

Section 3

Community Setting

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Section 3.1:

REGIONAL CONTEXT

Physical Location and Watershed Address

Geographical Location

Boston is in eastern Massachusetts on the coast of the Atlantic Ocean, at the westernmost point of Massachusetts Bay where the Mystic, Charles, and Neponset Rivers meet the sea. Boston is located within two major watersheds, the Boston Harbor Watershed and the Charles River Watershed. The Boston Harbor Watershed includes the Mystic River sub-watershed to the north and the Neponset River sub-watershed to the south. These watersheds are further described in Section 4.3. It sits at latitude 42.3581° N and longitude 71.0636° W. The lowest point of the city is at sea level. The highest point is at Bellevue Hill in West Roxbury which is 325 feet above sea level. The city has 48.4 square miles of land (not including islands) and 41.2 square miles of water. The City of Boston is the county seat of Suffolk County and the capital of the Commonwealth of Massachusetts.

Boston is bounded on the north by Chelsea Creek, the Mystic River, and the Charles River, and by the Town of Winthrop, the City of Revere, the City of Chelsea, the City of Everett, the City of Somerville, the City of Cambridge, and the Town of Watertown. It is bounded on the west by the Muddy River and the Charles River and by the City of Newton, the Town of Brookline, the Town of Needham, and the Town of Dedham. Boston is bounded on the south by the Neponset River, and by the Town of Milton and the City of Quincy. It is bounded on the east by Boston Harbor, Dorchester Bay, the Neponset River, and the Boston Harbor Islands.

Communities of Boston

The city is made up of many neighborhoods, but for the purposes of the Open Space and Recreation Plan, sixteen (16) communities were used: Allston-Brighton, Back Bay/Beacon Hill, Central Boston, Charlestown, Dorchester, East Boston, Fenway/Longwood, Hyde Park, Jamaica Plain, Mattapan, Mission Hill, Roslindale, Roxbury, South Boston, the South End, and West Roxbury. Many of these communities were once cities or towns that were annexed.

Impact of Location

The region as a whole is known as the Boston Basin, the lowlands and Boston Harbor surrounded by a series of hills. These hills, the Blue Hills to the south, the Arlington Heights to the west, and the Middlesex Fells to the north, define this outer rim. The Shawmut Peninsula, where the City of Boston began, was the center of this circle, and where the major rivers of this basin (the Mystic, Charles, and Neponset) radiated toward, making this a strategic location from which people, goods, and services could spread. Glaciation produced lowlands and drumlins, both inland and in the Harbor. The coastline is deeply embayed and varied. This containment by the rim of hills and the radiating rivers made the center of the region—Boston—uniquely poised to serve as its

economic engine, becoming a major port and transportation hub. Charles Eliot's regional park plan built on these regional assets, and sought to preserve the hills and lands along the rivers and coastline for the future enjoyment of the region's population, home to almost one-third of the state's population.

Adjacent Land Uses and Resources Shared with Neighboring Communities

Boston is linked with its municipal neighbors by infrastructure, commerce and education, and also by the larger regional system of open spaces and natural areas. The summary below specifically notes natural and environmental resources that are shared between Boston and adjacent communities from north to south. Appendix A presents further information about adjacent land uses in the communities around Boston.

Town of Winthrop

In Winthrop are large conservation properties owned by the Massachusetts Department of Conservation and Recreation (DCR) and the town including the Belle Isle Marsh Reservation, the Fort Banks Playground, and a cemetery, while across Belle Isle Inlet in East Boston are the large open spaces of Belle Isle Marsh Reservation, Constitution Beach, and Wood Island Bay Marsh.

City of Revere

Two areas in Revere that are across the Belle Island Inlet from East Boston are Revere-owned open space. The Suffolk Downs racetrack straddles the border of Revere and East Boston. The portion of East Boston that is adjacent to Revere includes the Belle Isle Marsh Reservation. The riverbank of Chelsea Creek continues northward from East Boston to Revere.

City of Chelsea

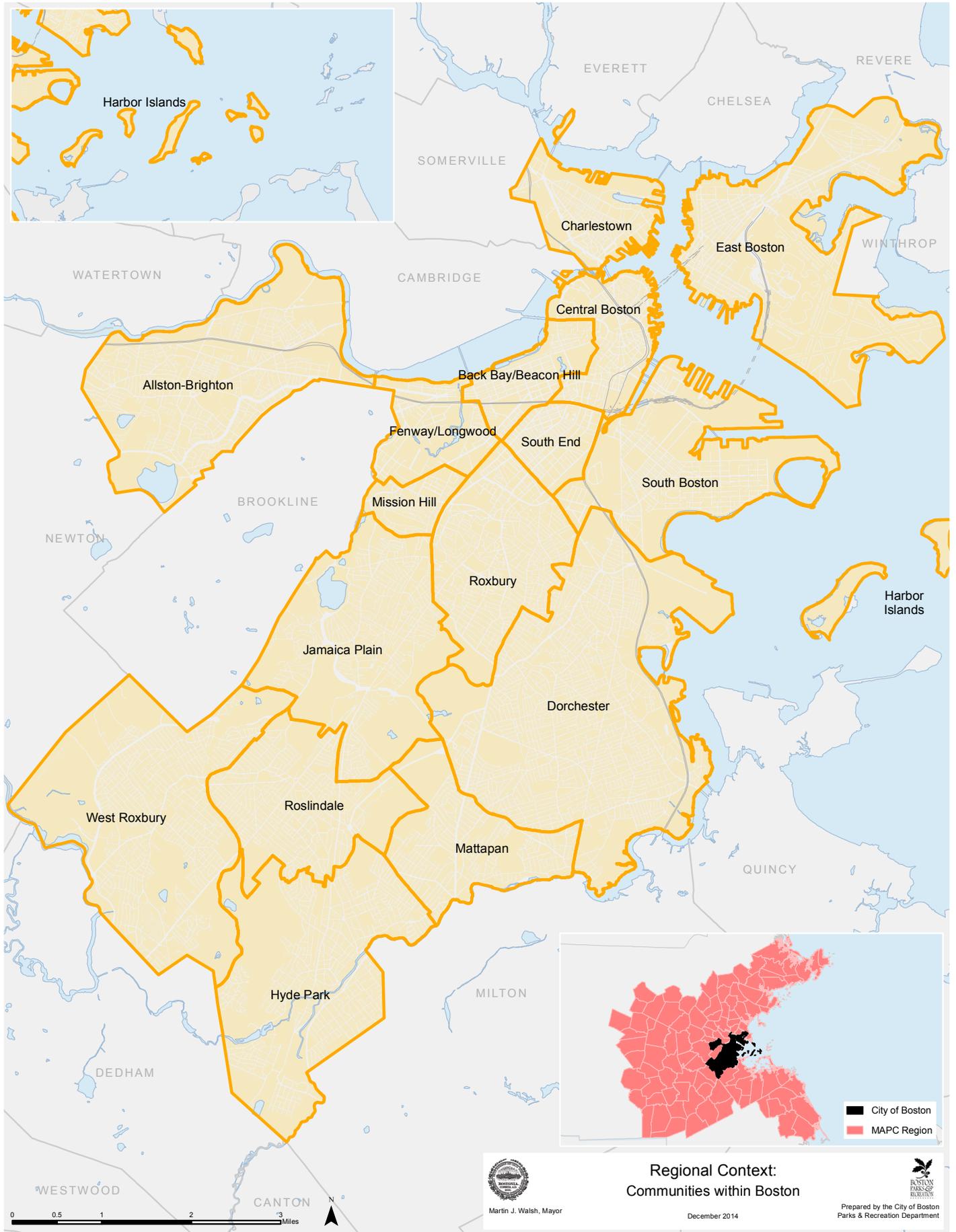
The common natural resource shared by East Boston and Chelsea is Chelsea Creek. However, industrial and commercial uses dominate both shorelines, with the exception of the Condor Street Beach urban wild in East Boston. The common natural resource shared by Charlestown and Chelsea is the Mystic River. In this segment of the Mystic River, industrial and commercial uses dominate the Charlestown side, while the Chelsea side is dominated by a city park (O'Malley Memorial Park).

City of Everett

The common natural resource shared by Everett and Charlestown is the Mystic River. The uses on both sides of the river are industrial, commercial, and transportation, with the exception of Ryan Playground on the southern side near the Alford Street Bridge (Route 99). The land adjacent to the Alford Street Bridge in Everett is currently designated to be the proposed Wynn Everett casino.

City of Somerville

The natural resource shared by Somerville and Charlestown is the Mystic River. The portion of Charlestown that abuts Somerville includes the MBTA Bus Barn which sits on the riverfront adjacent to Assembly Square, a large development area.



City of Cambridge

The shared natural resources between Boston and Cambridge are the Millers River and the Charles River. Parkland predominates on either side of these water bodies.

Town of Watertown

The shared natural resource between Boston and Watertown is the Charles River. Parkland predominates on either side of the river.

City of Newton

The natural resource shared by both Newton and Allston-Brighton is the Charles River. Not only this is by virtue of each area abutting along the southern side of the river, but also hydrologically, as the Newton Commonwealth Golf Course, a large municipal open space in Newton, is in the watershed of Chandler Pond, one of Boston's remaining fresh water bodies.

The Charles is also shared by Newton and West Roxbury, hydrologically connecting the DCR's Cutler Park and Boston's Millennium Park.

Town of Brookline

The primary natural resource shared by Brookline and Boston (Mission Hill and Jamaica Plain) is the Muddy River and the parklands on its banks known as the Riverway and Olmsted Park. Other wooded or open spaces along the Brookline/Boston border include those associated with Showa Institute, Daughters of Saint Paul, Lawrence Farm, Allandale Woods, Leatherbee Woods, Hancock Woods, and Blakely Hoar Sanctuary.

Town of Dedham

The major shared natural resources with Dedham and Boston include the Charles River, the Mother Brook, and the Neponset River. Most of Sprague Pond is in Boston, but its southern tip lies in Dedham. Natural areas and open spaces along these resources include DCR's Cutler Park, Havey Beach, the Fowl Meadow, and the Neponset River Reservation, Boston's Millennium Park, Dedham's Riverdale (Kehoe) Park, Condon Park, and Mother Brook Park, and private cemeteries.

Town of Milton

The Neponset River is the major shared natural resource for Milton and Boston. The Neponset River Reservation straddles much of both the Milton and Boston shorelines.

City of Quincy

The Neponset River is the major shared natural resource for Quincy and Boston. The Neponset River Reservation straddles some of both the Boston shoreline. The DCR Pope John Paul II Park, Port Norfolk Park, Tenean Beach, and Victory Road Park are located on the Boston side, and Squantum Point Park is located on the Quincy side.

Socio-Economic Context

Boston is the largest city in the state, and the largest city in New England. In 2010, Boston had a population of 617,594, making it the 22nd largest city in the U.S. Boston has a land area of 48.4 square miles making it the second smallest major U.S. city in

terms of land area, after San Francisco. Boston has a population density of 20.3 persons per acre, which is greater than Chicago at 18.6 persons per acre.

The city is the anchor of the Boston-Cambridge-Newton, MA-NH Metropolitan Statistical Area (MSA), which is the tenth-largest in the U.S., with a total population of approximately 4,640,802. The Boston-Worcester-Manchester/Nashua Combined Statistical Area is the fifth largest in the U.S. with more than 7.6 million residents. This CSA represents the commuting region of Boston.

Boston is among the most economically powerful cities in the world. Pricewaterhouse Cooper (Hawksworth, Hoehn, and Tiwari 2009) notes that the Greater Boston metro area has the sixth-largest economy in the country and the twelfth-largest economy in the world. The *2011 Global Economic Power Index* by noted urban planning theorist Richard Florida (2011) ranked Boston as sixth in the world in terms of economic power, behind Tokyo, New York, London, Chicago, and Paris.

The *2013 Economy Report* by the BRA summarizes Boston as follows:

"At the start of 2013, the overall demographic and economic health of Boston is strong. The City's population is growing, becoming increasingly diverse, and more educated. These population trends position Boston well for competing in the global knowledge economy. In terms of jobs, Boston appears to have weathered the most recent economic downturn well. While unemployment and job losses were issues here, the effects of the recent recession were not nearly as severe in Boston as they were throughout the U.S.

Over the last year Boston experienced significant job growth. Recent building permit data lends further support to the notion that the Boston economy is moving forward following the "Great Recession." Local employment projections suggest that Boston's leading industries are poised for strong growth over the next several years, particularly in Professional, Scientific and Technical Services and also Education and Health Care." (BRA, Research Division 2013)

With the strong presence of several institutions of higher learning and research hospitals, which attract private investment and businesses, the City of Boston is positioned to maintain its momentum for being an economic engine that attracts capital and people, which thereby generates pressures for development and the need for further open space protection and development.

Regional Watershed Planning Efforts

Regional watershed planning efforts include those of the Boston Harbor Watershed and its Mystic River and Neponset River sub-watersheds, and the Charles River Watershed.

Documents were reviewed for applicability to this Open Space and Recreation Plan, and for potential partnerships, programs, planning and projects. The documents are summarized in Appendix C.

Regional and Municipal Planning Initiatives

In addition to the watershed planning efforts referenced above, federal, state, regional, and municipal planning initiatives were reviewed for applicability to this Open Space and Recreation Plan. The documents reviewed are summarized in Appendix D.

Regional Land Trusts

Boston is served by several national, regional and local conservation organizations and land trusts, which work in partnership with smaller nonprofits.

The Trustees of Reservations

The Trustees of Reservations (TTOR) is the nation's oldest regional land trust, dedicated to preserving properties of scenic, historic, and ecological value in Massachusetts. The organization cares for more than 100 places statewide—nearly 25,000 acres. Through the incorporation of the Boston Natural Areas Network as of 2014, The Trustees has transformed the Network's holdings into its new Boston Region. This Boston Region holds more than 175 community gardens, the Leatherbee Woods urban wild in West Roxbury, and an agricultural preservation restriction on part of Allandale Farm in Jamaica Plain. (TTOR Undated)

The Trust for Public Land

The Trust for Public Land (TPL) has protected nearly 14,300 acres of land in Massachusetts since 1980, primarily through acquisition assistance and advocacy. The land protection and enhancement efforts in Boston have included Thompson Island, the East Boston Greenway, playgrounds such as Elmhurst Park, and community gardens such as the Berkeley Street Garden. (TPL Undated) The TPL also releases an annual Park Score Index which rates the provision of parks in the 60 largest cities in the US. Boston tied for third place in 2013, when 50 cities were ranked; in 2014, with 75 cities considered, Boston is ranked eighth. (TPL Undated)

Massachusetts Audubon Society

Founded in 1896, the Massachusetts Audubon Society is a completely separate organization from the National Audubon Society. It engages in research, education, advocacy, and natural land protection and management. It has nature sanctuaries statewide. The organization owns a 67-acre portion of the former Boston State Hospital site in the Mattapan-Roslindale section of Boston, known as the Boston Nature Center. The center includes two miles of trails, one mile of which is universally accessible. Per their website, the grounds are "home to over 150 species of birds, 40 species of butterflies, and more than 350 species of plants." It also contains the Clark-Cooper Community Garden, the largest and one of Boston's oldest. Year-round educational programs help inform Boston's residents of their natural surroundings. (MAS 2015) A "green" building houses its staff and programs, built with funds from the George Robert White Fund, which is managed by the City of Boston Trust Office.

Resources of Regional Significance

Resources of regional significance located in Boston include the parks of the Emerald Necklace, the Charles River Reservation, the Neponset River Reservation, the Stony Brook Reservation, the Belle Isle Marsh Reservation, the Dorchester Shores and Old Harbor Reservations, the Arnold Arboretum, two municipal golf courses, active and historic cemeteries, greenways, parkways, the Harborwalk, urban coastal beaches, the Boston Harbor Islands, Forest Hills Cemetery, and Soldiers Field. The Blue Hills Reservation is immediately adjacent to Boston, and also has regional significance.

Some of the most extensive and significant regional scale open spaces in the Boston metropolitan area are found in Boston's communities, and these resources are available to users beyond the City's boundaries. Many of the neighboring communities that are smaller in population lack the significant open space resources that can be found in Boston. It can be presumed that adjacent communities meet at least some recreational needs by making use of the facilities located in Boston.

Boston had 617,594 residents in 2010 and over 16,250,000 visitors to the Boston MSA region in 2014. (Greater Boston Convention and Visitors Bureau 2015) Being the center of a large metropolitan region, and a major tourist destination, generates significant impacts on Boston's open space resources of regional significance.

Open space resources of regional significance are further discussed in Sections 5 and 7.

Shared Protection Strategies

The above review of land use maps, watershed plans, regional open space documents and municipal open space plans suggests that watershed and river planning has offered the best examples of shared protection efforts. It appears that waterfront land uses may offer the greatest disparity between adjacent municipalities, and the greatest opportunities for regional planning. There is also opportunity for shared protection strategies between the State, the City of Boston, and other municipalities for regional scale or shared open space, beyond the awareness of protection needs of rare species.

A review of municipal open space plans indicates that a goal of some neighboring communities is to form coalitions, communications, and connections with neighbors on open space initiatives. There are opportunities for Boston and adjacent municipalities to work together with MAPC and the Commonwealth on waterfront and riverfront planning, linear parks, green infrastructure, alternative transportation, social equity, and climate change on a regional level and between adjacent municipalities. The opportunity exists for the City of Boston to be partners with its neighbors over shared resources and environmental issues that exist beyond the boundaries of the city.

Section 3.2:

HISTORY

Introduction

Boston's social and political history since colonization—its growth over the last 400 years, its academic, cultural, and industrial achievements—have brought it to world-wide renown and is well documented elsewhere. We will cover Boston's history and archeology from the perspective of how it has shaped our land uses, especially those pertinent to our environmental and recreational pursuits.

History of Settlement and Development in Boston*

Prehistoric Era (12,000–400 BP)

Boston's human history began approximately 12,000 years ago. The first Native People were hunters following migrating herds of large game like mastodon or caribou. These nomadic people settled on the ring of hills overlooking low-lying areas with rivers and wetlands where animals gathered.

The landscape and environment that the Native People encountered would have been far different than today. The one mile thick glaciers that once covered the area were retreating but still retained vast quantities of water, causing a sea level nearly 250 feet lower than today. Boston's shoreline would have extended nearly 10 miles east of its current location due to the lower sea level. The cold environment and lack of soil due to glacial erosion resulted in a tundra with low shrubs, mosses, and few trees. There is little evidence of human settlement from this early period due to seasonal movement, the tendency to locate within estuaries, the use of organic building materials, the consequent human development that may have eradicated these sites, and changes in land forms and sea level rise.

The Archaic Period (10,000–3,000 BP) saw an increase in the native population, now using many areas of Boston. The development of forests and major rivers allowed Native People to begin establishing seasonal camp sites at the location of resources such as wild berries, hunting areas, and stone outcrops that could provide the material for tools. The Woodland Period (3,000–400 BP) saw the stabilization of the overall climate and the formalization of settlements in villages at river confluences and outlets in Boston.

There were two major factors that occurred in Boston's environmental history 3,000 years ago. The first was the flooding of Boston Harbor. Up to this point, the Harbor was a hilly plain similar to Jamaica Plain and Roxbury today. Rising sea levels quickly transformed the area into a shallow harbor filled with islands. The shellfish in the harbor came to provide a reliable food source.

The second major development 3,000 years ago was the adoption of pottery and agriculture, which helped to transition the Native population from nomadic hunters to life in more formally established villages in places like Charlestown, downtown Boston, and the Lower Mills area of Dorchester. These villages contained the populations of Native People who were encountered by Europeans when they first began exploring and settling what would become Boston in the early 1600s.

Contact Period (1500–1620 AD)

The Historic and Archaeological Resources of the Boston Area (Massachusetts Historical Commission 1982) notes there likely developed a seasonal migration pattern, where in the spring and fall the native populations settled along the Neponset and Mystic River estuaries, and the nearby Harbor Islands, while during the summer and winter, they would likely have dispersed to smaller sites along upland tributaries and ponds (beyond the limits of present Boston) for greater protection from storms and the opportunity for ice fishing and hunting.

The Native American settlement along the coast probably increased during the Contact Period because the presence of Europeans provided opportunity for trade, yet also reduced their population through infectious diseases brought by the European traders.

The primary transportation system during the Contact Period was a complex network of trails that followed the natural contours of the landscape, changed elevation at an easy grade, and favored the sunny rather than shady slope. The trail network provided alternative routes for crossing the landscape. Examples of native trails include Shawmut Avenue in Boston proper and Mishawam Street in Charlestown.

Fords were located where trails crossed rivers, usually at the first fall line such as the Charles River at Watertown Square and the Neponset River at Lower Mills. Archeological evidence on the Harbor Islands indicates that water transport was used.

Plantation Period (1620–675 AD)

This period is defined by the establishment of permanent English settlement along the coast, and expansion inland along major tidal rivers. The initial European settlements of coastal trading posts and plantations clustered with the native population around the Mystic, Neponset, and Charles River estuaries.

This period is also characterized by the virtual removal of the native population from the Boston area. By the end of the 1600s, the remnants of the native population had retreated to upland sites such as the Blue Hills, or moved west and north of Boston.

There were two types of settlement patterns in this era—the planned town and the organic village. Charlestown is the only planned town within Boston, characterized by a regular street grid and formal market squares (Harvard Square in Cambridge is another local example). Partial attempts at formal street plans were made in Boston.

* Much of the material presented in the early eras of this history are sourced from personal communications with Joseph Bagley of the City of Boston Archaeology Program and from the Massachusetts Historical Commission's 1982 publication, *Historic and Archaeological Resources of the Boston Area*.

The most common type of settlement pattern was the organic village which was usually located at the intersection of existing native trails, and centered on a meetinghouse and burying ground, perhaps with a tavern and common ground. Early examples developed in Dorchester and Roxbury.

By the mid-1600s, most towns consisted of a small meeting house center with individual farms set in a grid of divided fields. Boston itself had developed in a more intense pattern by this time, with an urban density with separate residential and commercial districts.

The colonists used the native trail system to get around difficult terrain, and improved ford sites by building bridges. Planned towns such as Charlestown had street grids. Rangeways—long, straight roads that ignored changes in topography—were added to the trail network.

Colonial Period (1675–1775 AD)

Boston emerged, during the Colonial Period, to become one of the most important port cities on the Atlantic coast in the New World. Boston and Charlestown had key port facilities, and the Charles River continued to grow as the regional focus.

Settlement followed a pattern of infill and consolidation of the previously developed areas. Colonial settlement in Boston focused on many of the areas previously occupied by native villages including Charlestown, downtown Boston, and Savin Hill in Dorchester. Roxbury, Jamaica Plain, and areas along the Mystic River became fashionable for country estates in the early 1700s. Several of the Harbor Islands were used for grazing, fishing, and institutional purposes.

Boston proper had an increase in population and commercial activity that led to distinct social and economic districts. Three- and four-story brick buildings along Corn Hill (Washington) Street were the civic and commercial heart of the city. The area from Town Cove to the North End and Fort Hill was a district of wharves and shipyards, much of it built on filled land.

The water transport system grew, particularly to Portsmouth, Salem, and Plymouth. It was often easier to get to a local destination by boat than by road, and a large number of wharfs were built for passenger and freight use. The same corridors of enhanced native trails connected Boston to adjacent areas, and development focused along these routes. Many of these routes terminated in Roxbury, as Boston proper remained isolated on a peninsula. Roxbury controlled the access to Boston proper.

Federal Period (1775–1830)*

Boston saw a dramatic increase in population and prominence during the Federal Period, establishing itself as a major source of goods and supplies including ships, lumber, cod, and other material goods while also being a major port for immigrant arrival.

This period marked the beginning of the most extensive landscape transformation in Boston that rapidly expanded its land mass. By this time Boston reached the physical limits of its shoreline. The core city began to develop more density. It also expanded outward and absorbed adjacent communities. Toll bridges on causeways, turnpikes, and omnibus service (horse drawn carriage) encouraged

residential development beyond the urban core. Another solution was to expand the land mass, a process which began as hills were excavated and used to fill the surrounding tidal marshes and waters.

The newly filled land was platted in planned grids. Large speculative grids were also laid out in South Boston and Roxbury. Residential and industrial uses were often mixed. An institutional area of hospitals, prisons, almshouses, and naval facilities developed on the fringes of waterfront and filled land, between the central core city and the outlying residential areas of Roxbury and South Boston.

Early Industrial Period (1830–1870)*

The industrial revolution in Boston was fueled by the Stony Brook and Muddy Rivers as well as by a thriving sea port and large population of immigrants, making it one of the biggest producers of goods in the world.

Boston's central core increased in density with greater height and proximity of buildings, and differentiation of a central business and commercial district and high-density residential areas. Residential development in the central core of the city included high density rowhouses built in planned street grids around London-style residential parks. This pattern was realized in parts of the South End, Charlestown, and East Boston.

The settlement beyond the central core was defined by innovations in transportation including steam ferry, suburban commuter rail service, and horse-drawn street railways.

Important events in landscape and urban planning include an emerging green belt of landscaped cemeteries and municipal properties such as reservoirs. These were accessible by street railway and provided important areas for recreational and social activity for people in the inner city and outer suburban areas.

Late Industrial Period (1870–1915)

Development in this period was influenced by electrical-powered technology. The electrification of the street railway system and the opening of the subway and elevated lines generated development away from the core, now known as “streetcar suburbs” (Warner 1978). Larger buildings with elevator shafts were built in the urban core of Boston, increasing density.

During this era, secondary commercial areas developed at Kenmore Square on the end of downtown, and in Fields Corner, Uphams Corner, Dudley Station, and Jamaica Plain along major transit routes. These nodes served the immediate residential population of an expanding city.

In reaction to the rapid urbanization of the early and late industrial periods, both a comprehensive system of parks and parkways within the City of Boston (1875) and a comprehensive metropolitan park system (1892) were created and provided open spaces and recreation areas amidst dense urban and suburban development. Parkways were new then: transportation corridors generally emphasizing vegetated landscaping and curvilinear road layouts that connected parks and thereby stimulated residential and commercial development in the areas near the parks and parkways.

* Much of the material discussed in this mainly 19th century section of this history relied on the following sources: Whitehill 1968, Seasholes 2003, and Kennedy 1992.

Early Modern Period (1915–1940)

This era was defined by two World Wars and the Great Depression. The population in the core of Boston decreased for the first time in history. Railroad and waterfront facilities began to become obsolete as highways and new fuel storage facilities replaced coal yards and older wharves and warehouses. Military docks, shipyards, and facilities expanded and overwhelmed the communities of Charlestown and South Boston. Industrial activity began to decline in the Boston core.

The widespread use of automobiles and commercial air service had an influence on the development of Boston, where construction of Boston Municipal Airport (now Logan Airport) (1923), the Sumner Tunnel (1934), and the regional highway system (1931–1936) meant that people were no longer restricted to recreational facilities served by trolley or

train lines, and that land from existing parks and potential open spaces were used to support this new infrastructure. On the other hand, greater mobility allowed people to enjoy ponds, woods, and other scenic or historic areas that were on the periphery of the city.

A series of parkways were developed by the Metropolitan District Commission, scenic routes that connected the suburban residential areas to the urban core. These included the West Roxbury Parkway, Neponset River Parkway (now Truman Parkway), Brook Farm Parkway (now Veterans of Foreign Wars Parkway), and Morrissey Boulevard.

Urban Renewal

Boston was in decline in the mid-1900s, as factories became old and obsolete, and businesses moved out of the region for cheaper labor elsewhere, and population was not replaced as people moved to the suburbs or elsewhere. The city was in need of infrastructure improvements, as well as economic infusion. The Boston Redevelopment Authority (BRA) was established in 1957 and responded to this disinvestment by undertaking urban renewal projects. One project significant for its open space was the creation of Government Center which included City Hall Plaza. (Kennedy 1992)

Geographic Expansion

The city of Boston has grown to 40 times its original size from its original 783 acres at the time of settlement in 1630. Boston was originally about 1.2 square miles, and currently has a land area of 48.4 square miles. It is the second smallest major US city in terms of area, and that land mass was hard earned through the filling of wetlands and annexation of neighboring municipalities.

Original Land Mass

In 1630, the 783-acre Shawmut peninsula was surrounded by the Boston Harbor and the tidal land of the Back Bay, part of the Charles River estuary. To the south, a narrow isthmus which was 120 feet wide at high tide supported the single road (now Washington Street) that connected the peninsula to Roxbury on the mainland.

The peninsula originally had five hills—Copp’s Hill (in the North End); Fort Hill (in the Financial District); and the Trimount (meaning triple mountain) which actually consisted of the three hills of Mt. Vernon, Beacon Hill and Pemberton Hill.

Land Making

The first land making in Boston began with the “wharfing out” from the mainland. The area between the wharves was then often filled in, creating more land. (Seasholes 2003)

Except for the wharves that were built, there was little change in the topography and landform of Boston until 1775. Then the landscape was radically transformed over a period of 100 years to accommodate and encourage growth. Expanding onto the mainland was not considered first because of the maritime economy. The solution was to fill the tidal flats. (Seasholes 2003)

A second motivation for filling the tidal flats was to finally dispose of untreated sewage placed there. For several hundred years animal, human, commercial and industrial waste was disposed of by piping it to the tidal flats where it was washed away. However, the many mill dams enabled industry to thrive but prevented the tides from flushing the flats. Sewage and trash built up and created a noxious condition. Much of the new land was created by filling in the sewage- and trash-filled tidal areas with earth from Boston’s original hills.

From 1857 to 1894, the Back Bay was filled in behind the Boston & Roxbury Mill Dam. This added about 700 acres and nearly doubled the size of the original peninsula. This area became the Back Bay neighborhood.

Charlestown and the Fenway area were filled in a short while later. The end of the 1800s included fill projects in East Boston, Marine Park, and Columbus Park (now Moakley Park) to the south.

The area which would become Logan Airport began to be filled in 1922.

Land making in relation to parks and open space in Boston is discussed in the history of Boston parks section below.

Annexation

The city has also grown significantly through annexation of adjacent towns over the years. Boston annexed South Boston in 1804, East Boston in 1836, Roxbury in 1868, Dorchester including Mattapan and a portion of South Boston in 1870, Roslindale in 1873, Brighton including Allston in 1874, West Roxbury including present day Jamaica Plain and Roslindale in 1874, Charlestown in 1874, and Hyde Park in 1912.

Effect of Location and the Economy on Open Space

Boston has evolved over the centuries from an area of Native American encampment, to a coastal colonial outpost, to a major metropolis of global significance. The provision and protection of open space has changed along with the economy, politics, and the population’s needs.

The harbors, shoreline, tidal flats, lakes, ponds, marshes, and riverbanks have provided food and water, enabled transportation, encouraged trade, and influenced development throughout the history of Boston. The landscape of steep hills and small valleys with ponds, streams, and rivers was amenable to early agriculture. The early economy and survival was strongly supported by fishing and seafaring. Settlement followed the rivers inland.

This setting made possible a seaborne commerce that flourished with protected deep-water harbors. Early manufacturing utilized the waterpower of streams, rivers and tides. The terrain provided space for farmland, then suburban estates, and then streetcar suburbs as the population increased throughout the 19th century.

Demand for development in Boston resulted in many of the original landscape features being altered or obliterated through the centuries. Hills were used to fill wetlands; streams were culvertized; and the shoreline was extended.

The Great Migration of colonists began a continual influx of newcomers that peaked during the Industrial Revolution. In the mid-1800s, Boston was a densely populated city with a seafaring- and industrial-based economy that relied on its tidal flats for domestic and commercial waste elimination. Immigrants lived in heavily populated neighborhoods where parks, playgrounds, and other public open spaces became important to populations with limited resources and time for recreation.

The industrial uses along the harborfront and along the Charles and Neponset Rivers and other waterways helped to build a city and create a strong economy, but left behind significant pollution. Costly cleanup efforts have begun to alleviate these problems, thus enabling such areas to be used more extensively for water-based recreation.

Seaport commerce defined the economy of Boston for centuries, and shaped its landscape with wharves and human made land. But seaborne commerce declined (but has not disappeared) and freight and passenger traffic at Logan Airport increased. This led to runways and aviation facilities that spread across islands, tidal lands, and a city park (Wood Island Park designed by Frederick Law Olmsted, Sr.), to the bitterness of many East Boston residents.

Railroad tracks were converted to the Massachusetts Turnpike, enabling the flow of workers into the city, but with accompanying noise and air pollution, and the loss of land.

After World War II, the population declined as many families left the city, either to other parts of the country, or for the suburbs, trading apartment blocks and triple-deckers for single-family homes separated by private yards and linked by wide, tree-lined streets. The population decline had a significant adverse impact on several neighborhoods in Boston.

A rise in abandoned buildings and vacant lots resulted, affecting the property tax-based municipal budget and local private investment. Pressure grew to reduce labor-intensive municipal functions such as park maintenance. City parks deteriorated during the 1960s and 1970s with the loss of constituents and reduced maintenance. In the 1980s, the passage of Proposition

2½ capped the rate at which local property taxes could rise, further limiting municipal revenues and services, especially those related to park functioning.

In the mid-1980s, open space activists formed a coalition to strengthen their voice in City Hall. With local philanthropists, they put together an effort to focus on the critical deterioration of municipal and metropolitan parks.

Based on that effort, *The Greening of Boston* report (The Boston Foundation 1987) stimulated the City to develop an open space plan in 1987 that outlined a program to rehabilitate the park system. The strong economy in the 1980s allowed the City to enjoy large increases in property taxes, which funded the multi-million dollar capital rehabilitation campaign.

As important as the rehabilitation of the parks was the recognition at the policy level that beautiful, safe, clean, and functional parks were needed to revitalize neighborhoods and stimulate private re-investment. Parks were seen as a key quality of life factor by which individuals and businesses assessed the value and stability of a neighborhood and the potential for return on investment in it.

Boston's population and demand for development continues to grow. High density and small geographic size put developable parcels at a premium, and tax existing infrastructure systems such as open space. New and expanding residential buildings, office towers, and university campuses compete with parks, playgrounds, and other open space for land. Achieving a balance of development, grey infrastructure, and green infrastructure so that the city becomes an integrated whole remains a critical focus for policy and practice in the future.

History of Parks and Open Space in Boston

City of Boston Parks

Boston's park system includes the oldest public open space in the nation, Boston Common, established in 1634. The Public Garden was the next significant addition, developed more than 200 years later in 1838.

The park movement in the U.S. began in the mid-1800s in response to urbanization and the sanitary reform movement (which believed that disease was caused by bad odors, dirt, and dampness). Sanitarians sought to eliminate places that were overcrowded, dark, damp, and contained organic waste by introducing sunlight, fresh air, dry land, and pure water—parks were seen as one desirable solution. Parks were for the public and were a place where city residents could escape to a country setting.

The Office of the Superintendent of Public Grounds was established by ordinance on February 28, 1870. The Superintendent had charge of all public grounds—Boston Common, the Public Garden, and residential squares and small parks created before 1975.

In 1875, Boston's voters approved an act that set up a Board of Park Commissioners to establish and run public parks. In 1876, the Commissioners recommended a comprehensive system of

seven parks in the inner city and four in outlying areas which would be connected by parkways. By 1881, the City appropriated the funds for the parks.

In 1878 the Commissioners hired Frederick Law Olmsted, Sr., America's first and then most prominent landscape architect, to design and supervise the development of a comprehensive park system. Olmsted proposed to create a network of parks linked by parkways. The resulting park system is now known as the Emerald Necklace which then included the Charles River embankment, the Back Bay Fens, the Riverway, Leverett Park (now Olmsted Park), Jamaica Pond Park, the Arnold Arboretum, West Roxbury Park (now Franklin Park), and Marine Park. The parkways to connect these parks included the Arborway, Fenway, Jamaicaway, and Riverway.

The Park Commissioners also proposed to locate a park in each section of the city. Some parts of the city did not have enough remaining open land, so in those sections the parks were placed on the shore where land had to be filled in. Parks in this original system that required filling included Charlesbank in the West End, Marine Park in South Boston, and Wood Island Park in East Boston.

In the early 20th century, Boston created many playgrounds, mostly in parts of the city without squares or other public grounds, as the playground movement sought to improve the lives of the poor urban children through organized activities in smaller spaces closer to home. Some of these playgrounds were also on the shore and required landfilling, such as Charlestown Playground (now Ryan Playground).

The Park Department continued until 1913, when the Public Grounds, Bath, and Music Departments were merged with it to become the Park and Recreation Department. In 1920, the Cemetery Department was merged with the Park Department.

Land continued to be made in the 20th century to create public parks. The narrow Esplanade was filled along the Charles River as part of the Charles River Dam construction. Playgrounds and beaches were created by filling such as McConnell Park, Tenean Beach, Moakley Park, Carson Beach, Noyes Playground, and Constitution Beach. Storrow Drive was created in 1950 on part of the Esplanade; to compensate for the parkland that was taken, some filling was done along the river, creating a series of connected islands.

By 1950, most of Boston's parks and playgrounds were in place. As described previously, after World War II the budget for parks declined, and was then cut by more than half with the passing of Proposition 2½ in 1982, resulting in a period of severe deterioration for the City's park system.

By the mid-1980s, along with increased interest in urban living and improved economic conditions, citizen outcry brought attention to the poor condition of the parks. As a result, in 1987 the Mayor and the City Council approved \$75 million for a program to rebuild City parks and playgrounds.

In the early 21st century, the Central Artery/Tunnel Project (the "Big Dig") removed the elevated Central Artery through downtown and created a new highway tunnel. This project created a total of 300 acres of new and restored open space, including 45

parks and major plazas, among them the Rose Kennedy Greenway in downtown Boston managed by the Rose Kennedy Greenway Conservancy, and the Bremen Street Park in East Boston managed by Massachusetts Port Authority (Massport). Material from the Big Dig tunnel excavation was used to cap landfills as part of creating Millennium Park in West Roxbury and the park land at Spectacle Island.

Metropolitan Park System

Boston was the first American city to create a metropolitan park system and the first to undertake regional planning (Penna & Wright 2009). The Metropolitan Park System was established in 1893 and Frederick Law Olmsted's concept of networked parks was applied to the metropolitan region. The metropolitan parks and parkways were the first regional effort to protect environmentally significant areas and provide a physical framework for suburban growth.

The leading advocates of this effort were Charles Eliot, a landscape architect who had worked with Olmsted, and Sylvester Baxter, a social reformer. These men believed that a metropolitan government was needed to carry out major public works projects and provide the planning that would create a rational spatial and infrastructure framework for development.

Eliot and Baxter advocated for the creation of the Metropolitan Park Commission to develop a plan for a regional parks system to fulfill this vision. In 1892, the Metropolitan Parks Commission (MPC) was formed to provide for regional open space needs of Boston and its metropolitan area, and given eminent domain powers. The Commission issued the *1893 Report of the Metropolitan Park Commissioners*, which was the country's first regional plan, and was a blueprint for preserving Greater Boston's natural areas. The plan focused on the forests on the edge of the city, in the Middlesex Fells, the Blue Hills, and Stony Brook, and on riverbanks along the Charles, Mystic, and Neponset Rivers, and called for reservations to protect and manage them. A third focus was oceanfront beaches and many were preserved in outlying towns such as Revere. Eliot further proposed that the Harbor Islands be preserved as parkland. Finally, the plan proposed parkways between the city and the reservations.

The plan for the Metropolitan Parks system was soon implemented. By 1900, the Metropolitan Park Commission had acquired 9,177 acres of reservations, 13 miles of oceanfront, 56 miles of riverbanks, and had built seven parkways.

The State created the Metropolitan District Commission (MDC) in 1919, subsuming the MPC. In the 1920s, the MDC converted the parkways to four lane motorways. By the 1930s, these regional parks were evolving from beautification and preservation of nature to providing opportunity for recreation. The MDC added recreational facilities to its park system, including ball fields, golf courses, tennis courts, swimming facilities, and a ski run at the Blue Hills Reservation.

The Metropolitan District Commission (MDC) had water and sewer responsibilities as well as the park development and management responsibilities held by its predecessor agency, the Metropolitan Parks Commission. The MDC's water and sewer responsibilities were eventually reallocated to the Massachusetts

Water Resource Authority (MWRA) in 1985. Without this burden, the MDC was able to reinvest more effort to its parks mission. In 2003, the MDC merged with the Massachusetts Department of Environmental Management (DEM) to form a new agency, the Massachusetts Department of Conservation and Recreation (DCR), putting non-metropolitan Boston and metropolitan Boston parks under one agency.

As a result, the Boston Harbor Islands State Park, part of the assemblage of 34 islands ranging in size from less than one acre to 274 acres that total about 1,600 acres at high tide and 3,100 acres at low tide, and among the few DEM holdings in Boston, came under the purview of the DCR. In turn, that state park is a part of the Boston Harbor Islands National Recreation Area, an administrative unit under the National Park Service (a U.S. Department of the Interior agency), that extends 11 miles seaward from downtown Boston.

Section 3.3:

POPULATION CHARACTERISTICS

Unless otherwise noted, the information in this section is taken from U.S. Census data, and from information compiled by the Boston Redevelopment Authority (BRA).

Population

Population	1990	2000	2010
Boston	574,283	589,141	617,594

For Boston overall, the trend has been toward increasing total population: 2.6% for the period between 1990 and 2000, and 4.8% for the period between 2000 and 2010. Given the 2.0% increase in the 1980–1990 period, we can see a trend of accelerating population increase occurring.

Census data (see table below) indicates that the communities in Boston that experienced ten percent or more population growth from 2000 to 2010 are Central Boston with 24.4%, Mission Hill with 17.0%, Roxbury with 16.8%, Fenway/Longwood with 12.9%, the South End with 12.2%, and South Boston with 11.7%. The five communities that experienced the least population growth from 2000 to 2010 are the Harbor Islands with -16.4%, Mattapan with -7.1%, Roslindale with -5.5%, Dorchester with -3.9%, and Jamaica Plain with -1.9%.

Communities within Boston	2000 Population	2010 Population	2000-2010 Change	2000-2010 % Change
Central Boston	25,573	31,821	6,248	24.4%
Mission Hill	13,935	16,305	2,370	17.0%
Roxbury	41,484	48,454	6,970	16.8%
Fenway/Longwood	33,285	37,581	4,296	12.9%
South End	21,911	24,577	2,666	12.2%
South Boston	31,514	35,200	3,686	11.7%
Charlestown	15,195	16,439	1,244	8.2%
Allston-Brighton	69,648	74,997	5,349	7.7%
West Roxbury	28,755	30,446	1,691	5.9%
East Boston	38,413	40,508	2,095	5.5%
Hyde Park	30,076	30,637	561	1.9%
Back Bay/Beacon Hill	27,004	27,111	107	0.4%
Jamaica Plain	38,176	37,468	-708	-1.9%
Dorchester	118,848	114,235	-4,613	-3.9%
Roslindale	30,351	28,680	-1,671	-5.5%
Mattapan	24,333	22,600	-1,733	-7.1%
Harbor Islands	640	535	-105	-16.4%
Boston	589,141	617,594	28,453	4.8%

Hundreds of thousands of people travel into Boston daily for work, education, health care, culture, recreation, special events, etc. Research by the Boston Redevelopment Authority indicates that Boston's workforce more than doubles every day to over 600,000 when non-resident commuters arrive at their Boston-based jobs (BRA 2015). The Greater Boston Convention and Visitors Bureau notes that there were 16,250,000 visitors to the Boston MSA region in 2014. In all, over one million people pass through Boston on a daily basis, which would have an effect on Boston's parks and open spaces.

The *MetroFuture Regional Plan* (MAPC 2008) provides projections for the region. It notes that in 2030, one third of residents in the metropolitan region will be 55 or older. All other age groups will shrink, including school-age children which may decline by 6%.

Population and Housing Demand Projections for Metro Boston (MAPC 2014) provides two scenarios for growth—Status Quo and Stronger Region. The population projections for Boston under the two scenarios are below:

Boston	1990	2000	2010	Status Quo Scenario		Stronger Region Scenario	
				2020*	2030*	2020*	2030*
Total Population	574,283	589,141	617,594	640,798	664,867	664,218	709,400
Population under 15	94,381	98,320	85,766	90,657	92,706	93,217	99,568
Population over 65	65,152	61,336	62,237	78,018	96,079	78,688	97,393

*projected

The *Massachusetts Statewide Comprehensive Outdoor Recreation Plan 2012* (“2012 SCORP”) (EOEEA 2012) notes that Massachusetts had 6,547,629 residents in 2010. It is the third most densely populated state in the country at 839.4 persons per square mile (or 1.3 persons per acre). Only Rhode Island and New Jersey are more densely populated.

In 2010, Boston’s population density is 21.3 persons per acre (without Logan Airport acreage). This is an increase from 20.3 persons per acre in 2000. This density increase indicates that the need for more open space should be evaluated, as more people will put greater pressure on existing spaces.

OSP 2015-2021 Communities	Acres	Acres w/o Airport	2000 Population	2010 Population	Population Density 2000 (persons/acre)**	Population Density 2010 (persons/acre)**	Density Change (persons/acre)**
Mattapan	1,352	1,352	24,333	22,600	18.0	16.7	-1.3
Roslindale	1,678	1,678	30,351	28,680	18.1	17.1	-1.0
Dorchester	4,913	4,913	118,848	144,235	24.2	23.3	-0.9
Jamaica Plain	2,603	2,603	38,176	37,468	14.7	14.4	-0.3
Back Bay/Beacon Hill	599	599	2,004	27,111	45.1	45.3	0.2
Hyde Park	2,972	2,972	30,074	30,637	10.3	10.5	0.2
West Roxbury	3,516	3,516	28,755	30,446	8.2	8.7	0.5
East Boston	3,012	1,509	38,413	40,508	25.5	26.8	1.4
Charlestown	872	872	15,195	16,439	17.4	18.9	1.4
South Boston	2,062	2,062	31,514	35,200	15.3	17.1	1.8
Allston-Brighton	2,839	2,839	69,648	74,997	24.5	26.4	1.9
Roxbury	1,701	1,701	41,484	48,454	24.4	28.5	4.1
South End	472	472	21,911	24,577	46.0	52.1	5.6
Fenway/Longwood	749	749	33,285	37,581	44.4	50.2	5.7
Mission Hill	351	351	13,935	16,305	39.7	46.5	6.8
Central Boston	833	833	25,573	31,821	30.7	38.2	7.5
Boston*	30,479	28,976	588,501	617,059	20.3	21.3	1.0

* Boston Population Counts exclude the Harbor Islands

** Population Density based on Acres without Airport

Age

Age cohorts (aka age groupings) for Boston residents in 2010 are shown below.

Boston Age Cohorts	2010	% of Total Population*
Population 19 & under	135,592	22.0%
Population 20 to 34	216,213	35.0%
Population 35 to 54	147,501	23.9%
Population 55 to 64	56,051	9.1%
Population 65 & over	62,237	10.1%
Total Population	617,594	100.0%

* error may occur due to rounding

Children under 18

In 2010 there were 103,710 children between the ages of 0 and 17 living in Boston. This represents 16.8% of the total city population.

Boston Age Cohorts under 18	2010	% under 18	% of total population	% change since 2000
Under 6	38,089	36.7%	6.2%	-1.0%
6 to 11 years	31,701	30.6%	5.1%	-22.4%
12 to 17 years	33,920	32.7%	5.5%	-8.8%
Total under 18	103,710	100.0%	16.8%	-11.0%

The population of children in Boston dropped 11% since 2000. This drop was seen in all racial and ethnic groups except Hispanic/Latino. African-American and Hispanic/Latino children comprise 60% of the under 18 population in Boston.

Nearly 40% of Boston’s children live in Dorchester or Roxbury. Neighborhoods in which children make up more than 20% of the population include Dorchester, Roxbury, Mattapan, Hyde Park, Roslindale, East Boston, and West Roxbury.

Young Adults 20-34

Boston has the highest concentration of young adults (age 20–34) among the 25 largest cities in the U.S. Thirty five percent (35%) of Boston’s population is between 20–34 years old. The population of 20–34 year olds in Boston has increased 11% since 2000. The city’s population grew about 5% during that same time period.

The growth of the 20–34 population represents 75% of the city’s total population growth over the last decade. Much of this increase was driven by the 20–24 year olds whose population grew by close to 26% between 2000 and 2010.

Neighborhoods with a large population of young adults age 20–34 as a percentage of the neighborhood population include Allston (64.5%), Fenway (59.2%), Brighton (55.7%), North End (54.8%), Longwood (51.7%), Beacon Hill (50.9%), South Boston Waterfront (50.5%), Mission Hill (48%), Back Bay (46.5%), and South Boston (41.4%).

Of the young adult population age 20–34, 60% rent their homes, 29.5% own their homes, and 9.4% live in group quarters such as college dorms.

Persons 65 and Over

The proportion of the 65 and over population remained fairly constant between 2000 and 2010. Just over half of this cohort is between the ages of 65 and 75 years. Of this cohort, 94.7% live in some form of household, while 5.3% live in group quarters.

Ability

A Profile of Health among Persons with Disabilities in Massachusetts, 2008–2011 (MDPH 2012) defines disability as having one or more of the following conditions: (1) physical, mental, or emotional problem that limited activities or caused cognitive difficulties; or (2) used special equipment or required help from others to get around. This report notes that in 2011, 11% of the non-institutionalized population of Massachusetts (an estimated 740,400 individuals) reported having one or more disabilities:

- 6% of people in Massachusetts of all ages reported having an ambulatory disability,
- 5% reported having an independent living disability,
- 5% had a cognitive disability,
- 2% had a vision disability,
- 3% had a hearing disability, and
- 3% had a self-care disability.

The prevalence of disability increased with age: 5.8% among children ages 5–17 years, 8.8% among those ages 18–64 years, and 34% among persons ages 65 years and older.

The *2009–2010 National Survey of Children with Special Health Care Needs* (CDC 2012) notes that 18% of Massachusetts children (an estimated 261,475 children) had a special health care need. The prevalence in Massachusetts was higher than the national prevalence of 15%.

The prevalence of children with special health care needs increased with age: 9.8% among Massachusetts children ages 0–5 years (vs. 9.3% nationally), 21.4% among Massachusetts children ages 6–11 years (vs. 17.7% nationally), and 23.3% among MA children ages 12–17 years (vs. 18.4% nationally).

The Health Needs Assessment of People with Disabilities in Massachusetts, 2013 (MDPH 2013) notes that:

- People with disabilities are more likely to be older.
- Blacks, Native Americans, Hispanics, and those of other racial and ethnic minority groups are more likely to report a disability compared to those who are white.
- Asians are least likely to report a disability.

Also relevant to this Open Space and Recreation Plan, the *Health Needs Assessment of People with Disabilities in Massachusetts, 2013* reported on weight and obesity issues, as well as physical activity.

- Overweight: Among adults in Massachusetts in 2011, those with disabilities were more likely to report being overweight (67%) than those without disabilities (34%).
- Obese: Those with disabilities were more likely to report being obese (57%) than those without disabilities (20%).
- Physical activity of 150 minutes per week or more: Adults with disabilities were less likely to report 150 minutes or more of aerobic activity per week (45%) than those without disabilities (59%).
- Physical activity of 150 minutes per week or more: Adults with disabilities were less likely to report 150 minutes or more of aerobic activity per week (45%) than those without disabilities (59%).
- Muscle strengthening, two or more days per week: Those with disabilities were less likely to report muscle strengthening activity two or more days per week (26%) than those without disabilities (34%).

The *Health Needs Assessment of People with Disabilities in Massachusetts, 2013* notes that 45% of the respondents rated the ability to locate an accessible gym as a “Big Problem.” Though not specifically stated, the issue of locating accessible gyms could relate to the ability to find accessible amenities for physical activity, such as playgrounds and parks.

Age, Ability, and Park Use

The Metropolitan Area Planning Council (MAPC) has assisted other communities in the Boston metropolitan region with the production of open space plans, which have included the following summary of recreational needs by age group and ability:

“Under the age of five, most recreation is done with parental supervision. This recreation tends to be close to home due to the difficulties of traveling with children. This age group also needs structured preschool programs that focus on teaching basic skills.

Adolescents are a difficult age group to serve because they do not like to participate in traditional programs that are structured or involve adult supervision. They prefer programs where they are more actively involved in determining the activities. Programs that work well for adolescents include rock climbing, adventure programs, skateboarding, hiking, band concerts, cook outs, dances and sports.

The needs of [older adults] are divided between the [deleted], more active [older adults] and the frail[er older adults]. The frail[er older adults] generally require therapeutic recreational services. More active [older adults] tend to enjoy walking, golf, tennis, and swimming.

The recreation needs of persons with disabilities also vary. Some residents with disabilities can participate in regular recreational programs without any modifications while others may need some assistance. Depending on the degree of disability, there may also be a need for specific programs geared for that population.” (MAPC 2013, pp. 12–13)

Race, Ethnicity, and Country of Origin

In 2010, Boston was 8.9% Asian, 22.4% Black, 17.5% Hispanic and 47% White, with 43.8% of Hispanics and 69.5% of Asians being foreign-born.

Race/ Ethnicity	2000	2010	Change	% Change
Asian	44,009	54,846	10,837	24.6%
Black	140,305	135,073	-2,232	-1.6%
Hispanic or Latino	85,089	107,917	22,828	26.8
White	291,561	290,312	-1,249	-0.4
Total	589,141	617,594	28,453	4.8

Between 1990 and 2010, Boston's foreign-born population grew from 114,597 to 167,311. Immigrants now account for 26.7% of the city's population. Boston has the 6th highest proportion of foreign-born residents among the 25 largest U.S. cities.

In 2010, the most common countries of origin for Boston's foreign-born residents were Dominican Republic (18,189 persons), China (16,785), Haiti (13,782), Vietnam (7,684), El Salvador (7,575), Columbia (6,703), Cape Verde (6,457), Jamaica (5,637), Brazil (4,823), and India (4,203).

In 2010, 35% of Boston's residents spoke a language other than English at home. Nine and a half percent (9.5%) of Boston residents had limited English proficiency. Spanish is the most common foreign language spoken in Boston, with 15.2% speaking it. French (4.8%), Chinese (3.8%), Portuguese (2.0%) and Vietnamese (1.7%) are the next most common foreign languages spoken in Boston.

The neighborhoods of Boston where 25% or more of the population were foreign-born includes East Boston (50.3%), Mattapan (35.5%), Allston (33.1%), Downtown (32.4%), West End (32.3%), Dorchester (31.1%), Hyde Park (29.9%), Brighton (29.5%), Roslindale (29.1%), Mission Hill (24.7%), and Roxbury (24.6%).

The *MetroFuture* regional plan (MAPC 2008) forecasts that 31% of the region will be Black, Hispanic, Asian, or some other non-White race by 2030, and almost one-quarter of the region will be foreign-born.

Households

There were 252,699 households in Boston in 2010, a 5.47% increase over the number of households in 2000, which follows the 4.87% increase from 1990 to 2000. The increasing number of households and demand for housing puts pressure on existing open spaces and the remaining land available for open space.

Of these 252,699 households in 2010, 136,455 (54.0%) were non-family households and 116,244 (46%) were family households. Of the family households, 64,502 (55.5%) were husband-wife families of which 25,307 (40%) had children under 18, while 41,301 (35.5%) were female-headed, of which 22,741 (55%) had children under 18, and 10,441 (9.0%) were male-headed, of which 3,513 (34%) had children under 18.

Housing

Population and Housing Demand Projections for Metro Boston (MAPC 2014) provides two scenarios for growth—Status Quo and Stronger Region. The demand for housing units for Boston under the two scenarios are shown below:

Boston Metropolitan Region (MAPR)	2000	2010	Status Quo Scenario		Stronger Region Scenario	
			2020*	2030*	2020*	2030*
Households	239,528	252,699	271,109	285,176	279,515	301,774
Housing Units	251,935	272,481	292,823	307,504	301,696	324,975

*projected

Multi-family housing is the general rule in Boston: the Single to Multiple Unit Ratio has gone down even further to 0.14 as of 2013, from the 0.20 ratio in 2000. Renters and owners in multi-family structures will tend to have less access to open space on-site, and therefore have greater need for open space availability in the public realm.

Number of Housing Units in Structure	2013 Estimate	% of Total Units in Structure
1, detached	32,658	12%
1, attached	16,445	6%
2	35,964	13%
3 or 4	70,161	26%
5 to 9	31,457	12%
10 to 19	23,208	8%
20 to 49	24,842	9%
50 or more	38,068	14%
Mobile home	247	0%
Boat, RV, van, etc.	68	0%
Total	273,118	100%
	Single/Multiple Unit Ratio	0.14

"0%" means less than 1%

Source: U.S. Census Bureau, 2009–2013 5-Year American Community Survey

Means of Commuting

While the car is not the dominant means of commuting for workers 16 and over who are Boston residents, it is the most frequently used of the several transportation modes available (45%). On the other hand, 51% of those who traveled to work did so by means other than car, truck, or van, while 4% worked at home.

Means of Transportation to Work by Workers 16 & over	2013 Estimate	% of Workers 16 & over
Drove/driven in car, truck, or van	145,967	45%
Used public transportation (excluding taxicab)	107,375	33%
Bicycled	5,734	2%
Walked	48,911	15%
Used taxicab, motorcycle, or other means	2,753	1%
Worked at home	11,837	4%
Total	322,577	100%

Source: U.S. Census Bureau, 2009–2013 5-Year American Community Survey

Income

The 2011 estimated median household income was \$52,065, while the 2011 estimated family income was \$61,109.

Household Income in the Past 12 Months*	2011 Estimate	% of Total Households
Less than \$10,000	32,370	13.1%
\$10,000 to \$14,999	17,100	6.9%
\$15,000 to \$19,999	12,765	5.2%
\$20,000 to \$24,999	10,206	4.1%
\$25,000 to \$29,999	9,501	3.8%
\$30,000 to \$34,999	10,643	4.3%
\$35,000 to \$39,999	9,400	3.8%
\$40,000 to \$44,999	9,763	3.9%
\$45,000 to \$49,999	8,607	3.5%
\$50,000 to \$59,999	16,731	6.8%
\$60,000 to \$74,999	21,180	8.6%
\$75,000 to \$99,999	27,927	11.3%
\$100,000 to \$124,999	18,894	7.6%
\$125,000 to \$149,999	12,243	4.9%
\$150,000 to \$199,999	13,912	5.6%
\$200,000 or more	16,379	6.6%
Total households	247,621	100.0%
	Median Household Income	\$52,065

* in 2011 inflation-adjusted dollars

Source: 2007–2011 American Community Survey, BRA Research Division Analysis

Family Income in the Past 12 Months*	2011 Estimate	% of Total Families
Less than \$10,000	9,569	8.2%
\$10,000 to \$14,999	6,059	5.2%
\$15,000 to \$19,999	5,529	4.8%
\$20,000 to \$24,999	4,616	4.0%
\$25,000 to \$29,999	4,614	4.0%
\$30,000 to \$34,999	5,392	4.6%
\$35,000 to \$39,999	5,111	4.1%
\$40,000 to \$44,999	4,880	4.2%
\$45,000 to \$49,999	4,130	3.6%
\$50,000 to \$59,999	7,558	6.5%
\$60,000 to \$74,999	9,460	8.1%
\$75,000 to \$99,999	14,281	12.3%
\$100,000 to \$124,999	10,093	8.7%
\$125,000 to \$149,999	6,377	5.5%
\$150,000 to \$199,999	7,893	6.8%
\$200,000 or more	10,753	9.2%
Total Families	116,315	100.0%
	Median Family Income	\$61,109

* in 2011 inflation-adjusted dollars

Source: 2007–2011 American Community Survey, BRA Research Division Analysis

Quoting from a report called *Poverty in Boston* (BRA, Research Division 2014),

[Among the] “Overall Population

- 21.6% of Boston’s population lives in poverty. This percentage has remained fairly consistent since 2000.¹
 - In comparison, the U.S. poverty rate is 15.9% and the Massachusetts poverty rate is 11.9%.
- Boston’s elevated poverty rate is in part related to the high concentration of affordable housing units and public housing in the city.²
- Boston’s poverty rate decreases slightly when college students are excluded. Boston’s poverty rate, less college students, is 19%.
- The poverty rate among Boston’s college student population is 28.2%.
 - 48.6% of college students who are in poverty have children.

“Age [as related to poverty]

- Children consistently have a higher poverty rate than the city as a whole.³
- The poverty rate for Boston’s children is currently 26.9%.
 - In comparison, the poverty rate among children in the U.S. is 22.6%. In Massachusetts, it is 15.4%.
 - Additionally, the following neighborhoods have very high poverty rates among children: Roxbury (49.7%), South Boston (43.8%), Charlestown (42.4%) and Mission Hill (39.4%).
- The poverty rate for Boston’s elderly is 21.4%.
- However, the elderly poverty rate is higher in the following neighborhoods: Mission Hill (43.3%), Fenway (35.8%), and Downtown (35.5%).⁴
- Boston’s 18-24 population has a very high poverty rate, at 41%. However, 81.4% of this group is currently enrolled in school or college.
- Poverty rates tend to decrease during the prime years of labor force participation, ages 25 through 64.

Quoting from a report called *Unemployment in Boston* (BRA, Research Division 2014),

“General Overview

- 9.6% of Boston’s population is unemployed.⁵
- Unemployment rates are higher within the following subgroups:
 - Racial minorities
 - Black/African American population (13.5%)
 - Hispanic population (11.4%)
 - Asian population (10.7%)
 - Men (10.6%)
 - Recent immigrants (20.8%)
 - Individuals who did not graduate from high school (16.1%)
 - Individuals with a disability (19.7%)
- Excluding the Harbor Islands, unemployment rates are highest in Mattapan (17.3%), Roxbury(16.8%) and Dorchester (16.2%).

¹ The poverty rate in Boston in 2000 was 19.5%. In 2005, it was 22.3%. In 2010, it was 23.3%.

² See the BRA Research Division’s report, “Boston by the Numbers: Housing” for more information on housing in Boston”

³ In 2000, the poverty rate for children was 25.9%, compared to the city’s poverty rate of 19.5%. In 2010, the poverty rate among children was 30.4%, compared to the city’s poverty rate of 23.3%.

⁴ The elderly poverty rate in Longwood Medical Area is 45.5%. However, there are only approximately 11 people age 65 and over in this neighborhood.”

⁵ All unemployment data is for Boston's population age 16 and over. ..."

Low socioeconomic status is associated with limited access to regular health care, adequate housing, quality education, nutritious food, recreational opportunities, and other resources associated with a healthy lifestyle. When incomes are lower, persons and households may be more dependent on public open spaces close to home for their outdoor leisure pursuits.

Generally related to income, the availability of a motor vehicle for a household leads to mobility and access to recreation areas much farther from home than walking distance. In 2010, 36% of households in Boston did not have a car. This makes these residents generally dependent on walking or various forms of mass transportation to access open space. The neighborhoods where proportionally more of the households did not have cars than Boston as a whole were South Boston Waterfront, East Boston, Roxbury, Back Bay, Beacon Hill, Downtown, Fenway, Longwood, Mission Hill, the South End, Allston, the West End, and the North End. Compare this to the 12% of households in Massachusetts as a whole that have no vehicles available. The importance of close-to-home open space for Boston is clear.

Industries, Occupations, Employers, and Employment Trends

The *Boston by the Numbers: Economy and Jobs* fact sheet (BRA, Research Division 2011) notes that the total jobs in Boston in 2008 was 680,000. Boston has more jobs than residents and far more jobs than resident workers. Commuters from outside the city fill 62% of the jobs within Boston.

The *2013 Economy Report* (BRA 2013) states that by 2016 the city could approach 730,000 jobs. Should this growth scenario play out as projected, 26.6 % of these jobs would be in health and education, 35.7% would be in financial, professional and business services, and 10.2% will be in the leisure and hospitality sector.

Boston by the Numbers: Economy and Jobs notes that Boston has shifted from an industrial-based economy to a knowledge- and information-based economy. Industrial specialties in Boston include health care, education, financial, professional, and business services, and hospitality and leisure, all represented in greater proportion than found nationally. Wages have grown along with the evolution to a knowledge-based economy.

Using U.S. Census data, the report *Boston in Context: Neighborhoods* (BRA, Research Division 2015) states that there are 329,714 residents over 16 in Boston with occupations in the following industries:

Industries	Residents Employed	%
Educational services, health care, and social assistance	103,195	31.3%
Professional, scientific, management, and administrative and waste management services	51,575	15.6%
Arts, entertainment, recreation, and accommodation and food services	36,411	11.0%
Finance and insurance, and real estate, rental, leasing	30,677	9.3%
Retail trade	28,792	8.7%
Other services, except public administration	15,766	4.8%
Public administration	15,038	4.6%
Manufacturing	14,196	4.3%
Transportation, warehousing, and utilities	10,391	3.2%
Construction	10,243	3.1%
Information	8,319	2.5%
Wholesale trade	4,774	1.4%
Agriculture, forestry, fishing, hunting, and mining	337	0.1%
Total Boston	329,714	100.0%

Source: U.S. Census, 2009–2013 5-Year American Community Survey; BRA Research Division Analysis

The *Largest Employers in the City of Boston* report (BRA 2013) provides an overview of the largest private sector employers, defined as having 500 employees or more. The analysis revealed that there are 121 private sector companies in Boston with more than 500 employees. These companies account for 196,446 jobs. Massachusetts General Hospital, Brigham and Women's Hospital, and Boston University together provide more than 35,000 jobs.

Boston's largest employers are mainly providers of Health Care and Social Assistance, Finance and Insurance, and Educational Services. These three industries account for 144,070 jobs across 61 companies, representing 73% of all employment among Boston's largest employers.

However, not all business is big business in Boston. *Boston's Neighborhood Business Patterns* (BRA 2014) states that the majority of firms in Boston are small employers with almost half of the establishments having 1 to 4 workers. There are 8,800 immigrant-owned small businesses in Boston that generate almost \$3.7 billion in annual sales and employ 18,500 people.

Boston by the Numbers: Colleges & Universities (BRA, Research Division 2011) notes that the city is the location of 35 public and private colleges and universities. There are about 152,000 students at Boston's institutions of higher learning. The concentration of students ranks at the top in the nation and the world.

Boston's colleges and universities employ over 42,600 people, 6.5% of the jobs in the city. Student and student visitors spend about \$1.7 billion annually in Boston.

Currently, 54% of Boston's employed workers have a bachelor's degree (*Boston's Labor Force*, BRA, Research Division 2013). The combination of the large number of colleges and universities and skilled jobs results in a highly educated work force and a population that is relatively younger than other cities.

The city is home to a number of technology companies and is a hub for biotechnology. In 2014, Boston institutions received \$1.72 billion from the National Institutes of Health, which was the highest funding to any city in the U.S. for the 19th consecutive year (*Boston: Top Recipient of NIH Funding for 19 Consecutive Years*, BRA, Research Division 2014).

Tourism forms a large part of the local economy. The Greater Boston Convention and Visitors Bureau (2015) notes that there were 16,250,000 visitors to the Boston MSA region in 2014, spending a total of \$11.5 billion while visiting the area in 2013.

Boston is a state capital and county seat, and the home of federal, state, county and municipal agencies, law offices, and other government services, which are another major component of the city's economy.

The city is a major seaport on the East Coast and the oldest continuously operated industrial and fishing port in the Western Hemisphere.

The Boston Indicators Report 2012 (The Boston Foundation 2012) notes that an emerging industry is regional food production. This trend is seen in food trucks, farmers markets, farm-to-school programs, plans for urban hydroponic farms, and a regional food system. The *2013 Economy Report* notes that the Food Services industry “was the second greatest job producer, adding close to 4,000 jobs . . .,” i.e., a 10% jump in the 2010–2011 one-year period (BRA 2013).

The *MetroFuture* regional plan (MAPC 2008) provides employment projections for the region. It notes that in 2030, the region's economy may add 293,000 jobs from 2000. Half of the net jobs will be in Professional and Business Services, Education, and Health Services. Manufacturing is the only sector that is expected to decline and 46,000 manufacturing jobs may be lost.

Environmental Justice

The Executive Office of Environmental Affairs enacted an Environmental Justice Policy in 2002. Governor Patrick issued Executive Order 552 on November 25, 2014 requiring this policy to be updated. The information below is based on the 2002 policy (EOEA 2002).

This policy notes that Environmental Justice (EJ) is based on the principle that all people have a right to be protected from environmental pollution, and to live in and enjoy a clean and healthful environment. Environmental justice is the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits.

EOEA (now EOEAA) established an Environmental Justice Policy to address the disproportionate share of environmental burdens generally experienced by lower-income people and communities of color who, at the same time, often lack environmental assets in their neighborhoods. The policy is designed to help ensure protection from environmental pollution as well as promote community involvement in planning and environmental decision-making to maintain and/or enhance the environmental quality of their neighborhoods.

Environmental Justice neighborhoods are those areas that EOEAA has determined to be most at risk of being unaware of, or unable to participate in, environmental decision-making or to gain access to environmental resources. They were originally defined in the 2002 order, as neighborhoods that meet one or more of the following criteria:

- The median annual household income is at or below 65 percent of the statewide median income for Massachusetts; or
- 25% of the residents are minority; or
- 25% of the residents are foreign born, or
- 25% of the residents are lacking English language proficiency.

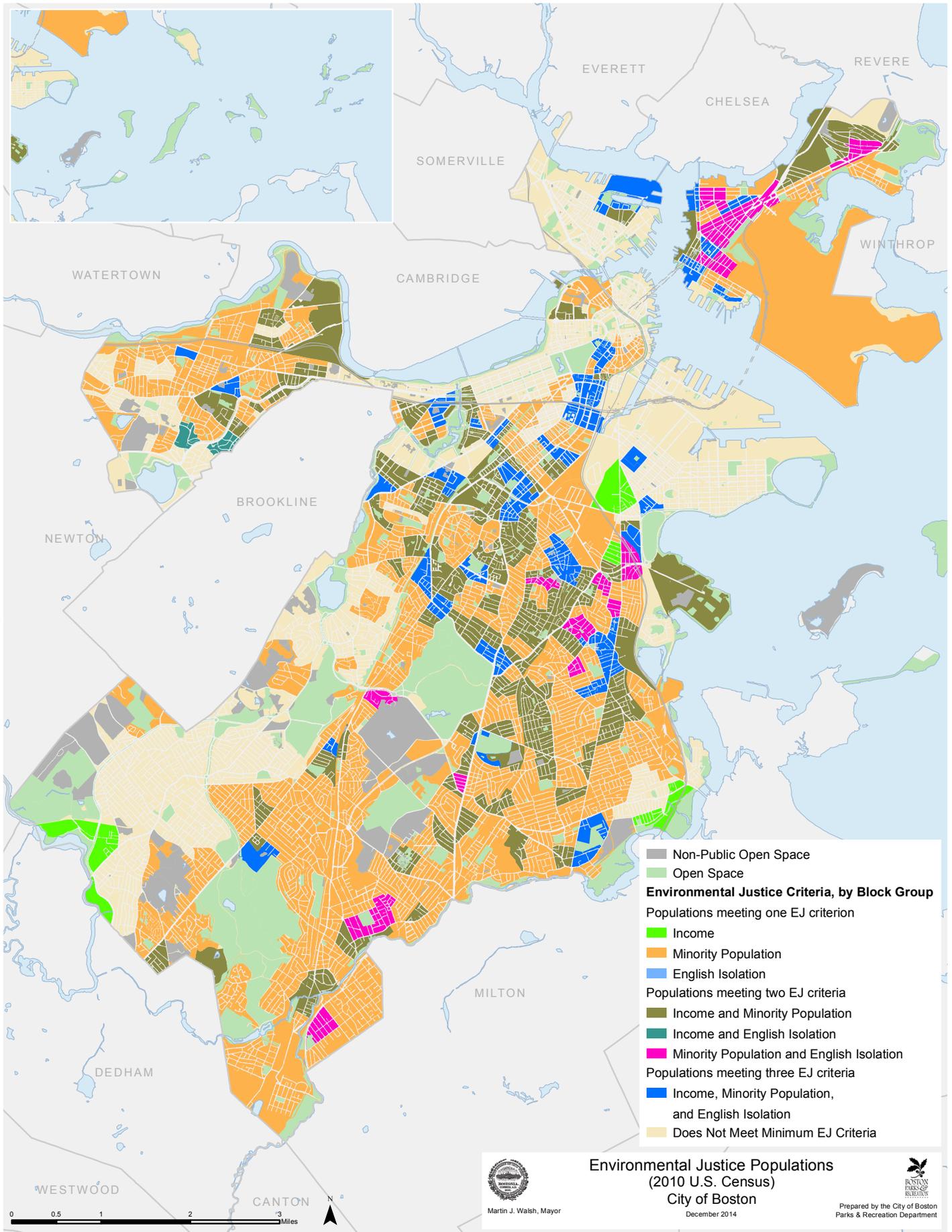
The 2002 criteria included the criterion that “25% of residents are foreign born.” However, the City of Boston did not use this criterion in the production of this Open Space and Recreation Plan, because the Massachusetts Office of Geographic Information Systems (MassGIS) indicated that the 2010 Census data is not accurate enough at the Census Block Group level to use for a determination of “residents who are foreign born.” (Pahlavan 2015) So only the remaining three criteria used by MassGIS for EJ population determination are portrayed for this Open Space and Recreation Plan (MassGIS 2012).

Boston meets the criteria for being defined overall as an environmental justice community. The total population of Boston that fell within an Environmental Justice Block Group was 456,403 or 74% of the population (MassGIS undated). All of Boston's neighborhoods contain at least one or more census block groups that meet the criteria.

The *State of Equity in Metro Boston* (MAPC 2011) addresses equitable access to open space. The report calls for land use decisions that provide equitable access to open space and address issues of safety. MetroFuture Goal #23 addresses environmental justice and states that “all neighborhoods will have access to safe and well-maintained parks, community gardens, and appropriate play spaces for children and youth. Even as density increases, MetroFuture will protect and enhance access to open space. The region will . . . focus on areas currently underserved by open space.” Such improvements will not only help children, but will also meet MetroFuture Goal #25 that all of the region's residents build more physical activity into their lives.

The Boston Foundation: The Boston Indicators Project (Undated) notes “[i]n Greater Boston, the highest concentration of environmental hazards are located in cities and towns with higher poverty rates and larger concentrations of children, such as . . . Boston with 121 per square mile[,]” i.e., that communities of color and low-income neighborhoods in Boston shoulder a disproportionate share of environmental and environmental health burdens. A recent Northeastern University study documented cumulative exposures to 17 different types of environmentally hazardous sites and facilities, and found 9 in Boston neighborhoods, particularly in communities of color (Faber and Krieg 2005). As a result, Boston was ranked among the 20 most environmentally overburdened communities in Massachusetts.

Similarly, analysis by the Boston Public Health Commission finds that people of color in Boston have higher rates of health problems that can reflect environmental conditions such as asthma (BPHC 2014, p. 7).



Section 3.4:

GROWTH AND DEVELOPMENT PATTERNS**Introduction**

Boston's historical growth and development has been discussed in Section 3.2, History. To briefly summarize Boston's development and growth, Boston's location on the Atlantic coast at the confluence of several rivers gave it great advantages that were used to make it a maritime port of international significance. When the industrial revolution occurred, its location near rivers allowed for transportation and power sources, and its port gave it worldwide market reach. The development of educational and cultural institutions from its beginnings gave it further advantages that continue to be exercised in the knowledge- and information-based economy. Thanks to this knowledge base, industries such as cutting-edge health care, advanced technologies, and advanced financial services are a robust part of the city's current growth. Its historical resources have provided the basis for a strong tourism economic sector, and its leadership role in the development of public open spaces, as well as strong support for the arts and culture, has helped make Boston a highly desirable place to live and work. Those assets help attract a strong talent base to Boston's knowledge- and information-based economy, as does the public transportation system and the varied housing stock, from high rise apartment towers to triple deckers and stately Victorian homes.

In the decade between 2000 and 2010, the following significant milestones in growth were achieved:

- Housing growth by 20,546 units occurred between 2000 and 2010, an 8.2% increase in Boston's housing stock, the strongest leap in 50 years. This growth has led to a total of 272,481 units by 2010, the largest housing stock in Boston's history, of which 19.4% is affordable (*Boston by the Numbers: Housing*, BRA, Research Division 2011).
- In this same decade, 29 dormitories and nearly 11,000 dormitory beds were added, an increase of 39%. Between 2007 and 2010, 11 non-residential higher-education projects were built at a total of 655,400 square feet (*Boston by the Numbers: Colleges and Universities*, BRA, Research Division 2011).
- During this decade, 9.8 million square feet of new office space was added. From 2000 to 2010, 4,970 hotel rooms (35%) were built (Mayor's Press Office March 22, 2011).

Open Space: Character and Change

Boston's open space has been a function of its growth and a definer of its growth. In the early 19th century, the small squares were assets to attract dense residential development. When in the later 19th century, rapid development greatly reduced informal access to open space in the countryside, and its density led to the call for a park system that would be pastoral landscape-oriented, as exemplified by the Olmsted-designed Emerald Necklace parks. This gave the public a more formalized access to green landscapes that would also define and attract development. However, it proved difficult to provide large landscape-oriented parks throughout the city. That combined with the new recreation movement that saw physical activity as

one means to counteract the ills of poverty in dense urban settings led to the movement to create smaller parks more oriented to sports and games, where the spaces were dedicated to them.

As development continued in the 20th century, with building technology allowing for tall buildings for residential and commercial purposes, the additional population and ensuing congestion again sought relief in the movement for on-site open space, either plazas for commercial buildings or parks with passive and/or active recreation elements in residential buildings or building complexes. Toward the latter part of the 20th century and into the early 21st century, there is more of a movement toward more intensive programming of parks, not just for physical activity, but also for entertainment, arts, and cultural events. This movement sees open space as an interactive realm, where society is limited to intimate encounters, as in the pastoral landscape park, but well integrated into the landscape/cityscape.

Of course, like many forms of technology, all these forms of open space have come to occupy their own niche, just as hard copy books are still published in the digital age, and radio and television have not been superseded by internet streaming services. The Emerald Necklace parks, probably among Boston's most defining physical elements, has taken on a historical character, yet is amenable to carefully wrought changes that fit into its own defining elements, such as the golf clubhouse in Franklin Park that blends into the pastoral landscape.

With preventive-oriented health care the focus of cost-cutting policy makers, active recreation will not fade as an important subject of park design, but will experience change as new immigrants bring new pursuits to the fields and courts, or whole new sports and games are created, or existing ones modified thanks to new technology.

Of course, demographic, socio-economic, and land use changes will affect open space needs and designs. As it has throughout Boston's history, open space will reflect and be part of the wider currents of its development and growth, helping to define community character and meet community needs.

Current Land Use and Development Trends

The Metropolitan Planning Council (MAPC) classifies Boston as a Metropolitan Core Community. These communities have a historic, high-density, urban character, with a range of housing from traditional triple-deckers and row houses to large multifamily buildings. New growth occurs mostly through redevelopment, infill, or conversion from industrial uses to residential or mixed uses. Minority, immigrant, and low-income populations comprise a large share of the population. (MAPC 2008)

The BRA (2011) notes that overall land use distribution in Boston is as follows: 51% tax exempt (26% state, 14% city, 2% higher education and medical, 8% other exemptions), 36% residential, 9% commercial, and 4% industrial. (BRA 2011)

The neighborhood land use maps generated by the BRA were analyzed to create the summary of current land uses that is presented in Appendix A1.

Future Trends

Population and Housing Demand Projections for Metro Boston (MAPC 2014) provides projections for Metro Boston through 2040 to help municipalities form policies to ensure that the region continues to grow. The report states that the aging and retirement of the Baby Boomers will have implications for the region, and the economic future depends on attracting more young workers from other places. The report states that 435,000 new housing units—mostly multifamily, and mostly in urban areas—will be needed by the year 2040 to accommodate these young workers and the growing senior population. This implies that all types of publicly accessible open space, active, passive, and natural resource-based, will be needed to accommodate this increase in population. This will be especially so given that most of these new units will be of a multifamily, urban nature, where onsite open space, if any, will be limited.

The report offers two possible scenarios—“Status Quo” and “Stronger Region.” The Status Quo scenario is based on the continuation of existing rates of birth, death, migration, and housing occupancy. The Stronger Region scenario explores how changing trends could result in higher population growth, greater housing demand, and substantially larger workforce. The key findings are below:

Population: The Status Quo Scenario assumes a population growth of 6.6% over thirty years. The Stronger Region projects a 12.6% growth in population.

Workforce: More than a million of the workers in the region will retire by the year 2030. Young people will need to be retained and attracted from other places in order to fill those jobs. The Status Quo scenario notes that the current weak in-migration of younger workers will result in 0.4% growth in the labor force. The Stronger Region scenario projects that more young people will be attracted from outside the region and then retained, adding 175,000 new workers to the labor force and growing it by 7%.

Housing: Under the Status Quo scenario, the need for more housing will require 305,000 new housing units by 2040. Under the Stronger Region scenario, there will be a need for 435,000 new units.

Households: There will be a need to provide housing for a growing number of households of declining size due to single person households (especially seniors), divorced households, and fewer children. An increasing percentage of senior-headed households will choose to downsize from single family homes to apartments and condominiums. The sale of single family homes by the aging Baby Boomer generation will provide an adequate supply for younger families. With smaller households, public open spaces will serve as community gathering spaces where social isolation can be reduced.

Housing Preferences: Attracting more young people to the region with the kinds of housing they prefer could result in a “Stronger Region” scenario with a total population increase of 12.6%. This

report confirms the need for significant new supplies of rental and owner multi-family housing to attract young people. The Status Quo scenario requires 48% of units to be multi-family in urban communities. The Stronger Region scenario requires 62% of the units to be multi-family in urban communities.

The report says that many signs point to the resurgence of inner core urban communities. An increasingly diverse population attracted by job proximity, transit access, community vibrancy, and cultural assets is likely to drive continued population growth in inner urban areas. More than half of housing demand will be in urban communities under either scenario—as much as 56% in the Stronger Region scenario.

Children: The number of children in the region peaked in 2000 and is likely to decline over the coming decades. The population aged 5 to 14 is projected to fall another 8% to 9% by 2020 and is not likely to fully rebound, even under the Stronger Region scenario.

Economy: MAPC’s recent economic development strategy report (MAPC Undated) includes trends in the Boston Metropolitan Regional Economy. It notes that in the colonial era, the region focused on international trade and building global connections. The economic security that resulted allowed governance that supported growth and universities that ensured an educated population. As manufacturing increased, there was greater investment in education, cultural institutions and physical development that enhanced the quality of life. The region is now undergoing an economic transition with core strengths in education, healthcare and finance that form the basis of an innovation and knowledge economy. To support this transition will demand further investments in education for economic/workforce development, and in cultural institutions and recreational venues and opportunities (including open space) that will attract an educated, skilled workforce to an area with a high quality of life.

Climate Change: The City’s climate action plans (City of Boston undated) note that the city is among the most vulnerable in the US to climate change and rising seas. Models that showed an ice-free status in the Arctic by 2050 are being revised to project open seas in a decade. Projections are for a 6 foot rise in sea level by the end of the century (City of Boston Undated). With increasing temperatures come stresses on vegetation that can affect species planted, while frequent high velocity/high volume rain events can create more erosion. High temperatures will also make outdoor activities less attractive, and along with more water pooling could increase mosquito-borne disease outbreaks. Among Boston’s approaches to address this issue may include the provision and use of open space to accommodate temporary periods of inundation, changes in species planted, and changes in hours of recreational programs. While some of these changes can moderate the climate-wrought changes, others may change the nature of the recreational experience in the affected open spaces.

Maximum Build-Out

In the late 1990s, the MAPC generated maximum build-out scenarios for municipalities within the region. However, only two small areas of Boston were attempted for the build-out analysis given the complexity of zoning. As a result, it was deemed

infeasible to go further with a build-out analysis of Boston. It was also understood that most new development in Boston is located in areas where development has already occurred.

A maximum build-out analysis is a display of the results of all allowable development on all developable land. This is a concern to open space planners because potential open spaces that are not protected may be developed. However, even without this analysis, the potential for losses of open space can be seen in the zoning maps mentioned earlier. How these unprotected areas may be protected from development is the subject of much consideration at the Boston Parks and Recreation Department.

Current Infrastructure

Boston's land use is compact, mixed-use, pedestrian-oriented, and well served by transit. Land is at a premium and development competes with open space. The infrastructure systems necessary to support a dense city include multi-modal transportation, electrical services, gas lines, water and waste systems, and recreational and ecological open space. Achieving a balance of infrastructure systems that allow for growth and maintains a superior quality of life requires the careful development and application of public policy.

Water Transportation

Natural water bodies provided the earliest means of transport in Boston. (Seasholes 2003) The sea and the harbor (including the Mystic River and Chelsea Creek) continue to be important avenues of international commerce, although Boston's share of this trade has fallen behind other port cities such as New York and Montreal. Today cruise liners calling in Boston are a bigger business than container ships. Harbor channel maintenance dredging under the direction of the US Army Corps of Engineers was completed in 2008. The next project is a channel deepening project that will enable larger container cargo ships to enter the Port of Boston.

In recent years the water ferry system for passenger transport has been revived and expanded. In a region defined by its access to water, ferry service will become an alternative to clogged highways and packed transit trains as population and development densities increase. (Massachusetts Department of Transportation 2012)

Streets, Roads, and Highways

Native People had a hierarchy of paths throughout the region that responded to topography, landforms, sun, and shade. The European settlers first adopted these paths and eventually augmented them, before then imposing straight line "rangeway" roads. Boston's colonial-era streets have grown into an 800-mile network that varies from narrow cobblestone alleys on Beacon Hill dating back several centuries to the massive and congested Massachusetts Turnpike Extension (I-90) and John F. Fitzgerald Expressway (I-93). The more significant highways that serve the city include Interstates 90 and 93, Massachusetts Routes 1A, 2, 3, 3A, 9, 28, 30, 99, and 203, and U.S. Routes 1 and 20.

As the ownership of privately owned vehicles increases, traffic adversely impacts the quality of life in the city. The conflict between personal choices and public good remains ongoing, from residential neighborhoods where merchants and residents call for more parking, to the heavily-used Interstate Highway System that cuts through and surrounds Boston. Traffic delays and air, water, and noise pollution are constant reminders of the impacts of an auto-dependent transportation system.

Some reductions in auto ownership and use may be coming, as some residents take advantage of car sharing systems like ZipCar, or bike sharing systems (see below) like Hubway, for personal mobility. At least one high rise residential development in downtown Boston was recently approved without any parking garage onsite or associated with it elsewhere, in recognition of a market for carless-lifestyle housing. This could potentially free up land for other uses, including open space, but such urban-oriented residents will also seek close-to-home recreation, which may lead to further pressures on existing limited open space.

Bridges and Tunnels

In many instances, colonial-era ferries and then bridges were developed at the fording places of the Native Peoples. The bridges and tunnels that now serve the city include the Callahan, Sumner, and Ted Williams Tunnels crossing Boston Harbor to East Boston, the Thomas P. "Tip" O'Neill, Jr. Tunnel (I-93) under downtown Boston, the Tobin Bridge (U.S. Route 1) crossing the Mystic River, and the Leonard P. Zakim Bunker Hill Memorial Bridge (also I-93) crossing the Charles River.

The Thomas P. "Tip" O'Neill, Jr. Tunnel is located below the Rose F. Kennedy Greenway in downtown Boston. It was built as part of Central Artery/Tunnel Project (aka "The Big Dig" or the CA/T Project), which removed the deteriorating elevated Central Artery. This project created a total of 300 acres of open space, including 45 parks and plazas in downtown Boston, Charlestown, East Boston, and South Boston. (Massachusetts Department of Transportation Undated)

Mass Transit

Railroads were first built in Boston during the 1830s. The tracks required flat land so wetlands were often filled to serve that purpose. This technology thereupon made possible the extensive filling in of tidal flats, wetlands, and other lowlands by transporting fill, thereby creating new land for neighborhoods, roads, and railroads.

Boston residents were served by horse drawn buses in colonial times. By the late 1800s, streetcar suburbs grew along trolley lines in Roxbury, Brighton, Dorchester, and other areas around Boston.

Boston developed the first subway system in the country. The FY2014–2018 capital plan for the state Department of Transportation (MassDOT 2014) notes that the MBTA is the fifth largest transit system in the country as measured by ridership. It serves a daily ridership of approximately 1.3 million passengers. It maintains 182 bus routes, 4 rapid transit lines of heavy and light rail, 5 bus rapid transit lines, 3 trackless trolley lines, 14 commuter rail lines, 3 ferry routes, and a flexible paratransit

service. This system allows for better public access to public open spaces throughout the city, whether local or regional scale open spaces. This system can help increase public open space use of unused land, but there are also trends toward sale of such assets or use of or impact upon public open spaces to improve or expand the transit network.

Air Travel

Logan International Airport started during the 1920s on the mud flats of East Boston. The neighborhood was originally composed of five separate islands. Significant fill has created the land mass that exists today.

Logan International Airport is a critical link between the New England and the rest of the world. Recent additions to the airport include a runway built in 2006, new terminal buildings, parking garages, circulation improvements, hotels, and a third harbor tunnel (Ted Williams Tunnel) to increase vehicular access.

Massport has built and maintains Piers Park as mitigation for impacts on surrounding communities, especially East Boston. The 10-acre Bremen Street Park opened in 2007, adjacent to the Airport MBTA stop on a former rail yard. This park was funded by the Massachusetts Turnpike Authority as part of the CA/T Project, and is maintained by Massport.

Pedestrians and Bicycles

Section 7.1.1 presents detailed information on recreational infrastructure for pedestrians and bicycles.

The draft *FY2014–FY2018 Transportation Capital Investment Plan* of the Massachusetts Department of Transportation (2014) notes that \$130 million will be provided for the construction or reconstruction of bikeway and bike path improvements, including rail trails and scenic byways, across the Commonwealth.

The *Boston Regional Pedestrian Transportation Plan 2010* (MAPC 2010) identifies actions that local governments, advocacy organizations, citizen groups, the private sector, and individuals can take to encourage walking.

Hubway is a public bicycle sharing system with stations throughout Boston and adjacent towns. (City of Boston Undated) This builds on the past decade's extensive laying out of bicycle lanes on city streets and arterial routes, and the installation of bicycle parking stands throughout the city. (City of Boston Undated)

Water Supply Infrastructure

The water supply infrastructure for Boston is the responsibility of both the Massachusetts Water Resources Authority (MWRA) and the Boston Water and Sewer Commission (BWSC).

Water services had a modest beginning in colonial Boston, as early settlers relied on water from cisterns and underground wells, but the quality was poor and the supply inadequate. The first attempt to provide an alternative came when the Aqueduct Corporation began delivering water from Jamaica Pond through wooden pipes in 1796. (MWRA 2015)

Through the 1800s, Boston sought water supply sources further away from the city: 1848, from Lake Cochituate via the Cochituate Aqueduct and the Brookline Reservoir; 1870, the

Chestnut Hill Reservoir, with the construction of reservoirs on the Sudbury River to feed the Chestnut Hill Reservoir through the Sudbury Aqueduct soon following. A regional approach, the Metropolitan Water District, was formed in 1895 and by 1908 the Wachusett Dam, Reservoir, and Aqueduct were completed.

By the early 1900s, the Boston metropolitan area required additional water supplies and a more comprehensive plan to ensure its delivery. The Metropolitan District Commission (MDC) Water Supply Division was created in 1926 as the agency responsible for building these new facilities, among them Quabbin Reservoir, the Quabbin Aqueduct, and the Hultman Aqueduct.

Today, the MWRA supplies water to Boston and 60 other communities, where 2.5 million people are served in 890,000 households. Some 230 million gallons daily come from the Quabbin Reservoir which is 65 miles west of Boston, and the Wachusett Reservoir which is 35 miles west of the city. The water is conveyed via aqueducts from the two reservoirs to the Weston and Norumbega reservoirs.

The MWRA water reaches Boston after passing through treatment plants, storage tanks, and aqueducts. The BWSC owns and operates a system for the distribution of drinking water within Boston. The BWSC purchases water, disinfected and fluoridated, from the MWRA, and is the MWRA's largest single customer for both water and sewer services.

The BWSC's water supply distribution system consists of approximately 1,096 miles of pipe, 13,074 hydrants, and 16,885 valves. The system serves approximately 88,000 accounts through four major service networks. (BWSC 2015)

The most significant assets of the water supply system which exist in Boston and that have a relationship to the open space system are the Chestnut Hill Reservoir, where no water contact is allowed, but a path on the perimeter of the water body allows for walking and running, and the Bellevue Hill storage tank that helps maintain water pressure in the system for the southwestern section of the Boston area, and is located within the Bellevue Hill Reservation under the control of DCR. Paths are located within this reservation.

Sewer Infrastructure

The BWSC owns and operates a system for the collection and transport of wastewater and storm drainage. The sewer system consists of conduits ranging in size from six-inch clay lateral sewers to 20-foot by 15.5-foot concrete culverts. The 1,450-mile system

has 600 linear miles of sanitary sewers, 550 miles of storm drains, and 300 miles of combined sewers. Other facilities include eight pumping stations, two gatehouses, 40 permitted combined sewer overflow outlets, 185 regulators, and 200 tide gates. (BWSC 2015)

In 1985, legislation transferred the possession, control, and operation of the MDC Water and Sewerage Divisions to the newly created Massachusetts Water Resources Authority. Today, all wastewater collected by BWSC facilities is conveyed to the MWRA's Deer Island Treatment Plant for treatment. The MWRA

has created a 44-acre park around the plant which is located within Boston, thus offering a harbor island experience accessible by land from Winthrop. (MWRA 2015)

The Deer Island Treatment Plant is part of the federal court-ordered cleanup of Boston Harbor. The court ordered the MWRA to build the wastewater and sludge facilities as well as improved combined sewer overflow facilities, all on a court-set schedule.

These sewer renovations and the wastewater and sludge treatment made up the largest public works project to be built in New England up to that time and had a final cost estimated at up to \$6.1 billion. This undertaking included a 9-mile effluent tunnel to carry treated water hundreds of feet below Boston Harbor and into Massachusetts Bay.

This vast undertaking was driven by the 2.5 million people (almost half of the state's population) and the 5,500 businesses and industries that send their waste to Boston Harbor. It was also driven by the high value of the Boston waterfront, where commercial, residential, and recreational interests have been positively affected by the cleanup of the harbor waters. The harbor beaches in Boston have come back as a recreational destination thanks to this cleanup of the effluent flowing into the harbor waters.

Stormwater Best Management Practices

The *Stormwater Best Management Practices (BMP): Guidance Document* (BWSC 2013) calls for green infrastructure that uses storm water runoff management practices to mimic the natural hydrologic cycle. Site planning includes reducing impervious areas, fitting the proposed improvements to the site terrain, preserving and using the natural drainage systems, and replicating pre-development hydrology.

The Water and Sewer Commission is currently working on the implementation of demonstration projects at Audubon Circle (Beacon Street/Park Drive area), Central Square in East Boston, and City Hall Plaza. (BWSC 2013) The potential need to use open space to manage stormwater runoff is an issue that warrants the further consideration of the Parks and Recreation Department.

Future Development

Boston's long term development is largely a function of the economy, the local land use controls, and the amount of remaining, buildable land. The areas where new development is taking place in Boston are discussed in Section 7.2 – Neighborhoods. There is a need to provide open space in a balanced manner to augment the build-out in these neighborhoods.

Local Land Use Controls: Planning

The City of Boston does not have a comprehensive master plan at this time. However, at the direction of Mayor Walsh, the Boston Redevelopment Authority has initiated the development of a General Plan for the City (Imagine Boston 2030) that will knit together and establish a context for the individual neighborhood plans that have been the focus of city planning for the last 30 years.

The BRA states that the scope of the General Plan will also include a review of all of the individual planning efforts being undertaken by various City departments that are specific to their own mission (e.g., the Parks and Recreation Department's Open Space and Recreation Plan) and incorporate that work into a single coordinated vision and plan for Boston.

Local Land Use Controls: Zoning

The City of Boston prescribes land use through citywide districts and special districts zoning. Specific to this plan, the zoning designations include Open Space Districts and Conservation Protection Subdistricts (see Map 3). The City's Zoning Code has several articles that relate to open space that are summarized in Section 5. These include the following:

- Article 29 Greenbelt Protection Overlay District
- Article 33 Open Space Subdistricts
- Article 49A Greenway Overlay District
- Article 56 Conservation Protection Subdistrict
- Article 89 Urban Agriculture

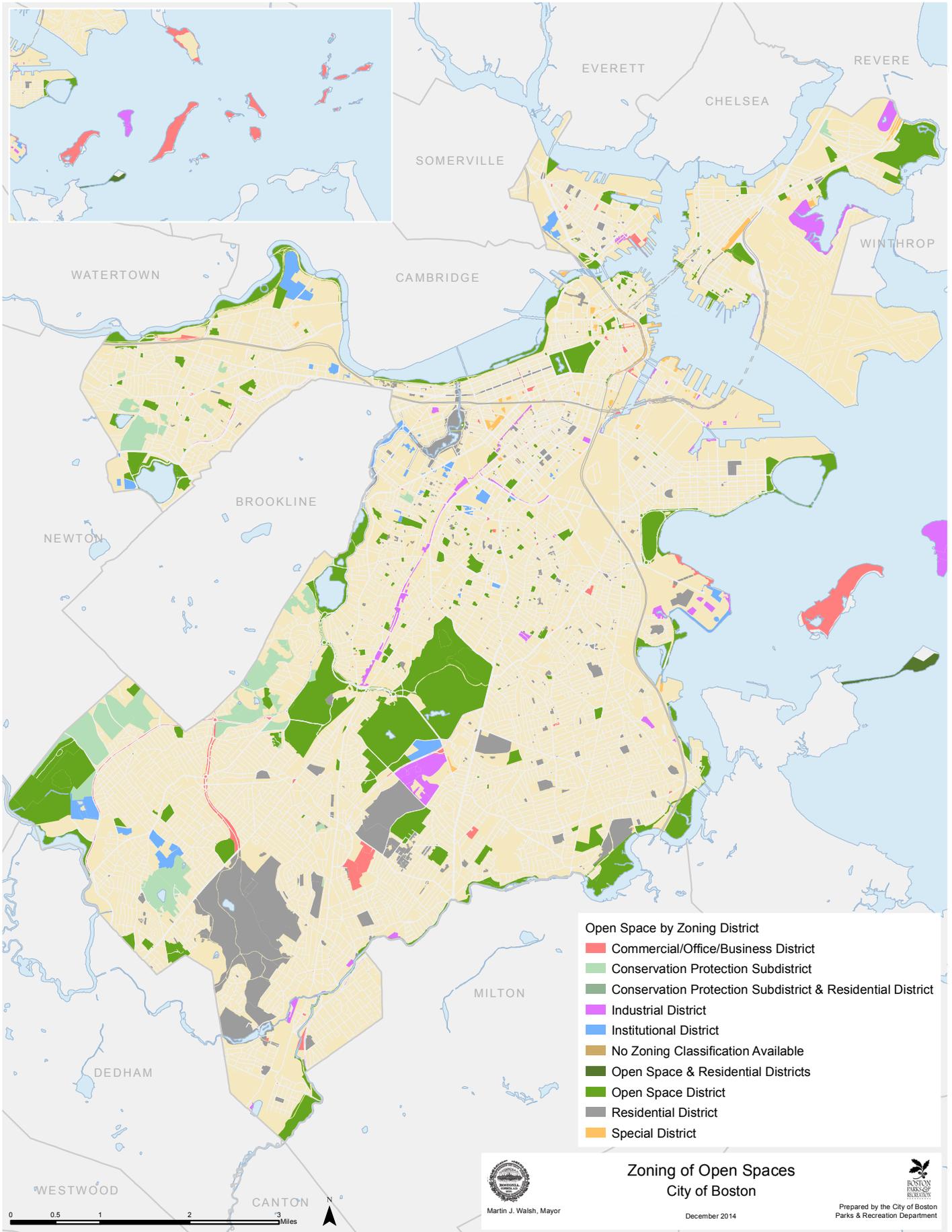
Open space zoning is designated for lands in public ownership that are currently used for open space purposes. Open space zoning prohibits or limits to varying degrees the development of open space. The type of open space typically governs what degree of development can be allowed. The protection of open space through zoning has limitations as a project that does not meet zoning requirements may seek a variance.

Private property owners may have their property zoned for open space if they so desire.

Residential zoning prescribes areas to be provided for open space on-site, as in Article 17, Open Space Requirement for Residences. New residential uses may be required to provide a minimum usable open space per dwelling unit on the project site. This requirement may be met by balconies or on the roofs. Required front, side, and rear yards are included in computing the usable open space.

Meeting the minimum usable open space per dwelling unit zoning requirement onsite has become a challenge in densely developing neighborhoods like South Boston where developers are maximizing the development on a site and seeking variances by which to do so, including seeking relief from the minimum onsite open space requirements. This puts pressure on existing open space in already dense neighborhoods with limited open space.

Article 80 Development Review: The Article 80 process is intended to protect and enhance the public realm and to mitigate the impacts of development projects on their surroundings and on City resources. One of the specific goals of Article 80 is "to encourage new buildings and public spaces that are designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets." However, the Article 80 review criteria do not specifically address a project's potential impact to the park system.



Planned Development Areas: The BRA may approve a Planned Development Area (PDA), a special feature of Article 80, for a project that codifies the development potential of a particular parcel through an extensive public process, review, and negotiation. The end result is that the required provision of open space on a site may be changed during this approval.

Institutional Master Plans: The BRA may also approve an Institutional Master Plan (IMP) under Article 80 that determines how a college or hospital will grow over a decade. There are no requirements for open space in this process. Open space may be provided in the IMP, but a later amendment, or a future IMP, may utilize that open space. The institution may eliminate the open space within its holdings, and instead look to the City's already oversubscribed public open spaces to serve its own users.

Local Land Use Controls: Parks and Recreation Commission Review

The Boston Parks and Recreation Department reviews development projects for the impacts to open space through the Section 7.4-11 (the 100-foot rule) and Article 80 processes.

Municipal Code Section 7.4-11 Permission for Construction near Parks or Parkways: The City's Municipal Code requires that the Parks and Recreation Commission must approve in writing construction or alteration of all buildings and structures within 100 feet of a public park or parkway. This review process is conducted either administratively or through the monthly public hearings of the Parks and Recreation Commission.

Infrastructure Improvements

The assets of a region that support an innovation/knowledge-based economy include its human capital, its public and civic institutions, and its physical and virtual infrastructure that allows people to live in the region and businesses to thrive. A vigorous, lively infrastructure of parks and open space can be considered part of this vision.

The MAPC's recent economic development strategy report (MAPC Undated) notes that Boston overall has good infrastructure systems that have contributed to general economic success. The future challenges include the maintenance, modernization, and expansion of these systems due to the age of the systems, changing demographics, development, and lack of funding sources. Of particular note are needs related to transit systems, storm water infrastructure, and energy infrastructure. The need to provide equitable distribution of infrastructure investments is critical, because it will determine where growth occurs and who benefits from it.

Development decisions in the future will be influenced by the preferences of the baby boomers and the millennials. These two groups have trended towards a distinct preference for urban environments, with living and working environments that require less automobile dependence for access to a wide array of entertainment, services, and innovative economic opportunities. From an infrastructure perspective, this creates a need for more urban investments, particularly with regard to transit which

enables higher density environments, and storm water management which helps to mitigate the adverse environmental impacts of development.

The transit systems of Boston require significant investments to support improvements and expansion. Transit in this region must offer higher quality and greater efficiency. It must also be expanded to support greater density and enhance connectivity.

Storm water management is also an issue of increased concern because the need to manage flooding and water quality in urban and suburban areas has necessitated the development of practices that create additional costs for municipalities and developers.

Mass Transit

The BRA Fairmount Indigo Planning Initiative (BRA Undated) notes that the line passes through Downtown Boston, South Boston, Roxbury, Dorchester, Mattapan and Hyde Park. There had been only four stops along the corridor and the line bypassed large sections of lower-income urban neighborhoods that endured the environmental impact of the train without enjoying the benefit of access to it. The MBTA has recently constructed three new stations along this line at Newmarket/South Bay, Four Corners/Geneva Avenue, and Talbot Avenue. A fourth new station, at Cummins Highway/Blue Hill Avenue, is in design and is expected to be completed in 2017. These new stations will significantly expand transportation options (both rail and bus) for communities living within the Fairmount Indigo Corridor. Approximately 40,000 people live within a one-half mile walk of the existing four stations. An additional 42,000 people live within a one-half mile walk of the three new stations and the one in design. If the last two proposed stations were to be constructed, an additional 26,000 people would be within a one-half mile walk of a transit stop.

The *Capital Investment Plan for FY2014-FY2018* for the Massachusetts Department of Transportation (2014) outlines how the state will spend about \$12.4 billion over the next five years, with investment in public transit, bike paths, paratransit, roads, bridges, airports and railroads. The plan seeks to fund investments that will enhance mobility, improve safety, stimulate economic growth, and protect the environment. The proposed improvements are as follows:

- \$75 million in matching funds to the MBTA for the purchase of 392 new buses.
- Green Line Cars (\$2.6 million)—supports initial planning and design work to replace the entire existing Green Line fleet, with anticipated delivery of new vehicles beginning in FY2021.
- Green Line Extension [GLX] (\$1.3 billion)—this will fund procurement of vehicles, construction of stations and improvements to rail and signal systems to enable service to Somerville and Medford by FY2020, improving access to employment opportunities for Boston residents.
- Red and Orange Line Program (\$835 million)—this represents initial funding for a \$1.3 billion program to replace the Red Line vehicles and Orange Line vehicles (120 Orange Line cars and 74 new Red Line cars) as well as improvements to tracks

and signals systems, thus improving capacity and frequency of trains for customers.

The report notes that the Red Line is the transit backbone of the region's innovation economy, connecting Kendall Square to the Massachusetts General Hospital campus and then to the Innovation District via South Station and the Silver Line.

The Orange Line runs through North Station through Roxbury and Jamaica Plain. It serves hundreds of thousands of residents, including many low and moderate income persons.

The improvements along this line will advance a host of smart growth and equity goals, while putting added pressure on the Southwest Corridor Park, located in Roxbury and Jamaica Plain, and built as part of the Orange Line reconstruction in the 1980s.

- DMU Service and Silver Line to Chelsea (\$252 million)—implementation of diesel multiple unit (DMU) vehicles (independently powered subway vehicles running on commuter rail lines) and expansion of the Silver Line service will provide reliable public transit to underserved communities in the Fairmont Corridor of Boston, Chelsea and the North Shore. The DMU funding will establish the new Indigo Line, using the Fairmont commuter rail corridor, to provide faster, more reliable service to that region of Boston.

Impacts of Growth

The regional *2012 to 2013 Annual Update, Comprehensive Economic Development Strategy* report (MAPC Undated) states a goal to promote economic development policies and practices driven by Smart Growth Principles. It notes that regional development patterns of the past have ceased to be in the long term self-interest of future generations.

Smart growth will focus a larger share of regional growth in central cities, urbanized areas, near transportation nodes, and in communities already served by adequate infrastructure. The intent is to encourage density in some places in order to save open land in other places. This is a goal, however, that can have a negative impact on the provision of parks within Boston, since as density increases, open space needs and pressures on open space both increase. This goal therefore needs further development to limit adverse impacts on Boston residents.

The MAPC encourages policies to promote the redevelopment of brownfields and regulate the development of greenfields in order to enable compact growth, protect natural landscapes, and focus economic growth.

The MAPC has a goal to develop the region's Green Economy. It supports the development and implementation of local and regional, state, and interstate plans that foster development projects, land and water conservation, transportation, and housing that have a regional benefit. The *MetroFuture* regional plan (MAPC 2008) includes goals to protect natural landscapes and conserve natural resources.

The MAPC has projected that there will be a need for 435,000 more housing units to be created in the region between 2010 and 2040 in order to accommodate and encourage growth. (MAPC 2014, page 20) This growth will be primarily in

multi-family housing, as lifestyles change to accommodate younger workers and aging baby boomers. This added density in housing units that are typically without private open space will thus need to be served by public open space.

There is already a heavy demand put on open space resources in Boston and the Metropolitan Boston Region, a highly urbanized and densely populated area. The Metropolitan Boston Region contains approximately 32% of the state population but only 4.8% of the land area. The per capita acreage available for open space and recreation is only 0.03 acres per person.

Land available for open space and recreation in the Metropolitan Boston Region is more limited than in other parts of Massachusetts. However, the percentage of total land area dedicated to recreation and open space in this region is 26 percent. This ranks third among the seven Statewide Comprehensive Outdoor Recreation Plan (SCORP) regions (EOEEA 2006) in total land area percentage dedicated to recreation and open space.

The 2006 SCORP also noted that the more heavily used resources in the region are golf courses, neighborhood parks, playgrounds and tot lots, lakes and ponds, and historical and cultural sites. The new 2012 SCORP supports this, in its statement (EOEEA 2012, page 18) that "[r]esidents in the Eastern part of Massachusetts were more likely to use local facilities than residents of Central and Western parts of the state."

The 2006 SCORP said that overall the satisfaction levels of the Metropolitan Boston Region are much lower than for other SCORP regions. High levels of dissatisfaction were associated with rivers or streams, bikeways and golf courses, neighborhood parks, playgrounds and tot lots. These resources seem to be suffering due the overall population density of the region. They will continue to suffer without improvements to existing public open spaces and additions to the supply of public open spaces.