queens County in the southeastern section of Queens. While the study area is referrred to as Far Rockaway, this area also encompasses the neighborhoods of Arverne, Edgemere, and Bayswater. The community was selected based on data from Parks and the Department of Health and Mental Hygiene indicating low street-tree density and high public health burdens. As well, local residents' perceptions of the extent of Far Rockaway, physical divisions such as subways, and water bodies were considered.

For the purposes of this project, the target community (referred to as Far Rockaway from here on) is a 2.89 square mile area east of Beach 59th Street, and west of the Long Island border (Nassau county line). Jamaica Bay bounds the peninsula to the north and the Atlantic Ocean is the southern boundary.

Demographics

Far Rockaway is represented by Community Board 14. The entire study area falls within the jurisdiction of Congressional District 6 and City Council District 31. The population of Far Rockaway is comprised of 66% white residents, 16% black or African American residents, 16% Hispanic residents (of any race), and 7% Asian residents.²⁵ Also notable is a new, growing community of Jewish residents in the eastern portion of the study area known as the West Lawrence neighborhood. These residents have been involved in the development of several local Jewish schools and medical facilities.

In 2006, the median household income in the Far Rockaway study area was \$33,204 with approximately 23% of households living below the poverty line.²⁵ By comparison, during the same period, 12% of families in the entire borough of Queens, 16% of families in New York City, and 11% of families in New York state were living below the poverty line.²⁵

History

Rockaway was once home to the Canarsie Indian tribe, part of the Mohawk Indian nation, before it was discovered by Henry Hudson in 1609. Thirty years after Hudson and his crew set foot on the peninsula, the land was sold by the Mohawk nation to the Dutch, along with a majority of Long Island.²⁶ The land changed hands again when the British took New York from the Dutch in 1685. Shortly thereafter, in 1687, Rockaway landed in the hands of Richard Cornell, an elite iron expert from Flushing, Queens. Cornell and his family settled in Far Rockaway, where they built their expansive homestead.²⁷ Cornell is believed to be buried in



Placement of target community in borough.



Survey zone with community districts.



Survey zone with zip codes.



Race / ethinicity in the Far Rockaway study area.





Tombstone of Richard Cornell and family members at the Cornell Burial Ground.

the Cornell family plot, known today as Cornell Cemetery and recognized by the New York City Landmark Preservation Commission as an official landmark.²⁸

In 1833, over a century after Richard Cornell purchased and settled in present day Far Rockaway, a wealthy group of entrepeneurs developed a plan to build a luxury oceanfront hotel in Rockaway. The group called themselves the Rockaway Association. Oceanfront property was purchased from descendants of Richard Cornell and developed into the Marine Hotel.²⁸ It was constructed on the site of the original Cornell homestead and soon gained popularity amongst the elite of New York City. Some noteworthy visitors included the Vanderbilt family, Henry Wadsworth Longfellow, and Washington Irving. Although the Marine

Hotel was completely destroyed by a fire in 1864, it paved the way for a succession of successful hotels and summer mansions on the Rockaway oceanfront.²⁸

Far Rockaway's new influx of visitors reached the peninsula first by ferry and later by steam train, which was initiated by James Remsen, a new owner of a large portion of the peninsula. This railroad system's objective was to connect residents of Canarsie and East New York with the Rockaway peninsula and remains active today as part of the Long Island Railroad system. With the arrival of the railroad, business in the Rockaway area flourished. In the late 1800's, Rockaway became known as "the playground of New

York" with the development of seaside resorts and amusement parks. Amusement parks became a mainstay in Rockaway until 1985 when the Rockaway's Playland amusement park (formally part of Seaside Amusement Company) finally went out of business due to competition from other larger parks.²⁸

July 1st, 1897, marked the incorporation of the Village of Rockaway Park into the City of Greater New York. In 1937, the Marine Parkway Bridge was completed. The beach and boardwalk followed soon after, as did the completion of the Cross Bay Bridge in 1939. Railroad improvements were also made in 1941, including the development of the



A pre-WWII postcard from Far Rockaway.

elevated subway. All of these advances led to greater accessibility for all classes of New York families and began the transition from Far Rockaway as a vacation area to year-round communities with permanent residents.

Following World War II, the popularity of the Rockaways began to decline.^{27,28} As transportation improvements were made, larger scale resorts were built further from NYC. Only a handful of hotels remained, and many others were destroyed by fire or torn down to make room for urban renewal projects.

Over the last several decades, these projects have resulted in both affordable housing and the construction of oceanfront apartments, condominiums, and multi-family homes. What were once streets full of sprawling, single-family homes with front wrap-around porches are now blocks of identical, newly constructed two- or three-family homes that occupy entire lots, leaving little open space. Because of



the current sub-prime mortgage crisis, many of these homes are sitting empty as the housing market continues to wane.

In January of 2006, the Department of City Planning and the Queens Borough President approved a rezoning application aiming to maintain Far Rockaway's historical identity. This proposal rezoned about 82 blocks in the Bayswater area to lower density districts. This type of rezoning will prevent multiplefamily homes from being constructed on lots that were previously developed as one- and two-family detached homes.²⁹



NYCHA's Ocean Bay Housing.

New, large-scale construction projects are continuing to appear all around Far Rockaway outside of the rezoning area. Arverne by the Sea is a development boasting that it is "New York City's New Oceanfront Hometown" and includes the construction of six distinct "neighborhoods" within the complex.³⁰ Arverne East is slated for construction later this year and will extend from Beach 32nd Street to Beach 54th Street. How these new towns-within-towns will fit in with the remainder of Far Rockaway's neighborhoods is yet to be seen.

Land Use

Almost half of the land in the Far Rockaway study area is classified as residential. Many of these residences are original summer homes and pre-war cottages mixed with one- and two-family detached or semi-detached homes. Of the residents of Far Rockaway, 10% live in the New York City Housing Authority (NYCHA) housing. This property occupies a little over 5% of the total land area.³¹ There are four NYCHA facilities in Far Rockaway. They include two Ocean Bay developments (ocean side and bay



Beach bungalows in Far Rockaway.

side), Beach 41st Street, and Redfern housing developments.

Far Rockaway's Community Board 14 has the sixth highest acreage of open space, as a percentage of total land area, out of all 59 Community Boards in New York City. There are 263 acres of open space in Far Rockaway, including 11 city-owned parks and playgrounds. Seven of these parks have 90–100% impervious ground cover, such as pavement or rubber safety surface.

The commonly accepted standard established by the

Trust for Public Land and adopted as a goal in the City Environmental Quality Review is 2.5 acres of open space per 1,000 residents. Currently, Community Board 14 has about 8.5 acres of land per 1,000 residents.³² However, a majority of the open space used in this calculation is inaccessible. For example, a large portion of the Rockaway Community Playground is currently used by the Department of Sanitation as an outdated landfill. Therefore, while the residents of Far Rockaway seemingly enjoy a large open space-to-resident ratio, much of this open space is not recreational land available to the public.

Despite recent development, a full 18% of the study area's land use is categorized as vacant. Currently, these vast vacant lands remain neglected. However, large-scale projects such as Arverne by the Sea will occupy these spaces in the near future.

Eight percent of Far Rockaway's total land area is made up of public facilities and institutions, including schools, nursing homes, and health centers. Two percent of the land area is categorized as commerical and business. The primary commercial corridors are along the intersection of Mott and Central Avenues. Much of the business activity occurs here or around this downown center. Most of these businesses are mixed-use commercial / residential; there are also a few large-scale businesses such as grocery store chains and fast food restaurants.



Commerical district along Mott Avenue.

Transportation and utility corridors comprise 3% of the study area's land use. Beach Channel Drive acts as a major through-street for traffic traveling through Far Rockaway. The Metropolitan Transit Authority (MTA) runs an aboveground subway line, the A line, through Far Rockaway. The train overpass cuts through Far Rockaway from west to east, terminating in the Mott Avenue stop. The subway overpass sometimes acts as a dividing line between the older bay-side neighborhoods and the newer oceanfront complexes.

Community Organizations

Far Rockaway's residents are supported by a wide range of community organizations. These are dominated by civic organizations, health care organizations, and tenant association groups. Each civic association works closely with the residents of their respective neighborhoods to ensure their neighborhoods are safe and receiving all the possible resources they can. Of the multi-service programs in Far Rockaway, Ocean Bay Community Development Corporation works towards providing community resources such as employment training and job skills training. Other community groups include the Graybeard organization, a non-profit group working towards increasing the welfare of Far Rockaway and establishing a sense of community responsibility. Also active in the Edgemere area is the Norton Basin Edgemere Stewardship group. Due to changing leadership and timeline constraints, outreach in the study area did not reach its maximum potential at the time of this report.

Air Quality and Health

Queen's County (which includes the Far Rockaway study area) ranked among the worst (90th percentile) of all counties in the U.S. in 1996 in terms of added cancer risk from hazardous pollutants, and non-cancer risk from hazardous air pollutants, carbon monoxide, and nitrogen oxide emissons. It also ranked in the 90th percentile for fine particulate (PM 2.5) emissions, course particulate (PM10) emissions, sulfur dioxide emissions, and VOC emissions.³³

About half of the days in 2003 were ranked to have good air quality, while the rest of the year was ranked with moderate air quality rankings.³³ Living in close proximity to major roads, factories, and airports has been shown to increase the prevalence and incidence of asthma.³⁴ With JFK airport less than three quarters of a mile away, across the bay, and the Long Island Power Authority / Keyspan site within the study area, Far Rockaway is a community at risk.

Poor air quality has a measurable impact on human health. Several recent studies indicate that the risk of premature death increases with increased ozone levels. Particulate pollution can also reduce



View of the Con Edision power plant in Far Rockaway that powers the Rockaways and Long Island.

one's lifespan, as well as cause permanent respiratory damage, induce heart attacks, and trigger asthma attacks. While one in 20 adults in the Rockaways suffers from asthma, the rate of hospitalizations related to asthma in adults has begun to decline in the past five years.³⁵ However, the rate of asthma-related



Beach 17th Playground.

hospitalizations in children has continued to increase. In fact, the rate of hospitalization for children aged 0 to 17 in the Rockaways is higher than both the Queens and Citywide rates.³⁵

Health professionals have known for some time that people with previous cardiovascular health conditions or lung diseases, children, and the elderly are most vulnerable to the health effects of air pollution. The American Lung Association now also adds diabetics to that list. Diabetes is an important health indicator because it is a chronic illness that is linked to other serious health complications, including blindness and amputation.³⁵ In the entire Rockaway area, there is a 9.4% prevalence of diabetes, where about one in ten adults are diabetic. This

figure falls in the middle of the range for diabetes prevalence in New York City.³⁵

One in four adults is obese in the entire Rockaway area. Because of the increasing prevalence of obsesity and the strong correlation between diabetes and obsesity, there is a strong likelihood for the continued spread of the diabetes epidemic. These results matched with New York City Department of Health childhood obesity research from 2004 that found that 43% of public elementary school children were overweight and 19% were obese. The high rate of childhood obesity only makes the future of this epidemic even more urgent. Sedentary behavior, poor food choices, and lack of food availability are all contributors to this major public health concern.

Urban Forest Cover

Over the years, a number of efforts have sought to characterize New York City's urban forest. In the mid-1990's, the U. S. Forest Service estimated canopy cover through an aerial photo interpretation of the entire New York City area. At that time, Community Board 14 had the 11th lowest canopy cover (6.7%) of the 14 community boards in Queens.³⁶ In 2005, the Parks Department analyzed a high resolution satellite image. In the new analysis, Community Board 14 displayed 16% tree cover, compared with 22% for Queens, and 24% for New York City as a whole.³⁷



Averne Playground in Far Rockaway.

In addition to measuring the extent of the total urban forest, in 1996, Parks surveyed all of the street trees in the entire city for the first time. At that time, 29% of available planting spaces in Community Board 14 were full, ranking it the least-stocked in the borough. In 2006, Parks completed the second tree census. Based on the new information, the number of trees in the study area has increased significantly in the last ten years, boosting the community board to a stocking level of 41%.

Methods

A successful strategy to increase tree canopy cover depends on an accurate assessment of the existing urban forest and the infrastructure that impacts this forest, as well as input and support from the local community. This project incorporates all of these components.

In the spring of 2005, Parks worked to form partnerships with community leaders who could help publicize the project to local residents. Simultaneously, Parks initiated a complete inventory of street trees and tree planting opportunities, recruiting local residents to participate.

Street Tree Inventory

The Trees Count! 2005/2006 Street Tree Census determined the quantity, characteristics, and health of the city's street trees, including those growing in Far Rockaway. Citywide volunteers and Parks staff went to the streets to record tree species, size, location, condition, and growing environment of every tree. Members from Parks' public service organization, Green Apple Corps (GAC), completed the field work for the tree census and then entered the data into an online database to develop a digital inventory. The data was then geocoded, mapped, and analyzed by Parks' technical staff using ESRI's ArcGIS 9.1 software package.

Tree Planting Opportunities

The next step in developing Far Rockaway's urban forest strategy was to determine the maximum capacity for street tree plantings in the target community. Capacity equals the total number of available planting opportunities plus the total number of existing trees. Using this total capacity number, an area's stocking level can be determined, which is defined as the proportion of existing trees to the area's total capacity for trees.

In Far Rockaway, staff calculated a real capacity number based on a field survey of every street to identify all available planting opportunities and existing trees. Parks staff and volunteers surveyed the study area by methodically counting tree planting opportunities (TPO) on each street. Lighthouse Inc., a local community group, participated in surveying TPOs in the Far Rockaway study area. Each block was surveyed by measuring the amount of available sidewalk space, taking into account sidewalk width, and distance between already existing street trees or other infrastructure conflicts. Parks' technical staff then mapped the data on a block-by-block level.

Park Tree Inventory

GAC members and Parks' staff visited each park and playground within Far Rockaway's borders and visually estimated the percent of each site covered by impervious surfaces. They also collected quantitative information about the number of trees and empty tree pits.

Outreach

Parks began outreach in the Far Rockaway area in the winter of 2007/2008. A contact list that had been compiled in 2005 was used as a starting point for outreach in the study area. First, contact was made with the Ocean Bay Community Development Corporation, which lead to an updated contact list for NYCHA tenant associations and gardening groups. Following this meeting, a progression of meetings with the Community Board 14 district manager lead to a presentation at the March 11th community board meeting. This meeting addressed the upcoming block planting in the Far Rockaway study area and emphasized the importance of trees in neighborhoods with high child asthma hospitalization rates. The community board members, as well as the community members present, voiced their concerns regarding the program and offered tips on how to engage the community.

Results and Analysis

Street Tree Inventory

The survey identified 3,779 live street trees in Far Rockaway. This is a 30% increase in the tree population over the last ten years.

Species Distribution

Species diversity is a critical element of a healthy urban forest. Pests and disease generally exhibit preferences for specific plant families or species. Over-representation of any one species in a population can leave it vulnerable to significant loss. Maintaining diversity is a way to build resilience into a landscape.

Acceptable management standards suggest that no more than 10% of any species, 20% of any genus, or 30% of any family should be represented in a given population of trees.³⁸ In Far Rockaway, the London planetree (25%), honeylocust (19%), and Norway maple (10%) are each over-represented in the population. Also, the Callery pear (8%), and cherry (7%) are approaching over representation. In total, 68 different species were identified, 14 of which (21%) are Asian longhorned beetle hosts.³⁹





Size Distribution

Tree size is an important factor in planning for the care and preservation of an urban forest. Size is typically measured by the diameter of a tree's trunk at 4.5 feet from the ground. This is called the diameter at breast height or DBH.

Helping young trees reach maturity is a priority because larger trees provide the greatest air quality benefits. A 30-inch diameter tree removes 70 times more air pollution than a three-inch or smaller

diameter tree.⁴⁰ A large portion of Far Rockaway's trees are small. Twenty-nine percent have diameters of six inches or less, while only 44 trees (1%) are over 30 inches in diameter.

Larger trees may need more pruning as well as attention to the provision of adequate growing space. Smaller trees are the most vulnerable segment of the population, reacting most to physical damage (trunk wounds, broken branches) and other stress factors, such as compacted soil and drought, suggesting that they benefit most from tree guards and community-based care.





Condition

According to the 2005/2006 survey, there are 3,779 live trees and 98 dead trees (3%) in Far Rockaway. This is the highest percentage of dead trees found among all of the TPH neighborhoods. The majority of trees in Far Rockaway are in good or excellent condition (87%). However, compacted soil, crowded underground growing space, damage from cars and bicycles, and pet waste are just some of the challenges that impact a tree's ability to thrive in the city.

Trunk Damage

A tree's trunk is its last line of defense. Maintaining a strong, intact trunk is necessary for the tree to effectively prevent invasion of pests and diseases. Trunks can be damaged accidentally from vehicles or purposely through vandalism. Dog urine also burns bark and can kill younger trees. Looking at trunk damage provides evidence of a community's relationship to its trees. This survey noted damage ranging from the most minor (torn bark) to the most severe (cavities). Twenty-two percent of Far Rockaway's trees exhibited some form of trunk damage.

Infrastructure Conflicts

In an urban area, anything from plastic bags to sneakers can end up in a tree's canopy. Sometimes, items intended to improve a tree's growing conditions can threaten the tree's health. For example, steel fencing that initially helps protect a tree can choke it if not removed. Assessing the extent of these physical



Choking wires.







Close paving.

conflicts throughout the urban forest provides an indicator of forest health and guidance for maintenance needs, as well as outreach and education campaigns. In Far Rockaway, 217 trees (about 6%) had some type of infrastructure conflict. The most common type of infrastructure conflict was close paving, with a total of 149 cases. The next most common conflict was choking wires, with a total of 40 cases.

Tree Planting Opportunities

Every community has a unique infrastructure that dictates its total capacity for street trees. Driveways, underground subways and utilities, bus stops, and street signs can all impede street tree planting. The survey identified 5,369 tree planting opportunities in Far Rockaway; with a total of 3,779 living trees, the neighborhood is about 41% stocked.

Parks Survey

City parks are important community resources. Not only do parks provide open space for recreation, but they present an opportunity to augment a community's green resources. Through the planting of trees,



Westbourne Playground at PS 104.

shrubs, and grasses, park lands can positively impact a community's environment. Because parks increase the degree to which the ground absorbs water, they can improve water quality and capture storm water run-off. Augmenting the community's tree canopy contributes to air quality improvements.

The majority of Far Rockaway's parks and playgrounds have impervious surfaces, such as pavement or rubber safety mats (see map for details). Of the 18 parks and playgrounds in Far Rockaway, seven are 95% impervious. Others contain large ball fields, open grass fields, or wetlands areas. However, while the numbers

indicate that a majority of the Far Rockaway's parks and playgrounds have impervious surfaces, in surface area, these parks amount to just a small percentage of the total acreage of recreational land.

A total of 662 trees were identified in Far Rockaway's active recreation areas, with additional trees (not enumerated) in wooded areas. Also, a total of 37 empty tree pits were enumerated in all of the 18 parks. Many of the playgrounds in this area present opportunities for increasing canopy cover by filling in remaining tree pits, and planting in open lawn areas and in lawn or mulch strips that surround many of the playgrounds.

Outreach

Community outreach coincided with the announcement of block tree planting in the study area. With a large portion of the community about to undergo extensive block planting in the upcoming planting seasons, Parks took a slightly different approach to community outreach than in the past. The project was announced to key community members at a March 2007 community board meeting. By using the community board meeting as a vehicle to begin spreading the word, further community



Beach 9th Playground on Rockaway Beach.

outreach was accomplished by targeting potential partners that emerged from that meeting, as well as other from Parks resources. As a result, approximately five key partners were identified. These partners were asked to collaborate with Parks to host tree stewardship workshops in their neighborhoods.

At the initial community board meeting, some residents expressed concerns regarding tree and sidewalk care once the trees were planted. Also, questions about overhead and underground wires were raised. Additionally, one board member suggested hiring local high school students to help care for the influx of new trees in the neighborhood. A tree workshop was planned for shortly after the community board meeting.

Stewmap is a database created by the U.S. Forest Service's New York City Urban Field Station to make community work readily available on the internet for over 4,000 community groups. Using data provided by the U.S. Forest Service, Parks staff created an informative map spatially representing all of the stewardship-based groups in the study area. These groups will lead Parks' outreach to potential partnerships for future stewardship events and planning.



City of New York Parks & Recreation

Michael R. Bloomberg, Mayor Adrian Benepe, Commissioner

Far Rockaway Parks



Recommendations

Increasing any community's tree canopy can be accomplished in three ways: by planting more trees, maximizing the trees' ability to thrive, and preserving the existing canopy. Many social and environmental variables, such as community will, development policies, disease and limited growing space, will influence our ability to accomplish these tasks. The following recommendations—which are informed by the results of the tree census and interviews with community group leaders—build upon these three basic needs and form a strategy tailored to Far Rockaway's specific character.

The overall vision is to increase the health and extent of the urban forest in Far Rockaway in order to improve the health and well-being of its residents. There are two primary goals to help achieve this vision: 1) support the PlaNYC goal to increase the number of street trees in the study area from 41% stocked to 100% by 2017 and 2) establish a Friends of Trees group. The Friends of Trees group is critical to realizing the goals of this project and to moving the program forward where action items are beyond Parks' resources.

Through these two primary goals, Parks can fullfill this vision using a multifaceted method. The core recommendations are detailed in the first three parts: Tree Planting, Stewardship, and Education. Two other categories, Policy Recommendations and Evaluation and Monitoring, are included to respond to the influences of other city agencies on the urban forest, and to track the implementation of this plan. While trees on private property and in parks make significant contributions to canopy cover, recommendations directed towards these trees are outside the scope of this project and, therefore, are only briefly addressed.

Two unique challenges that face the planting effort in Far Rockaway include limited growing space and tepid community participation. The stocking level in the study area is calculated to be only 41%, and there are many obstacles to bringing this level to 100%. Overhead wires and narrow sidewalks or lawn pits make tree planting spaces difficult to locate. Parks is compelled to find more creative ways to make space for trees and engage the public. These recommendations reflect this unique situation.

Part 1 – Tree Planting

GOAL: Plant all street tree pits using appropriate species prioritizing neighborhoods with the most need.

A. Increase street tree stocking level to 100% by 2017.

Far Rockaway has the capacity for 9,148 street trees. Subtracting the current population of 3,779 trees results in 5,369 trees to plant over the next 18 planting seasons. However, this does not account for loss, which normally occurs at a rate of about 1%. Taking tree loss into account, 5,423 street trees must be planted over the next nine years in order to reach the stocking level goal. Although Parks' budget has varied from year to year,



Intersection of Mott Avenue with Beach 20th Street.

the department now has increased street tree funding provided by PlaNYC.

The survey of Far Rockaway's parks identified additional opportunities for planting trees in grassy areas or planting beds. Planting these areas will help achieve an overall canopy cover increase in Far Rockaway, and they represent a simple means of getting more trees in the ground.

- □ Parks will plant at least 1000 street trees in Community Board 14 each year, based on current funding projections, until the streets are fully stocked.
- □ Parks will investigate creative solutions to finding tree planting opportunities and overcoming narrow sidewalk and infrastructure obstacles.
- Analyze Parks' open lawn space to determine capacity for additional trees.

B. Prioritize tree planting sites according to three specific criteria.

With over 5,000 possible planting sites, it is important that they be prioritized. While we are fortunate enough to have funding to plant in all possible planting sites over the next ten years, there is still a need to demonstrate an early planting success, using the following methods.

- 1. Prioritize neighborhoods with low street tree stocking levels.
- 2. Prioritize planting in streets that connect greenspaces to densely populated areas.
 - ➡ Include public housing and commercial areas that might provide access for residents to parks and waterfront.
 - ➡ Emphasize connections between current and future green spaces proposed in new oceanfront plans to sections of Far Rockaway that are not directly related to new construction.
- Prioritize planting in areas where there are established community groups interested in becoming tree stewards. Use StewMap to accomplish this.⁴¹

C. Select species to maximize diversity and air quality

improvements.



View from Rockaway Freeway from underneath the A-train tracks.

Detailed information about species distribution within the community is available from the 2005/2006 Street Tree Census. Utilizing this information, Parks will encourage population diversity through careful species selection.

- □ Limit the planting of London planetree and honeylocust to avoid the perils of monoculture. Also consider limiting quantities of Callery pear and cherry species.
- D. <u>Utilize the highest tree planting standards and newest technologies.</u>

All tree planting should adhere to the most up-to-date planting technologies to create the healthiest growing environment for the tree.

- □ Create the largest possible tree pits.
- □ Use urban soil mix under paved areas where feasible.



Part II – Tree Protection

GOAL: Increase tree survival.

A. Monitor trees threatened by unhealthy growing conditions or vandalism.

Trees are injured—or even killed—from natural and human-induced causes. They may be victims of arborcide (intentional killing) or accidents. Anyone who deliberately kills a tree or removes a tree without a permit is subject to a fine. Parks has a tree rescue program to address trees threatened by vandalism or infrastructure conflicts (e.g., strangling tree grates or tightly wrapped decorative lights).

- □ Verify 217 trees marked as threatened from the Street Tree Census, and place those that are confirmed on Parks' rescue contract.
- B. Install tree guards in heavy traffic areas and around significant large trees.

Young trees are especially vulnerable to physical damage from vehicles and to the soil contamination caused by pet waste and litter. By installing tree guards, these hazards are minimized. In addition, repeated pedestrian traffic over tree pits compacts the soil, limiting root growing space as well as the tree's ability to absorb water and nutrients from the soil. Thus, it is also important that older trees with the healthiest, largest canopies are kept alive by protecting their pits with tree guards and increasing pit size when possible.

- Partner with New York Restoration Project (NYRP) to raise funds to protect at least half of all newly planted trees with tree guards.
- Create a tree protection plan for the 44 largest trees, including installing tree guards and improving tree pits.
- C. <u>Remove dead trees promptly.</u>

The 2005/2006 Street Tree Census identified dead street trees in Far Rockaway.

□ Parks will remove 98 dead trees identified through the census.

Part III – Education and Stewardship

GOAL: Establish programs that increase the community's appreciation for street trees.

Sustaining a successful tree planting and tree care program requires community involvement and support. One way that Parks is working to generate that support is by the development of this management plan—which aims to be responsive to the specific concerns and desires of the community. The weak community response to initial outreach efforts necessitates a creative approach to attract attention to the goals of the project. The following strategies are based on these concepts.



Phragmites, a perennial wetland grass, commonly found in Far Rockaway.

A. Offer regular stewardship workshops.

Trained volunteers can significantly improve a tree's chance of survival through simple tasks such as watering, cleaning the tree pit, aerating the soil, and protecting the tree from physical damage and vandalism. Parks offers free training for citizens interested in learning how to care for the trees in their neighborhood, which includes providing free equipment for those residents who commit to caring for a particular tree.

- Parks will hold at least one stewardship training in the community each year.
- Parks will supply irrigation bags in areas with active stewards.



Rockaway Beach boardwalk at Beach 9th Street, looking westward.

B. <u>Provide educational programming and public awareness</u> about tree benefits.

Educating residents about the benefits of street trees will help establish a mindset that street trees are a critical element of a healthy community as opposed to a fringe benefit. Greater awareness may help recruit tree stewards, decrease vandalism, and generate financial support. Eventually, increased understanding and involvement will strengthen partnerships between Parks and the community.

- Parks will reach out to community organizations at the beginning of each planting season with the help of the Green Apple Corps and other partner organizations. Distribute information on street tree benefits, hold stewardship workshops, and increase school involvement in tree care and education.
- Promote tree awareness and appreciation through community activities such as street stenciling, planting demonstrations, and group walks.
- **D** Remind the community board and local elected officials to report threatened trees and arborcide



Lucretta Mott / PS 215 Briar Place, Far Rockaway.

to 311, as neighborhood residents are Parks' best defense against vandalism and arborcide.

C. Create and distribute print materials.

Parks has produced many flyers and other print media outlining the services we provide and introducing readers to the benefits of street trees. This information should be distributed to the community board, local schools, local community organizations, and public buildings. When appropriate, local newspapers should be recruited to publicize programs, events, or realized tree benefits.

- Distribute print materials describing street tree benefits and Parks' services.
- Publish four street tree press stories each year.



D. Incorporate active educational programs into school curricula and after-school programs.

While distributing print material is an important educational tool, it is a passive one. By actively engaging the community, Parks and partner organizations can cultivate community awareness and strengthen the public awareness campaign that is currently in place.

- □ Identify program partners in local schools and after-school programs.
- Establish street tree education curricula by the end of 2008 in every school through currently available programs: Urban Park Rangers, The Natural Classroom; NYRP's Fifteen for Trees; City Park Foundation's Seeds to Trees; CENYC's Training Student Organizers; and Trees New York's Young Citizen Pruners.
- E. Encourage residents to take ownership of their street trees.



Seagirt Avenue wetlands.

Training local citizens to perform ground pruning on young trees helps promote healthy tree structure and encourages residents to take ownership of their urban forest. Trees New York, a non-profit organization focused on educating people about the benefits of street trees, offers Citizen Pruner courses twice a year. People who complete this training are authorized to prune city trees, removing those branches they can reach from the ground. Parks offers scholarships to Citizen Pruner courses for those who join Parks' stewardship program and commit to caring for their neighborhood's trees.

Train two local Citizen Pruners each year.

Part IV – Policy Recommendations

GOAL: Identify and implement policies that influence the urban forest.

A. Coordinate with other city agencies to maximize street tree benefits.

The Parks Department has sole jurisdiction over the city's street trees. However, the policies of other city and state agencies can significantly impact the health and extent of New York City's urban forest. For example, the city recently passed a resolution requiring interior and perimeter tree planting for new parking lots.

In April 2008, the city council passed an amendment to the Zoning Resolution requiring all new developments to incorporate street trees into their design by planting one tree for every 25 feet of street frontage. Prior to this change, only those buildings designated as Quality Housing had to follow this requirement. While tax-deductible donations are currently accepted at City Parks Foundation and New York Restoration Project for tree planting projects, in the future, a tax incentive could be offered to large developers for tree planting off the public right-of-way.

- □ Parks and the Department of Buildings will implement street tree planting requirements for new buildings.
- □ Initiate new development reviews to minimize construction conflicts.

Part V – Evaluation and Monitoring

GOAL: Track progress on the overall vision and action items specified in this plan.

A system for measuring our progress must be established in order to assess the success of this project. Some variables that should be tracked are tree mortality, the number of trees planted and guards installed, stocking level, canopy cover change, and air quality.

- A. Track tree planting goals established in this document.
 - □ Track tree planting changes including planting, mortality, and permitted removals.
 - **D** Encourage other entities to track their tree planting changes in Parks' tree database.
- B. Assess canopy cover regularly.
 - □ Work with USDA Forest Service to assess canopy cover through digital satellite imagery every ten years.
- C. Encourage air quality trend assessment.
 - □ Work with EPA to determine the best methods for measuring air quality.
 - □ Seek partnerships with local colleges and universities to further an understanding of the relationship between canopy cover, air quality, and other health indicators.

This management plan focuses on planting and caring for trees on the streets and in parks. However, there are many other potential avenues for greening in Far Rockaway, including Parks' partnership with New York Restoration Project (NYRP) through MillionTreesNYC.¹

Existing Parkland

The parks and playgrounds in Far Rockaway were only surveyed for existing trees and tree planting opportunities. There are opportunities for greening parks that go beyond filling existing pits. Operation ReLeaf is a Parks program that creates horticultural enhancements near actively used areas of parks, such as playgrounds and public restrooms. Available spaces for ReLeaf sites should be identified in Far Rockaway.

Potential Greenstreets

Greenstreets present opportunities to create enhanced landscaped areas with trees planted in groupings with shrubs and flowering perennials. Commonly located on traffic triangles and median strips, greenstreets provide a better growing environment for trees than typical street tree pits. Potential greenstreet locations should be identified in Far Rockaway in an effort to utilize all available space for greening. PlaNYC provides funding for an additional 80 greenstreets citywide every year for the next ten years. Greenstreet construction in Far Rockaway should be prioritized.

New Park Property

Given that some of the best new greening opportunities are within Parks properties, acquiring new open space could improve the target area's canopy coverage. As part of this project, Parklands, a division of Parks that is responsible for land acquisition, looked at the availability of city-owned land within the project's boundaries. Acquisition of private lots would require outside funding and successful completion of a Uniform Land Use Review Process (ULURP)⁴² application.

Private and Institutional Property

In addition to public land, private property including front and backyards as well as institutional land, represents a substantial portion of the land in the target community. In fact, vacant land alone makes up 17% of the total land area in Far Rockaway. Private landowners should be encouraged, potentially through financial incentives, to preserve and care for the trees on their properties and to convert paved areas to landscaped areas.

Moving Forward

This report represents the culmination of a lengthy process involving community input and data collection. The recommendations proposed here set a solid foundation for achieving the goals of greening this neighborhood. Parks is proud to have acted as a catalyst for defining this strategy.

However, this is only the first step towards greening Far Rockaway. Realization of the goals established in this plan will require strong community will and significant leadership. Parks is committed to facilitating this process, but, ultimately, the partners that emerge during the early implementation phases are vital to sustaining the vision over the long term. Implementation will be successful only if the community supports the growth and preservation of its urban forest and works with Parks to strengthen our initial partnerships and cultivate new ones.

- 1 MillionTreesNYC Initiative is a partnership of New York Restoration Project (NYRP) along with many other local environmental organizations. The MillionTreesNYC campaign can become a driving force behind the greening of Far Rockaway beyond the streets and Parks properties by working with private property owners, developers, and infrastructure policy (http://milliontreesnyc.org).
- 2 New York City Department of Health and Mental Hygiene. 2006. Community Health Profile (http://www.nyc.gov/html/doh/downloads/pdf/data/2006chp-502.pdf).
- 3 Environmental Protection Agency (EPA). Fact Sheet: Asthma and Outdoor Air Pollution (http://www.epa.gov/airnow/health-prof/Asthma_Flyer_Final.pdf).
- 4 Guaderman, W. J., Avol, E., et al. 2004. The effect of air pollution on lung development from 10 to 18 years of age. *The New England Journal of Medicine*, 351(11), 1057-1067.
- 5 Bell, M. L., Peng, R. D., and Dominici, F. 2006. The exposure-response curve for ozone and risk of mortality and the adequacy of current ozone regulations. *Environmental Health Perspectives*, 114(4), 532-536.
- 6 Lovasi, et al. 2008. Children living in areas with more street trees have lower prevalence of asthma. *Journal of Epidemiology and Community Health*, 62, 647-649.
- 7 D. Nowak, et al. 2007. Assessing Urban Forest Effects and Values: New York City's Urban Forest. USDA Forest Service, Northern Research Station.
- 8 McPherson, E. G. 1991. Cooling urban heat islands with sustainable landscapes. Work. Pap. 91-10. Tuscon, AZ: The Drachman Institute for Land and Regional Development Studies, The University of Arizona. 16 pp. (M, NA).
- 9 Environmental Protection Agency (EPA). Heat Island Effect website (http://www.epa.gov/heatisland/).
- 10 This figure was based off of the 2005/2006 Street Tree Census and calculated to support PlaNYC iniatives.
- 11 According to the Academy of Allergy Asthma and Immunology, pollen graphs showed that NYC has a very low pollen problem compared to other cities (http://www.aaaai.org).
- 12 Nowak, D., et al. 1999. A modeling study of the impact of urban trees on ozone. Atmospheric Environment, 34, 1601-1613.
- 13 Kaplan, R. 1993. The role of nature in the context of the workplace. *Landscape Urban Planning*, 26, 193-201.
- 14 Kuo, F. E. 2003. The role of arboriculture in a healthy social ecology. Journal of Arboriculture, 29(3), 148-155.
- 15 Kuo, F. E. and Sullivan, W. C. 2001. Environment and crime in the inner city: does vegetation reduce crime? *Environment and Behavior*, 33(3), 343-367.
- 16 Kuo, F. E. and Sullivan, W. C. 2001. Aggression and violence in the inner city:effects of environment via mental fatigue. *Environment and Behavior*, 33(4), 543-571.
- 17 Taylor, A. F., Wiley, A., et al. 1998. Growing up in the inner city: green spaces as places to grow. Environment and Behavior, 30(1), 3-27.

18 Ulrich, R. S. 1984. View through a window may influence recovery from surgery. Science, 224 (Apr. 1984), 420-421.

- 19 Wells, N. M. 2000. At home with nature: effects of "greenness" on children's cognitive functioning. *Environment and Behavior*, 32(6), 775-795.
- 20 Wolf, K. 2003. Public response to the urban forest inner-city business districts. Journal of Arboriculture, 29(3), 117-126.
- 21 Foster, C. and Hillsdon, M. 2004. Changing the environment to promote health-enhancing physical activity. *Journal of Sports Sciences*, 22, 755-769.
- 22 Gehl, J. 1987. Life Between Buildings. New York: Van Nostrand Reinhold.
- 23 Humpel, N., Marshall, A. L., et al. 2004. Changes in neighborhood walking are related to changes in perceptions of environmental attributes. Annals of Behavioral Medicine, 27(1), 60-67.
- 24 Jackson, L. E. 2003. The relationship of urban design to human health and condition. Landscape and Urban Planning, 64, 191-200.
- 25 U.S. Census Bureau. American Fact Finder (http://factfinder.census.gov/home/saff/main.html).
- 26 The Rockaway Wave.
- 27 New York City Department of Parks & Recreation. Cornell Burial Ground and Lot (http://www.nycgovparks.org/sub_your_park/historical_ signs/hs_historical_sign.php?id=8277).
- 28 Landmarks Preservation Commission, Cornell Burial Ground.
- 29 Department of City Planning Commission. Bayswater/Far Rockaway Rezoning (http://www.nyc.gov/html/dcp/html/bayswater_far_rock/index. shtml).
- 30 Arverne by the Sea (www.arvernebythesea.com).
- 31 New York City Department of Parks & Recreation, MIS Division, Parks Properties data layer.
- 32 Open Space Ratios by District, New York City Department of Parks & Recreation, Parklands Division data.
- 33 Environmental Defense Scorecard (www.scorecard.org).
- 34 McConnell, R., Ling Y., et al. 2006. Traffic, susceptibility, and childhood asthma. *Environmental Health Perspectives*, 11(5), 766-772.
- 35 Kim, M., Berger, D., et al. 2006. *Diabetes in New York City: Public Health Burden and Disparities*. New York: New York City Department of Health and Mental Hygiene. Appendix B.
- 36 Pirani, R., Berizzi, P. C., et al. 1998. Keeping the Green Promise. New York: Environmental Action Coalition: New York, 8.
- 37 Grove, J. M., et al. 2006. A Report on New York City's Present and Possible Urban Tree Canopy. USDA Forest Service, Northeastern Research Station.
- 38 Santamour, F. S., Jr. 1990. *Trees for Urban Planting: Diversity, Uniformity, and Common Sense*. Proc. 7th Conf. Metropolitan Tree Improvement Alliance (METRIA), 7, 57-65.
- 39 The Asian longhorned beetle (ALB) is an invasive pest from China. It is a serious threat to our hardwood trees, some of which are more susceptible than others. Although the beetle has yet to be found in Far Rockaway specifically, it is a pest that knows no geographical boundaries, and 47% of New York City's trees are susceptible to infestation.
- 40 Nowak, D.J. 1994. Air pollution removal by Chicago's urban forest. In: McPherson, E.G., Nowak, D. J., and Rowntree, R. A. Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project. USDA Forest Service General Technical Report NE-186. pp. 63-81.
- 41 Stewardship Mapping and Assessment Project (STEW-MAP). USDA Forest Service, Northern Research Station, NYC Urban Field Station and Columbia University, Department of Sociology.
- 42 ULURP is a standardized procedure whereby applications affecting the land use of the city are publicly reviewed.
- 43 MSDS Hyper Glossary (http://www.ilpi.com/msds/ref/index.html).

Appendices

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The Environmental Protection Agency monitors air concentrations and emissions of six common air pollutants, otherwise known as "criteria" air pollutants: ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. While the level of each of these pollutants in our air has decreased in the last 20 years, there are still millions of people living in counties that do not meet air quality standards for one or more of these chemicals. Four of the six criteria pollutants are of particular concern for people living in the New York City Metropolitan area. An additional category, Volatile Organic Compounds is described below because of its role in the formation of ground-level ozone.

Ozone

Ozone is a highly reactive form of oxygen. Ozone is not directly emitted into the atmosphere, but is formed via a three-way reaction involving sunlight, nitrogen oxides (NOx), and what are known as volatile organic compounds—or VOCs. This reaction is temperature-dependent, with rising temperatures leading to faster rates of ozone formation.

Particulate Matter

Particulate matter includes carbon particles, soil, ash, and sulfate or nitrate compounds. Particulate matter is normally separated into two major size classes. Fine particulate matter (PM2.5) is any particle less than 2.5 micrograms and coarse particulate matter refers to particles between 2.5 and 10 micrograms (PM10). Combustion of fossil fuels (e.g., diesel exhaust and power plant emissions) is a major source of particulate matter. Sulfates and nitrates are not released directly from fuel combustion, but are formed from sulfur and nitrogen oxides which are a direct by-product of combustion. Other sources of particulate matter include construction activity and wood burning.

Sulfur and Nitrogen Oxides (NOx and SOx)

Sulfur and nitrogen oxides are gases formed when fossil fuels are burned. The formation of NOx are favored at high temperatures, while SOx are released regardless of temperature. Both NOx and SOx react with other substances in the air to form toxic compounds, including nitric and sulfuric acids, the culprits of acid rain. These acids cause environmental and human health effects, including disruption of the respiratory system. NOx also react with VOCs and sunlight to generate ground-level ozone.

Volatile Organic Compounds (VOCs)

Volatile organic compounds are organic chemicals that have a high vapor pressure, or form gases at normal temperature and pressure. Sources of VOCs include organic solvents, paint additives, aerosol spray can propellants, fuels (such as gasoline and kerosene), dry cleaning products, and many other industrial and consumer products ranging from office supplies to building materials. VOCs are also naturally emitted by a number of plants and trees. Some VOCs, like benzene, are toxic and hazardous to health when inhaled. Other hydrocarbon VOCs contribute to the formation of ground-level ozone and smog.⁴³

Far Rockaway Tree Facts

Diversity

- There are 68 different species within the population.
- The top 4 species make up about 50% of the population.
- Two species, London planetree and honeylocust each comprised more than 15% of the total population.

Condition

- There are 3,779 live trees and 98 dead trees in your neighborhood.
- 40% of the trees have some reported trunk damage.
- 87% of the live trees are in good or excellent condition.

Facts

- There are 251 empty pits in your neighborhood.
- 2,731 potential planting spaces were identified.
- With a little under 4,000 trees currently in your area, the streets are approximately 41% full.
- Based on our initial analysis, the number of trees in Far Rockaway has increased significantly since the 1995 census.



City of New York Parks & Recreation Michael R. Bloomberg, Mayor Adrian Benepe, Commissioner

STEWARDS FOR YOUNG TREES WORKSHOP

Mission

- Citizen Stewards for Young Trees educates and equips New Yorkers to care for street trees and greenstreets.
- Through simple tasks like watering, weeding, and picking up litter, you can help young street trees and greenstreets thrive, improving the health and beauty of our city.



Training

- \circledast Attend a free workshop and learn how to care for the urban forest.
- \circledast Receive a tool kit including gloves, trowels, garbage bags and watering tools.
- For advanced training, attend a free shrub pruning class or apply for a tree pruning course scholarship. Once certified, receive hand pruners, folding saws and pole pruners.

Rewards

<u>Basic Tool Kit</u>

Bucket Trowels Cultivators Weeders Garbage Grabbers Safety Vests Hoses Garbage Bags

- \circledast Establish a working relationship with the Parks Department to access additional resources.
- Receive free botanical street tree labels, recognition on your adopted greenstreets' sign, invitations to autumn borough receptions, and a volunteer permit card that provides discounts from select merchants throughout New York City.

TO REGISTER FOR A WORKSHOP

call (212) 360-8180 OR e-mail workshops@partnershipsforparks.org

Citizen Stewards for Street Trees and Greenstreets is a training program offered by Partnerships for Parks in partnership with the New York Tree Trust.

City of New York Parks & Recreation

Michael R. Bloomberg, Mayor Adrian Benepe, Commissioner



Trees for Public Health

Goals

- Create community informed plans to green neighborhoods with few trees and high asthma rates
- Mobilize community groups to work collaboratively with Parks and other agencies to establish and realize their greening goals

Trees for Public Health 2005

Parks will be focusing attention on at least one neighborhood per borough over the next year. East Harlem, East New York, Morrisania, Rockaways and Stapleton were selected given their high asthma rates and lower than average tree cover.

Parks and its Americorps crew (the Green Apple Corps) will work collaboratively with community-based organizations to:

- reach out to other groups to partner with Parks
- survey existing trees and tree planting opportunities
- establish greening goals and priorities
- develop strategic greening plans to reach these goals



This plan is based on our successful experience in Hunts Point, a community in the South Bronx similarly plagued by high asthma rates and low tree cover.

Research Shows

- Street trees make up one fifth of all New York City trees on public land.
- Trees provide beauty, instill community pride, and connect people to nature.
- Trees improve property values.
- In 1994, trees in New York City removed an estimated 1,821 metric tons of air pollution at an estimated value of \$9.5 million.
- Reduced air temperatures can improve air quality because the emission of many pollutants and/or ozone-forming chemicals are temperature dependent.
- Reducing daytime high temperatures can reduce heat related illness such as stroke, hypertension, and cardiovascular diseases.
- Trees reduce building energy use by lowering temperatures, shading buildings during the summer, and blocking winds in winter.
- Through the reduction of ozone and the filtering of particulate pollutants, both asthma triggers, trees can reduce asthma symptoms.

To participate in Parks' Trees for Public Health Initiative, please call Liza Rosen at 718-760-6895



City of New York Parks & Recreation Michael R. Bloomberg, Mayor Adrian Benepe, Commissioner





Survey Form Examples

Example A

F	Surveyor Last Name	Date (mm/dd) Z	one															
' 🛛	DOE	05 / 05	111	ATTENTION PLEASE: This form must be filled in with BLACK or DARK BLUE ink with HANDPRINTED CAPITAL LETTERS according to the following examples: A.B.C.D.E.F.G.H.I.J.K.L.M.N.O.P.Q.R.S.T.U.Y.W.X.Y.Z. 1.2.3.4.5.6.7.8.9.0. Example of checkmark X														
Place an x	Treet PARKSIDE AVE			Tree Location Tree Pit							Overhead	Infrastructure	dition Trunk Damage		Species			
if ALL of the data on this	Even Cross Street 1	OTCH RD		No.	1 Front 2 Side	Type	Soil Level	Vertical Treatment	Horizontal Treatment	Sidewalk	1 House Tap	1 Canopy Debris	1 Excel-	DBH	1 Torn bark	CODE		
form has been submitted online!	Cross Street 2 Odd SPR				3 Rear 4 Across	r walk Pit	2 Level 3 Below	guard 2 Tall	2 Grate 3 Planting	2 Cracked 3 Raised	3 Secondary 4 Other	3 Close Paving 4 Choking	2 Good 3 Poor	use correct side of tape	2 Trunk wound	from leaf key		
	Street Days (any frat apply Cleaning M		6 Media 7 Side/	6 Median 7 Side/	Pit 3 Lawn	Pit Lawn	guard 3 Wall 4 Other	- None	- None	= None	6 Tree Lights 6 Electric Outlet	5 Shaft 6 Stump	to the nearest 0.5 inch	- None	enter "UNK"			
	No trans 10							- None				7 Sneakers 8 Other - None	Pit		worst condition	CAPITALS		
2 0 0 5 Street Tree Census	1 Building #	2 Building Street Name			4	6	6	7	8	9 enter codes	10 for all that apply	11	12	13	14	15		
	360	PARKSIDE AVE.		1	1	1	2	-	1	1	12	1	1	15.5	-	GIBI		
	360	PARKSIDE AVE.		2	1	2	1	-	1	1	23	-	2	10	1	GLTR		
	362	PARKSIDE AVE.		1	1	1	2	1	1	3	1,2,3	5	1	5	3	ACPL		
	362	PARKSIDE AVE.		2	1	3	2		2	1	1234	-	6	25	-	UNK		
NC	366	PARKSIDE AVE.		1	1	3	1	4	1	1	2,3	-	1	9.5	2	ACPL		

Example B

	Surveyor Last Name		Date (mm/dd)	Zone													
' 🗋	DOE	ATTENTION PLEASE: This form must be filled in with BLACK or DARK BLUE ink with HANDPRINTED CAPITAL LETTERS according to the following examples: .A.B.C.D.E.F.G.H.I.J.K.L.M.N.O.P.Q.R.S.T.U.V.W.X.Y.Z. 1.2.3.4.5.6.7.8.9.0. Example of checkmark X															
Place an x	Street Street	SPRUCE ST.		Tree Location Tree Pit						Overhead Infrastructure Wires Conflicts		Tree Condition		Trunk Damage	Species		
if ALL of the data on this	Even Cross Street 1 P.	ARKSIDE	AVE.		No.	1 Front 2 Side	Type 1 Side	Level	Treatment	Horizontal Treatment	1 Good	1 House Tap 2 Primary	1 Canopy Debris 2 Choking Wires	1 Excel-	DBH	1 Torn bark	CODE
form has been submitted online!	Odd Cross Street 2	WORTHIST				3 Rear 4 Across	walk Pit	K 2 Level 3 Below	guard	2 Grate 2 Cri 3 Planting 3 Ra	2 Cracked 3 Raised	3 Secondary 4 Other	3 Close Paving 4 Choking	2 Good 3 Poor	use correct side of tape	2 Trunk wound	from leaf key
	Street Days (any flat apply) Cleaning				1	6 Adjacent 6 Median 7 Side/	2 Cont. Pit 3 Lawn		guard 3 Wall	4 Other - None	- None	- None	6 Tree Lights 6 Electric Outlet	6 Shaft 6 Stump	to the nearest 0.5 inch	3 Cavity - None	if unknown, enter "UNK"
	X Yes No 1					Across 8 Side/ Median			4 Other - None				7 Sneakers 8 Other – None	7 Empty Pit		choose worst condition	CAPITALS
	1 Building #	2 Building Street Nar	10 L .00		3	4	5	6	7	8	9	10	11	12	13	14	15
				-		Ť	-		(0	enter codes	s for all that apply)		1		0.10		
Census	366	PARKSID	E AVE.		1	2	1	2	1	3	1	-	6	1	15	-	TICO
	366	PARKSID	E AVE.		2	2	1	2	1	3	3		-	2	8	2	TICO
Tree 2																	
0 0																	