

6.1 INTRODUCTION

6.1.1 CONTEXT

Construction of the World Trade Center (WTC) displaced a densely developed 12-block area of Lower Manhattan that, until the mid-1960s, contained markets, electronics stores, and other business related to the piers that once lined the Hudson River waterfront. As was typical of such industrial and commercial development, the area contained no open space. When it was completed in 1973 in the tower-on-plaza configuration popular at that time, the WTC brought to Lower Manhattan a major open space of nearly 4 acres, the Austin J. Tobin Plaza (Tobin Plaza), with a central fountain and sculpture. The buildings of the WTC encircled the Plaza, effectively isolating it from surrounding streets on three sides. Entry at grade was from Church Street only, where Tobin Plaza connected to a linear plaza area along Church Street that wrapped around the corners of Vesey and Liberty Streets. Other open spaces in the area based on the same urban design principle included those associated with Chase Manhattan Plaza (1961), 140 Broadway (1966), One Liberty Plaza (1969), and 130 Liberty Street (1974).

For years, Tobin Plaza was criticized for its lack of liveliness, and the Port Authority of New York and New Jersey (the Port Authority) reprogrammed it several times, eventually filling the space with benches and landscaping. After the terrorist bombing at the WTC on February 26, 1993, a memorial was erected in Tobin Plaza in memory of the people lost on that day. In the decade prior to September 11, 2001, Tobin Plaza had become considerably livelier. It hosted concerts and other performances, as did the open space along Church Street, which was also a starting or ending point of walking tours of Lower Manhattan, walk-a-thons, and bike-a-thons as well as the site of greenmarkets and food stands. Similar efforts were made to utilize the other nearby open spaces built in the WTC era.

The materials excavated during construction of the WTC were used to create landfill in the Hudson River, across West Street from the WTC Site where deteriorating piers stood. Originally, a vast “city” of apartment buildings containing low- to moderate-income housing and arranged in tower-on-plaza configuration was planned for the new land. One project, Gateway Plaza, was completed in 1980, generally reflecting this plan. However, by 1980, it was clear that the tower-on-plaza form, and the superblocks and the broad expanses of open spaces often associated with that urban design approach, lacked the human scale that New York City’s more typical grid system offered. As a result, the plan for what was to become Battery Park City (BPC) and the World Financial Center within it adopted a more traditional street grid. In addition to residential buildings, mixed-use development was constructed, bringing community facilities, commercial uses, and open spaces to BPC. The parks of BPC, carefully designed to offer a variety of scales—from small neighborhood squares to broad expanses of green lawns, and a highly successful esplanade along the river—stood in strong contrast to the plaza form on the WTC Site. In particular, the paved open spaces at North Cove serving the World Financial

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Center and the Winter Garden, an interior publicly accessible recreational space, were programmed with plantings and water features and bordered by restaurants and shops, all succeeded in attracting great numbers of workers, visitors, and residents to their lively environment. The WTC's Tobin Plaza was connected directly to BPC/World Financial Center via the North Bridge, which brought pedestrians to the Winter Garden.

On September 11, 2001, each of the Twin Towers was struck by a terrorist hijacked airline jet. In less than two hours, the Twin Towers collapsed onto the WTC Site and surrounding areas, causing massive death and devastation in Lower Manhattan. All the open spaces on the WTC Site and the bi-level plaza on the Southern Site were destroyed or damaged and later excavated in the recovery process. Nearly 2,800 people were killed at the WTC Site that day, and thousands of other area residents and workers were evacuated and displaced in the aftermath. The outpouring of support for the physical, financial, and emotional recovery efforts led to the creation of the Lower Manhattan Development Corporation (LMDC) to coordinate the remembrance, rebuilding, and renewal efforts. With broad public input, LMDC and the Port Authority have developed the World Trade Center Memorial and Redevelopment Plan (Proposed Action), with open space dispersed throughout the Project Site and a 4.19-acre area on the WTC Site set aside for the Memorial honoring those killed on September 11, 2001 and February 26, 1993.

The Proposed Action would return *both open space and open space users* to the Project Site. This chapter considers how the Proposed Action would affect open space provision and use, compared in both the Current Conditions Scenario and the Pre-September 11 Scenario.

Open space is considered to be land that is publicly or privately owned, and has been designated for leisure, play, sport, or for the protection and enhancement of the natural environment. The Proposed Action would provide approximately 5.62 acres of open space on the Project Site, compared with the 7.41 acres available before September 11, 2001. The open spaces proposed under the Proposed Action would vary in size, scale, and character. However, each open space would be directly accessible from the street level.

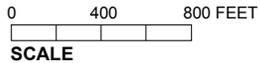
The Proposed Action would return workers and visitors to the Project Site—approximately 43,900 daily workers plus an estimated 24,700 average daily visitors to the Memorial in the years immediately following its opening and approximately 15,100 average daily visitors in later stabilized years. In addition, it is conservatively estimated that approximately 3,600 visitors would use amenities other than the Memorial (such as cultural facilities, performing arts space, and restaurant and café uses) in both analysis periods. These numbers are comparable to the number of workers and visitors on the WTC prior to September 11, as shown in Figure 6-1. These workers and visitors would create demand for passive open spaces within a short walk of the Project Site (¼ mile, or 10 minutes, as defined in the *New York City Environmental Quality Review (CEQR) Technical Manual*) that would be shared with other workers, visitors, and residents in the area. The analysis below determines whether the addition of the workers and visitors associated with the Proposed Action would generate significant adverse impacts on the inventory of and demand for passive open space within ¼ mile of the Project Site. The impacts are determined quantitatively, as a change in the ratio of acres of suitable open spaces to user population (“open space ratio”), and qualitatively, in an assessment of the amenities provided in and overall condition, safety, accessibility and usability of the open spaces. (See section 6.2, below, for discussion of methodology.)



3.26.04

HUDSON RIVER

-  Project Site
-  Open Space Study Area
-  1/4-Mile Perimeter
-  Census Tract Boundary
-  Census Tract Number
-  Open Spaces Current Conditions
-  Open Spaces Pre-September 11 Only
-  Open Space - Proposed
-  Open Spaces Outside Study Area



The Proposed Action would result in the addition of 5.62 acres of passive open space to the Project Site. These 5.62 acres would include Wedge of Light Plaza and open spaces surrounding the proposed permanent WTC PATH Terminal; September 11 Place, which would surround the cultural buildings on the Memorial quadrant; Liberty Park, located on the Southern Site; and the nearly 5-acre Memorial (which would include nearly 3 acres of publicly accessible open space), located in the southwest quadrant of the Project Site. These open spaces would serve a variety of purposes. The lively streetscape of Wedge of Light Plaza, the landscaped full-block Liberty Park, and the enduring, reflective space encompassed by the Memorial would invite workers, visitors, and residents alike to frequent the open spaces on the Project Site. This chapter examines both quantitatively and qualitatively how these proposed open spaces would affect open space and open space users in the future with the Proposed Action.

This chapter also considers pedestrian wind levels, as they may be altered by the size, shape, and orientation of the structures proposed for the Project Site to affect wind conditions at the public open spaces on site and nearby.

6.1.2 CONCLUSIONS

This chapter compares conditions in the future with the Proposed Action to conditions in the future without the Proposed Action under two scenarios. One scenario is based on current conditions, and takes into consideration development that is currently planned or proposed. The other scenario is based on pre-September 11 conditions, and takes into consideration development that had been proposed prior to September 11, 2001. The analysis below concludes that the Proposed Action would not have a significant adverse impact on open space resources. In the quantitative analysis, the adequacy of open space is measured using a ratio of open space acres to open space users (open space ratio). Although in the future with the Proposed Action some open space ratios would decrease compared with the future without the Proposed Action, the qualitative assessment of the new open spaces finds that the accessibility, amenities and comfortable human scale offered in the new WTC open spaces would be such that overall the Proposed Action would not have a significant adverse impact on open spaces in the area. The analysis also concludes that the Proposed Action would not have a significant impact on pedestrian-level wind conditions in open space areas.

The open space assessment addresses impacts on passive open spaces, which are the facilities primarily used by the new population to be introduced by the Proposed Action—workers and visitors. According to the *CEQR Technical Manual*, workers and visitors need a minimum of 0.15 acres of passive open space per 1,000 persons; residents, who are in the area for considerably longer periods of time, need more—0.50 acres of passive open space per 1,000 residents. These ratios represent the *CEQR Technical Manual* guidelines for the amount of open space considered adequate for the user populations. The screening analysis undertaken for this chapter found passive open space ratios to be adequate for both residential and non-residential user populations.

The *CEQR Technical Manual* also recommends that if an action would reduce the open space ratio by more than 5 percent, it would be necessary to assess conditions in greater detail in order to make a full determination of impact. As shown on Table 6-1, in all cases and analysis years, the ratios of the supply of passive open spaces to the volume of users would be well above the

**Table 6-1
Adequacy of Open Space Quantities**

PROJECT SITE							
Condition	Average Daily Population			Open Space			
	Workers	Visitors	Combined	Acres			
Pre-September 11	47,885	7,304	55,189	7.41			
Current Conditions ¹	75 ²	5,500	5,500	0.00			
Build Conditions, 2009	13,880	28,258	42,138	5.62			
Build Conditions, 2015	43,861	18,668	62,530	5.62			
OPEN SPACE RATIOS IN THE ¼-MILE STUDY AREA							
	User Population		Passive Open Space Acres			Open Space Remaining Ratios	
	Residents	Workers and Visitors	Total	Acres Reserved for Residents	Acres Remaining for Non-Residents ⁴	Acres per 1,000 Residents Residential Guideline	Acres per 1,000 Non-Residents ⁴
Pre-September 11 Scenario							
Baseline (pre-September 11)	13,707	177,948	55.47	6.85	48.62	0.50	0.27
2009 Without Proposed Action	23,324	198,918	59.14	11.66	47.48	0.50	0.24
2009 With Proposed Action	23,324	185,867	57.35	11.66	45.69	0.50	0.25
2015 Without Proposed Action	23,714	204,118	59.14	11.86	47.29	0.50	0.23
2015 With Proposed Action	23,714	209,459	57.35	11.86	45.49	0.50	0.22 ⁴
Current Conditions Scenario							
Baseline (current conditions)	18,458	123,991	47.81	9.23	38.58	0.50	0.31
2009 Without Proposed Action	28,897	155,894	53.36	14.45	38.91	0.50	0.25
2009 With Proposed Action	28,897	192,552	58.98	14.45	44.53	0.50	0.23 ⁴
2015 Without Proposed Action	30,015	163,494	53.36	15.01	38.35	0.50	0.23
2015 With Proposed Action	30,015	212,944	58.98	15.01	43.91	0.50	0.21 ³
Notes:							
CEQR Technical Manual guidelines for adequate passive open space: 0.50 acres per 1,000 residents; 0.15 acres per 1,000 non-residents. All values are within recommended adequacy levels.							
¹ Approximate Current Conditions							
² Total employment throughout the course of each day. Source: Port Authority							
³ Decrease of more than 5 percent; requires more detailed analysis.							
⁴ Remaining passive open space acreage for non-residents is taken into account after satisfying the demand for residents.							
Source: <i>Urban Planning and Transportation Study for Lower Manhattan, Draft Summary Report</i> . Beyer Blinder Belle and Parsons Brinckerhoff, 2002 (population on Project Site); AKRF, Inc. (population in study area)							

applicable guidelines. Residents would always have enough open space to meet the guideline value of at least 0.50 acres per 1,000 residents; the *remaining* acreage available for non-residents would be ample enough to produce open space ratios ranging from 0.21 to 0.31 acres per 1,000 people, well above the guideline value of 0.15 acres per 1,000 people. *The analysis in Table 6-1 shows that both non-residents and residents would have enough passive open space to satisfy guidelines, even when considered simultaneously, as it is assumed that both residents and non-residents will “compete” for passive open space resources in the study area. The amount of passive open space necessary to fulfill the recommended guideline of 0.5 acres per 1,000*

residents is shown in the column labeled “acres reserved for residents.” These acres are then subtracted from the amount of passive open space acres in the study area, and the remainder is shown in the column labeled “acres reserved for non-residents.” This number, representing the remaining acres of passive space available for non-residents, is then divided by the number of non-residents, giving the open space ratio for non-residents. This ratio is listed in the column labeled “acres per 1,000 non-residents.” Because this ratio is always greater than the recommended guideline of 0.15 acres per 1,000 residents (and, as previously discussed, the residential ratio of 0.50 is fulfilled) there is clearly sufficient passive open space resources in the study area to satisfy any condition under any scenario.

The Proposed Action would reduce several ratios *in the Current Conditions Scenario* by more than 5 percent. The implications for the Pre-September 11 Scenario and the Current Conditions Scenario are summarized below.

PRE-SEPTEMBER 11 SCENARIO

Open Space

- Comparing conditions with the Proposed Action with conditions that would have occurred without the Proposed Action assuming the attacks on the WTC had not taken place (Pre-September 11 Scenario), the analysis found that because the open spaces would be complete, but the development program would not, the Proposed Action would not adversely change open space ratios in 2009.
- In 2015, the entire program would be complete and the anticipated worker and stabilized visitor population would be in place. *When examining the remaining amount of passive open space per 1,000 non-residents* under the Pre-September 11 Scenario, the Proposed Action would decrease the ratio of *passive* open space to non-resident user population of 0.23 acres per 1,000 people to 0.22 acres per 1,000 people—a decrease of 6.25 percent.

However, an examination of more qualitative aspects of the open space on the Project Site concluded that the accessibility, quality, and programming of the proposed open spaces would outweigh quantitative factors and there would be no significant adverse impact on open space, as follows:

- Comparing the proposed open spaces on the Project Site to those that would have been there in the future without the Proposed Action had the events of September 11 not occurred, the Proposed Action would provide spaces that would be substantially more accessible to the public than Tobin Plaza at the former WTC and the upper level plaza of 130 Liberty Street.
- All of the Proposed Action’s open spaces would be at street level and immediately adjacent to sidewalks. They would not be concentrated in the center of the WTC Site and along Church Street but rather would be found across Fulton and Liberty Streets on major east-west pedestrian paths. In particular, Liberty Park would extend open space into the densely developed neighborhood south of the WTC, and would be large enough to host the concerts *and events* formerly held on the WTC Plaza. Wedge of Light Plaza would open to Church Street, creating an open space link from September 11 Place to St. Paul’s Chapel.

In addition to their accessibility, the Proposed Action’s open spaces would be designed specifically to be attractive, lively, and inviting. Liberty Park, September 11 Place, the PATH Plaza, and Wedge of Light Plaza would provide passive open space throughout the Project

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Site. The street levels of all buildings facing the open spaces and plazas would be lined with restaurants and shops; like the North Cove plaza at the World Financial Center (and the recent rehabilitation of Stone Street), it is assumed that the restaurants would offer open air dining on nice days, thus adding to the overall liveliness of the area. The spaces would have trees and other landscaping, benches and other seating, water features, and other amenities to create attractive places for workers, visitors, and residents to sit, eat, and enjoy the out-of-doors.

The Proposed Action would also include the creation of a 4.87-acre Memorial in memory of the events that took place on February 26, 1993, and September 11, 2001, of which 2.87 acres would be publicly accessible passive open space. The Memorial would be an integral part of the Proposed Action, recognizing those lost and providing the central focus of the Project Site. Based on the concept "Reflecting Absence" (see Chapter 1 for details), the Memorial would include landscaping on the plaza level, an exposed portion of the west slurry wall, and access to the tower perimeter column bases. The configuration of cultural buildings and the Memorial Center would also be addressed as the Memorial and site infrastructure are further developed.

The Memorial would be located in a field of trees interrupted by two large voids containing recessed pools. The pools and the ramps that surround them would recognize the footprints of the Twin Towers, while a continuous cascade of water would circumscribe the perimeter of each square. Although the two recessed pools would contribute to the open nature of the Project Site and would be publicly accessible, the area they cover (approximately 2 acres) is conservatively excluded from the open space inventory. The surface of the Memorial plaza would be punctuated by the linear rhythms of rows of deciduous trees, forming informal clusters, clearings, and groves. This surface would consist of a composition of stone pavers, plantings, and low ground cover. Through its annual cycle of rebirth, the living park would extend and deepen the experience of the Memorial.

The plaza surrounding the Memorial is designed to be a meditative space. Located at street level to allow for its integration into the fabric of the city, the plaza would encourage the use of this space by visitors, residents, and workers on a daily basis. The Memorial grounds would not be isolated from the rest of the city, but a living part of it. Because the Memorial would be publicly accessible, open to the sky, and would encourage visitors to spend contemplative, reflective time out of doors, its 2.87 acres of open space are included in the open space inventory. The Memorial, which is the heart of the Proposed Action, would act as a major open space on the Project Site, and would be a new and unique open space in Lower Manhattan.

Considering that even with a decrease in open space ratio, the study area would still have a more than adequate supply of passive open space and that the proposed open spaces would be designed to offer the maximum in amenities for their users, the decrease is not considered to be significant, and the Proposed Action would not have a significant adverse impact on open space.

Pedestrian-Level Wind Conditions

The Proposed Action would be expected to result in pedestrian-level wind conditions that are comparable to those that existed before September 11. Typically, pedestrian-level wind conditions would be in the comfortable range. However, during some limited time periods,

particularly in the *Liberty Park* area and at building corner locations, uncomfortable conditions may occur, and activities like sitting, standing, and walking may be impeded. In addition, a few hours per year, particularly when high wind speed conditions occur in the New York City area, severe conditions—which may limit activities, produce difficult walking conditions, and, at times, pose potential safety problems that would limit access to some areas—may occur. As part of the final design activities for the Proposed Action, wind tunnel studies will be undertaken to examine measures to reduce and mitigate undesirable wind effects. However, absent development and implementation of such measures, conditions with the Proposed Action would be comparable to pre-September 11 conditions.

CURRENT CONDITIONS SCENARIO

Open Space

- In both 2009 and 2015, when the Proposed Action was compared to the future without the Proposed Action based on current conditions (Current Conditions Scenario), the analysis determined that the Proposed Action would decrease the ratio of passive open space to non-resident user population by more than 5 percent. *Although the absolute amount of passive open space would increase, the subsequent increase in population would cause some open space ratios to decrease.* Specifically, the ratio would go from 0.25 acres per 1,000 people to 0.23 acres per 1,000 people in 2009 (a 7.35 percent decrease) and from 0.23 acres per 1,000 people to 0.21 acres per 1,000 people in 2015 (an 11.98 percent decrease).

However, as with the Pre-September 11 Scenario, an examination of more qualitative aspects of the open space on the Project Site found that the accessibility, quality, and programming of the proposed open spaces would outweigh quantitative factors and there would be no significant adverse impact on open space, as follows:

- *In the future with the Proposed Action, a totally new system of open space would be introduced on the Project Site. In the future without the Proposed Action, the WTC Site would remain in its current state (vacant except for the No. 1/9 Subway line and the temporary, and, in the future, permanent WTC PATH Terminal) and would contain no open space. With the Proposed Action, both workers and visitors as well as new passive open space would be added to the Project Site.*
- As compared to open space in the future without the Proposed Action in the Current Conditions Scenario, the Proposed Action would provide much more open space, though the large non-residential population introduced as a result of the Proposed Action would cause the open space ratio to decline. Without the Proposed Action the only open space on the Project Site would be the relatively inaccessible bi-level plaza at 130 Liberty Street, if it were to be restored.
- As described above for the Pre-September 11 Scenario, the Proposed Action's open spaces would be located all along the site's major pedestrian routes, surrounded by active ground-floor retail, restaurant, and other lively uses. They would offer seating, landscaping, lighting, water features, sculpture, and other amenities to add to their attractiveness and usability. Additionally, the Memorial would provide an integral piece of open space, commemorating the events of September 11, 2001 and February 26, 1993.

Considering that even with a decrease in open space ratio, the study area would still have a more than adequate supply of passive open space and that the proposed open spaces would be designed to offer the maximum in amenities for their users, the decrease is not considered to be significant.

Pedestrian-Level Wind Conditions

The Proposed Action would be expected to result in pedestrian-level wind conditions that are comparable to, but slightly worse than, those that currently exist on the WTC development site. Conditions would be slightly worse because of the tall buildings that are part of the Proposed Action. Typically, pedestrian-level wind conditions would be in the comfortable range. However, during some limited time periods, uncomfortable conditions may occur, and activities like sitting, standing, and walking may be impeded. In addition, a few hours per year, severe conditions—which may limit activities, produce difficult walking conditions, and, at times, pose potential safety problems—would limit access to some areas. As discussed above, wind tunnel studies will be undertaken as part of the final design activities to examine measures to reduce and mitigate undesirable wind effects. However, absent the development and implementation of such measures, conditions with the Proposed Action would be comparable to current conditions.

6.2 METHODOLOGY AND SCREENING FOR IMPACTS

6.2.1 OPEN SPACE IMPACTS

Created specifically to examine the potential effects of development projects in New York City, the methodology of the *CEQR Technical Manual* has been used as a guideline in analyzing the Proposed Action. This methodology sets appropriate study areas and provides quantitative guidelines for screening for open space impacts, as discussed below.

STUDY AREA

The study area for an open space analysis is based on a reasonable walking distance from the Project Site to local open space. Because the Proposed Action would add workers and visitors, but no residents, the focus of the analysis is on *passive* open space. For non-resident users of open space walking to benches and other seating areas at lunchtime or during a tourist or shopping trip, this distance is approximately ¼-mile. As shown on Figure 6-1, the open space study area is based on the ¼-mile radius, adjusted to contain every census tract that is at least 50 percent located within ¼-mile of the Project Site. Three census tracts—13, 21, and 317.01—meet this requirement. They include BPC, the area south of the WTC Site and west of Broadway, and the area directly north of the WTC Site south of Reade Street and west of Broadway. In addition, in the interest of analyzing a more comprehensive study area, portions of two other census tracts that fall within ¼-mile of the Project Site—tracts 7 and 15.02—are included. The inclusion of portions of these two additional census tracts expands the study area to the east, capturing the populations and open spaces in the blocks between Broadway and William Street (see Figure 6-1).¹

¹ Geographic analyses were conducted to determine the percentage of each census tract included in the study area. These percentages were applied to U.S. Census, New York State Department of Labor, and New York City Department of City Planning data to determine worker and residential populations within each census tract portion.

As shown in Figure 6-1, several larger open space resources, including Washington Market Park and City Hall Park, are located immediately adjacent to the study area boundary. Although these parks are not included in the open space inventory, it is highly likely that workers, visitors, and residents in the study area would use these open spaces as well as those within the study area.

OPEN SPACE INVENTORY

Within the study area, all publicly accessible open spaces are inventoried to determine their character, condition, and acreage; the inventory identifies acreage dedicated to active and passive recreation. Active open spaces typically have facilities for organized games, children's play equipment, basketball courts, handball courts, fields, and playgrounds. Passive open spaces are typically characterized by gardens, walkways, and benches, perhaps with tables and board games (e.g., chess tables). As noted above, the focus of this open space analysis is on passive open spaces. Fieldwork to determine conditions of open spaces in the study area was conducted in June 2003.

USER POPULATIONS

To determine the extent to which open spaces within the study area are utilized, data to describe user populations is also compiled. As noted above, the user population has been defined to include all residents, workers, *as well as daily visitors to the Project Site*. For the purposes of this analysis, various sources have been used to estimate residential, working, and visiting populations for each scenario. For this analysis, 2000 Census data were updated with data from Community Board 1, the Alliance for Downtown New York (Downtown Alliance), and the New York City Department of City Planning (DCP). Future population was estimated using control totals for Manhattan forecast by the New York Metropolitan Transportation Council (NYMTC) and distributed based on current and anticipated land use patterns and trends. Throughout this chapter, population data are shown in tables and source data are referenced.

CRITERIA FOR QUANTIFIED ANALYSIS

The adequacy of open space in the study area is quantitatively assessed using a ratio of usable open space acreage to the study area population—referred to as the open space ratio. The determination of the need for a quantified analysis is based on both the adequacy of the quantity of open space (see discussion in section 6.2.5 below) and how the Proposed Action would change the open space ratios in the study area compared with the ratios in the future without the Proposed Action. If a potential decrease in an adequate open space ratio would exceed 5 percent, it is generally considered to be a substantial change, warranting further analysis. However, if a study area exhibits a low open space ratio (e.g., below the guidelines set forth in the *CEQR Technical Manual*, indicating a shortfall of open space), even a small decrease in that ratio as a result of the action may have an adverse effect and would warrant detailed analysis.

COMPARISON TO DCP GUIDELINES

To assess the adequacy of the quantity of open space resources, open space ratios are compared against goals set by DCP. Although these open space ratios are not meant to determine whether a proposed action might have a significant adverse impact on open space resources, they are helpful guidelines in understanding the extent to which user populations are served by open space resources. For non-residential populations, 0.15 acres of passive open space per 1,000 non-residents is typically considered adequate. For residential populations, DCP's standards are

higher. Ideally, there would be a total of 0.50 acres of passive space per 1,000 residents. There is also a guideline for adequate active space, which applies only to residential users. This guideline is 2.00 acres per 1,000 residents. In addition, there is a general guideline to determine the adequacy of all open spaces for residential users: 1.5 acres of active and passive open space per 1,000 residents.

CRITERIA FOR QUALITATIVE ANALYSIS

Additionally, according to the *CEQR Technical Manual*, the capacity, conditions, and distribution of open space may contribute to the qualitative assessment of open space resources. The accessibility of open space resources is also considered in this analysis. A significant change in the quality of an open space resource may be attributed to a change in shadows, noise, air quality, pollutants, or odors within an open space. Also taken into account when determining the qualitative change in open space resources is the extent to which open space serves specific user groups and specific utilization needs.

SCREENING OF IMPACTS ON RESIDENTIAL USERS ONLY

Because the Proposed Action would not introduce any new residents or residential users of the area's open spaces, the issue of specific impacts on residential users only was addressed in a screening. As noted above, residential users would be affected by the Proposed Action through the demands for passive open space from the workers and visitors generated at the Project Site. As shown in Table 62, in both the Current Conditions Scenario and the Pre-September 11 Scenario, the study area would provide ample open space for the residential population, based on the overall guideline of 1.5 acres per 1,000 residents. Ratios in all time periods and Scenarios would exceed an overall ratio of 2.0 acres per 1,000, with some cases exceeding 3.0 acres per 1,000 residents. Over time, the residential population is expected to increase more rapidly compared to increases in both passive and active open spaces, so that the open space ratios will decrease. This is particularly so in the case of active open space; as shown in Table 6-2, no increase in active open space is expected in either Scenario with or without the Proposed Action. The baseline ratios of 0.63 and 0.85 acres per 1,000 residents (both of which are well below the guideline of 2.0 acres per 1,000 residents) are expected to decrease in direct proportion to population increase. The Proposed Action would have no effect at all on these conditions. Thus, potential impacts on active open space used by area residents are not considered in the detailed analysis.

With passive open space, the open space ratio range of 1.78 acres per 1,000 residents to 4.05 acres per 1,000 residents is well above recommended *CEQR Technical Manual* guideline of 0.50 acres per 1,000 residents. In the Current Conditions Scenario, the Proposed Action would increase the inventory of passive open space above the baseline and future without the Proposed Action (both 2009 and 2015), and so would increase the ratio. In the Pre-September 11 Scenario, the Proposed Action would slightly decrease the inventory of passive open space (approximately 4 percent), but the resulting open space ratio would still be well above the CEQR guideline and would thus not trigger the need for additional analysis.

**Table 6-2
Screening of Open Space Ratios for Residential Users Only**

	Residents	Open Space Acres		Acres/1,000 Residents	
		Passive	Active	Passive	Active
Pre-September 11 Scenario					
Baseline	13,707	55.47	11.59	4.05	0.85
2009 Without Proposed Action	23,324	59.14	11.59	2.54	0.50
2009 With Proposed Action	23,324	57.35	11.59	2.46	0.50
2015 Without Proposed Action	23,714	59.14	11.59	2.49	0.49
2015 With Proposed Action	23,714	57.35	11.59	2.42	0.49
Current Conditions Scenario					
Baseline	18,458	47.81	11.59	2.59	0.63
2009 Without Proposed Action	28,897	53.36	11.59	1.85	0.40
2009 With Proposed Action	28,897	58.98	11.59	2.04	0.40
2015 Without Proposed Action	30,015	53.36	11.59	1.78	0.39
2015 With Proposed Action	30,015	58.98	11.59	1.96	0.39

SCREENING OF QUANTIFIED IMPACTS OF THE PROPOSED ACTION

As shown in Table 6-1, above, the analysis of open space ratios with and without the Proposed Action in both the Current Conditions and Pre-September 11 Scenarios showed that: (1) open space quantities would be greater than the guideline levels recommended by the *CEQR Technical Manual* in all cases; and (2) the Proposed Action would decrease open space ratios by more than 5 percent in three out of four future years and scenarios: 2009 and 2015 in the Current Conditions Scenario. Thus, this chapter contains a detailed analysis of open space impacts of the Proposed Action.

6.2.2 PEDESTRIAN-LEVEL WIND CONDITIONS

Under certain meteorological conditions, buildings—particularly tall buildings—may increase pedestrian-level winds. In general, this condition is most notable around corners and between buildings. While neither New York State nor New York City has regulations or standards for assessing the pedestrian-level wind effects of a proposed action, this chapter contains a qualitative assessment of potential pedestrian-level wind effects of the Proposed Action on publicly accessible open spaces. This analysis was based on an examination of building heights and locations, review of meteorological data for the area, knowledge of the aerodynamics of buildings, and past experience with wind engineering studies and wind tunnel tests for buildings in Manhattan of various sizes and shapes, as explained below.

GENERALIZED PEDESTRIAN WIND EFFECTS

Tall or exposed buildings adjacent to public spaces may cause abnormally intense winds at ground level. These winds may affect the comfort and safety of pedestrians and thus reduce the usefulness of the public space. For purposes of this discussion, these effects can be broken into vortex and corner stream effects, and funneling and deflection effects.

Vortex and Corner Stream Effects

When the wind is perpendicular to the broad dimension of a building (or structure), part of the air striking the building is deflected over and around it, and part of the air is directed to the base of the building. There, this air which is directed to the base of the building, is trapped between the ground and the continued downward flow of air from above, and is forced to either side of the building, in spiraling horizontal eddies, called vortexes. When the spiraling air flow reaches the edges of the building, it accelerates and streams rapidly around the corner into the unconfined space, in what is known as a corner stream effect. This effect dissipates as the air stream moves into the lower pressure area on the far side of the building (see Figure 6-2).

A shorter building produces a less pronounced effect on pedestrian-level winds than a tall building, since it entraps less downflow and there is less pressure to drive the spiraling horizontal eddies or vortexes at the base. Similarly, a tall building with a narrow face perpendicular to the wind would have a less pronounced effect on pedestrian-level winds than a tall building with a wide face perpendicular to the wind, since it would have a corresponding narrow downflow, also generating less pressure to drive the horizontal eddies.

Pedestrian wind effects are most pronounced when the windward face of the building has no setbacks and is both broad and high. Winds coming off the Hudson River in the project area are essentially unobstructed until they encounter the buildings at either BPC or the Project Site. Pedestrian level wind effects would be expected to be most common with strong winds generally perpendicular to building faces.

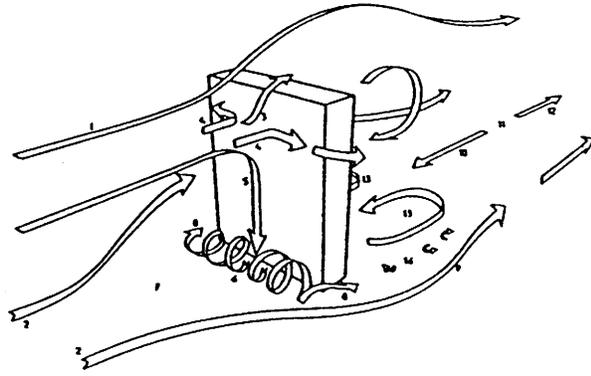
Funneling and Deflection Effects

Funneling and deflection are two types of effects that may concentrate winds in a constricted space, such as a street between tall buildings, resulting in increased velocities at various locations including ground-level. Severe ground-level effects from deflection are generally associated with very tall buildings in plazas. A strong funneling effect can occur with a narrowing of the distance between buildings at ground-level. Under such conditions, the accelerated wind stream emerging from the narrow end of the funnel can project for some distance beyond the leeward edge of the buildings.

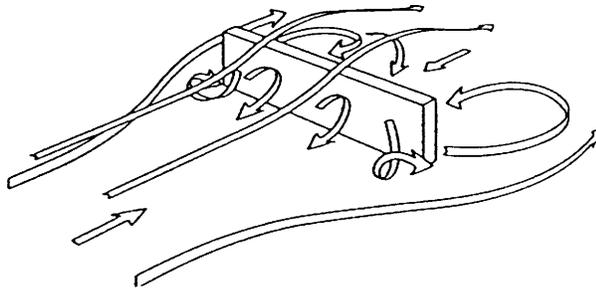
WIND CONDITIONS AFFECTING THE WEST SIDE OF MANHATTAN

Figure 6-3 shows the wind roses (i.e., wind directions and wind speeds) for a typical year in New York City. The values shown were taken at LaGuardia Airport, and are representative of conditions that occur in the WTC area. Northwest winds are slightly more prevalent than winds from other directions. Easterly winds are infrequent. Since pedestrian wind effects vary greatly with terrain and building geometry, ambient wind speed by itself is not a good predictor of pedestrian-level effects at a given location. Pedestrian wind effects can frequently magnify “comfortable” ambient wind speeds into distinctly “uncomfortable” velocity ranges.

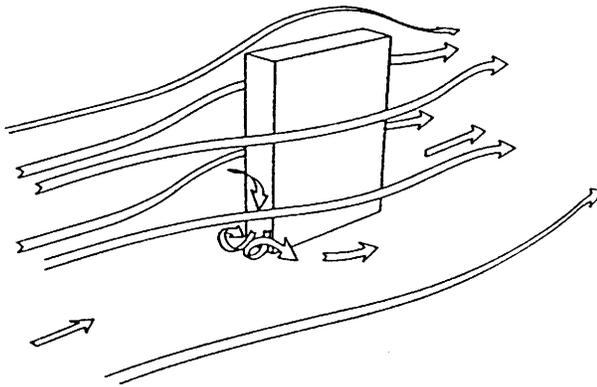
In the area of the Project Site, westerly and northwesterly winds moving across the Hudson River have more than a mile of unobstructed fetch before striking buildings at BPC or the Project Site. As a result, strong winds can have the potential for creating vortex and corner stream effects. While funneling and deflection effects may also occur, these effects would be less common, and probably less noticeable.



Air Stream Pattern of a Tall Building



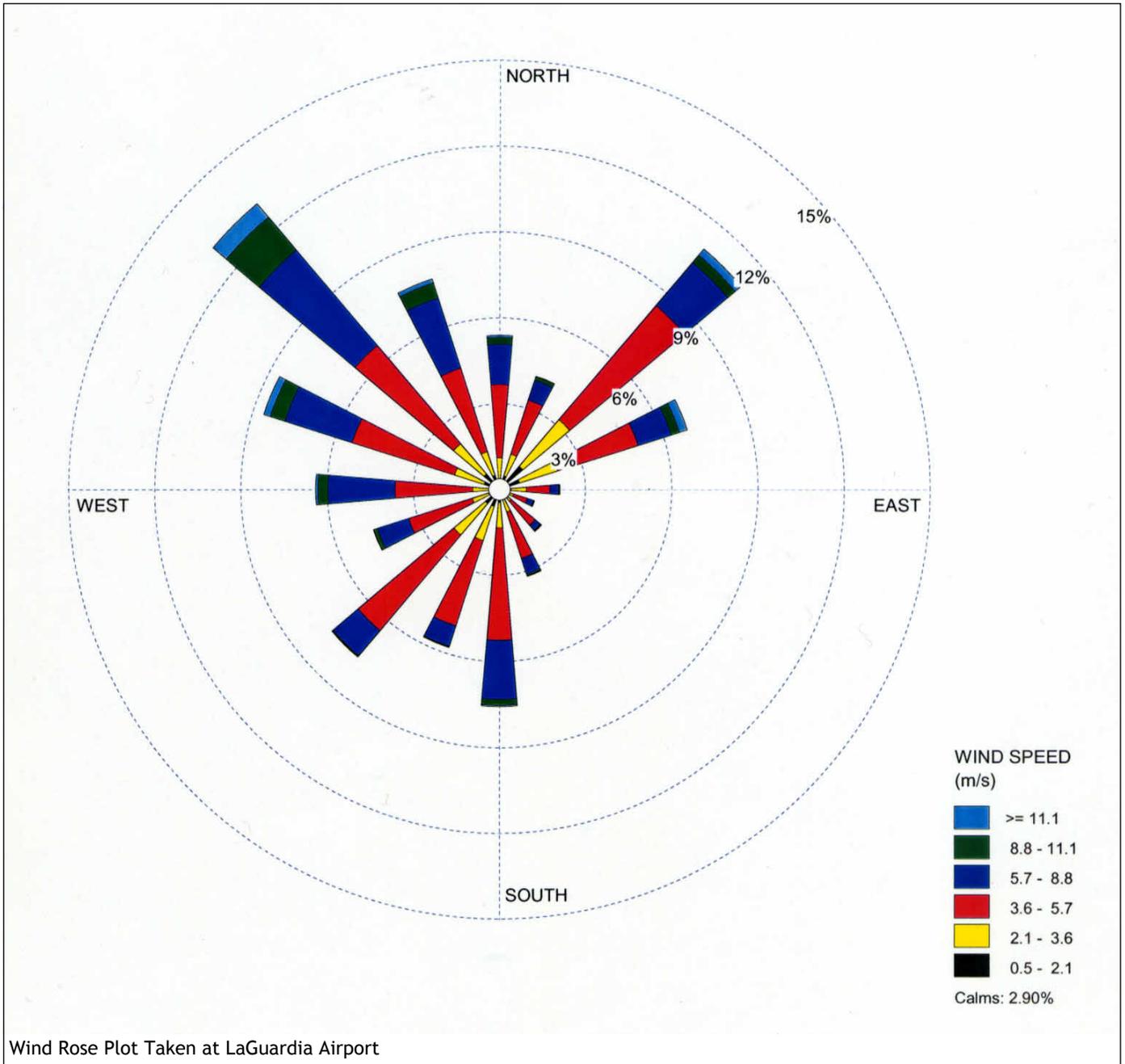
Flow Around Low & Wide Rectangular Building



Flow Around Narrow Rectangular Building

Source: Kluwer

12-03



PREVIOUS PEDESTRIAN-LEVEL WIND TUNNEL STUDIES

A number of wind tunnel studies have examined pedestrian-level wind effects on publicly available open spaces (including sidewalks) for various development projects adjacent to the Hudson River on the West Side of Manhattan. Areas examined included BPC, De Witt Clinton Park, Riverside South, and Riverside Park. Different investigators used differing wind comfort criteria to assess wind conditions. In general, though, pedestrian-level wind conditions are classified as comfortable, uncomfortable, and severe. Comfortable conditions are those that permit people to sit, stand, and/or walk comfortably, without interference from winds. Uncomfortable conditions occur when winds create a nuisance for these types of activities (i.e., sitting, standing, and/or walking). Typically, with uncomfortable conditions trees would sway and wind forces would be felt on a person's body. Severe conditions denote excessive wind speeds that could disturb a pedestrian's balance and footing, and may pose safety concerns.

In general, at most locations on the West Side of Manhattan adjacent to the Hudson River, during the majority of the year (i.e., more than 80 percent of the time), pedestrian-level wind conditions are in the comfortable range, and pedestrian winds do not affect typical daily activities. At some locations, generally near tall buildings, during limited time periods (approximately 10 to 20 percent of the time), uncomfortable conditions may occur. During these limited time periods, walking may become difficult, and sitting and standing for extended periods of time may be less than desirable activities. In addition, a few times per year, severe conditions may occur and pedestrian-level winds may limit activities and pose potential problems.

6.3 CURRENT CONDITIONS SCENARIO

6.3.1 EXISTING CONDITIONS 2003

PROJECT SITE

Currently, the WTC Site is vacant except for the temporary WTC PATH station and the No. 1/9 subway lines. It is fenced (except for the temporary WTC PATH station entry) and provides no public access or open space resources. However, there are temporary viewing areas on Church and Liberty Streets. The *Southern Site* does not provide any open space. 130 Liberty Street is a vacant structure, its former plaza along Liberty Street is a hole in the ground, and the 140 Liberty Street block is a construction staging area.

OPEN SPACE INVENTORY

The study area contains a total of 27 open spaces, totaling 59.40 acres, 47.81 acres of which are for passive recreation. All of these open spaces are described in Table 63, and some are described in greater detail below.

When the WTC was completed in 1973, it was intended to anchor Lower Manhattan as a financial center. At that time, Lower Manhattan supported mainly commercial and retail uses. There were few residences, and few community facilities. In response to this demographic, office buildings constructed during this time often provided plazas and open spaces where workers might sit and eat their lunch, or take a break during the work day. Today, many of these

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**Table 6-3
Inventory of Open Space in the Study Area, 2003**

Map ID	Name	Location	Owner	Passive Acres	Total Acres	Amenities	Condition	Hours	Use Level
1	One Liberty Plaza	Between B'way, Liberty, Church, Cortlandt Sts	New Liberty Plaza LLP	0.64	0.64	Trees, planters, seating	Excellent	24	Moderate
2	Liberty Plaza	Between B'way, Liberty, Trinity, Cedar Sts	New Liberty Plaza LLP	0.82	0.82	Trees, plantings, benches, lighting,	Good	24	Heavy
3	Trinity Church Graveyard	Between Church St and B'way	Trinity Church Corp	1.43	1.43	Trees, benches, footpaths, grass	Good	24	Moderate
4	140 Broadway Plaza	140 Broadway	Silverstein 140 Broadway Property LLC	0.62	0.62	Planters, trees, seating, sculpture	Good	24	Moderate
5	Bank of New York	1 Wall St	One Wall Street Holdings LLC	0.11	0.11	Seating, planters, trees	Good	24	Moderate/light
6	55 Bway/1 Exchange Plaza	55 Broadway	Bank of Communications	0.15	0.15	Plantings, trees, seating	Fair	24	N/A
7	45 B'way Atrium	45 Broadway	45 Broadway LP	0.07	0.07	Plantings, trees, seating	Good	24	Fair
8	Bowling Green	Broadway and Whitehall St	DPR	0.52	0.52	Benches, trees, fountain, garden, lighting, lawn, sculpture	Excellent	24	Heavy
9	Triangle Park at foot of Trinity Park	Between Greenwich St and Broadway at Edgar St	TBTA	0.37	0.37	Benches, trees, planters, lighting, subway entrance	Good	24	Light
10	Battery Park	Southwest tip of Manhattan	DPR	15.00	23.00	Lawn, trees, benches, sculptures, esplanade	Excellent	24	Heavy
11	17 Battery Place	Washington St	17 Battery Upper Partners LLC	0.13	0.13	Lawn, tables, chairs, trees, plantings, artwork, fence	Good	24	N/A
12	90 Washington St	90 Washington St	90 Washington St LLC	0.20	0.20	Flagpoles, planters, seating	Under construction	24	N/A
13	West Thames Playground	Battery Park City	BPCA	0.00	0.75	Play equipment, benches	Excellent	10 am to dusk	Moderate
14	Walkway/Bikeway	Rte 9A from West Thames to Battery Pl	NYS DOT	1.00	1.00	Trees, pathway	Excellent	24	Heavy
15	Rector Park	Rector Place at South End Ave	BPCA, DPR	0.77	0.77	Seating, trees, landscaping	Excellent	24	N/A
16	Battery Park Esplanade	Along Hudson River	BPCA	22.10	22.10	Lawn, trees, benches, sculptures, esplanade, play equipment,	Excellent	24	Heavy
17	Irish Hunger Memorial	North End Ave at Vesey St	BPCA	0.44	0.44	Sloped hill, historic house, landscaping	Excellent	24	Moderate
18	Triangular Median	North End Ave at Murray Street	BPCA	0.18	0.18	Landscaping, trees	Good	24	Light
19	3 Medians	North End Ave	BPCA	0.58	0.58	Landscaping, trees	Good	24	Light
20	Ball fields	Between Murray and Warren Sts near Rte 9A	BPCA	0.00	2.84	Ball fields	Excellent	Call to use	N/A

**Table 6-3 (cont'd)
Inventory of Open Space in the Study Area, 2003**

Map ID	Name	Location	Owner	Passive Acres	Total Acres	Amenities	Condition	Hours	Use Level
21	Millenium Hilton	Fulton St at Church St	Millenium Hilton	0.12	0.12	Planters, seating, trees, flowers	Excellent	24	Moderate
22	Two Federal Reserve Plaza	33 Maiden Lane between Maiden Lane and John St	BBV US Real Estate Fund III, LP	0.10	0.10	Covered pedestrian space, trees, movable seats	Good	24	N/A
23	Chase Manhattan Plaza	Nassau, William, Liberty, and Pine Sts	JP Morgan Chase	1.31	1.31	Benches, trees, planters, lighting, sculpture	Excellent	24	Fair
24	Federal Hall Steps	28 Wall St	National Park Service	0.06	0.06	Steps, statue, plantings	Good	24	Heavy
25	Home Insurance Company Plaza	59 Maiden Lane at William St	Olympia & York Maiden Lane Co.	0.19	0.19	Seating, landscaping, lighting, trees, artwork	Good	24	Moderate
26	James Bogardus Viewing Garden	Broadway, Hudson, Chambers and Reade Sts	NYCDPR	0.07	0.07	Plantings, flowers, trees, steps	Good	N/A	N/A
27	Stuyvesant High School Plaza	West of Rte 9A, North of Chambers St	BOE	0.83	0.83	Trees	Good	24	Light
Total				47.81	59.40				
Source: AKRF, Inc. fieldwork conducted during May, 2003, weekday afternoons.									

plazas and open spaces are still in existence. They provide amenities such as benches, planters, and trees and often include steps and other hard landscaping that could be used as seating. Because these spaces are often small, paved, and located in the shadow of tall office buildings, they are most conducive to use by workers and building visitors for passive recreation.

Within the study area, there are many such open spaces. In fact, two of the open spaces located closest to the Project Site are typical of this style: the open space surrounding One Liberty Plaza and the full-block plaza to its south. Other open spaces of this style are generally located to the east of the Project Site, in the Financial District. Following are descriptions of key open spaces that typify this style.

- **One Liberty Plaza:** This building and its associated plaza are located just east of the Project Site. The building is situated in the middle of the block, with expanded sidewalk areas and plazas surrounding the building. On the southern side of the building is a plaza which includes amenities such as seating, planters, and trees. Workers can be found sitting outside, taking a break during the day or eating their lunch. The western side of the site has steps leading down to the sidewalk. Although there are no amenities traditionally associated with open space, it should be noted that these steps are used in much the same way as the plaza; people sit and rest, eat their lunch, and look at the WTC Site directly across the street. Similarly, the eastern side of the block facing Broadway provides an informal open space for workers and visitors to One Liberty Plaza.
- **Liberty Plaza:** Located on the full block directly south of One Liberty Plaza, this paved plaza includes amenities such as benches, lighting, trees, and planters. Patches in the paving and steps recall the damage of September 11 and its aftermath. During the week, this park is frequented by neighborhood workers and visitors to the area. In addition to serving the non-

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residential population as a place to take a break from work during the day, it has seasonally been home to the former WTC Greenmarket, and is the site of informal chess tournaments.

- Chase Manhattan Plaza: Located between Nassau, William, Liberty, and Pine Streets, this public plaza is one of the largest in the study area. It is large and open, occupying the southeast corner of the block. It provides amenities including benches, trees, planters, and sculpture, and is in excellent condition. It is used mainly by workers during business days. People can be seen gathering and relaxing in the plaza throughout the day. However, the plaza is so vast that it remains relatively empty when compared to other open spaces in the study area.

In the years and decades following the construction of the WTC, development occurred in Lower Manhattan that brought uses other than commercial and retail to the study area. Built with the intention of mixed-use development, BPC brought many residents, as well as new workers, to the study area. With this increased population which included many residents, a need for open space resources arose. The BPC open spaces, which total approximately 32 acres, reflect this need for open spaces that serve both workers and residents. In BPC, there is a mix of open spaces, including lawns, plazas, playgrounds, walking paths, and landscaped areas. Careful consideration is given to the design and accessibility of these open spaces. This careful consideration is evidenced in the extent to which these open spaces are used. On any given day, the open spaces in BPC are filled with a mix of workers, visitors, and residents, taking part in a variety of activities, both passive and active. Described below are key portions of the BPC open space that are used by workers, visitors and residents for passive recreation.

- Waterfront Esplanade: Stretching from the north to the south of BPC, this esplanade is heavily used by workers, visitors and residents. Its unique waterfront location and well-kept amenities allow visitors to stroll, sit, and relax while taking in views of the Hudson River, New Jersey, and the New York Harbor.
- North Cove Yacht Harbor: Nested between the World Financial Center Buildings to the north and east and residential buildings to the south, this open space houses a wide variety of amenities and serves workers, visitors, and residents. Restaurants and cafes in the World Financial Center open onto the World Financial Center Plaza, where people can sit at tables and chairs and eat outside while looking at the Harbor. Benches, planters, and trees surrounding the Harbor provide a place for passive recreation near the waterfront activity. The circular lawn located at the foot of Liberty Street provides a place for both active and passive recreation. People may sit on benches and enjoy the landscaping while children play on the lawn.
- The Irish Hunger Memorial: Located west of North End Avenue at Vesey Street, this open space attracts tourists, workers, and residents alike. Memorializing the Irish potato famine as well as contemporary issues in world hunger, this site is accessible from the east side, and includes an abandoned stone cottage, a fallow potato field, and flora typical of Ireland. Visitors may walk through the landscape on a paved path to a viewing area overlooking the Esplanade and the Hudson River, or they may walk around the monument to read the messages on its north, south, and west walls.

Additionally, the study area includes two historic publicly owned open spaces, Battery Park and Bowling Green.

- Battery Park: This park has been in public use for over 300 years. Today, Battery Park offers benches, paths, and a waterfront esplanade. Battery Park is being improved by The Battery

Conservancy, a not-for-profit educational corporation created to revitalize the park. The Castle Clinton National Monument, a fortification dating to the War of 1812, is located in the park and is open to the public. The park is the scene of summer concerts as well as the departure point for ferries to Liberty and Ellis Islands. It is heavily used by workers, tourists, and residents.

- **Bowling Green:** Located at the point where Broadway and Whitehall Street divide, this ½-acre open space contains a lawn with trees, benches, planters, and a fountain. Between the fenced portion of Bowling Green and the former United States Custom House to the south is a cobblestone-paved area used for a farmers market during the spring, summer and fall. Though less heavily used than Battery Park, this space also attracts workers, visitors, and residents alike.

STUDY AREA USER POPULATION

As shown in Table 6-4, there are approximately 18,458 residents and 123,991 workers and visitors in the study area. The average daily number of people who visit the perimeter of the WTC Site each day is estimated at 5,500. Although this analysis conservatively assumes that residents and employees are separate populations, it is likely that many residents work in the area. As a result, there is likely to be some double-counting of the daily user population when residential and worker populations overlap.

**Table 6-4
Estimated Study Area Population 2003**

Census Tract	Residential Population	Non-Residential Population	Total User Population
13	4,364	33,954	38,318
21	2,866	35,638	38,504
317.01	8,853	13,289	22,141
7	340	22,265	22,606
15.02	2,035	13,367	15,401
Total	18,458	123,991	142,449
Sources: Residential Data: U.S. Department of Commerce, Bureau of the Census, 2000 Census of Population and Housing, adjusted to reflect known residential development completed between 2000 and the present. Worker Data: Fourth quarter 2002 NYS SIC / NAICS estimates of employment by zip code.			

ANALYSIS OF OPEN SPACE CONDITIONS IN 2003

As shown in Table 6-1, the study area’s 47.81 acres of passive open space are adequate to meet the needs of its user population of residents, workers, and visitors. The 18,458 residents require 9.23 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. Since the area contains substantially more passive open space acreage than that, there is ample open space (38.58 acres) remaining for non-residential users. Applying the 123,991 workers and visitors to the remaining acres produces an open space ratio of 0.31 acres per 1,000 non-residential users. This is more than twice the CEQR guideline value of 0.15 acres.

PEDESTRIAN-LEVEL WIND CONDITIONS IN 2003

Currently, except for 130 Liberty Street (a 45-story vacant building which is shrouded in protective netting and surrounded by scaffolding), the No. 1/9 IRT Line, and the temporary

WTC PATH station, the Project Site has been cleared of debris and is vacant. BPC to the west provides some limited shielding from winds coming from the west. However, the wide expanse of Route 9A allows winds coming from the west and northwest a relatively unobstructed stretch from the Hudson River before they reach the Project Site. Typically, pedestrian-level wind conditions are in the comfortable range, and activities like sitting, standing, and walking are not impeded. At some limited times, however, uncomfortable conditions occur—leaves, paper, and other small debris may be seen swirling around, and activities like sitting, standing, and walking become less desirable and could be impeded. A few hours per year, severe conditions may occur, and pedestrian-level winds may limit activities and pose potential safety problems, such as difficulty in walking or, at the extreme, danger of being hit by larger wind-blown objects.

Conditions at the Project Site are not significantly different from those that may occur at other locations on Manhattan’s West Side, particularly adjacent to the Hudson River. But they may be slightly more severe due to the heights of surrounding buildings and the size of the open area at the Project Site.

6.3.2 FUTURE WITHOUT THE PROPOSED ACTION 2009—CURRENT CONDITIONS SCENARIO

In this scenario, it is assumed that without the Proposed Action, the Project Site would remain largely undeveloped. The No. 1/9 subway lines would continue to run through the site, and the permanent WTC PATH Terminal would replace the temporary WTC PATH station. The analysis takes into account proposed development in the surrounding study area, including projects funded by Liberty Bonds and other initiatives that resulted from the events of September 11.

PROJECT SITE

By 2009 there would be new workers on the site associated with the permanent WTC PATH Terminal.¹ Public open space would be limited to the permanent WTC PATH Terminal entrance and the sidewalks that serve as viewing areas—neither of which would be counted as recreational open space. It is assumed that *the Southern Site would remain undeveloped*. (see Chapter 2, “Methodology”).

OPEN SPACE INVENTORY

Five new open spaces are expected to be open for use by 2009. Teardrop Park, which is currently under construction, is located in the northern portion of BPC (see Figure 6-1, No. 32). This 2.75-acre space will feature meandering paths, landscaping, trees, and fields. *Also in BPC, Site 16/17 is expected to be developed with improvements including a 0.34-acre open space*. The proposed residential development at Chambers Street and Route 9A would provide a 0.27-acre plaza on Warren Street between Route 9A and Greenwich Street (see Figure 6-1, No. 33.) In addition, a portion of the former 7 WTC site outside the footprint of the new building will provide about a third of an acre of open space. It would consist of a central open plaza with a fountain, flanked by groves of trees and shrubs. The central plaza would feature a 30-foot-wide fountain surrounded by marble benches. In the winter, this fountain area may be used to display public art (see Figure 6-1, No. 34).

¹ PATH riders are counted at their final destinations, not at the Terminal.

Open space resources along Route 9A would also be expanded. A promenade would provide a 15- to 40-foot landscaped walkway along the east side of Route 9A from Albany Street to Battery Place. An approximately 0.76-acre open space would be created at the foot of Route 9A adjacent to Battery Park. Battery Place Park, an approximately 1-acre triangular park, would be created near the portal to the Battery Park underpass. The Route 9A open spaces would add approximately 1.86 acres of passive open space to the study area (see Figure 6-1, No. 35). In all, the total of passive open space would rise to 53.36 acres.

STUDY AREA POPULATION

Both residential and non-residential populations are expected to increase by 2009 due to a number of development projects (see Table 6-5), many of which are funded by Liberty Bonds and other initiatives that were put into place as a result of the events of September 11. In determining the number of workers and residents that would be added to the study area as a result of these development projects, the following methodology was used. For residential developments, the number of dwelling units expected in each project was multiplied by the average household size in the study area (household size from Bureau of the Census, 2000 *Census of Population and Housing*). Commercial development assumes four workers per 1,000 square feet of office space and three employees per 1,000 square feet of retail space. (Hotel development assumes 800 square feet per room, and one employee per 2.6 rooms.) By 2009, the residential population is expected to rise to approximately 28,897 and the non-residential population is expected to rise to approximately 155,894, resulting in a combined user population of an estimated 184,792.

ANALYSIS OF OPEN SPACE CONDITIONS IN 2009

Because the residential and non-residential populations are expected to rise more substantially than the amount of usable open space is expected to increase, the open space ratio for workers and visitors is expected to decrease compared with existing conditions (see Table 6-1). As shown in Table 6-1, the study area's 53.36 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers and visitors. The 28,897 residents would require 14.45 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. Since the area would still contain substantially more passive open space acreage than that, there would still be ample, if slightly less, open space (37.73 acres) remaining for non-residential users. Applying the 155,894 workers and visitors to the remaining acres produces an open space ratio of 0.25 acres per 1,000 non-residential users. This is still well above the CEQR guideline value of 0.15 acres.

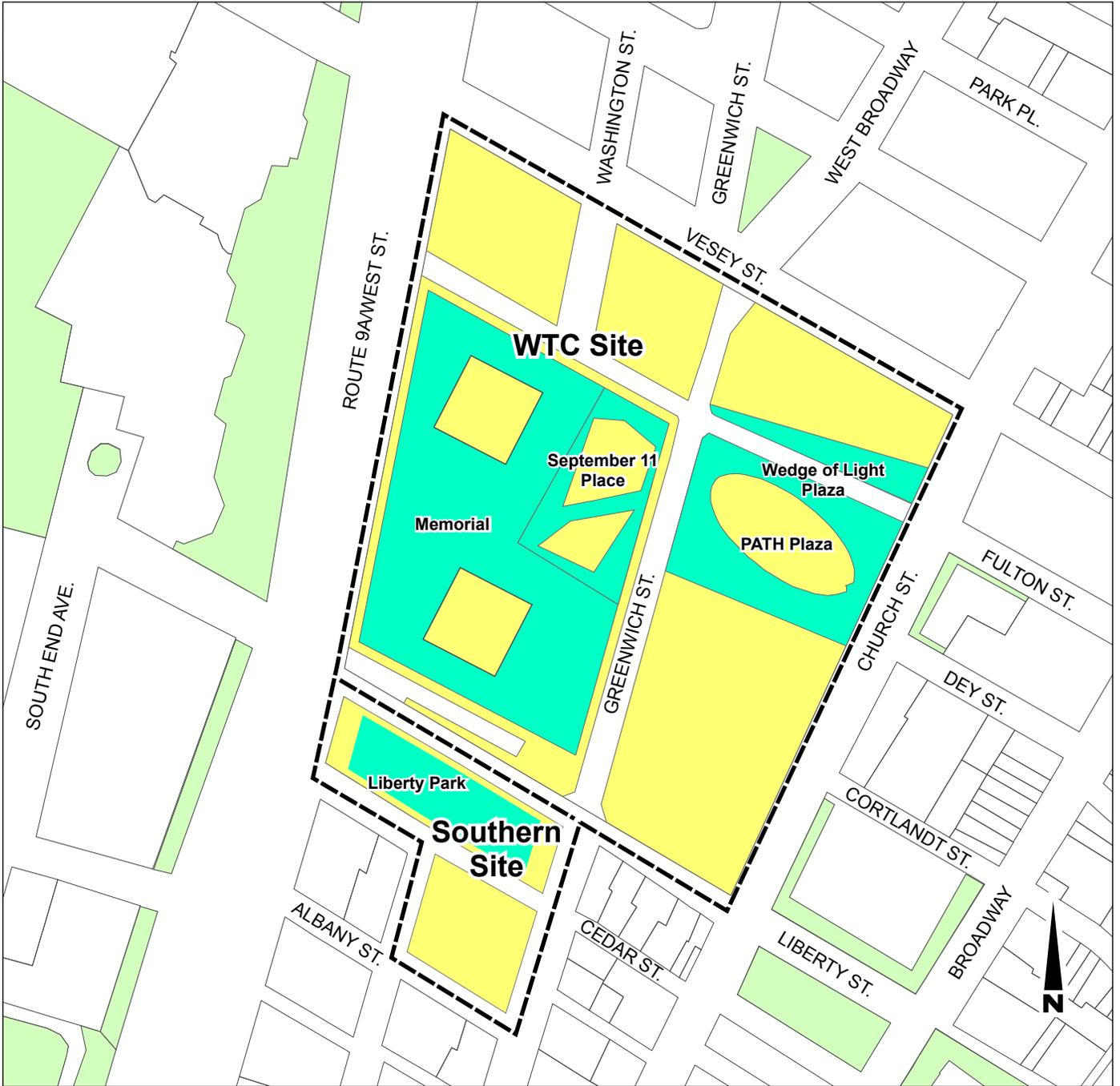
PEDESTRIAN-LEVEL WIND CONDITIONS

As noted above, it is assumed that without the Proposed Action, one large building would be developed on Site 26 in BPC. This structure in BPC may help to shield the site from west and northwest winds, and the two towers on the southern edge of the site would create local winds at their corners, but in general, pedestrian-level wind conditions would not change materially from conditions on the Project Site today.

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**Table 6-5
Study Area Projects in Construction or Planned to Be Complete by 2009
Current Conditions Scenario**

Name	Address	Status	Use
Permanent WTC PATH Terminal	WTC Site-Church Street	2006-2009	Transportation
Barclay-Vesey Building	140 West Street	2004	Restoration: 1,171,540 sf office
	125 Church Street	2004	50 residential units
Woolworth Building	233 Broadway	2004	150 residential units
7 World Trade Center	Vesey and Greenwich Streets	2005	1,685,000 sf office and two electrical substations
Federal Office Building/USPO	90 Church Street	2005	500,000 sf (Post Office) & 626,260 sf (Office)
	10 Barclay Street	2005	375 residential units, 19,341 sf community facility, 90 parking spaces
WSURA Site 5C	Route 9A and Chambers Streets	2006	456 residential units, 14,000 sf retail, 18,000 sf community facility, 102-space parking garage
WSURA Site 5B	270 Greenwich	2008	730 residential units, 240,000 sf retail
Filterman Hall	30 West Broadway	By 2009	360,000 sf institutional
	130 Fulton Street	2004	62 residential units
	21-23 Maiden Lane	2003**	30 residential units
Fulton St. Transit Center	Fulton Street and Broadway	2008-2009	Transportation
	90 Washington Street	2003**	387 residential units
	90 West Street	2005	410 residential units, 11,400 sf retail, 69 accessory parking spaces
Skyscraper Museum	2 West Street	2004	Institutional—Skyscraper Museum
Teardrop Park	22 River Terrace	2004	Recreational/open space
Museum of Jewish Heritage	Site 14C, BPC S	2004	Institutional—Museum expansion (in construction)
	Site 18B, BPC	2005	268 residential units, 14,000 sf retail
	Site 19B, BPC	2005	264 residential units
	Pier A	2005	7,000 sf retail
	Site 23, BPC N	2006	246 residential units, 20,000 sf BPC Parks Conservancy
	Site 24, NPC N	2006	345 residential units, 40,000 sf community recreation center
	Site 3, BPC S	2006	420 residential units, 45,000 sf BPC Parks Conservancy
Route 9A	Between Albany Street and Battery Place	2006	Transportation
Route 9A	West of WTC Site	2008	Transportation
	Site 2, BPC S	by 2009	282 residential units, 125,000 sf Women's Museum
	Site 16/17, BPC N	by 2009	530 residential units, 12,000 sf NY Public Library branch, 4,000 sf World Hunger info, 10,000 sf cultural not-for-profit, 100 sf BPC Parks Conservancy, 1,400 sf café, 14,682 sf public open space
	23 Wall Street / 15 Broad Street	2007	428 residential units; 850,000 sf institutional, hotel, and/or retail uses
	Site 26, BPC N	2009	2.3 million sf commercial (1.275 million sf office, 450,000 sf trading floors, 200,000 sf building amenity space, 345,000 sf mechanical), up to 30,000 sf retail, up to 300 accessory parking spaces



- Project Site Boundary
- Project Site
- Proposed Open Spaces
- Study Area Open Spaces
- Parcel Boundaries

0 200 FEET
SCALE

6.3.3 PROBABLE IMPACTS OF THE PROPOSED ACTION 2009—CURRENT CONDITIONS SCENARIO

PROJECT SITE

In 2009 the Proposed Action would provide approximately 2.6 million square feet of office space in Freedom Tower and up to 1 million square feet of retail space, as well as cultural facilities, the Memorial and *the Memorial Center*, and new open spaces. Fulton and Greenwich Streets would be extended through the WTC Site. Washington Street between Cedar and Liberty Streets would be closed, but Cedar Street between Washington and Greenwich Streets would be reopened. It is also expected that the permanent WTC PATH Terminal would be open and operational by 2009 without or with the Proposed Action.

OPEN SPACE INVENTORY

The Proposed Action would create several distinct open spaces on the Project Site. These open spaces include the Memorial, Wedge of Light Plaza and the PATH Plaza, September 11 Place, and Liberty Park. These open spaces would total 5.62 acres, as shown on Figure 6-4. Additionally, though not counted in the quantitative inventory, widened sidewalks and green streetscapes throughout the Project Site would provide additional passive open space resources.

The Memorial, located on the southwestern quadrant of the Project Site, would be the largest and most important open space on the Project Site. Based on the “Reflecting Absence” concept by Michael Arad and Peter Walker, the Memorial would recognize and remember those lost on September 11, 2001, and February 26, 1993.

In April 2003, LMDC launched a worldwide competition to design a Memorial at the WTC Site. LMDC received 5,201 Memorial design submissions from 63 nations and 49 states, making it the largest design competition in history. In November 2003, LMDC unveiled eight finalist designs for the competition, and on January 6, 2004, the 13-member WTC Site Memorial jury announced the winner of the Memorial design competition: “Reflecting Absence” by architect Michael Arad and landscape architect Peter Walker. The design proposes a space that would convey the feelings of loss caused by the destruction of the WTC and the loss of thousands of lives on September 11, 2001, and February 26, 1993. The design centers around two large voids containing recessed pools. The pools and the ramps that surround them would recognize the footprints of the Twin Towers. A cascade of water that describes the perimeter of each square would feed the pools with a continuous stream. They would be large voids, open and visible reminders of the absence.

The surface of the Memorial plaza would be punctuated by landscaping and rows of trees, forming informal clusters, clearings, and groves. This surface would consist of a composition of stone pavers, plantings, and low ground cover. Through its annual cycle of rebirth, the living park would extend and deepen the experience of the Memorial (see Figure 6-5).

Bordering each pool would be a pair of ramps that lead down to the Memorial spaces. Descending into the Memorial, visitors would be removed from the sights and sounds of the city and immersed in a cool darkness. As they proceed, the sound of water falling would grow louder, and more daylight would filter in from above. At the bottom of their descent, they would find themselves behind a thin curtain of water, staring out at an enormous pool.

Surrounding this pool would be a continuous ribbon of names. The enormity of this space and the multitude of names that form this endless ribbon would underscore the vast scope of the destruction. Standing there at the water's edge, looking at a pool of water that would flow away into an abyss, a visitor to the site could sense that what would be beyond this curtain of water and ribbon of names would be inaccessible.

The Memorial, though unique in purpose and design, would fill many of the uses of open space, as it would be publicly accessible, open to the sky, would contribute to the openness of the WTC Site, and would provide workers, visitors, and nearby residents a quiet, reflective outdoor space. The two voids, circumscribed by 3-foot-tall walls, would cover the two approximately 1-acre footprints where the Twin Towers stood. These areas, though open to the sky, are not counted in the open space inventory. However, as there would be minimal above-ground improvements in and around the voids, these areas would contribute light and air to the Project Site, and add to the open feeling of the Memorial. Located at street level to allow for its integration into the fabric of the city, the plaza would encourage the use of this space by New Yorkers on a daily basis. The Memorial grounds would not be isolated from the rest of the city; they would be a living part of it.

Wedge of Light Plaza and the PATH Plaza would become the main civic open spaces of the redeveloped Project Site. They would be designed to capture the energy of those who pass through as well as be able to accommodate public events. These open spaces, located at the corner of Greenwich and Fulton Streets, would act as an lively urban plaza, lined by shops and restaurants, and attracting workers, visitors, and residents. Additionally, these open spaces would integrate into the procession of spaces that would connect the Lower Manhattan business district to the Hudson River. Hard surfaces would predominate in Wedge of Light Plaza, while the PATH Plaza would include landscape planting and seating where appropriate. Recommended paving material includes natural stone unit pavers. Landscaping, site furnishings, and lighting that recognize the importance of this civic space and that are complementary with the surrounding building designs would also be used. The PATH Terminal building would stand independently between Wedge of Light Plaza and the PATH Plaza on a diagonal axis.

September 11 Place would serve as the primary gateway to the Memorial as well as a setting for the cultural complex. September 11 Place would be largely paved to accommodate the heavy demands of visitors. As visitors pass through September 11 Place, they would move away from the lively, commercial atmosphere surrounding Wedge of Light Plaza and the PATH Terminal building and move toward the more somber, reflective space of the Memorial.

The development of Liberty Park would create an opportunity for a new park to serve the growing number of workers, visitors, and residents in the surrounding areas. The edges of this space would remain visually open to the surrounding streets to ensure a safe environment throughout the day and evening. Liberty Park would provide landscaped green space and possibly other programmed uses along its eastern edge. Sidewalks would be located along the edge of the park, and unit pavers could be used for hard surfaces within the park. Landscaping, lighting, and site furnishings could also be incorporated where appropriate.

As the WTC Site is located between the older, dense fabric of the Financial District and the newer, spacious fabric of the World Financial Center and BPC, the streetscape of the WTC would relate to features of both. By employing a unified palette of landscaping, paving,



lighting, and furnishings, the streetscapes would create a distinctive appearance across the WTC Site. At the same time, this streetscape would relate to the emerging streetscape of Lower Manhattan. Where appropriate, street trees could be introduced to create green corridors, potentially providing additional open space amenities.

STUDY AREA POPULATION

In 2009 the Proposed Action would introduce workers to the site in Freedom Tower and at the retail center and cultural facilities, and would attract a peak surge in visitors, expected in the few years following the opening of the Memorial. This peak visitor population is expected amount to 9 million annual visitors to the Memorial; this would introduce an average of approximately 24,700 visitors to the study area every day. In all, the Proposed Action would add a net of 42,100 workers and daily visitors in 2009. Overall, the ¼-mile study area is projected to have approximately 28,897 residents (the same as in the future without the Proposed Action) and approximately 192,552 non-residents (workers and visitors), for a total of approximately 221,450 total open space users.

ANALYSIS OF POTENTIAL OPEN SPACE IMPACTS IN 2009

Quantitative Analysis

With the addition of workers and visitors attributable to the Proposed Action the open space ratio for workers and visitors is expected to decrease compared with conditions in 2009 without the Proposed Action (see Table 6-1). However, the study area's 58.98 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers, and visitors. The 28,897 residents would continue to require 14.45 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. With the addition of the Proposed Action's open spaces, the *passive* open space (44.53 acres) remaining for non-residential users would be greater than under conditions without the Proposed Action. Applying the 192,552 workers and visitors to these remaining acres would produce an open space ratio of 0.23 acres per 1,000 non-residential users. *This would still be well above the CEQR guideline value of 0.15 acres, though it would represent a decrease of 0.02 acres per 1,000 people, a decrease of 7.35 percent from conditions without the Proposed Action.*

Qualitative Analysis of Impacts

In considering the *significance* of the projected decline in the passive open space ratio with the Proposed Action, it is important to remember that the Proposed Action is adding open space where it would not otherwise exist. Moreover, all of the Proposed Action's open spaces would be at street level and immediately adjacent to major east-west pedestrian paths. In particular, the large open space south of Liberty Street would extend open space into the densely developed neighborhood south of the WTC Site, and would be large enough to host the concerts formerly held on the WTC Plaza. Wedge of Light Plaza, which may be used to host events also, would open to Church Street, creating an open space link from September 11 Place to St. Paul's Chapel.

In addition to their accessibility, the Proposed Action open spaces would be designed specifically to be attractive, lively, and inviting. The street levels of all buildings facing the open spaces and plazas would be lined with restaurants and shops; like the North Cove plaza at the

World Financial Center (and the recent rehabilitation of Stone Street), it is assumed that the restaurants would offer open air dining on nice days, thus adding to the overall liveliness of the area for residents, workers, and visitors. The spaces would have trees and other landscaping, benches and other seating, water features, and other amenities to create attractive places for workers, visitors and residents to sit, eat, and enjoy the out-of-doors.

PEDESTRIAN WIND CONDITIONS

The Proposed Action would introduce a very tall building (approximately 1,800 feet) in the northwest corner of the WTC Site and other, smaller structures in the southwest quadrant. The presence of the tall tower would probably slightly worsen pedestrian-level wind conditions *in areas of* the Project Site closest to Freedom Tower. The remainder of the site would experience pedestrian wind level conditions similar to baseline 2003 conditions.

6.3.4 FUTURE WITHOUT THE PROPOSED ACTION 2015—CURRENT CONDITIONS SCENARIO

PROJECT SITE

In the future without the Proposed Action (2015), it is assumed that the WTC Site would remain vacant except for the permanent WTC PATH Terminal and the No. 1/9 subway lines, and that two office towers (130 and 140 Liberty Street) would be occupied on the Southern Site. There would be no additional construction on the WTC Site itself and no Memorial, but it is assumed that a visitor population would continue to come to the undeveloped site.

OPEN SPACE INVENTORY

In addition to the open spaces listed in Table 6-2 and new open spaces expected to be open by 2009, it is possible that the buildings at 130 and 140 Liberty Streets would provide some passive open space. However, since there are no plans extant for these buildings, no open space *is* assumed.

STUDY AREA POPULATION

All user populations are expected to increase within the study area by 2015, based on projects under construction or those proposed and expected to be completed by that year (see Table 6-5 above and Table 6-6). By 2015, it is expected that there will be approximately 30,015 residents and approximately 163,494 non-residents, for a total of approximately 193,509 open space users in the study area.

**Table 6-6
Potential and Proposed Projects 2010—2015
Current Conditions Scenario**

Name	Address	Status	Use
Former Deutsche Bank	130 Liberty Street	Potential	1.4 million sf office
	140 Liberty Street	Potential	500,000 sf office
Former Downtown Athletic Club	16-20 West Street	Potential	Residential or hotel
<i>Battery Garage</i>	<i>Greenwich/West Streets</i>	<i>Potential</i>	<i>900 residential units</i>
	<i>59 John Street</i>	<i>Proposed</i>	<i>Residential conversion</i>

ANALYSIS OF CONDITIONS IN 2015

Because the residential and non-residential populations are expected to rise more substantially than the amount of usable open space is expected to increase, the open space ratio for workers and visitors is expected to decrease compared with 2009 conditions without the Proposed Action. As shown in Table 6-1, the study area's 53.36 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers and visitors. The 33,155 residents would require 15.01 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. Since the area would still contain substantially more passive open space acreage than that, there would still be ample, if slightly less, open space (38.35 acres) remaining for non-residential users. Applying the 163,494 workers and visitors to the remaining acres produces an open space ratio of 0.23 acres per 1,000 non-residential users. This is still well above the CEQR guideline value of 0.15 acres.

PEDESTRIAN-LEVEL WIND CONDITIONS

Without the Proposed Action, the WTC development site would remain vacant except for the permanent WTC PATH Terminal, and two office towers (130 and 140 Liberty Street) would be constructed. These additions would not significantly change pedestrian wind conditions in the area, and conditions would be expected to remain similar to those described above for existing conditions.

6.3.5 PROBABLE IMPACTS OF THE PROPOSED ACTION 2015—CURRENT CONDITIONS SCENARIO

PROJECT SITE

By 2015 the Proposed Action is expected to reach full build-out with 10 million square feet of office space and a conference center and hotel facilities, as well as the Memorial, *Memorial Center* and other cultural facilities, transportation improvements, and new open space resources that were completed in 2009.

OPEN SPACE INVENTORY

There would be 5.62 acres of open space on the Project Site with the Proposed Action. The plaza area assumed with the redevelopment of 130 Liberty Street on the Southern Site in the future without the Proposed Action would not be created. Passive open space in the ¼-mile study area would total 58.98 acres.

STUDY AREA POPULATION

The Proposed Action would add an estimated net of 62,500 workers and daily visitors to the 2015 population without the Proposed Action. Overall, the population in the study area in this scenario would be approximately 30,015 residents (the same as in the future without the Proposed Action) and approximately 212,944 non-residents, for a total of approximately 242,959 combined residents and non-residents. The annual number of visitors to the Memorial is expected to drop after an initial peak in 2009 to a stabilized 5.5 million visitors per year. Therefore, a daily visitor population of 15,068 is included in the non-residential population.

ANALYSIS OF POTENTIAL OPEN SPACE IMPACTS

Quantitative Analysis

With the addition of workers and visitors attributable to the Proposed Action the open space ratio for workers and visitors is expected to decrease compared with conditions in 2015 without the Proposed Action (see Table 6-1). However, the study area's 58.98 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers and visitors. The 30,015 residents would continue to require 15.01 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. With the addition of the Proposed Action's open spaces, the total open space (45.97 acres) remaining for non-residential users would be greater than under conditions without the Proposed Action. Applying the 212,944 workers and visitors to these remaining acres would produce an open space ratio of 0.21 acres per 1,000 non-residential users. Although this would still be well above the CEQR guideline value of 0.15 acres, it would represent a decrease of 0.02 acres per 1,000 people, a decline of 12 percent from conditions without the Proposed Action, which is greater than 5 percent and thus requires consideration of additional factors to determine the potential for adverse impacts on open space.

Qualitative Analysis

In considering the *significance* of the projected decline in the passive open space ratio with the Proposed Action, it is important to remember that the Proposed Action is adding open space where it would not otherwise exist. Without the Proposed Action the only open space on the Project Site would be the plaza at 130 Liberty Street, if it is restored. Moreover, all of the Proposed Action's open spaces would be at street level and immediately adjacent to major east-west pedestrian paths. In particular, the large open space south of Liberty Street would extend open space into the densely developed neighborhood south of the WTC Site, and would be large enough to host the concerts formerly held on the WTC Plaza. Wedge of Light Plaza would open to Church Street, creating an open space link from September 11 Place to St. Paul's Chapel. *The proposed open spaces on the Project Site would greatly contribute to the "greening" of Lower Manhattan, and would link both existing and proposed open spaces.*

In addition to their accessibility, the Proposed Action's open spaces would be designed specifically to be attractive, lively, and inviting. The street levels of all buildings facing the open spaces and plazas would be lined with restaurants and shops; like the North Cove plaza at the World Financial Center (and the recent rehabilitation of Stone Street), it is assumed that the restaurants would offer open air dining on nice days, thus adding to the overall liveliness of the area. The spaces would have trees and other landscaping, benches and other seating, water features, and other amenities to create attractive places for workers, visitors and residents to sit, eat, and enjoy the out-of-doors.

PEDESTRIAN-LEVEL WIND CONDITIONS

The proposed site plan for the Proposed Action includes five towers ranging in height from approximately 900 feet to approximately 1,800 feet and several smaller structures, including the permanent WTC PATH Terminal, *Memorial Center* and cultural facilities, performing arts center, and hotel and conference center (see Chapter 1, "Project Description"). The various towers and buildings would be set on two sides of a large area containing the Memorial. Most of the proposed publicly accessible open space (Wedge of Light Plaza and September 11 Place)

would be located adjacent to tall buildings along Fulton and Greenwich Streets on the Project Site.

The Proposed Action would be expected to result in pedestrian-level wind conditions that are comparable to, but slightly worse, than those that currently exist on the Project Site. Conditions would be slightly worse because of the tall buildings that are part of the Proposed Action. Absent the development of design measures to reduce potential adverse pedestrian-level wind effects, these tall towers would be expected to create vortex and corner effects that would be slightly worse than currently exists on the site.

Typically, pedestrian-level wind conditions will be in the comfortable range. However, during some limited time periods, uncomfortable conditions may occur and activities like sitting, standing, and walking may be impeded. In addition, a few hours per year, conditions severe enough to limit activities, produce difficult walking conditions, and, at times, pose potential safety problems may occur. Occasionally, access to some areas of the site may be limited

As part of the final design of the Proposed Action, wind tunnel studies will be undertaken to examine measures to reduce and mitigate undesirable pedestrian-level wind effects. Measures to be examined would include the use of landscaping (i.e., trees and bushes), wind screens, and possible building design modifications. However, absent development and implementation of such measures, conditions with the Proposed Action would be comparable to, but slightly worse than, current conditions at the site and in the project area.

6.4 PRE-SEPTEMBER 11 SCENARIO

The Pre-September 11 Scenario compares the Proposed Action to the Project Site as it existed prior to the events of September 11. To the extent possible, data were gathered to reflect the user populations and open space conditions existing at that time.

6.4.1 BASELINE CONDITIONS

PROJECT SITE

Prior to September 11, the WTC Site contained more than 10 million square feet of office space, approximately 500,000 square feet of retail space, and a 22-story hotel. The buildings surrounded Tobin Plaza; some 6.35 acres of plazas, widened sidewalks, benches, seating areas, and planters surrounded the WTC buildings on Church, Liberty, and Vesey Streets. A broad plaza connected 7 WTC to the main site across Vesey Street. On the Southern Site stood an office building employing 5,051 additional workers and providing a 1.06-acre two-level plaza at 130 Liberty Street; a bridge from the WTC connected to this plaza, although it was not well-used, and in the years prior to 2001, the bridge was closed. The block to its west was occupied by a parking lot with St. Nicholas Church, a small Greek Orthodox church, facing Cedar Street. The WTC had a daily worker population of approximately 42,800 and a daily visiting population of approximately 7,400.¹ The building at 130 Liberty Street housed 5,051 additional workers.

¹ Urban Planning and Transportation Study for Lower Manhattan and the World Trade Center Site Draft Summary Report. Beyer Blinder Belle and Parsons Brinkerhoff, 2002.

OPEN SPACE INVENTORY

In addition to the 28 open spaces listed in Table 6-2, 7.41 acres of public open space existed in the ¼mile study area, specifically on the Project Site (see Table 6-7). The largest single resource was the 3.96-acre Tobin Plaza at the heart of the WTC Site (see Figure 6-6). Used by workers and visitors to the WTC Site, by September 11, 2001, the Plaza featured benches, plantings, and trees. Its centerpiece was a granite fountain with the *Sphere*, a 25-foot bronze and steel sculpture by Fritz Koenig and surrounded by benches. The Plaza was home to several outdoor cafes, with tables and chairs located at the edges of the Plaza. Despite its many positive attributes, the Plaza was not readily accessible from any side but the east, where it opened onto Church Street. It was also frequently criticized as cold, windy, and unfriendly.

**Table 6-7
Open Space on the Project Site—Pre-September 11**

Map ID	Name	Location	Owner	Acres (Total)	Amenities	Condition	Hours	Use Level
28	Austin J. Tobin Plaza	WTC Site	Port Authority	3.96	Trees, plantings, benches, lighting, fountain, event facilities, food kiosks	Excellent	24	Moderate
29	Other plaza areas and sidewalks	WTC Site along Church St.	Port Authority	2.39	Plantings, seating, tables and chairs, farmers market	Excellent	24	Moderate
30		130 Liberty Street	Bankers Trust Company	1.06	Trees/planters, fountain	Excellent	24	Light
Total				7.41				

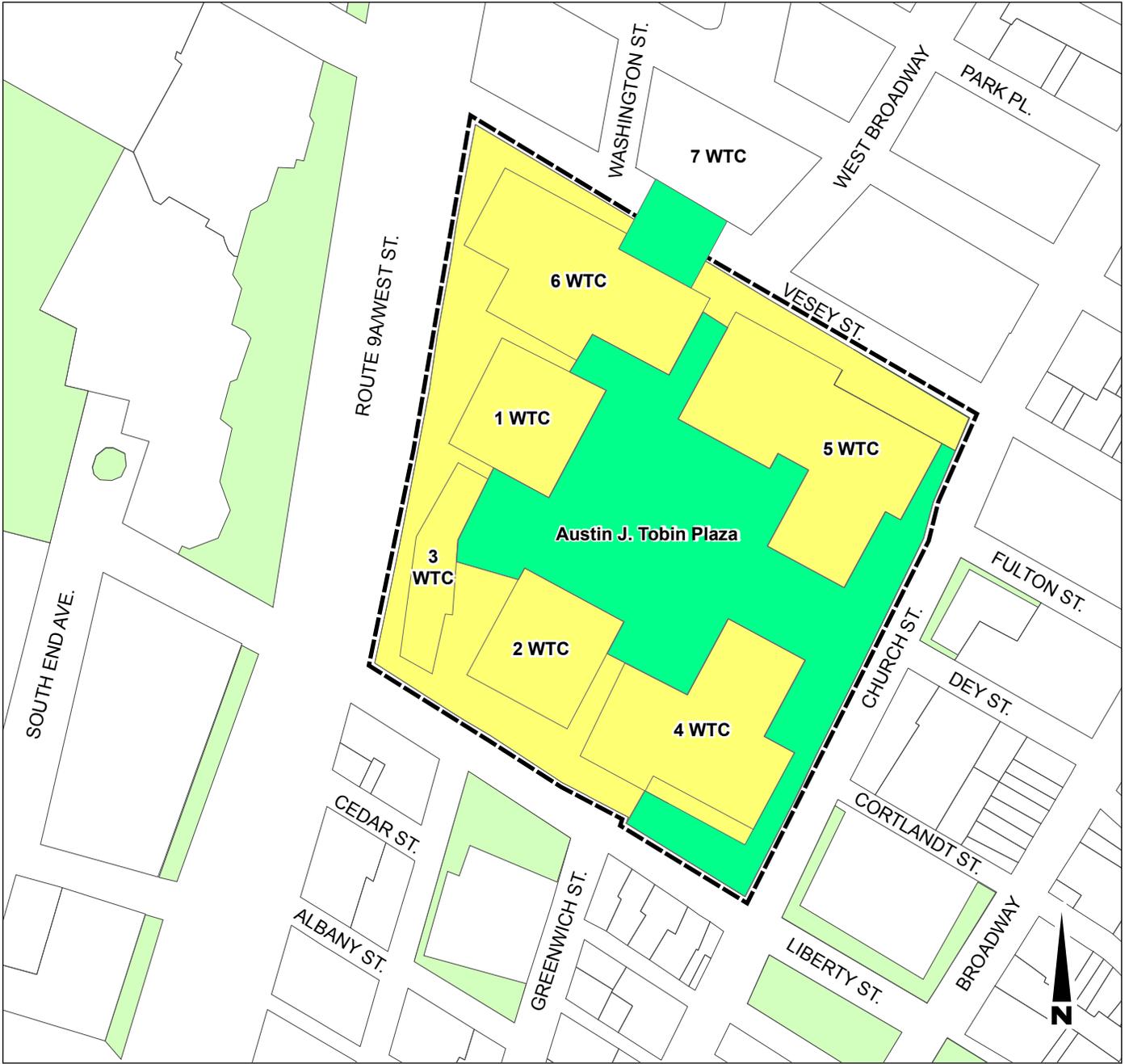
Sources: *Privately Owned Public Space*, Jerold S. Keyesen, 2000.
Year 2000 Sanborn map.

In addition to the Plaza, the portions of the WTC Site along Church, Vesey, and Liberty Streets contained an additional 2.39 acres of passive open space. The Port Authority had provided benches, planters, tables, and chairs that spread the usable open space area from the widened sidewalks into the unused southbound lanes of Church Street. The southeast corner of the WTC Site was home to the popular Greenmarket on Tuesdays and Thursdays from the spring through the fall.

The WTC open spaces served a variety of functions. The Plaza was used for many free public concerts and entertainment events. Over the last decade of its existence, the open space along Church Street was frequently used as a concert and performance venue that included a stage. This open area was also used for starting or ending points for charitable walkathons and bikeathons. In combination with the pedestrian bridge to the Winter Garden, the Plaza offered a safe vehicle-free path between Church Street and the World Financial Center and the BPC open spaces.

Connecting the WTC Site to 7 WTC north of Vesey Street was a 0.25-acre above-grade plaza. This plaza included passive open space amenities such as planters, seating, and sculpture. This plaza was highly used as a pedestrian walkway across Vesey Street as well as a place for workers and visitors to take a break during the day.

Prior to September 11 there was also a 1.06 acre plaza at 130 Liberty Street on the Southern Site. It featured a large fountain, seating, planters with trees, and food kiosks. A pedestrian bridge linked the upper level of the open space to the WTC Site across Liberty Street.



- WTC Site
- Building and Sidewalk
- WTC Open Spaces
- Study Area Open Spaces

0 200 FEET
SCALE

World Trade Center Open Spaces Pre-September 11

Figure 6-6

STUDY AREA POPULATION

Prior to September 11, approximately 13,700 people lived within the ¼mile study area and approximately 177,900 people worked within and visited the study area, for a total user population of approximately 191,600 (see Table 6-8). The number of residents is lower in the Pre-September 11 Scenario baseline condition than in the Current Conditions Scenario baseline condition, because many residential projects have been completed between the 2000 Census of Population and Housing and 2003. On the other hand, the number of non-residents is much higher in the Pre-September 11 Scenario than in the Current Conditions Scenario, due to the worker population lost or displaced on September 11. PATH and subway riders who pass through the WTC Site are counted at their final destinations.

**Table 6-8
Study Area Population 2000**

Census Tract	Residential Population	Non-Residential Population	Total User Population
13	1,525	70,282	71,807
21	2,407	37,999	40,406
317.01	7,951	21,072	29,023
7	340	25,801	26,141
15.02	1,484	15,489	16,973
Total	13,707	170,644	184,352
Sources: AKRF, Inc. 2003; Residential Data: U.S. Department of Commerce, Bureau of the Census, 2000 Census of Population and Housing. Worker Data: 1990 Reverse Journey to Work data compiled by NYCDOP, 2000 NYS Department of Labor estimates of employment by zip code.			

ANALYSIS OF OPEN SPACE CONDITIONS IN 2000

In the Pre-September 11 Scenario baseline condition, the open space study area provided more passive open space for residents and non-residents than the DCP planning guidelines (see Table 6-1). As shown in Table 6-1, the study area’s 55.47 acres of passive open space were adequate to meet the needs of its user population of residents, workers, and visitors. The 13,707 residents required 6.85 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. Since the area contained substantially more passive open space acreage than that, there was ample open space (48.62 acres) remaining for non-residential users. Applying the 177,948 workers and visitors to the remaining acres produced an open space ratio of 0.27 acres per 1,000 non-residential users. This was nearly twice the CEQR guideline value of 0.15 acres.

PEDESTRIAN-LEVEL WINDS IN 2000

Pre-September 11, the WTC Site contained the Twin Towers (both with heights of approximately 1,350 feet), several smaller (but still tall) buildings, and a large public plaza. BPC to the west provided limited shielding from prevailing winds coming from the west and northwest. However, the wide expanse of Route 9A allowed winds coming from the west and winds coming from the northwest a relatively unobstructed stretch from the Hudson River before reaching the Project Site. While typical pedestrian-level wind conditions were in the comfortable range, and activities like sitting, standing, and walking were not impeded, during some limited time periods uncomfortable conditions occurred. During these time periods, particularly in the Plaza area and at building corner locations, activities like sitting, standing, and walking were impeded and leaves, paper, etc. could be seen swirling around. Also, a few hours per year, particularly when high wind speed conditions occurred in the New York City area, severe

conditions were experienced at the WTC. These conditions limited activities, produced difficult walking conditions, and, at times, posed potential safety problems requiring that access to some areas be closed off. The heights of the buildings contributed to slightly more severe pedestrian-level wind conditions than those experienced at other locations on the West Side of Manhattan that are adjacent to the Hudson River.

6.4.2 FUTURE WITHOUT THE PROPOSED ACTION 2009— PRE-SEPTEMBER 11 SCENARIO

For the Pre-September 11 Scenario, it is assumed that developments that had been proposed in the surrounding area (including those that would not occur based on Current Conditions) would move forward toward completion.

PROJECT SITE

The Project Site—including the WTC Site and 130 Liberty Street—is assumed to be as it was before September 11, 2001.

OPEN SPACE INVENTORY

In addition to the open spaces listed in Table 6-2 and 6-7, two open spaces were proposed in the study area by 2009. One is Teardrop Park, a 2.75-acre open space in the BPC North neighborhood with meandering paths, landscaping, trees, and fields. A commercial office project proposed for 270 Greenwich Street would have provided an approximately 40,000-square-foot plaza.

STUDY AREA POPULATION

Both the residential and the non-residential populations would have increased by the year 2009. Based on known projects under construction and proposed immediately prior to September 11 (see Table 6-9), estimates were made regarding the study area's state of development by 2009. By this year, the residential population would have increased to approximately 23,324, the non-residential population to approximately 198,918, and the combined residential and non-residential populations to approximately 222,243.

ANALYSIS OF OPEN SPACE CONDITIONS IN 2009

Because the residential and non-residential populations were expected to rise more substantially than the amount of usable open space was expected to increase, the open space ratio for workers and visitors would have been expected to decrease compared with conditions in 2000 (see Table 6-1). As shown in Table 6-1, the study area's 59.14 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers, and visitors. The 23,015 residents would require 11.66 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. Since the area would still contain substantially more passive open space acreage than that, there would still be ample, if slightly less, open space (47.48 acres) remaining for non-residential users. Applying the 198,918 workers and visitors to the remaining acres produces an open space ratio of 0.24 acres per 1,000 non-residential users. This is still well above the CEQR guideline value of 0.15 acres.

Table 6-9
Study Projects in Construction or Planned to Be Complete by 2009
Pre-September 11 Scenario

Name	Address	Status	Use
Park Place	53 Park Place	2002	116 residential units
	270 Broadway	2002	87 residential units
	110-120 Church Street	2003	389 residential units
Keystone	38-44 Warren Street	2003	24 residential units
WSURA 5C	West and Chambers Streets	2003	260 residential units, with ground-floor commercial
WSURA 5B	270 Greenwich Street	2004	1,354,940 sf office, 25,400 sf retail, 100 parking spaces (below-ground)
	125 Church Street	2004	50 residential units
	75-81 Nassau St.	2002	28 residential units
	130 Fulton Street	2003	62 residential units
Woolworth Building	21-23 Maiden Lane	2003	30 residential units
	233 Broadway	2004	150 residential units
	90 Washington Street	2005	387 residential units
	22 River Terrace	2002	293 residential units
	West Street between Murray and Warren Streets	2003	Recreational/open space
Skyscraper Museum	2 West Street	2003	Institutional—Museum
Teardrop Park	22 River Terrace	2003	Recreational/open space
Solaire Building	20 River Terrace	2003	335 residential units
Museum of Jewish Heritage	Site 14C, BPC S	2004	Institutional—Museum expansion (in construction)
	Site 2, BPC S	2004	628 residential units
	Site 18B, BPC	2005	268 residential units, 14,000 sf retail
	Site 19B, BPC	2005	264 residential units
	Pier A	2005	7,000 sf retail
	Site 23, BPC N	2006	269 residential units, 7,000 sf retail
	Site 24, BPC N	2006	250 residential units, 7,000 sf retail
	Site 3, BPC S	2006	500 residential units, 38,500 sf institutional (Women's Museum)

PEDESTRIAN-LEVEL WIND CONDITIONS

Since the future without the Proposed Action in 2009 assumes that the same conditions prevailed on the Project Site as those of before September 11, 2001, the pedestrian-level wind conditions would be the same as those before September 11, 2001.

6.4.3 PROBABLE IMPACTS OF THE PROPOSED ACTION 2009— PRE-SEPTEMBER 11 SCENARIO

This analysis compares conditions with the Proposed Action in 2009 to conditions that would have existed in 2009 had the catastrophic events of September 11 not occurred.

PROJECT SITE

The 2009 program includes the Memorial, *the Memorial Center* and cultural facilities, Freedom Tower, the permanent WTC PATH Terminal, and retail space. The open spaces on the Project Site would total to 5.62 acres, less than the 7.41 acres on-site in pre-September 11 conditions. Compared with the pre-September 11 condition, the Proposed Action in 2009 would produce considerably less office, but more retail-space, would not have a hotel, and would offer a major Memorial and cultural complex, as important as any other in the United States.

OPEN SPACE INVENTORY

With the Proposed Action there would be 1.79 fewer acres of open space on the Project Site than existed prior to September 11. In all, the ¼-mile study area would contain 57.35 acres of passive open space.

STUDY AREA POPULATION

In this analysis, the population with the Proposed Action in 2009 is compared to the population that would have been expected in 2009 if the WTC still existed and 130 Liberty Street was undamaged. Additionally, the population associated with developments known to have been proposed as of September 11 that would have been completed by 2009 is included. In 2009 the Proposed Action would introduce workers to the site in Freedom Tower and at the retail center and cultural facilities, and would attract a peak surge in visitors, expected in the few years following the opening of the Memorial. This peak visitor population is expected to amount to 9 million annual visitors to the Memorial; this would introduce an average of approximately 24,700 visitors to the study area every day. In all, the Proposed Action would reduce the number of workers and daily visitors compared to pre-September 11 conditions in 2009. Overall, the ¼-mile study area is projected to have approximately 23,324 residents (the same as in the future without the Proposed Action) and approximately 185,867 non-residents (worker and visitors), for a total of approximately 209,191 total open space users.

ANALYSIS OF POTENTIAL OPEN SPACE IMPACTS IN 2009

Although with the Proposed Action the inventory of open space in the ¼-mile study area would be lower compared with conditions in 2009 without the Proposed Action, the worker and visitor population would also be lower (see Table 6-1). As a result, there would be no change in the open space ratio pertaining to workers and visitors. As shown on Table 6-1, the study area's residents would require 11.66 acres of passive open space, leaving 45.69 acres for other user populations. This results in a ratio of 0.25 acres of passive open space per 1,000 workers and visitors, which is *higher than* conditions in 2009 without the Proposed Action. Therefore, there is no need for further analysis of open space in this condition.

PEDESTRIAN WIND CONDITIONS

The Proposed Action would introduce a very tall building in the northwest corner of the WTC Site and other, smaller structures in the southwest quadrant. The presence of the tall tower would probably slightly worsen pedestrian-level wind conditions on the Project Site in the area closest to the Freedom Tower. The remainder of the site would experience pedestrian wind level conditions similar to baseline 2003 conditions.

6.4.4 FUTURE WITHOUT THE PROPOSED ACTION 2015— PRE-SEPTEMBER 11 SCENARIO

PROJECT SITE

In this case the Project Site is assumed to be in its pre-September 11 configuration and have the same population and open space as it did prior to September 11.

OPEN SPACE INVENTORY

The open space inventory would comprise the open spaces listed in Tables 6-2 and 6-7, as well as Teardrop Park and the plaza at 270 Greenwich Street. No change in the inventory between 2009 and 2015 is currently anticipated.

STUDY AREA POPULATION

Both the residential and the non-residential populations would have further increased in this scenario. Based on information regarding projects proposed before September 11 that are expected to be completed by 2015 (see Table 6-10), the residential population would have increased to approximately 23,714, and the non-residential population to approximately 204,118. The combined user population would have increased to approximately 227,832.

**Table 6-10
Potential and Proposed Projects Between 2009 and 2015
Pre-September 11 Scenario**

Name	Address	Status	Use
	10 Barclay Street	Potential	328 residential units, 72,000 sf office
	115 Nassau Street	Proposed	Residential conversion
	10 Broadway	Proposed	Residential conversion
	5 Beekman	Proposed	Residential conversion
	60 Broad Street		200 residential units, 800,000 sf office
One World Plaza	140 Liberty Street		500,000 sf office
(formerly) Downtown Athletic Club	16-20 West Street	Potential	Unknown
	Site 16/17 BPC N	Potential	471 residential units or 223,955 sf commercial with NY Public Library Branch and playground
	Site 26 BPC N	Potential	1,887,570 sf office
	59 John Street	Proposed	Residential conversion

ANALYSIS OF OPEN SPACE CONDITIONS IN 2015

Because residential and non-residential populations would have further increased in this scenario and open space resources in 2015 would have remained as they were in 2009, the open space ratios would have all decreased. As shown in Table 6-1, the study area's 59.86 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers, and visitors. The 23,714 residents would have required 11.86 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. Since the area would still contain substantially more passive open space acreage than that, there would still be ample, if slightly less, open space (47.29 acres) remaining for non-residential users. Applying the 204,118 workers and visitors to

the remaining acres produces an open space ratio of 0.23 acres per 1,000 non-residential users. This is still well above the CEQR guideline value of 0.15 acres.

PEDESTRIAN-LEVEL WIND CONDITIONS

Since the future without the Proposed Action in 2015 assumes that the same conditions prevailed on the Project Site as those of 2000 and 2009, the pedestrian-level wind conditions would be the same as those prior to September 11 and 2009.

**6.4.5 PROBABLE IMPACTS OF THE PROPOSED ACTION 2015—
PRE-SEPTEMBER 11 SCENARIO**

PROJECT SITE

This analysis compares conditions with the Proposed Action in 2015 to conditions in the future without the Proposed Action based on the Pre-September 11 Scenario. By 2015 the Proposed Action is expected to reach full build-out with 10 million square feet of office space and a conference center and hotel facilities, as well as the Memorial, *the Memorial Center*, and other cultural facilities, transportation improvements, and new open space resources that were completed in 2009. This program would approximately equal that of the pre-September 11 condition in the provision of office space, but it would provide more retail space, and would feature the Memorial, *Memorial Center* and cultural facilities of major, national importance.

OPEN SPACE INVENTORY

Open spaces on the Project Site in 2015 would be the same as in 2009. Overall, Project Site open spaces would be 1.79 acres less than in pre-September 11 conditions. In total, there would be 59.35 acres of passive open space in the study area.

STUDY AREA POPULATION

In 2015 the Proposed Action would introduce workers to the site in its five office buildings and at the retail center and cultural facilities, and would attract a stabilized flow of visitors, expected to amount to 5.5 million annual visitors to the Memorial; this would introduce an average of approximately 15,068 visitors to the study area every day. In all, the Proposed Action would slightly increase the number of workers and daily visitors compared to pre-September 11 conditions in 2015. Overall, the ¼-mile study area is projected to have approximately 23,714 residents (the same as in the future without the Proposed Action) and approximately 209,459 non-residents (worker and visitors), for a total of approximately 233,173 total open space users.

ANALYSIS OF POTENTIAL OPEN SPACE IMPACTS IN 2015

Quantitative Analysis

With the addition of workers and visitors attributable to the Proposed Action the open space ratio for workers and visitors is expected to decrease compared with conditions in 2015 without the Proposed Action (see Table 6-1). However, the study area's 57.35 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers and visitors. The 23,714 residents would continue to require 11.59 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. The total open space (45.49 acres) remaining

for non-residential users would be slightly less than under conditions without the Proposed Action in the Pre-September 11 Scenario. Applying the 209,459 workers and visitors to these remaining acres would produce an open space ratio of 0.22 acres per 1,000 non-residential users. This would still be well above the CEQR guideline value of 0.15 acres, it would represent a decrease of 0.01 acres per 1,000 people, a decline of 6.25 percent from conditions without the Proposed Action.

Qualitative Analysis

In considering the *significance* of the projected decline in the passive open space ratio with the Proposed Action, it is important to remember that the 8.13 acres of open space available in the pre-September 11 conditions were not easily accessible from streets around the superblock that contained the Twin Towers. The only street-level entrance to Tobin Plaza was at Church Street. In comparison, the proposed open spaces would be considerably more accessible and designed to meet the needs of workers, visitors and residents for passive open space. All of the Proposed Action's open spaces would be at street level and immediately adjacent to major east-west pedestrian paths. In particular, the large open space south of Liberty Street would extend open space into the densely developed neighborhood south of the WTC Site, and would be large enough to host the concerts formerly held on the WTC Plaza. Wedge of Light Plaza, which may also be used to host events, would open to Church Street, creating an open space link from St Paul's Chapel and cemetery, through the site to September 11 Place and westward to the Winter Garden at the World Financial Center.

In addition to their accessibility, the Proposed Action's open spaces would be designed specifically to be attractive, lively, and inviting. The street levels of all buildings facing the open spaces and plazas would be lined with restaurants and shops; like the North Cove plaza at the World Financial Center (and the recent rehabilitation of Stone Street), it is assumed that the restaurants would offer open air dining on nice days, thus adding to the overall liveliness of the area. The spaces would have trees and other landscaping, benches and other seating, water features, and other amenities to create attractive places for workers, visitors, and residents to sit, eat, and enjoy the out-of-doors. Overall it is anticipated that the Proposed Action would not have a significant adverse impact on open space resources in the study area.

PEDESTRIAN-LEVEL WIND CONDITIONS

The proposed site plan for the Proposed Action includes five towers ranging in height from approximately 900 feet to approximately 1,800 feet and several smaller structures, including the permanent WTC PATH Terminal, the Memorial Center and cultural facilities, performing arts center, and hotel and conference center (see Chapter 1, "Project Description.") The various towers and buildings would be set on two sides of a large area containing the Memorial. Most of the proposed publicly accessible open space (Wedge of Light Plaza and September 11 Place) would be located adjacent to tall buildings along Fulton and Greenwich Streets on the Project Site.

The Proposed Action would be expected to result in pedestrian-level wind conditions that are comparable to those described above for baseline conditions. Absent the development of design measures to reduce potential adverse pedestrian-level wind effects, the tall towers of the Proposed Action would be expected to create vortex and corner effects that would be comparable to pre-September 11 conditions.

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Typically, pedestrian-level wind conditions would be in the comfortable range. However, during some limited time periods, uncomfortable conditions may occur, and activities like sitting, standing, and walking could be impeded. In addition, a few hours per year, severe conditions—which may limit activities, produce difficult walking conditions, and, at times, pose potential safety problems that would limit access to some areas—may occur.

As part of final design for the Proposed Action, wind tunnel studies will be undertaken to examine measures to reduce and mitigate undesirable pedestrian-level wind effects. Measures to be examined would include the use of landscaping (i.e., trees and bushes), wind screens, and possible building design modifications. However, absent the development and implementation of such measures, conditions with the Proposed Action would be comparable to pre-September 11 conditions at the site and in the project area. *