

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 more lively. 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 open space, open space users, and a 4.19-acre Memorial 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.

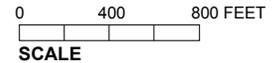
Open space is considered to be land that is publicly or privately owned, and has been designated for leisure, play, sport, or for the protection and enhancement of the natural environment. The Proposed Action would provide approximately 5.52 acres of open space on the Project Site, compared with the 8.13 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.)

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



In addition to the 5.52 acres of open space provided under the Proposed Action, a 4.19-acre Memorial would be created in memory of the events of September 11 and February 26, 1993. This Memorial would be unlike any other memorial in New York City, and would draw a significant number of visitors. As the design for the Memorial is still being developed, discussion of the specific amenities and programming on the Memorial is limited. The Memorial is not considered for the purposes of this chapter as a traditional open space because of its design and contemplated use, and is therefore excluded from the quantitative analysis. It is discussed qualitatively in this chapter because it is expected to be the most visited publicly accessible space on the Project Site. It would likely also serve many of the purposes of open space, allowing visitors to pause and reflect in a contemplative, largely outdoor setting. Were the Memorial to be counted, it could add up to 4.19 acres to the open space supply for a total of 9.71 acres of open space on the Project Site. In this case, all open space ratios would increase as compared with the future without 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

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**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	8.13				
Current Conditions ¹	75 ³	5,500	5,500	0.00				
Build Conditions, 2009	TO COME			5.52 ²				
Build Conditions, 2015	43,861	18,668	62,530	5.52 ²				
OPEN SPACE RATIOS IN THE 1/4 MILE STUDY AREA								
	User Population		Passive Open Space Acres			Open Space Ratios		
	Residents	Workers and Visitors	Total	Acres for Residents	Acres for Non-Residents ⁵	Residential Guideline	Acres for Non-Residents ⁵	
Pre-September 11 Scenario								
Baseline (pre-September 11)	13,707	177,948	56.19	6.85	49.34	0.50	0.28	
2009 Without Proposed Action	22,975	192,147	59.86	11.49	48.37	0.50	0.25	
2009 with Proposed Action	22,975	179,096	57.25	11.49	45.76	0.50	0.25	
2015 Without Proposed Action	24,221	205,570	59.86	12.11	47.75	0.50	0.23	
2015 with Proposed Action	24,221	210,910	57.25	12.11	45.14	0.50	0.21	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	30,584	139,863	53.02	15.29	37.73	0.50	0.27	
2009 with Proposed Action	30,584	176,521	58.54	15.29	43.25	0.50	0.25	⁴
2015 Without Proposed Action	33,155	155,974	53.02	16.58	36.45	0.50	0.23	
2015 with Proposed Action	33,155	205,424	58.54	16.58	41.96	0.50	0.20	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 Does not include 4.19-acre Memorial or streets.								
³ Total employment throughout the course of each day. Source: Port Authority								
⁴ Decrease of more than 5 percent; requires more detailed analysis.								
⁵ Remaining passive open space acreage for non-residents is taken into account after satisfying the demand for residents.								
Source: Urban Planning and Transportation Study for Lower Manhattan, Draft Summary Report. 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 acreage available for non-residents would be ample enough to produce open space ratios ranging from 0.20 to 0.31 acres per 1,000 people, well above the guideline value of 0.15 acres per 1,000 people. However, the Proposed Action would reduce several ratios 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, when the entire program would be complete and the anticipated worker and stabilized visitor population would be in place, under the Pre-September 11 Scenario, the Proposed Action would decrease the ratio of open space to non-resident user population of 0.23 acres per 1,000 people to 0.21 acres per 1,000 people—a decrease of 8.7 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, the large open space south of Liberty Street would extend open space into the densely developed neighborhood south of the WTC, 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 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. 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.
- It is possible that some of the streets within the Project Site may be closed to traffic but open to pedestrians for events from time to time. This would add more than 2.36 acres to the supply of open space and reduce the incremental decrease in all relevant open space ratios to less than 5 percent.
- The quantified analysis did not consider the Memorial to be traditional public open space. However, it would contain substantial open space and would be publicly accessible. Were the Memorial to be counted, it could add approximately 4.2 acres to the open space supply

for a total of 9.71 acres of open space on the Project Site. In this case, all open space ratios would increase as compared with the future without the Proposed Action.

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 Southern Site plaza 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. Specifically, the ratio would go from 0.27 acres per 1,000 people to 0.25 acres per 1,000 people in 2009 (a 7.4 percent decrease) and from 0.23 acres per 1,000 people to 0.20 acres per 1,000 people in 2015 (an 8.0 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:

- 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.

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.

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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.

For purposes of this analysis, the Memorial was not included in the inventory of open space. This decision reflected the specialized use of the Memorial and its controlled access. However, the Memorial would provide many of the qualities of open space—light and fresh air, visual relief—and its visitors would use it in much the same way as traditional open space—as a place for contemplation, being outdoors, etc. Moreover, as noted below, the quantified analysis of open space would include all average daily visitors to the Memorial in the inventory of user populations. Thus the analysis in this chapter is very conservative.

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, and visitors—including average daily visitors to the Memorial. 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 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 6-2, 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.

**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	56.19	11.59	4.10	0.85
2009 Without Proposed Action	22,975	59.86	11.59	2.61	0.53
2009 with Proposed Action	22,975	57.25	11.59	2.49	0.53
2015 Without Proposed Action	24,221	59.86	11.59	2.47	0.50
2015 with Proposed Action	24,221	57.25	11.59	2.36	0.50
Current Conditions Scenario					
Baseline	18,458	47.81	11.59	2.59	0.63
2009 Without Proposed Action	30,584	53.02	11.59	1.81	0.40
2009 with Proposed Action	30,584	58.54	11.59	2.00	0.40
2015 Without Proposed Action	33,155	53.02	11.59	1.68	0.37
2015 with Proposed Action	33,155	58.54	11.59	1.85	0.37
Source: U.S. Department of Commerce, Bureau of the Census, 2000 Census of Population and Housing, residential development known to have occurred between 2000 and 2003 (AKRF, Inc.)					

With passive open space, the open space ratio range of 1.68 acres per 1,000 residents to 4.08 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.

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 and 2015 in the Pre-September 11 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 La Guardia 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.

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.

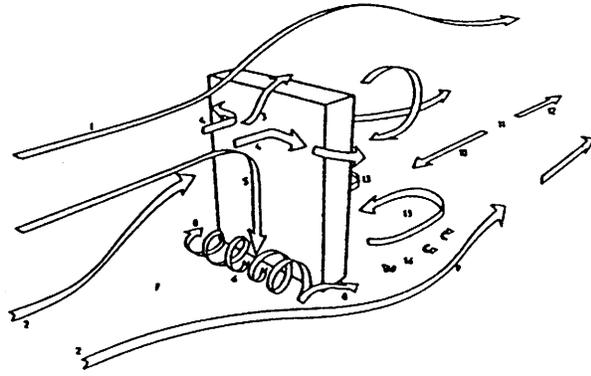
In general, at most locations on the West Side of Manhattan adjacent to the Hudson River, during the majority of the year (i.e., more than 80 percent of the time), pedestrian-level wind conditions are in the comfortable range, and pedestrian winds do not affect typical daily activities. At some locations, 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

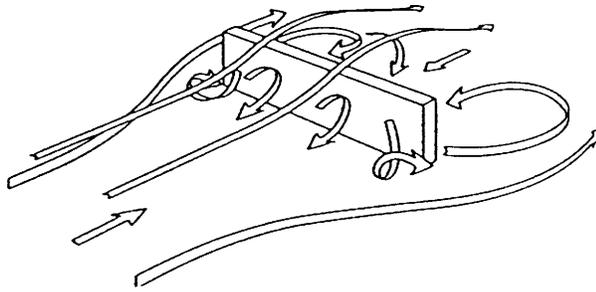
6.3.1 EXISTING CONDITIONS 2003

PROJECT SITE

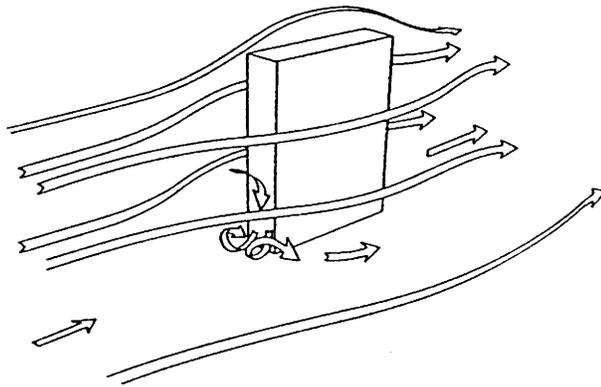
Currently, the WTC Site is vacant except for the temporary WTC PATH station and the No. 1/9 subway lines. It is fenced (except for the temporary WTC PATH station entry) and provides no public access or open space resources. However, there are temporary viewing areas on Church and Liberty Streets. The adjacent sites do not provide any open space. On the Southern Site, 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. Site 26 in BPC is a paved parking lot.



Air Stream Pattern of a Tall Building



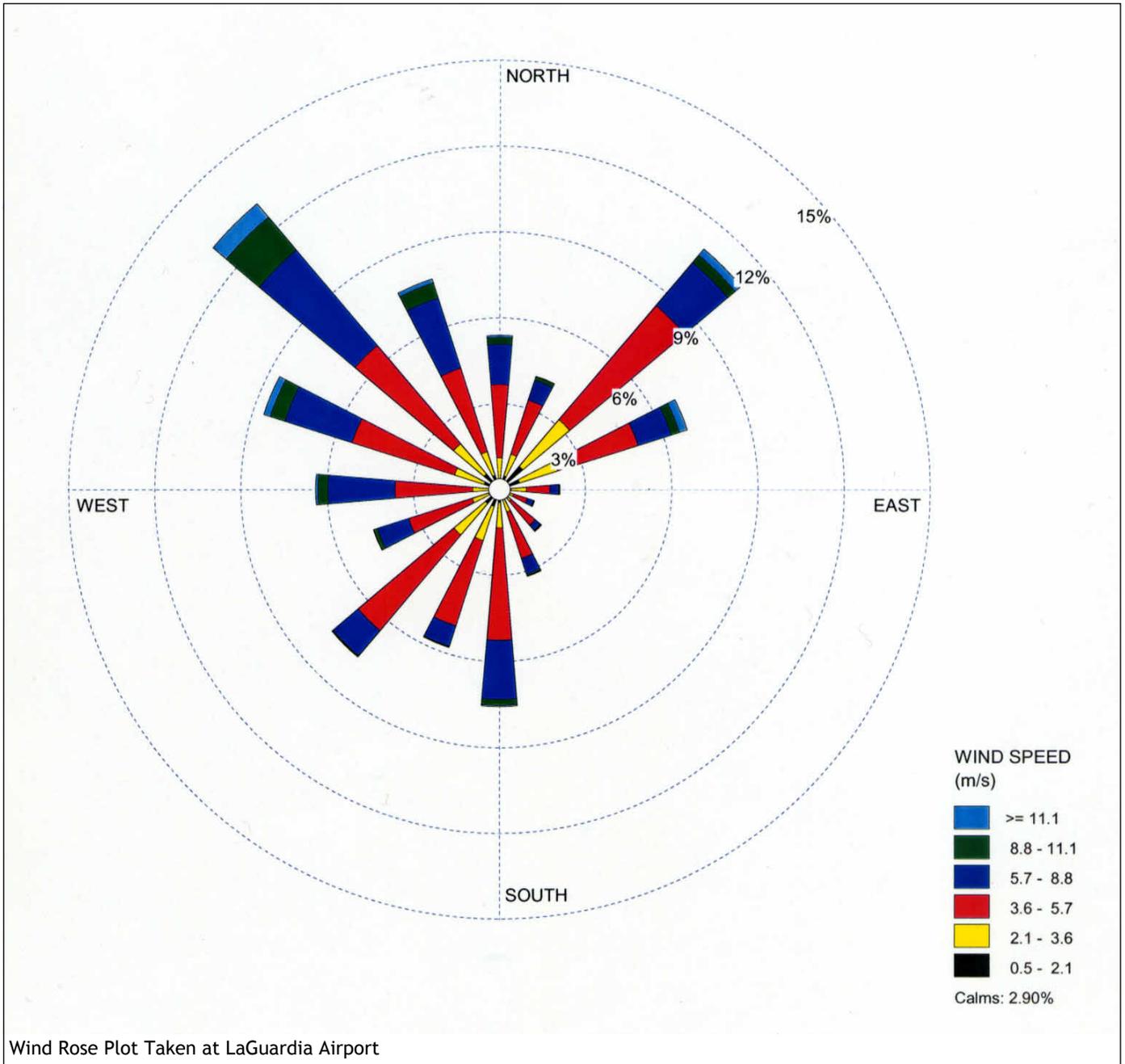
Flow Around Low & Wide Rectangular Building



Flow Around Narrow Rectangular Building

Source: Kluwer

12-03



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 6-3, 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 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-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.

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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 Bway, Liberty, Church, Cortlandt Sts	New Liberty Plaza LLP	0.64	0.64	Trees, planters, seating	Excellent	24	Moderate
2	Liberty Plaza	Between Bway, 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 Bway	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 Bway 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	Ballfields	Between Murray and Warren Sts near Rte 9A	BPCA	0.00	2.84	Ballfields	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	Millennium Hilton	Fulton St at Church St	Millennium 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.									

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

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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 as 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 neither the Southern Site nor BPC Site 26 would be developed.

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

OPEN SPACE INVENTORY

Four 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. 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).

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 53.02 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 30,584 and the non-residential population is expected to rise to approximately 139,863, resulting in a combined user population of an estimated 170,400.

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 53.02 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers and visitors. The 30,584 residents would require 15.29 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 139,863 workers and visitors to the remaining acres produces an open space ratio of 0.27 acres per 1,000 non-residential users. This is still well above the CEQR guideline value of 0.15 acres.

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

Name	Address	Status	Use
Keystone	38-44 Warren St	2004	24 residential units
Barclay-Vesey Building	140 West St	2004	Restoration: 1,171,540 sf office
7 World Trade Center	Vesey and Greenwich Sts	2005	1,685,000 sf office and two electrical substations, 1/3-acre open space
Fed Office Bldg/Post Office	90 Church St	2005	500,000 sf (post office) and 626,260 sf (office)
WSURA Site 5B	270 Greenwich St	2008	1,120 residential units, 25,000 sf retail
WSURA 5C	West and Chambers Sts	2008	551 residential units, 14,950 sf retail
Woolworth Building	233 Broadway	2004	150 residential units
Fulton St. Transit Center	Fulton St and Broadway	2007	Transportation
90 W	90 Washington St	2005	387 residential units
	90 West St	2005	410 residential units
Skyscraper Museum	2 West St	2004	Institutional—Skyscraper Museum
Teardrop Park	BPC N	2004	Recreational/open space
Solaire	20 River Terrace BPC N	2004	335 residential units
	Site 2 BPC S	2004	628 residential units
	Site 18B, BPC N	2005	268 residential units, 14,000 sf retail
	Site 19B, BPC N	2005	323 residential units
	Pier A	2005	7,000 sf retail
	Site 23 BPC N	2006	269 residential units, 7,000 sf retail
	Site 24 NPC N	2006	250 residential units, 7,000 sf retail
	Site 3 BPC S	2006	500 residential units, 38,500 sf institutional
Route 9A	Between Albany St and Battery Pl	2006	Transportation, approx. 1.86 acres of open space
Route 9A	West of WTC Site	2008	Transportation
	102 Fulton St	2004	14 residential units
	23 Wall /15 Broad St	2007	1,321 residential units
Sources: Battery Park City Authority, DCP, Community Board 1, and the Alliance for Downtown New York.			

PEDESTRIAN-LEVEL WIND CONDITIONS

As noted above, it is assumed that without the Proposed Action, three large buildings would be developed on the Project Site, but not on the WTC Site. Two would be to the south, and one to the northwest on Site 26 in BPC. The additional 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.

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 related museum, and new open spaces. Fulton and Greenwich

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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

In addition to an up-to-4.19-acre Memorial honoring the events of September 11, the Proposed Action would create five new publicly accessible open space resources on the Project Site. Four (Wedge of Light Plaza, Heroes Park, September 11 Place, and Liberty Park North) would be on the WTC Site; one (Liberty Park South) would be on the Southern Site; and one (a viewing area for the Memorial) would be on Route 9A. These open spaces would total to 5.52 acres, not counting the Memorial, as described below.

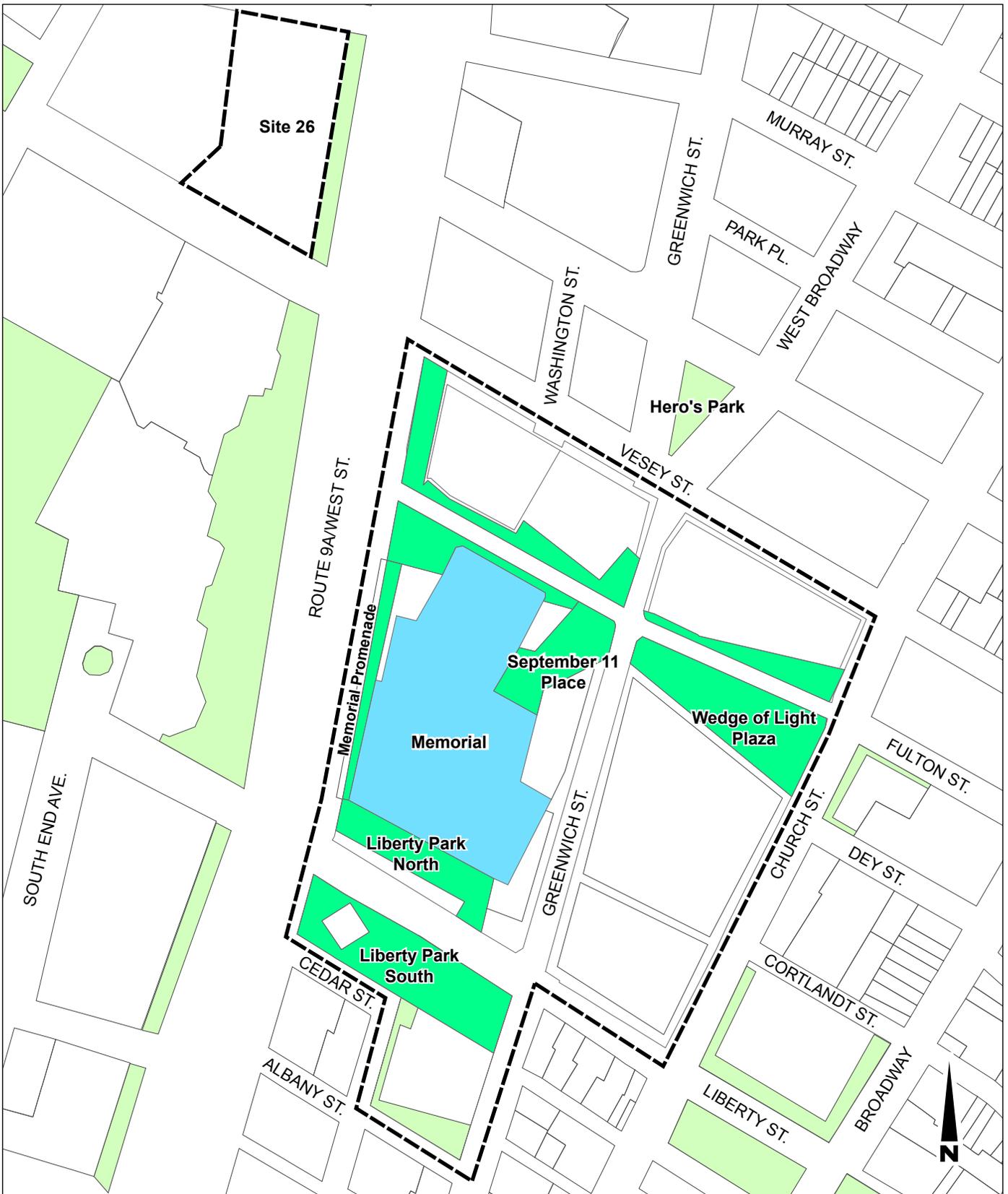
As shown in Figure 6-4, Wedge of Light Plaza—a broad 1.33-acre plaza flanking Fulton Street that would be reintroduced on the WTC Site—would become the main civic open space of the new WTC. It would also be a key link in the procession of public spaces along Fulton Street, extending from St. Paul’s Chapel and cemetery, through the WTC Site, to the Route 9A Esplanade and the Winter Garden at the World Financial Center. Wedge of Light Plaza would be designed as a civic plaza to capture the energy of the thousands of people whose paths would cross it each day. It has been conceived as the place for residents, workers, and visitors to meet, gather for public events or outdoor concerts, or take a break from daily routines.

Heroes Park, a 0.79-acre open space, with as much landscaping as possible, would connect Wedge of Light Plaza with the Memorial precinct, the Freedom Tower and the World Financial Center. The “greening” of this space would help make a transition between the landscaped boulevard along West Street and the more hard surfaced urban space of the Project Site and the Financial District. The space along Route 9A would also serve as the entry plaza for visitors to the observation decks of the Freedom Tower. The name of Heroes Park honors the courage of those who lost their lives rescuing others on September 11, 2001.

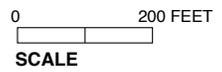
September 11 Place, a 0.55-acre open space surrounded by the museum and Memorial, would be located in the center of the WTC Site at the southwest corner of Greenwich and Fulton Streets. Located at the cultural nexus of the site, adjacent to the performing arts center, Wedge of Light Plaza, the permanent WTC PATH Terminal, and Heroes Park, this space will be a gathering place for people visiting the Memorial and cultural facilities, and an overlook for viewing the slurry wall and Memorial space.

On the south side of Liberty Street, the 1.89-acre Liberty Park South would stretch from Route 9A to Greenwich Street. North of Liberty Street, Liberty Park North would allow viewing of the Memorial from street level. Along Route 9A a 12,000-square-foot Memorial viewing area is planned.

Although for purposes of this open space impact analysis, only permanent, publicly accessible open spaces without a special purpose are being counted in the inventory, the Project Site will actually offer considerably more open space than 5.52 acres. The Memorial may in fact be the only open space that some visitors visit, and so it could be considered an open space. As described in Chapter 1, “Project Description,” in the fall of 2002, LMDC, in conjunction with drafting committees comprised of family members, residents, survivors, first responders, arts and architecture professionals and community leaders, created a Memorial Mission Statement and Program. In the months that followed, the international competition for the Memorial design



-  Project Site Boundary
-  WTC Open Spaces
-  Memorial
-  Study Area Open Spaces



Proposed Project Site Open Spaces
Figure 6-4

generated over 5,000 entries. In November, 2003, eight finalists were selected to proceed and further develop their memorial design concepts. From these eight design concepts (described fully in Chapter 1), one has been chosen for implementation as the WTC Site Memorial. Depending on the specific programming, the open space supply could approach 9.7 acres. Additionally, regardless of the specific design of the Memorial, it will provide light, fresh air, and a visual relief to the Project Site, as there will be very few above-grade improvements.

In addition, it is likely that at certain times the streets through the WTC Site would be closed to traffic for special events. At these times, open space available on the Project Site would temporarily increase by approximately 2.36 acres, expanding Wedge of Light Plaza, Heroes Park, and September 11 Place.¹ For purposes of this open space analysis, passive open space in the study area would total 58.54 acres; counting the Memorial and closed streets would raise that number to approximately 65 acres.

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 30,584 residents (the same as in the future without the Proposed Action) and approximately 176,500 non-residents (worker and visitors), for a total of approximately 217,100 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 58.54 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers, and visitors. The 30,584 residents would continue to require 15.29 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 (43.25 acres) remaining for non-residential users would be greater than under conditions without the Proposed Action. Applying the 176,521 workers and visitors to these remaining acres would produce an open space ratio of 0.25 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 7.47 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.

¹ Based on street widths of Greenwich and Fulton Streets and dimensions of WTC Site.

Qualitative Analysis of Impacts

In considering the import 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.

As noted above, the quantified analysis does not include the Memorial itself in the inventory of publicly accessible open space, yet the design guidelines for the competition assure that the large area of the Project Site devoted to the Memorial will be largely open, with only low structures. In addition, it is likely that there will be a number of outdoor events, open to the public, that will close the streets on the site to vehicular traffic and add another 2.36 acres to the inventory from time to time. In all, the focus on creating passive open spaces that are lively and attractive, plus the presence of the Memorial on the Project Site and the ability to use the streets as open space as well, outweigh the slight decline in the quantified open space ratio, and allow the analysis to conclude that the Proposed Action would have no significant adverse impact on open space in the Current Conditions Scenario in 2009.

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 on the Project Site in the area of the Heroes Walk, which is closest to the 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. A large commercial office tower would be expected to occupy Site 26, in accordance with the BPC

Master Plan. 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 33,100 residents and approximately 156,000 non-residents, for a total of approximately 189,100 open space users in the study area.

**Table 6-6
Potential and Proposed Projects 2009—2015
Current Conditions Scenario**

Name	Address	Status	Use
Fiterman Hall	30 West Broadway	Vacant	360,000 sf institutional
	10 Broadway	Proposed	Residential conversion
(Former) Downtown Athletic Club	16-20 West St.	Potential	Unknown
Brooklyn Battery Tunnel Area	Greenwich/West Sts.	Potential	600 residential units
	Site 16/17 BPC N	Potential	471 residential units or 223,955 sf commercial with NY Public Library Branch
	Site 26 BPC N	Potential	1.9 million sf office
	130Liberty St.	Potential	1.4 million sf office
	140 Liberty St.	Potential	500,000 sf office
Source: Lower Manhattan Development Corporation, Battery Park City Authority, NYC Department of City Planning, and Community Board 1.			

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 53.02 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 16.58 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 (36.45 acres) remaining for non-residential users. Applying the 155,974 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, two office towers (130 and 140 Liberty Street), and in the surrounding area Site 26 at BPC 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, a museum and other cultural facilities, transportation improvements, and new open space resources that were completed in 2009.

OPEN SPACE INVENTORY

There would be 5.52 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 58.84 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 33,155 residents (the same as in the future without the Proposed Action) and approximately 205,400 non-residents, for a total of approximately 238,600 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 58.54 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 continue to require 16.58 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 (41.96 acres) remaining for non-residential users would be greater than under conditions without the Proposed Action. Applying the 205,424 workers and visitors to these remaining acres would produce an open space ratio of 0.20 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 0.03 acres per 1,000 people, a decline of 13 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 import 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, which may also be used to host events, 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. 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.

As noted above, the quantified analysis does not include the Memorial itself in the inventory of publicly accessible open space, yet the Memorial will be open, with only low structures. In addition, it is likely that there will be a number of outdoor events, open to the public, that will close the streets on the site to vehicular traffic and add another 2.36 acres to the inventory from time to time. In all, the focus on creating passive open spaces that are lively and attractive, plus the presence of the Memorial on the Project Site and the ability to use the streets as open space as well, outweigh the slight decline in the quantified open space ratio, and allow the analysis to conclude that the Proposed Action would have no significant adverse impact on open space in the Current Conditions Scenario in 2015.

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, museum 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, Heroes Park, 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

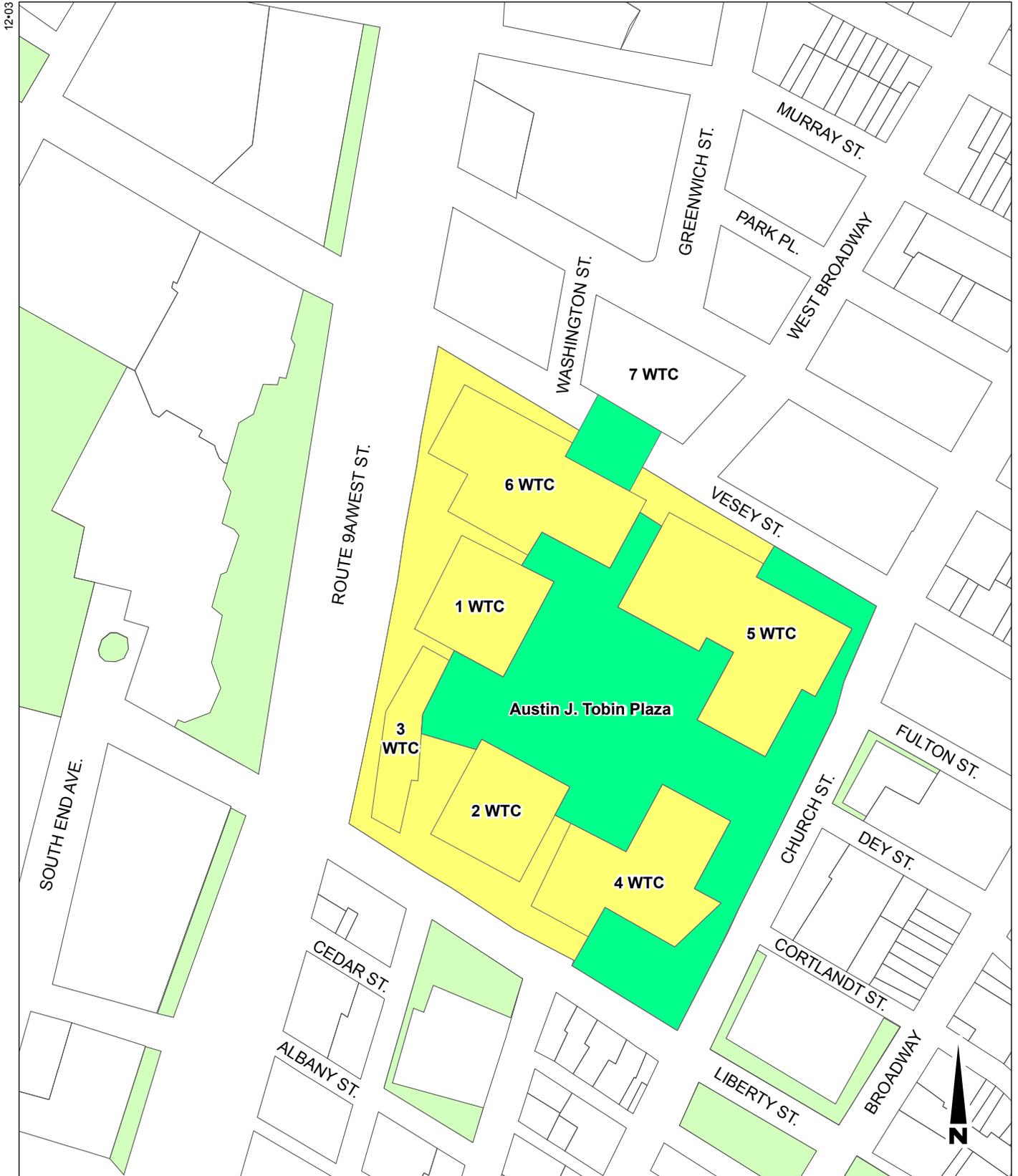
PROJECT SITE

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 7.07 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. BPC Site 26 was used for surface parking. 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.

OPEN SPACE INVENTORY

In addition to the 28 open spaces listed in Table 6-2, 8.13 acres of public open space existed in the ¼-mile 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 6-5). Used by workers and visitors to the WTC Site, by September 11, 2001, the Plaza featured benches,

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.



- WTC Site
- WTC Open Spaces
- Study Area Open Spaces

0 200 FEET
SCALE

World Trade Center Open Spaces Pre-September 11

Figure 6-5

**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	3.11	Plantings, seating, tables and chairs, farmers market	Excellent	24	Moderate
30		130 Liberty Street	Bankers Trust Co.	1.06	Trees/planters, fountain	Excellent	24	Light
Total				8.13				

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

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.

In addition to the Plaza, the portions of the WTC Site along Church, Vesey, and Liberty Streets contained an additional 3.11 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.

STUDY AREA POPULATION

Prior to September 11, approximately 13,700 people lived within the ¼-mile 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

**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.			

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.

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 56.19 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 (49.34 acres) remaining for non-residential users. Applying the 177,948 workers and visitors to the remaining acres produced an open space ratio of 0.28 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 23,000, the non-residential population to approximately 192,150, and the combined residential and non-residential populations to approximately 215,150.

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 59.86 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers, and visitors. The 22,975 residents would require 11.49 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 (48.12 acres) remaining for non-residential users. Applying the 192,147 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

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.

**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 Pl.	2002	116 residential units
	270 Broadway	2002	87 residential units
	110-120 Church St.	2003	389 residential units
Keystone	38-44 Warren St.	2003	24 residential units
WSURA 5C	West and Chambers Sts.	2003	260 residential units, with ground-floor commercial
WSURA Site 5B	270 Greenwich St.	2004	1.35 million sf office, 25,400 sf retail, 100 parking spaces, 0.92 acre plaza
	Park Row at Ann St. (J&R Music World)	2002	32,000 sf retail
Woolworth Building	233 Broadway	2004	150 residential units
	90 Washington St.	2005	387 residential units
	22 River Terrace BPC	2002	293 residential units
Ballfields	BPC N/Murray St to Warren St. near Rte 9A	2003	Recreational/open space
Skyscraper Museum	2 West St.	2004	Institutional
Teardrop Park	BPC N	2003	Recreational/open space
Solaire Building	20 River Terrace BPC N	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 N	2005	268 residential units, 14,000 sf retail
	Site 19B, BPC N	2005	323 residential units
	Pier A	2005	7,000 sf retail
	Site 23 BPC N	2006	269 residential units, 7,000 sf retail
	Site 24 NPC N	2006	250 residential units, 7,000 sf retail
	Site 3 BPC S	2006	500 residential units, 38,500 sf institutional (Women's Museum)
	123 Chambers St.	2003	6 residential units
	15 Dutch St.	2002	14 residential units
	80 Nassau St.	2002	11 residential units
	102 Fulton St.	2003	14 residential units
NYSE	23 Wall/15 Broad St.	2006	1.9 million sf: 600,000 sf NYSE facility, 1.3 million sf office
	10 Barclay St.	2005	375 residential units, 19,341 sf office
Sources: AKRF, Inc., Lower Manhattan Corporation, Battery Park City Authority, NYC Department of City Planning, and Community Board 1.			

**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, museum and cultural facilities, Freedom Tower, the permanent WTC PATH Terminal, and retail space. The open spaces on the Project Site would total to 5.52 acres, less than the 8.13 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 2.94 fewer acres of open space on the Project Site than existed prior to September 11. If the Memorial is considered as part of the open space supply, the Proposed Action would provide a total of 9.71 acres, 1.58 acres more than existed prior to September 11. If Greenwich and Fulton Streets on the WTC Site are closed to traffic from time to time, the open space on the Project Site would be increased temporarily by 2.36 acres, but the total would still fall short of what existed prior to September 11. In all, the ¼-mile study area would contain 57.25 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 23,000 residents (the same as in the future without the Proposed Action) and approximately 179,100 non-residents (worker and visitors), for a total of approximately 202,100 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 11.49 acres of passive open space, leaving 45.76 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 no different from 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

World Trade Center Memorial and Redevelopment Plan GEIS

probably slightly worsen pedestrian-level wind conditions on the Project Site in the area of the Heroes Walk, which is 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 be comprised of 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 24,200, and the non-residential population to approximately 205,600. The combined user population would have increased to approximately 229,800.

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

Name	Address	Status Pre-September 11	Use
	115 Nassau St.	Proposed	Residential conversion
	10 Broadway	Proposed	Residential conversion
	5 Beekman St.	Proposed	Residential conversion
	60 Broad St.	Potential	200 residential units, 800,000 sf office
One World Plaza	140 Liberty St.	Potential	500,000 sf office
(Former) Downtown Athletic Club	16-20 West St.	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 St.	Proposed	Residential conversion
Sources: AKRF, Inc., Lower Manhattan Corporation, Battery Park City Authority, NYC Department of City Planning, and Community Board 1.			

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 24,221 residents would have required 12.11 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 (47.75 acres) remaining for non-residential users. Applying the 205,570 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, a museum 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, museum 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 2.61 acres less than in pre-September 11 conditions. If the Memorial is considered in the open space inventory, the Project Site would have more open space than it did prior to September 11. If Fulton and Greenwich Streets on the WTC Site are used for open space, the open space supply would be increased but would still not reach its pre-September 11 level.

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 24,200 residents (the same as in the future without the Proposed Action) and approximately 210,900 non-residents (worker and visitors), for a total of approximately 235,100 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 57.25 acres of passive open space would still be adequate to meet the needs of its user population of residents, workers and visitors. The 24,221 residents would continue to require 12.11 acres to meet the CEQR guideline ratio of 0.50 acres per 1,000 residents. The total open space (45.14 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 210,910 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 8.7 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 import 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 through Heroes Park 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.

As noted above, the quantified analysis does not include the Memorial itself in the inventory of publicly accessible open space, yet the design guidelines for the competition assure that the large area of the Project Site devoted to the Memorial will be largely open, with only low structures. In addition, it is likely that there will be a number of outdoor events, open to the public, that will close the streets on the site to vehicular traffic and add another 2.36 acres to the inventory from time to time. In all, the focus on creating passive open spaces that are lively and attractive, plus the presence of the Memorial on the Project Site and the ability to use the streets as open space

as well, outweigh the slight decline in the quantified open space ratio, and allow the analysis to conclude that the Proposed Action would have no significant adverse impact on open space in the Current Conditions Scenario in 2009.

Additionally, regardless of the specific design of the Memorial, it will provide light, fresh air, and a visual relief to the Project Site. Therefore, it is conservative to count the approximately 15,100 daily Memorial users as open space users while not counting the Memorial as open space. 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, museum 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, Heroes Park, 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.

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. *