

A. PREFACE

This Generic Environmental Impact Statement (GEIS) has been prepared by the Lower Manhattan Development Corporation (LMDC), to assess the significant environmental impacts arising from the World Trade Center Memorial and Redevelopment Plan (the Proposed Action) and its alternatives. *Its purpose is to inform decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. It identifies the Proposed Action, from among various alternatives, as the recommended course of action that minimizes adverse impacts to the maximum extent practicable, based on the purpose and need of the Proposed Action.*

This Proposed Action is as unprecedented as were the events from which it arose. This *Final GEIS (FGEIS)* and its public review provide an open evaluation of the environmental consequences of the extraordinary reconstruction project that has been proposed to remember, rebuild, and renew what was lost on *September 11, 2001*.

The Proposed Action seeks to create an appropriate Memorial for the victims, to restore commercial, retail, and open space uses on the Project Site and to revitalize and enhance the Lower Manhattan community. The Proposed Action has been designed and is expected to achieve each of these goals while minimizing the potential for adverse environmental impacts. Nevertheless, as discussed in the analyses that follow, construction of the Proposed Action would necessarily involve significant traffic, noise, and short-term air quality impacts during its construction period, the early part of which is likely to overlap with construction of other Lower Manhattan recovery projects being carried out by other public agencies. When completed, the Proposed Action would add traffic and pedestrians to already congested intersections in Lower Manhattan and some incremental shadows to Washington Market Park. By reutilizing the existing WTC cooling water intake system in order to reduce potable water and energy requirements, the Proposed Action would also result in the loss of some aquatic biota. The Memorial would honor the victims of September 11 and enhance the historic significance of the site; however, the Proposed Action would also likely require removal of some remnants of the former WTC. While LMDC has committed to a broad program of measures to mitigate (or avoid entirely) these impacts, some adverse impacts are inevitable if the significant benefits of the Proposed Action are to be realized.

LMDC appreciates the continuing support of the thousands of citizens and the many agencies and officials who have joined in this effort to honor those lost on September 11 and to renew our community in a way that reflects the vitality and resolve of our city, state, and nation.

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B. SEPTEMBER 11, 2001

The World Trade Center (WTC) stood as a symbol of New York as a global center of commerce, and of the soaring aspirations of the city. The Twin Towers at the WTC were an instant icon, even before their completion in 1970 and 1972, reshaping the skyline, spurring development and refocusing attention on Lower Manhattan (see Figure S-1). When they were opened, the Twin Towers were the two tallest buildings in the world, but even as they were surpassed in height they remained the best known skyscrapers in the world. On the ground, and below it, the WTC was the hub of movement in Lower Manhattan, traversed by several hundred thousand people each day: workers, business and tourist visitors, shoppers, commuters, and area residents.

Construction of the WTC by the Port Authority of New York and New Jersey (the Port Authority) was a remarkable achievement, and exemplified the planning ideas of the day. Intermediate streets across the site were eliminated, creating a 16-acre superblock (*WTC Site*), with a ring road for drop-offs and service. The western half of the site was excavated to bedrock—some 70 feet below grade—and protected from intrusion of groundwater and the Hudson River by 3-foot-thick slurry walls. Six levels of underground structure provided access to a new WTC PATH Terminal, accommodated about 400,000 square feet of retail space along concourses, and housed central utility areas, storage vaults, and parking. At grade, a gigantic public plaza added a new kind of open space to Lower Manhattan and, while often buffeted by strong winds, recent improvements had begun to transform it into an active urban space.

On February 26, 1993, at 12:18 PM, a terrorist truck bomb exploded on the B-2 level of the WTC, killing six people and injuring thousands. The bomb created a five-story crater underground and caused severe damage to the infrastructure of the complex, including emergency communications, electricity, and water systems. The hotel at 3 WTC was also severely damaged. Following the bombing, public parking was eliminated from the site and additional security measures were implemented.

On September 11, 2001, two passenger jetliners departed from Boston's Logan International Airport in the early morning en route to Los Angeles International Airport and were seized by armed terrorists shortly after takeoff. Each plane was forced to fly to Lower Manhattan toward the Twin Towers of the WTC. The first plane, American Airlines Flight 11, departed from Logan International Airport at 7:59 AM carrying 92 passengers and crew members. The plane was flown south over Manhattan and crashed into floors 94 through 98 of the North Tower at 8:46 AM. The second plane, United Airlines Flight 175, departed from Logan International Airport at 8:14 AM with 65 passengers and crew members on board. It approached Manhattan from the south, flying over Staten Island before crashing into floors 78 through 84 of the South Tower at 9:03 AM. The attacks caused massive explosions that showered burning debris over the surrounding buildings, open spaces, and streets; and they ignited intense, rapidly spreading fires within the two Towers. The South Tower collapsed at 9:59 AM and the North Tower collapsed at 10:28 AM. From the moment the North Tower was hit, rescuers rushed to the WTC to help evacuate those people who were still in the towers. Even after the collapse of the South Tower, countless fire fighters, Port Authority and New York City police officers, and others climbed up the North Tower to aid those fleeing the building. It is estimated that these rescue efforts and the courage of those in the Towers saved more than 15,000 lives. Even so, nearly 2,800 people lost their lives that day in the WTC and its vicinity.

Additional planes hijacked on September 11 also resulted in destruction and human casualty elsewhere in the nation. A third plane crashed into the Pentagon in Washington, D.C., and a



Source: PANYNJ

fourth crashed in Shanksville, Pennsylvania. In total, including those who perished at the WTC Site, over 3,000 lives were lost on U.S. soil on September 11.

Following the September 11 attacks, thousands of workers—including police officers, firefighters, construction workers, New York City Department of Sanitation employees, and other laborers—toiled at the WTC Site and in the surrounding areas covered by material from the collapse of the Twin Towers (see Figure S-2). In the first days after the attacks, the activity was aimed at the paramount goal of rescuing survivors. On September 29, 2001, the mandate officially shifted, moving from a search for survivors to recovery of those lost, demolition of the ruined structure, and cleanup of the mountain of material, tasks that continued for approximately nine months.

The City of New York maintained primary responsibility for the recovery efforts until June 30, 2002. Necessary infrastructure repairs were undertaken concurrently with the recovery efforts, including temporary stabilization of the slurry walls and flood-proofing of the WTC Site. Construction of a temporary WTC PATH station by the Port Authority began in July 2002 on conclusion of the recovery operations, and the station opened for service in November 2003.

Long-term recovery efforts continue in Lower Manhattan and the area surrounding the WTC Site. The destruction and damage to the WTC Site on September 11 dramatically altered the character of the immediate area and surrounding neighborhoods. The attacks tore through the urban fabric of Lower Manhattan, creating an enormous physical and emotional void. Area residents and businesses faced economic uncertainty and community instability due to costs and vacancies associated with the disaster and recovery efforts, and the attacks resulted in the subsequent loss of billions of dollars in revenues for New York City and State. The loss of life, jobs, infrastructure, and office space diluted the presence and importance of the Financial District, and continues to affect the vitality of Lower Manhattan.

Lower Manhattan experienced substantial destruction of property in and around the WTC complex as a direct result of the attacks (see Figure S-3). North of the Project Site, 7 WTC was destroyed. On the Southern Site (two blocks fronting Liberty Street between Greenwich Street and Route 9A), the outdoor parking lot at 140 Liberty Street was covered by material from the collapses, the St. Nicholas *Greek Orthodox Church* was destroyed and the 39-story office building at 130 Liberty Street was severely damaged. Other buildings surrounding the WTC Site, including the Millennium Hilton Hotel, the Winter Garden, and Gateway Plaza in Battery Park City (BPC) were also severely damaged. Mass transit stations and facilities near the WTC Site were destroyed. In the aftermath, much of Lower Manhattan south of Houston Street became a restricted area, and large streets and parks were taken over by emergency vehicles and recovery facilities and equipment. Some streets remain closed. Many businesses and residents in the surrounding area were temporarily displaced, and some have not returned. Some buildings surrounding the WTC Site remain unoccupied; 130 Liberty Street remains damaged and vacant, shrouded in black nettings. 140 Liberty Street is still a construction staging area.

The significant loss of life, jobs, and commercial space has affected the vitality of the Financial District, and continues to pose a threat to the financial, emotional, and cultural vitality of Lower Manhattan. Prior to September 11, the WTC complex stood at the heart of the nation's third-largest business district, containing over 12 million square feet of commercial office space. Over 42,000 workers were employed at the WTC Site, which in addition to the commercial and office space also contained hotel and conference facilities, open space, and retail space. Through direct and indirect results of the September 11 attacks, Lower Manhattan lost approximately 71,256

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employees between 2000 and 2002—almost 17 percent of its year 2000 workforce. Nearly 25,000 of those jobs have been lost from New York City altogether.

LMDC and the Port Authority have developed the Proposed Action with tremendous and unprecedented public input and participation. The Proposed Action is intended to provide a permanent Memorial that will allow future generations to remember and honor the people who died on September 11 in New York City, in Shanksville, Pennsylvania, and at the Pentagon, as well as those who died in the terrorist bombing of February 26, 1993. The Proposed Action also strives to foster the growth of Lower Manhattan as a vibrant cultural and financial district, to remember and restore life at the WTC Site, and to repair the underlying fabric of Lower Manhattan.

C. PROJECT DESCRIPTION

INTRODUCTION

In the aftermath of September 11, the LMDC was created by Governor George E. Pataki and former Mayor Rudolph Giuliani as a subsidiary of the New York State Urban Development Corporation (UDC) doing business as Empire State Development Corporation (ESDC), a political subdivision and public benefit corporation of the State of New York) to coordinate the remembrance, rebuilding, and revitalization efforts. LMDC is proposing to undertake, in cooperation with the United States Department of Housing and Urban Development (HUD) and the Port Authority, a Proposed Action that includes the construction of a World Trade Center Memorial, a *Memorial Center*, and memorial-related improvements, as well as commercial, retail, cultural facilities, new open space areas, new street configurations, and certain infrastructure improvements at the WTC *Site* superblock bounded by Liberty, Church, and Vesey Streets, and Route 9A. The *Southern Site* comprises the two city blocks south of the WTC Site and portions of Liberty Street and Washington Street. The WTC Site and *Southern Site* are referred to collectively as the Project Site in this FGEIS (see Figure S-4).

LMDC is conducting a coordinated environmental review of the Proposed Action pursuant to federal law as the recipient of HUD Community Development Block Grant program funds (42 USC § 5304(g)) and as lead agency under both the National Environmental Policy Act (NEPA) and the New York State Environmental Quality Review Act (SEQRA) and their implementing regulations. LMDC has prepared this *FGEIS* as part of that review. On June 20, 2003, LMDC released on its web site (www.renewnyc.com) and circulated publicly a Draft Scope for the GEIS, making it available to agencies and the public for review and comment. LMDC held public scoping meetings at Tribeca Performing Arts Center at the Borough of Manhattan Community College, 199 Chambers Street, New York, NY, on Wednesday July 23, 2003. The public comment period remained open for submission of further written comments until 5 PM, August 4, 2003. Based on the substantive comments received and other considerations, a Final Scope was prepared and then approved by LMDC's Board of Directors on September 16, 2003, and made available to the public and cooperating agencies. *LMDC's Amended General Project Plan for the World Trade Center Memorial and Cultural Program (GPP) was approved by LMDC's Board on September 16, 2003.*

The Draft GEIS (DGEIS) was approved by the LMDC Board and published in January 2004. Public review for the DGEIS began on January 22, 2004, with publication and distribution of the document. The DGEIS was circulated to involved and interested agencies, community

organizations, and other parties and posted on LMDC's web site, and notices of its availability and the public hearings were published in the Federal Register on January 23, 2004, the New York State Environmental Notice Bulletin on January 28, 2004, and in daily (English, Chinese, and Spanish language) and neighborhood newspapers in between and around those two dates. Notices announcing public hearings on the GPP were also published in the daily newspapers. LMDC held two joint public hearings at Pace University in Manhattan to receive comments on the DGEIS and the GPP on February 18, 2004, one from 1 PM to 5 PM and one starting at 6 PM. The public comment period on the DGEIS remained open through March 15, 2004. The public comment period on the GPP remained open through March 19, 2004.

LMDC is also conducting a parallel review under Section 106 of the National Historic Preservation Act (NHPA). Section 106 requires federal agencies to identify historic properties listed in or eligible for inclusion in the National Register of Historic Places that may be affected by a proposed undertaking. As fully discussed in Chapter 5, "Historic Resources," LMDC coordinated the Section 106 process regarding the WTC Site's eligibility for listing on the National Register of Historic Places with the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA). On March 31, 2004, LMDC, FTA, and FHWA issued a Coordinated Determination of National Register Eligibility (Coordinated DOE) for the WTC Site finding the entire WTC Site eligible for listing. LMDC recently prepared a draft Programmatic Agreement, with the New York State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP), to address historic resources on the WTC Site. LMDC is now considering comments on that draft. The Programmatic Agreement was distributed to "consulting parties" identified during the Section 106 process and released for public comment through newspaper notice and on LMDC's website until April 8, 2004.

Responses to comments on the DGEIS, the GPP, and Section 106 documents are included in Chapter 27. The text and figures in the FGEIS have been modified in response to the comments received and to changes in the Proposed Action.

BACKGROUND AND CONTEXT

In 1962, the States of New York and New Jersey authorized and directed the Port Authority to acquire the Hudson Tubes interstate public transit system (now known as PATH), to construct the WTC complex and to cooperate with other governmental agencies for the purpose of reviewing and improving the WTC area as part of the Port Authority's mission to develop the port of New York and New Jersey. The WTC complex consisted of the 16-acre WTC Site, a superblock bounded generally by Church Street on the east, Liberty Street on the south, Route 9A on the west, and Vesey Street on the north, and a 2-acre commercial parcel immediately to the north of the WTC Site that would be the location of an office building completed in 1983.

Construction on the WTC Site began in 1966. As part of the construction process, a slurry wall was constructed around the area of the site west of the Metropolitan Transportation Authority/New York City Transit (MTA/NYCT) No. 1/9 subway line and the area was excavated to bedrock, lined with concrete to seal the four sides and bottom, creating a structural "bathtub" for the Twin Towers, two 110-story buildings that rose over 1,350 feet and were then the tallest buildings in the world. Occupancy of the Twin Towers began in December 1970 at the North Tower, One World Trade Center (1 WTC, or Tower One) and in April 1972 at

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the South Tower, Two World Trade Center (2 WTC, or Tower Two). The roof of 1 WTC also had an approximately 350-foot mast supporting television and FM radio antennae for major public and private broadcasters in New York City.

The WTC Site included Four and Five World Trade Center (4 and 5 WTC), both of which were nine-story buildings; the eight-story U.S. Customs House (6 WTC); and a 22-story hotel (3 WTC), all of which surrounded the Austin J. Tobin Plaza (the Plaza). Directly below the Plaza was the Concourse, a retail mall and transportation hub that provided pedestrian connections to the PATH trains to New Jersey and seven subway lines operated by MTA/NYCT. There were six below-grade floors, which included parking for 2,000 cars, a system of freight servicing and loading, 500,000 square feet of tenant storage, and significant infrastructure and utilities supporting the operation of the WTC's buildings and transportation facilities, including PATH. The six below-grade floor slabs also provided critical lateral stability for the slurry wall of the bathtub.

Pursuant to an agreement between the Port Authority and New York State's Battery Park City Authority (BPCA), a pedestrian bridge was built connecting the northern part of the WTC Site with the World Financial Center west of the WTC. The *WTC* complex included Seven World Trade Center (7 WTC) to the north of the WTC Site, a 47-story office building completed by Silverstein Properties in 1987 over two Consolidated Edison Company of New York, Inc. (Con Edison) electrical substations, and a *connecting* pedestrian bridge over Vesey Street.

In July 2001, the Port Authority entered into long-term leases for the office, and related space at the WTC Site—not including the hotel at 3 WTC or the U.S. Customs House at 6 WTC—with affiliates of Silverstein Properties and for existing and future retail spaces at the WTC Site with affiliates of Westfield America (collectively, together with their successors, the Net Lessees).

PURPOSE AND NEED FOR THE PROPOSED ACTION

This *FGEIS* evaluates the purpose, need, benefits, and environmental impacts of the Proposed Action. The effects of the terrorist attacks were felt throughout the region and the country, leading to an outpouring of support for recovery efforts. In the aftermath of the attacks, the Twin Towers became a symbol of antiterrorist resolve. A widespread sentiment arose in the city, the state, and the nation for a rebuilding effort to restore the iconic center of Lower Manhattan's Financial District, and to honor those who died there on September 11, 2001 and on February 26, 1993. Efforts to rebuild the physical, financial, and emotional health of the nation and of Lower Manhattan continue to this day.

The impact caused by the disaster resulted in an overwhelming response from federal, state, and city agencies, and from individuals throughout the country volunteering time, money, and resources to the rebuilding process. President George W. Bush declared Lower Manhattan a national disaster area, and \$21 billion dollars was appropriated by the United States Congress to various government agencies to aid in the repair, restoration, and recovery efforts. Federal, state, and local government initiatives have since been established to provide financial assistance to Lower Manhattan, and policy initiatives such as the New York Liberty Bond Program have been enacted to assist in the financing of rebuilding and revitalization efforts. LMDC was allocated two grants totaling \$2.783 billion that are administered through HUD's Community Development Block Grant program.

The need for reflection and emotional healing was also of paramount importance in the wake of the September 11 attacks. Victims' families, survivors, rescue workers, and other affected

individuals called for a permanent Memorial. On March 11, 2002, six months after the attacks on the WTC, LMDC, the Port Authority, and New York City established the interim memorial in Battery Park. And a temporary one-month memorial in lights, "Tribute in Light," was installed in BPC near Site 26.

A permanent Memorial will be created at the WTC Site to ensure that future generations never forget the people who died on September 11 in New York City, in Shanksville, Pennsylvania, and at the Pentagon, as well as those who died in the terrorist bombing at the WTC on February 26, 1993. *Last year, LMDC conducted the WTC Site Memorial Competition that concluded in January 2004 with the competition jury's selection of the preferred Memorial design concept.*

The rebuilding of the WTC Site as a mixed-use center of commerce, public space, and culture with a Memorial at its heart is the culmination of a two-year public dialogue. In addition to fulfilling the public purpose that evolved out of the events of September 11, the principles for rebuilding advance the goals of the UDC Act, the objectives of the LMDC, the mission of the Port Authority, and the goals articulated by the Governor and the Mayor: to remember and honor the victims of the terrorist attacks while revitalizing Lower Manhattan. Meeting the immediate need for physical, financial, and emotional recovery efforts following the attacks on September 11, 2001, is the principal purpose of development of the Proposed Action.

PLANNING FOR DEVELOPMENT

PRINCIPLES FOR REBUILDING

After an initial widespread public outreach campaign, LMDC released its *Principles and Preliminary Blueprint for the Future of Lower Manhattan (Blueprint)* on April 9, 2002. This draft document presented planning concepts for a memorial setting, traffic and transportation improvements, commercial and residential development, open space, and other principles to be considered in the formulation of a plan for the redevelopment of the WTC Site and surrounding area. LMDC and the Port Authority held a joint public hearing on the *Blueprint* on May 23, 2002, after considerable public outreach and distribution of the document. Over 1,000 people attended the public hearing, and comments were incorporated into a *Revised Blueprint* issued on June 5, 2002.

The principles of the *Revised Blueprint* emphasize the importance of the revitalization of Lower Manhattan and the WTC Site, and the simultaneous preservation of the site as a place of remembrance and memorial. They call for the restoration of transit services and of the street grid, and the elimination of Route 9A as a barrier between the Financial District and BPC. Excellence and sustainability in new design and engineering (including "green building" technology) are also factors. Key principles of the *Revised Blueprint* also call for the revitalization and development of cultural facilities, retail/commercial opportunities, parks, historic resources, and residential spaces that will enhance and revive Lower Manhattan as a center of new financial, cultural, and community activity. As such, LMDC efforts are directed at more than physical construction projects, and the *Revised Blueprint* document guides agency policy decisions beyond the Memorial and redevelopment plans.

PRELIMINARY DESIGN CONCEPTS

The team of Beyer Blinder Belle Architects and Planners LLP and Parsons, Brinckerhoff, Quade and Douglas, Inc., was selected to conduct a study of options for the WTC Site, adjacent areas, and related transportation infrastructure. Guided by this study of options and by the *Revised*

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Blueprint principles, LMDC and the Port Authority released six initial concept plans to the public on July 16, 2002. Each of the six concept design plans included re-envisioned traffic and pedestrian patterns for the site and surrounding area, development of mixed-use retail and commercial space, and potential residential development south of Liberty Street. Each concept design included plans for Memorial sites, open space, and a significant skyline structure.

LMDC and the Port Authority conducted an extensive outreach program to solicit public comment on the six preliminary design concepts. On July 20 and July 22, 2002, the LMDC and Port Authority sponsored interactive town hall meetings to discuss the concepts. The meetings, part of a series entitled *Listening to the City*, were held at the Jacob Javits Center in Midtown Manhattan, and were attended by over 4,500 people representing a diverse demographic and geographic population. Through September 30, 2002, LMDC received, categorized, and summarized over 10,000 public comments on the preliminary design concepts submitted via email, at public hearings, through public comment brochures, and by letter. LMDC released a report on the process in October 2002 entitled *The Public Dialogue: Phase I*.

The general consensus of both the *Listening to the City* series and the over 1,000 additional public comments received by LMDC at an exhibit located at Federal Hall revealed dissatisfaction with the six proposals. The public made clear a firm desire to see the Memorial planning and site planning more closely linked, and to create a new 24-hour downtown that mixes commerce, culture, and residences for all income levels. Public response also called for bold, innovative architecture that would restore the iconography of the lost skyline; re-establishment of the street grid, better pedestrian connections across Route 9A (between BPC and points east); creation of an interconnected transportation hub; a reduction of commercial density on the site; potential for cultural/civic facilities; and open space. These common ideas and elements informed the next phase of planning for development.

INNOVATIVE DESIGN STUDY

In response to public sentiment, LMDC initiated an Innovative Design Study for the WTC Site through a Request for Qualifications for Innovative Designs for the World Trade Center issued in August 2002. To guide the design teams selected, LMDC synthesized the public input from the outreach campaign in a program document entitled *A Vision for Lower Manhattan: Context and Program for the Innovative Design Study (Vision for Lower Manhattan)*. The program called for, among other elements, an appropriate setting for a memorial, a bold new skyline to rise in Lower Manhattan, better-connected Downtown *neighborhoods*, and a range of uses.

Through an open and competitive process, seven design teams were ultimately invited to participate: Foster and Partners; Meier Eisenman Gwathmey Holl; Petersen/Littenberg; Skidmore, Owings and Merrill Team; United Architects; Studio Daniel Libeskind; and the THINK team led by Rafael Viñoly and Frederick Schwartz.

Nine designs by the teams were presented to the public in December 2002. Each of the nine designs featured a combination of commercial space, public space, and cultural facilities. Each design also included Memorial areas that incorporated the footprints of the Twin Towers and each contained one or more towers of significant height to restore the skyline.

PLANS IN PROGRESS

In coordination with the release of the nine designs to the public, LMDC launched *Plans in Progress*, one of the most ambitious public outreach campaigns ever undertaken. *Plans in Progress* included multiple ways for the public to view and comment on the nine design

concepts, including the internet, several public hearings and a major exhibition at the Winter Garden in BPC that drew over 100,000 people. *LMDC utilized extensive print, mail, electronic, and direct distribution methods to publicize the hearings and solicit comment. LMDC conducted briefings on the nine design concepts with LMDC Advisory Councils, including residents, victims' families, and members of civic organizations and environmental conservation and historic preservation groups, and LMDC sent a mailing with Plans in Progress campaign and input information to more than 3,000 families of victims (including the 1993 families) and to every city, state, and federal elected official in New York State. LMDC also invited public comment through its website and through email, fax, and regular mail. LMDC staff reviewed in detail the over 13,000 public comments solicited through Plans in Progress. Results of the public outreach campaign were published by LMDC in March 2003 in a document entitled The Public Dialogue: Innovative Design Study.*

SELECTION OF THE MEMORIAL AND REDEVELOPMENT PLAN

LMDC and the Port Authority evaluated each of the nine designs against a series of quantitative and qualitative factors, including the comprehensive record of public comment. LMDC and the Port Authority also conducted an extensive feasibility analysis of each design. The agencies based the evaluation on numerous factors:

- *Memorial Setting*: How well does the plan provide an appropriate Memorial setting?
- *Program*: How well does the plan meet the program requirements outlined in the RFQ?
- *Parcels/Street Pattern*: How well does the plan establish practical street, block, and development parcels?
- *Public Response*: What was the public response to the plan?
- *Vision*: How well does the plan support Mayor Bloomberg's *Vision for a 21st Century Lower Manhattan*?
- *Connectivity*: How well does the plan connect with its surroundings?
- *Phasing*: Does the plan allow for phased development over time?
- *Public Realm*: How effective is the addition to the public realm?
- *Private Development*: Does the plan provide an attractive environment for private development?
- *Irresolvable Issues*: Are there components that are irresolvable?
- *Resolvable Issues*: How significant are the issues that can be resolved?
- *Cost*: What is the estimated cost of publicly funded elements of the plan?

Although all of the designs had positive elements, LMDC and the Port Authority determined that two of the design concepts best satisfied the selection criteria—Studio Daniel Libeskind's Memory Foundations and the THINK team's World Cultural Center.

The Memory Foundations plan, submitted by Studio Daniel Libeskind, would preserve and reveal the slurry walls of the bathtub of the WTC Site as a symbol and physical embodiment of the resilience of withstanding the attacks of September 11. The tallest building in the world would rise 1,776 feet in the air *on the northwest corner*, and four other commercial towers would encircle the Memorial setting in a descending spiral. New cultural facilities and a performing arts center would be sited directly around the Memorial. At street level, Memory Foundations would create a lively public realm by restoring Greenwich and Fulton Streets with a continuous street wall and at-grade retail shops and restaurants. In the east, Wedge of Light Plaza would create a plaza along Fulton Street from the St. Paul's churchyard to the entrance to

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September 11 Place. Fulton Street would be extended west and create another major new open space.

The World Cultural Center design submitted by the THINK team (Ban, Schwartz, Smith, Vinoly) centered around two open-lattice towers built around the footprints of the former towers. A memorial would be located at the top of the latticework, with other cultural uses including a museum and performing arts center below. A series of pedestrian bridges would cross through the site, intersect at the heart of the two towers, and extend across Route 9A to BPC. Commercial development would take place in office towers surrounding the memorial site. Fulton and Greenwich Streets would be extended for pedestrian and vehicular traffic.

Public sentiment concurred with the selection of these two designs. Ninety-two percent of the public comments received by LMDC gave Memory Foundations a positive rating. Popular elements of the design included the approach to restoring the skyline, and the use of the slurry wall and bathtub area for the Memorial. There was favorable response to the open space and parks, particularly Wedge of Light Plaza. Ninety percent of the comments received were also favorable toward the THINK World Cultural Center. Many responded favorably to the approach to restoring the skyline and the inclusion of cultural and civic facilities. There was positive interest in the memorial context and setting, though some concern about its feasibility.

Based on further refinements and evaluation by the LMDC, the Port Authority, and other government officials, Governor Pataki and Mayor Bloomberg announced on February 27, 2003, that Studio Daniel Libeskind's *Memory Foundations* had been selected as the basis for the redevelopment plan. The selection team noted that the Memory Foundations design best reconciled the need to preserve the setting and remember those whose lives were lost with the need to rebuild what was lost and bring vitality back to the area.

LMDC, together with the Port Authority, entered into agreements with Studio Daniel Libeskind to refine of the design concept; to serve as the consultant architect for overall redevelopment of the WTC Site; and to develop design guidelines for future commercial development at the WTC Site in coordination with the Port Authority, LMDC, and the Net Lessees. LMDC also engaged Studio Daniel Libeskind to assist in site planning of the Memorial and the cultural components.

DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action *is* a comprehensive plan to redevelop the *Project Site*. The Proposed Action seeks to revive and enhance the financial stability of Manhattan's *downtown* Financial District and provide a thriving cultural and civic destination that will revitalize the heart of Lower Manhattan and New York City. The Proposed Action would also honor, commemorate, and remember the events of February 26, 1993, and September 11, 2001. The Proposed Action analyzed here is the refined *plan as of February 2004*.

PROJECT SITE

The Project Site includes the WTC Site and the *Southern Site*. The WTC Site is an approximately 16-acre parcel bounded by Liberty, Church, and Vesey Streets, and Route 9A. The Project Site does not include the portion of the WTC Site *to be* occupied by the permanent WTC PATH Terminal.

The Southern Site comprises two adjacent blocks south of the WTC Site—one bounded by Liberty, Washington, Albany, and Greenwich Streets, and the other bounded by Liberty, Cedar,

and Washington Streets and Route 9A—and portions of two streets: Liberty Street between those blocks and the WTC Site and Washington Street between Cedar and Liberty Streets.

BUILDING PROGRAM

The Proposed Action would provide for the construction on the Project Site of a Memorial, Memorial Center and cultural facilities, up to 10 million square feet of above-grade Class A office space, plus associated storage, mechanical, loading, below-grade parking, and other non-office space, up to 1 million square feet of retail space, a hotel with up to 800 rooms and up to 150,000 square feet of conference space, open space areas, and certain infrastructure improvements described in more detail below. While this is the maximum development program for each of the components, the combined total of the retail and hotel facilities would not exceed 1.6 million square feet.

SITE PLAN

The proposed street configuration would divide the WTC Site into four quadrants of unequal size (see Figures S-5 and S-6). Specifically, Fulton Street would run east-west through the WTC Site, and Greenwich Street would run north-south through the WTC Site. The Memorial, *the Memorial Center*, and cultural buildings would occupy the southwest quadrant, where the Twin Towers stood. At the northwest corner of the WTC Site would be the tallest structure in the complex, Freedom Tower. The four other proposed towers would descend in height clockwise to the fifth tower on the Southern Site.

This fifth tower would have ground-floor retail and be located on the south end of the Southern Site between Cedar and Albany Streets. The Southern Site would be reconfigured to open Cedar Street between Greenwich and Washington Streets and close Washington Street between Liberty and Cedar Streets. This would allow the creation of a single large open space on the new block south of Liberty Street as well as the tower site. St. Nicholas Greek Orthodox Church would *be reconstructed* in the open space not far from its location on September 10, 2001.

The Proposed Action also provides for infrastructure and utilities to support the operations of the Project Site as a whole, including below-grade freight servicing and loading, a below-grade bus parking garage serving the Memorial, *rentable storage, below-grade chiller and fan plants*, a parking garage for building tenants and safety and security-related facilities. The bus parking may be underground on the Southern Site, on the *eastern portion of the WTC Site*.

LMDC and the Port Authority, in cooperation with the city and Silverstein Properties, are developing design guidelines for the commercial structures and open space that would be built as part of the Proposed Action.

VEHICULAR ENTRANCES AND CIRCULATION

By *extending* two streets through the WTC Site, the Proposed Action would restore vehicular access both from north to south and from east to west. Traffic would flow south on West Broadway and Greenwich Street from Tribeca to the area south of Liberty Street. Vehicular traffic would flow west on Fulton Street. These streets may be restricted or closed from time to time.

On the Southern Site, traffic would flow west on Cedar Street. With Washington Street eliminated north of Cedar Street, vehicles traveling north on Washington Street would turn left on Cedar Street to Route 9A.

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Tour buses would be allowed to stop to discharge and pick up passengers along the west side of Greenwich Street in the WTC Site. Buses (without their passengers) would then proceed south on Greenwich Street, and turn right (west) on *Cedar Street* and right (north) on Route 9A and from there turn right into a ramp on Liberty Street on the WTC Site.

Trucks would enter the below-grade service levels of the site via the Liberty Street ramp. Automobiles *belonging to building tenants* would be allowed to enter and exit the WTC Site via a ramp on the south side of Vesey Street (at Washington Street). *All vehicle types* could exit the on-site service and parking areas via the *Liberty or Vesey Street ramps* or via an exit *ramp* onto the *northbound Route 9A median*.

QUADRANTS

The southwest quadrant would contain the approximately 4.87-acre Memorial based on the *"Reflecting Absence" concept (described on page S-16)*, an interpretive museum (the Memorial Center) relating the events of September 11 and containing some artifacts from the WTC Site, and other cultural institutions. *The Memorial design features two recessed pools of water that recognize the footprints of the former Twin Towers. Visitors would descend along ramps adjacent to the pools to approximately 30 feet below grade, where victims' names would be inscribed.* The Memorial would also preserve and provide access to a portion of the exposed slurry wall on the west side of the WTC Site and box-beam column bases at the lowest level of the structural bathtub. The main entrance to the Memorial would be from September 11 Place, a paved civic plaza at the southwest corner of Fulton and Greenwich Streets. Pedestrian access would also be provided at other locations on Greenwich, Fulton, and Liberty Streets.

The northwest quadrant would be the location of Freedom Tower and the performing arts center. Freedom Tower would be the visual landmark of the Proposed Action in New York City's skyline. It would have approximately 70 floors of office, mechanical, and functional space. A viewing platform would be located atop the building and above that would be a broadcast tower at 1,776 feet. Current plans *call for the top of the structure to contain wind turbines, which would generate electricity to meet a portion of the building's energy demands.* The proposed performing arts center would be located east of Freedom Tower.

The northeast quadrant would be the location of an office building. Tower 2 would have approximately 65 floors of offices, and its lobby would open onto both Fulton and Vesey Streets. Retail use in the base of Tower 2 may be an anchor tenant. For purposes of this analysis a hotel approximately 25 stories tall *with up to 800 rooms* would also *be located in the northeast quadrant.* It would provide meeting rooms and function space, and its lobby *entrance* would be at the corner of Greenwich and Fulton Streets. The northern portion of Wedge of Light Plaza would be located along the southern (Fulton Street) edge of this quadrant.

The southeast quadrant would contain the major portion of Wedge of Light Plaza, the entrance leading to both the permanent WTC PATH Terminal and the subway system, and two office towers (Towers 3 and 4). Wedge of Light Plaza would be widest at Church Street, to draw people into the site toward its active center at the intersection of Fulton and Greenwich Streets. It would help create a strong connection from the open space surrounding St. Paul's Chapel to September 11 Place *and the Memorial and cultural facilities*, and from there westward to Route 9A. It would be designed to be a lively space to accommodate a range of activities. *Tower 3, with 62 floors of offices above its retail base, would be separate from and to the south of the*

permanent WTC PATH Terminal building, allowing the Dey Street view corridor to extend between Church and Greenwich Streets. Tower 4, with 58 office floors above a retail base, would be located south of Cortlandt Way.

SOUTHERN SITE

On the Southern Site, Washington Street would be closed between Liberty and Cedar Streets to create Liberty Park, a large rectangular open space between Route 9A and Greenwich Street. St. Nicholas Greek Orthodox Church would be reconstructed in *the park*. Tower 5 would be built south of the reconstructed segment of Cedar Street and overlook *Liberty Park*. It would have approximately 57 floors of office space and ground floor retail. Its lobby *entrance* would be on Cedar Street.

The Proposed Action would require the deconstruction of the damaged building at 130 Liberty Street on the Southern Site. The building was exposed to dust and debris as a result of the events of September 11. Therefore, prior to deconstruction and removal, material in the building would be tested and cleaned.

BELOW GRADE

The Proposed Action would *expand* the existing bathtub south to include the entire Southern Site. A new bathtub would be excavated on the east side of the WTC Site to allow more below-grade levels of development in that location.

Beneath the office towers and plazas and except in the Memorial area, the Proposed Action would provide for retail uses on two below-grade concourse levels. Retail uses would enliven the pedestrian *connection* linking the permanent WTC PATH Terminal to the World Financial Center in BPC on the west and the subway system on Church Street, and would provide connections to street-level retail and pedestrian activities.

Beneath the concourse levels would be two service levels above the bedrock. The upper service level would be adjacent to the PATH mezzanine, while the lower level would be adjacent to the PATH tracks and platforms. There would also be loading facilities (docks, stalls, and bins) for trucks on the mezzanine level beneath the new office towers. Parking for buses would be provided below grade at the Southern Site or at the WTC Site itself. Parking for 1,200 to 1,400 cars belonging to building tenants would also be provided below grade. No parking is contemplated in the area of the site below the Memorial.

As part of the infrastructure for the Proposed *Action* an existing Hudson River pump station below grade in BPC would be reactivated *to provide chilled water for air conditioning purposes, reducing the Proposed Action's reliance on potable water from New York City.*

SITE DESIGN/DESIGN GUIDELINES

Commercial Design Guidelines for the Proposed Action is being prepared by LMDC and Port Authority, in consultation with the City of New York and Silverstein Properties, to translate the vision of Memory Foundations into a set of principles and standards that *would* guide the design of the open spaces and commercial projects. These guidelines *would* establish a framework *for the development of the commercial and retail elements as well as the public open spaces, encouraging* designers to be creative in the design for each component while defining the essential elements that will ensure that each part of the *Proposed Action* contributes to the

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overall vision. *A definitive set of guidelines would be adopted and administered by LMDC and Port Authority with participation by the City following approval of the Proposed Action.*

TOWERS

The five towers would be organized in a three-dimensional spiral, culminating in Freedom Tower. Their orientation would emphasize the centrality of the Memorial space. When viewed from a distance, the towers would recall the dynamism of the Statue of Liberty, creating an association between what would become the two most prominent landmarks along the Hudson River. The towers would also incrementally increase in size, beginning with Tower 5 as the lowest and Tower 1 as the tallest. Consistency of the towers' design would be achieved by using a palette of compatible materials. Each tower would be subject to height and bulk limits and *would* be designed to maximize daylight to buildings and streets, *reinforce the streetwalls*, improve views from the upper stories, *strengthen the overall composition of buildings on the site*, and mitigate the wind effects at ground level.

SAFETY AND SECURITY

Although pedestrian traffic would dominate the ground level of the site, safe and efficient vehicle access and mobility is important for goods movement, emergency vehicles, buses, taxis and for-hire vehicles.

The Port Authority has adopted stringent criteria for vehicle security that all structures and spaces must meet. Vehicular approaches would be designed to include sufficient queuing space (to prevent back-ups). Vehicles arriving in the security screening area would be subjected to security procedures.

OPEN SPACE

Wedge of Light Plaza, PATH Plaza, and September 11 Place

Wedge of Light Plaza *and the PATH Plaza* would become the main civic open spaces of the new WTC. *They would be designed to bustle with the energy of those who pass through as well as be able to accommodate spontaneous and programmed public events. They would be plazas while at the same time part of the procession of spaces that would connect the Lower Manhattan business district to the Hudson River. Hard surfaces would predominate in Wedge of Light Plaza, while the PATH Plaza would introduce landscape planting and seating, where appropriate. September 11 Place, which would be largely paved, would serve as the primary gateway to the Memorial as well as a setting for the cultural complex.*

Liberty Park

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

STREETSCAPE

The streetscape would employ unified landscaping, paving, lighting, and furnishings to create a distinctive appearance across the *Project Site and define its boundaries, while relating to the*

Memorial design and the urban fabric of Lower Manhattan. Where appropriate, trees *would* be introduced to create green corridors. Street edges *would* be created that are both visually and physically porous, while respecting the security needs. Fulton Street *would* be developed as a linked series of public open spaces, not as a conventional streetscape. Significant urban vistas *would* be framed through the orientation of streets, buildings, and landscape elements. Visible and convenient connections would be provided between the street and transit concourses below grade. *Strategies would* be developed that meet the criteria for security, but do not impede the movement of pedestrians and the visual continuity of trees, lighting, and furnishings.

RETAIL

Retail spaces, which would be located at the underground concourses and above ground at the bases of buildings, would be integrated with the overall *plan*. Below-grade storefronts *would* be primarily of glass and metal. Storefront walls would be sleek and minimalist. Stone facades may be used on corners or at the ends of concourses. Above-grade storefronts would be integrated with the design of the individual buildings in which they are located. The designs may vary, but would include clear glass glazing. *Preferably*, there would be *some* consistency between the below-grade and above-grade proportions, materials, and details. Stone or metal panels are allowed in certain areas. All retail signage would be located behind the storefront. Retail uses may also extend to kiosks, temporary structures, and movable carts in specified locations.

SUSTAINABLE DESIGN GUIDELINES

LMDC and the Port Authority intend to achieve improved environmental and sustainable attributes in the design, construction, and operation of the Proposed Action. One of the methods identified is the adoption and implementation of the Sustainable Design Guidelines for the WTC commercial and open spaces. The Sustainable Design Guidelines identify and describe the environmental and sustainable attributes for the commercial buildings and structures of the Proposed Action. (The current draft is included as Appendix A.) The Memorial and cultural buildings would also meet appropriate sustainability measures in their design, construction, and operation.

Developed in conjunction with the LMDC, Port Authority and Silverstein Properties, the *Sustainable Design Guidelines* go beyond the other comparable guidelines, which tend to be focused on only a specific building or project. At the WTC, issues of regional and neighborhood scale (e.g., regional transportation systems and relationships to each individual building) necessitate strategies and guidelines that go beyond addressing only one particular building type. At their broadest level, the *Sustainable Design Guidelines* address issues of regional and neighborhood scale, such as regional transportation systems and the Proposed Action's interface with surrounding neighborhoods. *In following the guidelines, developers would achieve eligibility for LEED certification at a minimum, and strive for certification at the "silver" level.*

COMPLETION DATES

It is anticipated that the Proposed Action would be constructed in several phases. The first phase, scheduled for completion by 2009, would include the Memorial, *the Memorial Center*, and cultural buildings, the below-grade levels across the Project Site, Freedom Tower, up to 1 million square feet of retail, streets, and all the proposed open space. Remaining phases, principally the additional office towers and hotel, are expected to be completed by 2015.

MEMORIAL MISSION STATEMENT, PROGRAM, AND DESIGN

Just as public input and participation informed the selection of Memory Foundations to provide a setting for the WTC Memorial and to guide redevelopment at the WTC Site, the search for a Memorial design has been the subject of extensive public dialogue. In June 2002 the LMDC Families Advisory Council began the process of creating a draft Memorial Mission Statement and Program for the WTC Memorial. LMDC solicited extensive public comment on the draft Memorial Mission Statement and the draft Memorial Program elements, launching an aggressive public outreach campaign (*Plans in Progress*) to solicit public input. A wide range of views were expressed, which helped shape the final Memorial Program guiding principles.

In April 2003, the final Memorial Mission Statement and Memorial Program were both adapted. The Mission Statement is as follows:

Remember and honor the thousands of innocent men, women, and children murdered by terrorists in the horrific attacks of February 26, 1993, and September 11, 2001.

Respect this place made sacred through tragic loss.

Recognize the endurance of those who survived, the courage of those who risked their lives to save others, and the compassion of all who supported us in our darkest hours.

May the lives remembered, the deeds recognized, and the spirit reawakened be eternal beacons, which reaffirm respect for life, strengthen our resolve to preserve freedom, and inspire an end to hatred, ignorance, and intolerance.

The Memorial design was the subject of an international competition judged by a distinguished jury. In November 2003, eight finalists were selected to proceed and further develop their Memorial design concepts. Their designs—Votives in Suspension, Lower Waters, Passages of Light: the Memorial Cloud, Suspending Memory, Garden of Lights, Reflecting Absence, Dual Memory, and Inversion of Light—were placed on public exhibit in the Winter Garden at the World Financial Center starting on November 17. The eight design concepts are described in detail in Chapter 1, “Project Description.”

On January 6, 2003, LMDC announced that the Memorial Competition jury had selected Michael Arad and Peter Walker’s Memorial design concept, “Reflecting Absence.” *The Memorial plaza would have clusters of trees and attractive landscaping at street level, to encourage its integration into the urban fabric of Lower Manhattan. Amidst this surface would be two large “voids,” occupied by pools of water, recognizing the footprints of the absent towers. These pools, recessed approximately 30 feet below grade, would be circumscribed by curtains of water falling from the plaza level. Descending into the corridors surrounding either pool, visitors would find a wall inscribed with the names of the victims of the attacks of September 11, 2001, and February 26, 1993. A chamber for public remembrance would connect these corridors.*

Visitors would be given access to a portion of the western slurry wall and box beam column bases at the lowest level of the structural bathtub. A room for unidentified remains, located below the northern void, would incorporate a large opening to allow daylight to enter. The

Memorial Center, to the west of the southern void, would house preserved artifacts from the attacks.

SAFETY AND SECURITY

Safety and security considerations are assessed in relation to the design, construction, and operation of the Proposed Action and safety procedures to be implemented during the project's construction and operation. The Proposed Action would feature advanced safety and security procedures to protect visitors, tenants, passengers, workers and the community.

The Proposed Action would promote security upgrades and improved safety. An objective of the Proposed Action is to create a safe and secure urban site, exceeding the criteria set forth by applicable building codes and safety regulations. A number of features would be included in the design to enhance and maximize the safety and security systems and procedures at the Project Site. The goal in safety and security design is to anticipate program failures and emergency conditions, and to support preparedness through response plans and systems. Safety and security design elements present in the reconstruction of 7 WTC would be incorporated throughout the Project Site. The planning and design for the Project Site would form a security and protection plan to promote safe and secure development, occupancy and participation in a variety of uses planned for the Project Site.

OTHER LOWER MANHATTAN RECOVERY PROJECTS

Additional recovery projects are already under way in Lower Manhattan. Governor Pataki's Immediate Action Plan is aimed at improving accessibility in and around Lower Manhattan, and enhancing the quality of life in the area. Construction of the 7 WTC replacement building began by Silverstein Properties in the spring of 2002 and is expected to be completed in 2005. The Port Authority is planning for a permanent WTC PATH Terminal that would restore full PATH operations to the WTC Site (construction on the terminal is expected to begin in 2004/5). Other projects currently under consideration are Route 9A Reconstruction, the Fulton Street Transit Center, and the South Ferry Terminal Subway Station. *LMDC is exploring various major public transit initiatives, such as ferry service linking Lower Manhattan, Midtown, Yonkers, and Haverstraw, as well as rail access from Lower Manhattan to the airports.* These projects are independent of the Proposed Action and will undergo separate environmental reviews by the appropriate agencies.

ALTERNATIVES TO THE PROPOSED ACTION

Throughout the process of planning for development, public desire for the inclusion of certain program and design elements has been well documented. Alternatives to the Proposed Action are described and analyzed below in "Alternatives."

AGENCY ACTIONS AND APPROVALS

The Proposed Action may require or involve, among others, the following regulatory agency notifications, actions, permits and/or approvals:

FEDERAL

- Advisory Council on Historic Preservation (ACHP)—review under Section 106 of National Historic Preservation Act

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- Department of Housing and Urban Development (HUD)—funding and action plan approval
- Department of Transportation, Federal Aviation Authority (FAA)—review of building heights
- Department of Transportation, Federal Transit Administration (FTA)—possible funding and appropriate related reviews and approvals
- Department of Transportation, Federal Highway Administration (FHWA)—possible approval of bus tunnel and truck access ramps
- Federal Emergency Management Agency (FEMA)—possible funding approval
- Federal Communications Commission (FCC)—licensing of broadcast antenna

BI-STATE

- Port Authority of New York and New Jersey (Port Authority)—plan approval and implementation; possible acquisition of Southern Site

STATE

- Lower Manhattan Development Corporation (LMDC)—general project plan approval and implementation; possible acquisition of the Southern Site; Coastal Zone Consistency Determination
- Empire State Development Corporation (ESDC)—possible acquisition of the Southern Site
- Office of Parks Recreation and Historic Preservation (OPRHP)—possible review pursuant to National Historic Preservation Act and State Historic Preservation Act
- Department of State (NYSDOS)—*Coastal Zone Consistency determination for federal activities; Coastal Zone Consistency review for certain state actions*
- Department of Environmental Conservation (NYSDEC)—possible stationary source and indirect source air permits; possible Phase II stormwater permit, State Pollutant Discharge Elimination System permit; possible protection of waters and tidal wetlands permits and water quality certifications
- Department of Transportation (NYSDOT)—possible approvals for pedestrian passageway and appropriate related transportation approvals (with the New York Metropolitan Transportation Council)

NEW YORK CITY

- New York City Planning Commission—Coastal Zone Consistency review
- New York City Department of Transportation—review of possible signage, street signal timing and street direction changes

In addition, the inclusion of some or all of the *Southern Site* in the Proposed Action may require agreement, approval, or consent of the City of New York.

D. METHODOLOGY

This GEIS has been prepared pursuant to NEPA, 42 USC Section 4321 et seq., and SEQRA, New York State Environmental Conservation Law, Section 8-0101 et seq., and their implementing regulations, to assist decision-makers in evaluating the environmental consequences of the Proposed Action and its alternatives, and to identify feasible measures to mitigate any significant environmental impacts.

The methodology for the analysis in each substantive review area is consistent with federal and state statutory and regulatory requirements and guidelines, which are identified in each chapter as applicable. Although the Proposed Action is not subject to City Environmental Quality Review (CEQR), certain analyses are guided by the methodologies set forth in the 2001 CEQR Technical Manual where appropriate, as it is useful guidance for the assessment of impacts in certain review areas for projects located in New York City.

FRAMEWORK FOR ANALYSIS

In the case of the Proposed Action, because of the unique historical circumstances, the complexity of the planning context, and the scale of the project, the GEIS presents a range of potential conditions, thereby providing a framework for depicting a full consideration of impacts associated with the Proposed Action and its alternatives. Two reference conditions without the Proposed Action will be established: one begins with the Project Site in its current condition, while the other is based on the previous development that existed on the Project Site before September 11, 2001, as discussed below.

CURRENT CONDITIONS SCENARIO

The first scenario will start with conditions in 2003 (Current Conditions Scenario), with the Project Site in its post-September 11 excavated, cleared, or vacant state—i.e., the WTC Site vacant except for temporary WTC PATH station and the No. 1/9 IRT subway lines; 140 Liberty Street site and 155 Cedar Street cleared and the 130 Liberty Street building and plaza standing vacant—and then modify the baseline to forecast a profile of the future analysis years of 2009 and 2015. This scenario will account for anticipated construction and public initiatives in the larger study area along with background growth trends to depict a “future without the Proposed Action—Current Conditions Scenario” in which other expected development activity moves forward, but the Project Site remains in its current state. The other development activity considered here would include not only specific office, residential, institutional, and retail development, but also expected transportation improvements, such as the Fulton Street Transit Center, the permanent WTC PATH Terminal, and reconstruction of Route 9A in the vicinity of the WTC Site and south to Battery Park. This framework will then form the basis for adding the overlay of development and activity associated with the Proposed Action and formulating a depiction of the “future with the Proposed Action.” This redevelopment condition would incorporate the specific building envelopes of the design framework of the Proposed Action.

PRE-SEPTEMBER 11 SCENARIO

The second scenario reflects a reasonable depiction of conditions that would have been expected in the study area absent the events of September 11 (Pre-September 11 Scenario). It accounts for the development and activity that were present on the Project Site prior to September 11, 2001, and then adjusts that baseline to account for projects that had been initiated at that time and would likely have been completed by the 2009 and 2015 analysis years (“future without the

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Proposed Action—Pre-September 11 Scenario”). *In most cases*, this Pre-September 11 Scenario of the future without the Proposed Action is a benchmark against which expected impacts of the Proposed Action are assessed. That is, impacts are identified by comparing the future with the Proposed Action to the Pre-September 11 Scenario of the future without the Proposed Action.

TWO ANALYSIS YEARS

The analyses in the GEIS evaluate a variety of services and resources accounting for future conditions with and without the Proposed Action in two separate analysis years. The first analysis year, 2009, was chosen to represent a time frame in which the initial phases of the Proposed Action will have been completed. The second year, 2015, was chosen for environmental analysis purposes as the time when full build-out and occupancy of the Proposed Action are assumed.

In 2009, it is expected that the Memorial, *the Memorial Center*, and cultural facilities would be complete in the southwest quadrant of the WTC Site; Freedom Tower and the performing arts facility would be complete in the northwest quadrant; and on the northeast and southeast quadrants the retail uses would be complete (see Table S-1). The concourse levels across the WTC Site would have been developed as well as the two surface streets, Fulton and Greenwich Streets, and the open spaces. The below-grade bus parking and service facilities would be complete as well as the open space.

**Table S-1
Elements of Proposed Action Assumed to Be Completed by 2009**

Southwest Quadrant	
Memorial	212,200 square feet of open space (including tower voids)
Memorial Center	50,000 square feet ¹
Cultural	200,000-240,000 square feet
September 11 Place	12,562 square feet of open space (excluding cultural buildings)
Northwest Quadrant	
Freedom Tower	2.6 million square feet of office space (70 floors) 60,000 square feet of retail space: café (600 seats), restaurant (400 seats) 6,000 square-foot viewing deck (400-person capacity)
Performing Arts	Up to 2,200 seats
Northeast Quadrant	
Tower 2 Base	57,000 square feet of retail space (on three levels)
Wedge of Light Plaza (north of Fulton Street)	21,602 square feet of open space ²
Southeast Quadrant	
Tower 3 Base	126,000 square feet of retail space (on three levels)
Tower 4 Base	127,500 square feet of retail space (on three levels)
Wedge of Light Plaza (south of Fulton Street)	25,174 square feet of open space ²
PATH Plaza	30,545 square feet (including former bed of Dey Street)
Concourse Levels	
	Additional retail area, bringing total up to 1 million square feet; parking and security for automobiles; loading facilities to accommodate approximately 80 trucks; utilities; and possible bus garage if not on <i>Southern Site</i>
Southern Site	
Liberty Park	29,766 square feet of open space
Bus Parking Facility	Below-grade parking facility to accommodate 100 buses; below-grade security checkpoint for all trucks and buses
Notes: ¹ Analyses in the document reflect up to 140,000 square feet as a worst-case condition. ² Open space areas include sidewalks and streetscape. The permanent WTC PATH Terminal would also be completed by 2009.	

By 2015, it is expected that the full program for the WTC Site and the tower south of Liberty Street would be developed with the completion of the three towers on the east side of the WTC Site and the tower and retail on the Southern Site (see Table S-2).

**Table S-2
Elements of Proposed Action Assumed to Be Completed Between 2009 and 2015**

Northeast Quadrant	
Tower 2	2.2 million square feet of office space (65 floors)
Hotel	600,000 square feet (800+ rooms) and 150,000 square feet of function space
Southeast Quadrant	
Tower 3	1.9 million square feet of office space (62 floors)
Tower 4	1.7 million square feet of office space (58 floors)
Southern Site	
Tower 5	1.6 million square feet of office space and retail (57 floors)
St. Nichols Greek Orthodox Church	Approximately 5,000 square feet (to be rebuilt by church)

ASSESSMENT OF IMPACTS

The two analysis scenarios described above provide the necessary framework for full consideration of the impacts associated with the Proposed Action. This approach allows disclosure of the changes from both current and pre-September 11 conditions anticipated as result of the Proposed Action.

In most cases, the Pre-September 11 Scenario of the future without the Proposed Action is the benchmark against which expected impacts of the Proposed Action are assessed. That is, impacts are identified by comparing the future with the Proposed Action to the Pre-September 11 Scenario of the future without the Proposed Action. This represents a more appropriate baseline for assessing potential impacts than current conditions, which reflect the absence of long-established commercial and retail activity on the WTC Site, the Southern Site, and surrounding areas. It would be inappropriate to measure impacts on traffic and open space, for example, solely by reference to current conditions, when traffic has been reduced and diverted by street closures because of the events of September 11, and open space on the Project Site has been destroyed. On the other hand, for construction, hazardous materials, and historic resource assessments, current conditions are a more appropriate baseline for identifying impacts.

To identify adverse impacts from the Proposed Action, the future with the Proposed Action is generally compared with the Pre-September 11 Scenario of the future without the Proposed Action in both 2009 and 2015. To the extent practicable, mitigation will be considered with the objective of returning conditions to the levels that would have existed in that analysis year absent the events of September 11. To the extent practicable, further mitigation measures may also be formulated to address additional adverse impacts identified by comparison with the Current Conditions Scenario for those years. For those cases in which impacts are assessed by comparison to the Current Conditions Scenario of the future without the Proposed Action, mitigation measures are also formulated to address the identified impacts to the extent practicable.

CONSTRUCTION ANALYSIS PERIOD AND CUMULATIVE EFFECTS ANALYSIS

In addition to the construction on the Project Site, a number of major transportation infrastructure projects in Lower Manhattan may be under construction, including the Route 9A Promenade south of Albany Street to Battery Park, the permanent WTC PATH Terminal on the WTC Site, the Fulton Street Transit Center a block east of the WTC Site, the new South Ferry *subway* terminal near the southern tip of Manhattan, and the Route 9A bypass immediately adjacent to the WTC Site on the west.

As Lower Manhattan will be subject to several construction and rebuilding efforts over the next decade, the potential for cumulative construction effects warrants particular consideration. Such cumulative effects can result from the incremental effect of a given action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes such actions. The objective of a cumulative effects analysis is to identify and consider the combined effects of multiple actions that potentially would not be identified if each action and its associated impacts were evaluated in isolation.

This analysis of the potential cumulative effects of the Proposed Action and the above projects focuses on five areas of potential concern during the construction period that have been identified by and agreed to by LMDC and the various involved agencies: air quality, access and circulation, cultural resources, noise and vibration, and economic effects.

Other areas of potential cumulative effects during construction will also be reviewed as appropriate, including waste disposal, water quality, and neighborhood character.

OVERVIEW OF CUMULATIVE EFFECTS APPROACH

The cumulative construction period analysis includes the effects of those actions that overlap with the Proposed Action in time and space, that affect the same resource as those that may be affected by the Proposed Action, and that represent a change from conditions existing prior to September 11, 2001.

The cumulative effects analysis considers other projects that incrementally contribute to the cumulative effects on resources affected by the Proposed Action. Resource categories that are not affected by the Proposed Action, including those that may be affected by other projects and other actions that have cumulatively insignificant effects on resources potentially affected by the Proposed Action, are not evaluated.

The cumulative construction period analysis *is* conducted for the peak year (2006) of the combined construction activities of the major Lower Manhattan construction projects.

The conditions in 2006 *are* projected based on the Current Conditions Scenario. For impact analysis purposes, 2006 conditions with background growth and the construction of the major Lower Manhattan projects except the Proposed Action are compared against the same condition including the Proposed Action. The increment between these two conditions represents the cumulative construction effects of the Proposed Action on top of background growth and construction activity of the other major Lower Manhattan projects.

The potential impacts of the Proposed Action are added to those of the other projects, rather than assessing the effects of the Proposed Action without those of the other projects. This is a conservative approach, as it analyzes the combined effect on environmental conditions in Lower Manhattan resulting from the Proposed Action and the other projects.

The analysis presents both (1) the individual construction-period environmental impacts of the Proposed Action; and (2) the environmental conditions resulting from the combined impacts in 2006 of the Proposed Action and the other major Lower Manhattan projects discussed above. The analysis also presents existing environmental conditions in 2003 for traffic, air quality, noise, and other areas of environmental concern during the construction period. The difference between 2003 existing conditions and 2006 conditions with the Proposed Action and other major Lower Manhattan projects represents the cumulative impacts of all such Lower Manhattan projects, including the Proposed Action, in 2006. This is a highly conservative portrayal of such impacts because it not only assumes simultaneous construction activities on all five projects during the analysis periods, but takes no credit for any background growth in the area between 2003 and 2006.

Potential cumulative effects from the operation of the Proposed Action are considered in each of the subject matter chapters of this *FGEIS* by including the effects of other relevant projects in the future with the Proposed Action as described in such chapters.

BACKGROUND PROJECTS

CURRENT CONDITIONS SCENARIO

This scenario takes into consideration current conditions and development that is currently projected outside the Proposed Action. Some buildings in the immediate area are still vacant. Most are being repaired and restored, some to their previous uses and some to new uses. One is to be demolished. One is being reconstructed from new foundations up. The fate of another remains uncertain. However, elsewhere in Lower Manhattan—Battery Park City, south of Liberty Street, east of Broadway, north of City Hall and in Tribeca—development and redevelopment, some of it a continuation of trends that existed pre-September 11, and some of it spurred by government incentives, is evident. More specifically, there are a large number of residential projects, both new buildings and conversions, large and small, in construction or being planned in the primary and secondary study areas. Subareas in the primary and secondary study areas were designated to facilitate the land use analysis and are referenced throughout the GEIS.

PRE-SEPTEMBER 11 SCENARIO

The projects proposed for Lower Manhattan in the summer of 2001 are different from the projects currently proposed or in construction. In the first place, buildings damaged and vacated on September 11 were still occupied by their former use. For example, 90 West Street was a fully occupied office building; now it is a vacant structure being restored and redeveloped for residential use. Prior to September 11, 7 WTC was in its former configuration blocking Greenwich Street and having 1.9 million square feet of office space rather than being reconstructed west of Greenwich with only 1.6 million square feet of office space. In the second place, a number of sites, which were proposed for commercial use, are now expected to be residential. For example, the building at 270 Greenwich Street, a few blocks north of the WTC Site, was expected to be an office building; it is now expected to be a residential building. In another example, the construction of a new facility for the New York Stock Exchange was expected to demolish all but one of the structures on the block bounded by Wall, Broad, and William Streets and Exchange Place. Today it is likely that these structures will all become residential. There were also projects planned or in construction that have now been completed, such as the expansion of J&R Music World. The major projects that were generally known and expected prior to September 11, as well as the smaller projects that are likely to have occurred

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based on prevailing trends, have been accounted for as part of the impact analyses for the Proposed Action.

E. ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

E.1 LAND USE AND PUBLIC POLICY

The Proposed Action would not result in any significant adverse impacts to land use, land use trends, or public policy in the 2009 and 2015 analysis years.

PRE-SEPTEMBER 11 SCENARIO

The proposed developments would primarily replace many of the uses that existed before September 11, as well as add new cultural uses. These uses would be consistent with the uses that existed at the Project Site prior to September 11 as well as those land uses and public policies expected in the future in the surrounding area. The Proposed Action would also restore part of the street grid to reintegrate the WTC Site into the surrounding areas of Lower Manhattan and provide better east-west and north-south connections among the neighborhoods surrounding the WTC Site.

CURRENT CONDITIONS SCENARIO

The Proposed Action would transform a large, mostly vacant site into a mixed-use center of cultural, commercial, and open space uses. The Proposed Action would remove the post-disaster blighted conditions that currently exist at the Project Site, creating a critical mass of mixed-use development that would help to restore Lower Manhattan as a vibrant central business district that attracts and retains businesses, residents, and visitors. These new uses would be consistent with and supportive of the existing and future land uses in the surrounding Lower Manhattan business district, as well as those public policies established in response to the events of September 11.

E.2 URBAN DESIGN AND VISUAL RESOURCES

The Proposed Action would not result in any significant adverse impacts to urban design or visual resources in the 2009 and 2015 analysis years. On the contrary, the Proposed Action is expected to significantly enhance the area's urban design and visual characteristics.

PRE-SEPTEMBER 11 SCENARIO

2009

Compared with pre-September 11 conditions, the Proposed Action would create new open spaces that would enliven the Project Site and surrounding area. The WTC Site would be divided into four blocks that would integrate better with the urban design of the neighborhood, compared with the superblock that existed prior to September 11. With retail bases complete, there would be more retail frontage on sidewalks than prior to September 11. Freedom Tower would replace the Twin Towers in the skyline, and would reintroduce a modern structure that would be one of the tallest in the United States.

Fulton and Greenwich Streets would be extended through the WTC Site, creating new view corridors to the west and east and north and south, respectively. This would be beneficial to the neighborhood south of Liberty Street that was isolated by the superblock of the WTC and the

lack of view corridors through the WTC Site. These streets would also relate better to the street patterns, block shapes, and streetscape of the study area. The height and design of buildings in the Proposed Action is similar to the tradition of modern development on the WTC Site, the Southern Site, and the study area.

2015

In 2015, completion of the four other office towers would increase bulk along Church Street on the WTC Site and on the south end of the Southern Site. These towers would be in keeping with building uses, heights, and designs on the WTC Site and Southern Site prior to September 11 as well as buildings in the study area. These towers would block views across the WTC Site; however, these views were blocked by development on the Project Site prior to September 11. The extension of Greenwich and Fulton Streets through the WTC Site would introduce new view corridors to the study area that were blocked by the superblock of the WTC.

CURRENT CONDITIONS SCENARIO

2009

The Proposed Action would create new open spaces that would enliven the Project Site and surrounding area. The WTC Site would be divided into four blocks that would integrate better with the urban design of the neighborhood, compared with the present superblock. Retail frontage along the sidewalks would increase pedestrian traffic.

Fulton and Greenwich Streets would be extended through the WTC Site, creating new view corridors to the west and east and north and south, respectively. This would be beneficial to the neighborhood south of Liberty Street that is isolated by the superblock of the former WTC and the lack of view corridors through the WTC Site. These streets would also relate better to the street patterns, block shapes, and streetscape of the study area. The height of buildings in the Proposed Action would be similar to, and the design in keeping with, the tradition of modern development on the WTC Site, the Southern Site, and the study area.

2015

In 2015 completion of the four other office towers would increase bulk along Church Street on the WTC Site and on the south end of the Southern Site. The Proposed Action would be in keeping with the character of the Project Site and surrounding area, which were located in a densely developed urban setting. New office towers would be constructed on the Project Site that would reintroduce tall, modern structures to this portion of the skyline. These towers would be in keeping with building uses and heights in the former WTC as well as existing buildings in the study area. The reopening of Greenwich and Fulton Streets through the WTC Site would introduce new view corridors to the study area that are currently blocked by construction in and around the WTC Site.

E.3 HISTORIC RESOURCES

Potential effects to historic resources can include both direct physical effects and indirect contextual effects. Potential effects to archaeological resources could occur during excavation and below-grade construction activities in the area where construction and excavation for the Proposed Action would occur. To assess these potential effects, a study area—or Area of Potential Effect (APE) as it is also called—was defined as encompassing the Project Site itself and the area bounded by Murray and Spruce Streets to the north, Exchange Place and Joseph P.

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Ward Street to the south, Route 9A to the west, and Nassau and Broad Streets to the east; next, an inventory of historic and architectural resources located in the APE was compiled.

The Proposed Action would memorialize the tragic events of September 11 while returning the commercial, open space and other uses that existed on the Project Site on that date and reintroducing streets that pre-existed the WTC. The Memorial has been designed to reflect the former presence of the Twin Towers, and to provide access to portions of the west slurry wall and box-beam column bases outlining portions of the perimeters of the former Twin Towers. The Memorial Center would be a museum that would exhibit or incorporate significant artifacts from the former WTC.

Under either the Pre-September 11 or Current Conditions Scenario, the Proposed Action is not expected to have significant adverse impacts on historic resources on the Project Site—namely the WTC Site itself—or elsewhere in the APE. The Proposed Action would, however, have the potential to adversely affect some of the remaining remnants at the WTC Site. In implementing the Proposed Action, LMDC and the Port Authority would undertake appropriate efforts to avoid, minimize or mitigate any such adverse effects or any unexpected adverse effects on other historic resources. These efforts would include both the Environmental Performance Commitments described in Chapter 21, “Construction,” and the measures described in Chapter 22, “Mitigation,” and the Programmatic Agreement under consideration referred to below. Overall, the Proposed Action would serve to enhance the historic significance of the WTC Site and its role in the city’s and the nation’s consciousness.

PRE-SEPTEMBER 11 SCENARIO

2009

Archaeological Resources

All below-grade construction activities would have occurred by 2009, with the possible exception of the foundation of *Tower 5*. Therefore, this phase is analyzed for potential effects to archaeological resources. Construction of the former Twin Towers and associated excavations on the west side of the WTC Site to create the existing bathtub have limited the potential for significant archaeological resources to exist in this area. However, the north and south portions of the WTC Site east of the No. 1/9 IRT subway and portions of the Southern Site may be potentially sensitive for archaeological resources, *such as shaft features and wharf and/or cribbing features*. In order to identify any potential impacts to archaeological resources, Phase IB investigations are recommended in those areas.

Architectural Resources

In the Pre-September 11 Scenario, the SHPO had determined that the WTC was not eligible for listing on the National Register, and no other agency had identified any historic resource on the Project Site. Therefore, redevelopment would have no impact on historic resources on the Project Site.

The Proposed Action would shift the bulk of the buildings away from the footprints of the Twin Towers in the southwest quadrant of the site, altering views of adjacent historic resources to the north of the Project Site. Freedom Tower would rise immediately south of the Barclay-Vesey Building, blocking views of the structure from the southwest that were previously afforded by the lower-rise 6 WTC. Although the Proposed Action would in these respects shift the bulk of

development as compared with pre-September 11 conditions, this change would not be *an* adverse effect as the Project Site and immediate study area have historically been developed with tall and modern structures in close proximity to historic buildings.

The Proposed Action would benefit historic resources in the study area. Fulton Street and Greenwich Street would be extended through the WTC Site, restoring the street linkage between historic resources to the north and south of the WTC Site. The division of the WTC Site into four separate blocks at grade level would also allow the development to relate better to the neighboring historic resources.

Lower Manhattan, specifically the WTC Site, has historically been developed with technologically advanced buildings—such as the H&M Terminal and the Twin Towers—that were pioneering achievements at the time of their construction. The Proposed Action would continue this tradition of building evolution and design and would introduce a new and more modern skyscraper, Freedom Tower, to the Project Site and surrounding neighborhood.

On the other hand, the open spaces that would be part of the Proposed Action would also benefit certain historic resources. Liberty Park would greatly improve the setting of 90 West Street and the Beard Building. It would also generally improve the neighborhood for all the other historic resources south of the Project Site. Farther north on the WTC Site, Wedge of Light Plaza would link to St. Paul's Chapel and historic resources east of the WTC Site.

Due to the proximity of historic resources, adherence to Construction Protection Plans would be required to avoid potential construction period damage to architectural resources.

2015

The full development of the Proposed Action would further alter the Project Site. However, since there would have been no historic resources on the site, there would have been no impacts to *on-site* historic resources.

In addition to the impacts on off-site resources described in 2009, completion of the four other office towers would increase bulk along Church Street on the WTC Site and on the south end of the Southern Site. The proposed office tower and hotel on the northeast quadrant would face directly into the Federal Office Building/U.S. Post Office and block views of it from the southeast that were formerly afforded by the much lower 5 WTC building. The proposed office building south of the permanent WTC PATH Terminal entrance would tower over the former East River Savings Bank. Finally the tower at the southeast corner of the WTC Site would be taller and have greater bulk than 4 WTC, altering the context of the Beard Building and 114-118 Liberty Street. Again this change would not be *an* adverse effect as the study area has historically been developed with tall, modern structures among smaller-scale historic buildings.

In both 2009 and 2015, the increased traffic levels expected as a result of the Proposed Action would have some effect on the setting of historic resources, but not to a degree that they would be expected to constitute an adverse effect on historic resources, since those resources are already located in heavily trafficked areas.

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CURRENT CONDITIONS SCENARIO

2009

Archaeological Resources

All below-grade construction activities would have occurred by 2009, *except, possibly, the foundation of Tower 5*. Therefore, this phase is analyzed for potential effects to archaeological resources. As described above under the Pre-September 11 Scenario, the north and south portions of the WTC Site east of the No. 1/9 IRT subway and portions of the Southern Site may be potentially sensitive for archaeological resources, such as shaft features and wharf and/or cribbing features. In order to identify any potential impacts to archaeological resources, Phase IB investigations are recommended in those areas.

Architectural Resources

Based on the events of September 11, the WTC Site was found eligible for listing on the National Register. Although the eligibility of the WTC Site does not depend on existing remnants of the prior structures, the Proposed Action would have the potential to adversely affect some of the remaining remnants at the WTC Site. LMDC will consult with the SHPO, the Port Authority, and Silverstein Properties in order to minimize or mitigate such effects. LMDC is also considering a Programmatic Agreement with the SHPO and the Advisory Council on Historic Preservation (ACHP) that would address any potential adverse effects on historic resources and include additional consultation with the consulting parties who participated in the Section 106 process.

By 2009, Fulton Street and Greenwich Street would be extended through the WTC Site, restoring the street linkage between historic resources to the north and south of the WTC Site. This would be particularly beneficial to resources south of Liberty Street that are now isolated by the large construction site that remains on the WTC Site.

Although the Proposed Action would change the study area through the addition of tall and modern towers, this would not be an adverse effect. The Project Site and immediate study area have historically been developed with tall and modern structures in close proximity to low-rise and high-rise historic buildings. In addition, the Proposed Action would be in keeping with the character of the Project Site and surrounding area, which were located in a densely developed urban setting.

New office towers would be constructed on the Project Site that would re-introduce tall, modern structures to this portion of the Lower Manhattan skyline. The towers of the Proposed Action would block views across the now largely open WTC Site to historic resources on the other side. In particular, views of the Barclay-Vesey Building and the Federal Office Building/U.S. Post Office from Church and Liberty Streets, and from the Winter Garden to St. Paul's Chapel and the former East River Savings Bank would be blocked. Views from the corner of Vesey and Church Streets and along Church Street to the Beard Building and 90 West Street would be blocked. The Proposed Action would create a series of structures with retail frontage along the north and east sides of the WTC Site. Freedom Tower would rise immediately south of the Barclay-Vesey Building.

On the other hand, the open spaces that would be part of the Proposed Action would benefit certain historic resources. Liberty Park would greatly improve the setting of 90 West Street and the Beard Building. It would also generally improve the neighborhood for all the other historic

resources south of the Project Site. Farther north on the WTC Site, Wedge of Light Plaza would link to St. Paul's Chapel and historic resources east of the WTC Site.

Due to the proximity of historic resources, adherence to Construction Protection Plans would be required to avoid potential construction period damage to architectural resources.

2015

In addition to the impacts on off-site resources described in 2009, completion of the four other office towers would increase bulk along Church Street on the WTC Site and on the south end of the Southern Site. The proposed office tower and hotel on the northeast quadrant would face directly into the Federal Office Building/U.S. Post Office. The proposed office building south of the permanent WTC PATH Terminal entrance would tower over the former East River Savings Bank. Finally the tower at the southeast corner of the WTC Site would alter the context of the Beard Building and 114-118 Liberty Street. Overall, this change would not be an adverse effect, as the study area has historically been developed with tall, modern structures among smaller-scaled historic buildings.

In both 2009 and 2015, the increased traffic levels expected as a result of the Proposed Action would have some effect on the setting of historic resources, but not to a degree that they would constitute an adverse effect on historic resources, since those resources are already located in heavily trafficked areas.

E.4 OPEN SPACE

In the Pre-September 11 Scenario with the Proposed Action, open space ratios would decrease compared with conditions without the project. However, the accessibility, amenities, and comfortable human scale of 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 in 2009 or 2015. The Proposed Action also would not have a significant impact on pedestrian-level wind conditions.

The Proposed Action would return open space, as well as open space users, to the Project Site—including new workers and visitors to the Memorial, the *Memorial Center*, and the cultural facilities. Specifically, the Proposed Action would provide approximately 5.62 acres of open space on the Project Site, compared with the 7.41 acres available before September 11, 2001. *These 5.62 acres would include Liberty Park, Wedge of Light Plaza, PATH Plaza, September 11 Place, and the 2.87-acre publicly accessible open space of the Memorial (but not the two one-acre voids).* Approximately 43,900 daily workers would return to the Project Site plus an estimated 24,700 average daily visitors to the Memorial in the years following its opening and approximately 15,100 average daily visitors in later stabilized years. In addition, an estimated 3,600 average daily visitors would use other amenities, such as the museum, cultural facilities, and observation deck. These workers and visitors would create demand for passive open spaces within a short walk of the Project Site.

The *CEQR Technical Manual guidelines provide for* a minimum of 0.15 acres of passive open space per 1,000 workers and visitors, *and* 0.50 acres of passive open space per 1,000 residents. According to an analysis of the Proposed Action, comparing conditions with both the Pre-September 11 and Current Conditions Scenarios, passive open space ratios would *exceed these guidelines* for both residential and non-residential user populations, as described below.

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PRE-SEPTEMBER 11 SCENARIO

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, the analysis found that because the open spaces would be complete, but the development program would not, the Proposed Action would not change open space ratios in 2009. Therefore, no further consideration of qualitative conditions was required.

In 2015, the entire program would be complete and the anticipated worker and stabilized visitor population *would be* in place. *When examining the remaining amount of passive open space per 1,000 non-residents under the Pre-September 11 Scenario*, the Proposed Action would decrease the ratio of *passive* open space to a non-resident user population of 0.23 acres per 1,000 people to 0.22 acres per 1,000 people—a decrease of 6.25 percent.

However, comparing the proposed open spaces on the Project Site with those that would have been there in the future without the Proposed Action had the events of September 11 not occurred, it is clear that 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 across Fulton and Liberty Streets on major east-west pedestrian paths. In particular, Liberty *Park* would extend open space into the densely developed neighborhood south of the WTC, and would be large enough to host the concerts *and events* formerly held on the WTC Plaza. Wedge of Light *Plaza and PATH Plaza* would open to Church Street, creating an open space link from September 11 Place to St. Paul's Chapel.

In addition to their accessibility, the Proposed Action's open spaces would be designed specifically to be attractive, lively, and inviting. *Liberty Park, September 11 Place, the PATH Plaza, and Wedge of Light Plaza would provide passive open space throughout the Project Site.* The street levels of all buildings facing the open spaces and plazas would be lined with restaurants and shops. The spaces would have trees and other landscaping, benches and other seating, water features, and other amenities to create attractive places for workers, visitors, and residents to sit, eat, and enjoy the out-of-doors.

The Proposed Action would also include the creation of a 4.87-acre Memorial in memory of the events that took place on February 26, 1993 and September 11, 2001—2.87 acres of which would be publicly accessible passive open space. The Memorial would be located in a field of trees interrupted by two large voids containing recessed pools. Although the two recessed pools would contribute to the open nature of the Project Site and would be publicly accessible, the area they cover (approximately 2 acres) is excluded from the open space inventory to be conservative.

Located at street level, the landscaped plaza would encourage the daily use of this space by New Yorkers. Because the Memorial would be publicly accessible, open to the sky, and encourage visitors to spend time out of doors, its 2.87 acres of plaza space (but not the two 1-acre voids) are included in the open space inventory. The Memorial would act as the major open space on the Project Site, and would be a new and unique open space in Lower Manhattan.

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

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

CURRENT CONDITIONS SCENARIO

In both 2009 and 2015, *although the absolute amount of passive open space would increase, the subsequent increase in population would cause some open space ratios to decrease.* Specifically, the ratio would go from 0.25 acres per 1,000 people to 0.23 acres per 1,000 people in 2009 (a 7.35 percent decrease) and from 0.23 acres per 1,000 people to 0.21 acres per 1,000 people in 2015 (an 11.98 percent decrease).

With the Proposed Action, a totally new system of open space would be introduced on the Project Site. In the future without the Proposed Action, the WTC Site would remain in its current state (vacant except for the PATH facility) and would contain no open space. With the Proposed Action, both workers and visitors as well as new passive open space would be added to the Project Site

However, compared with open space in the future without the Proposed Action in the Current Conditions Scenario, the Proposed Action would provide much more open space. 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. *In addition, the Memorial would provide an integral piece of open space, commemorating the events of September 11, 2001 and February 26, 1993.*

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

Regarding pedestrian-level wind conditions, the Proposed Action would be expected to result in conditions that are comparable to, but slightly worse than, those that currently exist on the WTC Site. Conditions would be slightly worse because of the tall buildings that are part of the

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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, as in the Pre-September 11 Scenario, severe high wind speed conditions 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.

E.5 SHADOWS

As a result of the Proposed Action, some open spaces would receive additional sunlight and some open spaces would receive additional shadow, compared with conditions prior to September 11. In the winter, Freedom Tower and Tower 2 would cast additional shadow on Washington Market Park, resulting in a significant adverse *impact* by increasing the coverage and duration in this season. In addition, the Proposed Action would increase shadows in the evening on the open space areas along Church Street east of the WTC Site. From late spring through the summer, this would remove all sun on the open spaces for periods in the afternoon or early evening. However, since this would occur in warmer weather and would not alter the usage of these spaces, it is not considered a significant adverse impact. The Proposed Action would also provide somewhat more sunlight in the new Liberty Park and at ground level at the Memorial than was present at the Tobin Plaza in pre-September 11 conditions. The Proposed Action would also cast shadows that did not exist prior to September 11 on the 7 WTC Plaza.

PRE-SEPTEMBER 11 SCENARIO

The major difference when comparing shadow increments with the Proposed Action to those produced by the Project Site prior to September 11 is the shift in the locations in incremental shadow. While both the Twin Towers and the Proposed Action would produce considerable shadows, the Twin Towers cast larger incremental shadow to the west and the Proposed Action would cast larger shadow increments to the east. This would occur due to shifting the bulk of development to the east in the Proposed Action in order to reserve the southwest quadrant of the WTC Site for a Memorial. *Based on the current design, approximately the top third of Freedom Tower would be an open steel cable structure, which would allow some sun to filter through, resulting in a less dense shadow.*

Freedom Tower would cast shadows similar to those of the North Tower that stood prior to September 11, except that the North Tower was opaque, while the cable system at the upper levels of Freedom Tower would allow some light to pass. Tower 2, which at approximately 65 stories is located where the nine-story 5 WTC building stood, would cast incremental shadows on several of the open spaces in the area, including Washington Market Park, 7 WTC Plaza, and a few of the open spaces northeast of the Project Site. Under the *CEQR Technical Manual*, the December increment would cause a significant adverse impact to Washington Market Park in December. In the Proposed Action with the bulk of the buildings relocated on the east side of the WTC Site, where there were previously relatively short buildings, open spaces directly across Church Street would receive heavy afternoon to evening shadow. Depending on the analysis day, any buildings over approximately 10 stories would have the potential to cause adverse impacts to the open spaces on the east side of Church Street.

The Proposed Action would create incremental shadows on the open spaces to the west of the WTC Site in the early morning hours throughout the year. At this same time, these open spaces would receive sunlight in areas previously cast into shadow by the Twin Towers. From September through March, the Proposed Action would cast mid-morning shadows onto the open spaces northwest of the Project Site in BPC and midday shadows to the north falling on open spaces such as Washington Market Park and the playgrounds of PS 234. In the late spring to summer months shadows are shorter and would not reach these open spaces. From March through September, late afternoon to early evening shadows would be cast onto the open spaces such as City Hall Park northeast of the Project Site, and the open spaces directly to the east of the Project Site, across Church Street, would receive shadow for most of the afternoon to evening.

On most of the open spaces in the area the incremental shadows created from the Proposed Action would not be large enough or last long enough to create a significant adverse impact to the vegetation or the users of the open spaces. However, the Proposed Action would cast additional shadows onto the already heavily shadowed open spaces directly to the east of the WTC and Southern Sites for 1½ to 3½ hours per day in late spring through summer, completely covering the open spaces in shadow. In December the already heavily shadowed Washington Market Park would receive large incremental shadows from Tower 2 and Freedom Tower, removing all sun from the park in the midday. *Based on the current design for Freedom Tower, approximately the top third of Freedom Tower would be an open steel cable structure, which would allow some sun to filter through, resulting in a less dense shadow.* Within the criteria under the *CEQR Technical Manual*, as discussed below, this would nevertheless constitute a significant adverse impact.

The open spaces created by the Proposed Action would receive incremental shadow from the Proposed Action throughout the year. For most of the late spring through summer months, the proposed open spaces on the Project Site would receive full sun in the midday to early evening. The Memorial would receive incremental shadows from the base of Towers 3 and 4 during the morning throughout the year. For the spring to fall months, *the Memorial area* would receive ample sun in the early to mid-afternoon until shadows from existing buildings across Route 9A begin to cast shadow onto the WTC Site. *Wedge of Light Plaza and the PATH Plaza* would receive incremental shadows throughout the analysis day all year. Tower 2 and Tower 3 would cast shadow on *Wedge of Light Plaza*. *Wedge of Light Plaza and the PATH Plaza* would receive incremental shadows throughout the day in each analysis period but would receive sun from March through September in the early to mid-morning hours depending on the analysis day. The Memorial would receive shadows in the morning from the Proposed Action throughout the year, as compared to shadows on the Tobin Plaza from the buildings of the WTC. However, under the Proposed Action, in the spring to fall months, the Memorial would receive almost full sun for up to 3 hours in the middle of the day.

Since the Proposed Action's open spaces would have different layouts than the original open spaces of the WTC they are considered newly created and are not compared to the shadows originally cast on the WTC open spaces. That is, the analysis here of shadows that would be cast on the Proposed Action's open spaces does not take into account shadows that were cast by the original Twin Towers and the lower structures. It should also be noted that prior to September 11, the space where 7 WTC Plaza will be built was occupied by the original 7 WTC building.

CURRENT CONDITIONS SCENARIO

Shadow increments are generally worse with the Proposed Action compared to the Current Conditions Scenario since the only structures on-site are the temporary WTC PATH station entrance canopy and 130 Liberty Street. Similar to the Pre-September 11 Scenario, the Proposed Action would create incremental shadows on the open spaces to the west of the WTC Site in the early morning hours throughout the year. From September through March, the Proposed Action would cast larger mid-morning shadows onto the open spaces northwest of the Project Site in BPC, and midday shadows would be cast north falling on open spaces such as Washington Market Park and the playgrounds of PS 234. In the late spring to summer months, shadows are shorter and would not reach these open spaces. From March through September, late afternoon to early evening shadows would be cast onto the open spaces such as City Hall Park northeast of the Project Site, and the open spaces directly to the east of the Project Site, across Church Street, would receive shadow for most of the afternoon to evening. The incremental shadows would be larger in the Current Conditions Scenario than in the Pre-September 11 Scenario because the shadows from the Proposed Action would be casting all new shadow and would not fall within shadows previously cast by the WTC.

Again, the incremental shadow created from the Proposed Action on most of the open spaces in the area would not be large enough or last long enough to create a significant adverse impact to the vegetation or the users of the open spaces. However, the Proposed Action would cast additional shadows onto the already heavily shadowed open spaces directly to the east of the WTC and Southern Sites for 1½ to 3½ hours per day in late spring through summer making the open spaces completely covered in shadow. In December, the already heavily shadowed Washington Market Park would receive large incremental shadows from Tower 2 and Freedom Tower, removing all sun from the park in the midday. The newly created 7 WTC Plaza would receive shadow from Tower 2 and Freedom Tower throughout the year.

The open spaces created by the Proposed Action would receive incremental shadows throughout the year. For most of the late spring through summer months, the proposed open spaces on the Project Site would receive full sun in the midday to early evening. The Memorial would receive incremental shadows from the base of Towers 3 and 4 during the morning throughout the year. For the spring to fall months, *the Memorial* would receive ample sun in the early to mid-afternoon until shadows from existing buildings across Route 9A begin to cast shadow onto the WTC Site. *Wedge of Light Plaza and the PATH Plaza* would receive incremental shadows throughout the analysis day all year. Tower 2 and Tower 3 would cast shadow on *Wedge of Light Plaza and the PATH Plaza*. *Wedge of Light Plaza and the PATH Plaza* would receive incremental shadows throughout the day in each analysis period but would receive sun from March through September in the early to mid-morning hours depending on the analysis day.

E.6 COMMUNITY FACILITIES

The Proposed Action would not result in a significant adverse impact on community facilities and services in 2009 and 2015.

After September 11, extensive measures were taken on local, state, and national levels to reduce the likelihood of another terrorist attack and increase emergency preparedness. These measures include relocating the city's Office of Emergency Management (OEM) from 7 WTC to a more secure, undisclosed location; street closings; increased security in Lower Manhattan, including the perimeter of the WTC Site; improving training and coordination among emergency response providers, including the New York City Police Department (NYPD), New York City Fire

Department (FDNY), and Port Authority Police Department (PAPD); increased security in building design; and legislation such as the Homeland Security Act. However, even with these measures, the possibility exists for large-scale emergencies in the future. This analysis therefore considers, in addition to daily service and protection, the potential effect of larger emergencies on community facilities.

Although the Proposed Action would add an average of approximately 42,000 workers and visitors to the Project Site over the course of each day in 2009, approximately 28,000 of these people would be visitors. Because visitors are likely to spend a relatively short amount of time at the Project Site, far fewer than 42,000 people would be at the Site during any given time. In 2015, with full development, an average of approximately 62,500 workers and visitors would be at the Project Site over the course of each day. Because approximately 18,700 of these people would be visitors, the population on the Project Site at any given time would be far less than 62,500. Prior to September 11, approximately 47,900 workers and visitors were present at the Project Site each day, among which were only approximately 7,300 visitors. Therefore, the total number of workers and visitors at any given time would be similar in both the future with and without the Proposed Action.

Potential impacts of the Proposed Action on specific community facilities and services are summarized below.

NEW YORK CITY FIRE DEPARTMENT

The Proposed Action would not have an adverse impact on FDNY services or operations. FDNY does not anticipate that the Proposed Action would have any adverse impacts on its level of service in the area surrounding the Project Site. The Proposed Action would neither physically alter any station house nor alter operations of or access to or from any Engine or Ladder Company.

NEW YORK CITY POLICE DEPARTMENT

Although patrol and security on the WTC Site are not the responsibility of the NYPD, NYPD is responsible for patrolling and providing service to the area surrounding the WTC Site, as well as responding to emergency calls on the WTC Site. There are many ways to measure the adequacy of police service, one of which is a review of crime statistics. First Precinct crime statistics suggest that the area is well served by NYPD. As NYPD continually evaluates its level of service and makes changes as they are deemed necessary, no significant adverse impacts are expected as a result of the Proposed Action.

PORT AUTHORITY POLICE DEPARTMENT

In the future with the Proposed Action, the Port Authority may propose to acquire some or all of the Southern Site. Because the Project Site would be larger in the future with the Proposed Action than it would be in the future without the Proposed Action, PAPD would need more officers to patrol the site. However, this increased demand for officers would not be considered a significant adverse impact. The PAPD would adjust its staffing levels and resources to provide sufficient policing of the area.

HEALTH CARE FACILITIES

As mentioned earlier, the Proposed Action would introduce approximately 62,500 workers and visitors to the Project Site each day by the year 2015. It can be reasonably expected that a percentage of these people might need health care services at some time. The demand for health

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care facilities in the future with the Proposed Action would be no greater than the demand for health care facilities in the future without the Proposed Action in the Pre-September 11 Scenario, and therefore the Proposed Action would not have an adverse impact on health care facilities.

E.7 SOCIOECONOMIC CONDITIONS

The Proposed Action would not result in significant adverse socioeconomic impacts. As intended, the Proposed Action would eliminate the blighting effect of the vacant and excavated Project Site, and would produce substantial economic benefits during construction and operation of the new development, including direct and indirect employment, wages and salaries, business and sales tax, and total economic output (or demand for goods and services). However, the Proposed Action would also place demands on Lower Manhattan's infrastructure, including police and fire safety, which would be required to service the planned uses.

PRE-SEPTEMBER 11 SCENARIO

The Proposed Action would not result in significant direct or indirect residential displacement in either the 2009 or 2015 analysis year. To the contrary, the Proposed Action would restore the office presence on the Project Site to levels comparable to what existed prior to September 11, while the additional retail and other amenities would promote a more vibrant overall presence. Lower Manhattan has long been a center of world finance and a major economic engine for the entire region, but it has more recently become the fastest-growing residential neighborhood in the city. The various amenities planned as part of the Proposed Action reflect an existing and projected need from residents, rather than an effort to alter or accelerate trends in neighborhood character.

The Proposed Action would not result in significant direct or indirect business displacement in either the 2009 or 2015 analysis year. By 2015, the Proposed Action would reintroduce approximately 10 million square feet of office space to the Project Site, which is about 1.9 million square feet less office space than existed prior to September 11. This slightly reduced total square footage would not significantly affect long term rental rates for office space in Lower Manhattan, nor would it adversely alter existing economic patterns. The anticipated office presence would be consistent in scale and types of uses with conditions on the Project Site prior to September 11, and similar to existing buildings in the surrounding area.

In addition, the Proposed Action would be consistent with, and would reflect the implementation of, New York City and State policy since September 11 of strengthening Lower Manhattan as an office center. The new office space would accommodate the employment growth critical for sustaining Manhattan's role as a leading center of commerce and business. The Proposed Action, coupled with existing financial incentives and other physical improvements planned for Lower Manhattan, would represent a clear signal to commercial businesses that the city and state are committed to attracting and supporting new investments in Lower Manhattan.

There would be a greater amount of retail on the Project Site compared to pre-September 11 conditions (350,000 to 400,000 square feet in the former WTC mall, depending on occupancy), and a majority of the new retail would be above ground, in the first three floors of the new office towers. This new street-level retail presence on the Project Site would better facilitate trips from the new retail to existing retail in the area surrounding the Project Site, and in Lower Manhattan more generally. In addition, the existing retail stores in Lower Manhattan would benefit from the increased visitation expected at the Memorial, *the Memorial Center*, and other places of interest on the Project Site, compared with visitation to the former WTC complex.

By 2015, the Proposed Action would re-introduce a hotel to the Project Site, which would contain approximately 20 fewer rooms than the New York Marriott World Trade Center Hotel that existed on the site prior to September 11, but would have larger conference facilities. While the new hotel space would compete with existing hotels in Lower Manhattan, the substantial project-generated visitation to Lower Manhattan is expected to have a net benefit on existing hotels and would therefore not impair their economic viability.

The Proposed Action would generate enormous economic and fiscal benefits during both the construction and operation of the development. Construction of the completed building program would create about 50,830 person-years of direct construction employment in New York City, as well as an additional 45,698 person-years of indirect employment in New York City and State. Construction activity would have a total effect on the local economy, measured as economic output or demand for local industries, equal to about \$15.75 billion in New York State, of which \$12.06 billion would occur in New York City. LMDC and the Port Authority have existing policies regarding contracting and procurement of goods and services from minority, disadvantaged, and women-owned businesses, and it is expected that these policies will be applicable to publicly funded portions of the Proposed Action. These policies are expected to facilitate the distribution of direct jobs and economic benefits to minority, disadvantaged, and women-owned businesses. During operation, the on-site employment of the completed building program is estimated at approximately 39,412 to 40,553 full-time equivalent jobs, as well as an additional 56,057 full-time equivalent jobs generated indirectly in New York City and State. The total effect from the operation of the completed building program is estimated at \$31.17 to \$31.36 billion annually in New York State, of which \$26.78 to \$26.94 billion would occur in New York City. The Proposed Action is estimated to generate non-property tax revenues estimated at approximately \$1.17 to \$1.19 billion annually. Overall, the Proposed Action would restore the economic vitality of the Project Site and the corresponding economic and fiscal benefits to approximately the same levels that existed prior to September 11, or to even greater levels when accounting for the off-site spending by visitors to the site.

CURRENT CONDITIONS SCENARIO

As with the Pre-September 11 Scenario, the Proposed Action would not result in significant direct or indirect residential displacement in either the 2009 or 2015 analysis year under the Current Conditions Scenario. The proposed changes in land use would not adversely affect the local residential real estate market. To the contrary, the amenities associated with the Proposed Action would make the area livelier and would serve as a key component of the broader initiative to make Lower Manhattan a more attractive place to live, work, and visit. The development on the Project Site would be compatible with the surrounding area, and would provide neighborhood amenities to serve the substantial existing residential population as well as the growing residential presence in Lower Manhattan.

The Proposed Action would not result in significant direct or indirect business displacement in either the 2009 or 2015 analysis year. By 2015, the 10.0 million square feet of office space would be a major addition to the Lower Manhattan office market, representing approximately 8.8 percent of the total office space in Lower Manhattan. The anticipated office uses would be consistent with the existing economic activity in the area, and would be of the type and amount that would support renewed economic activity within the third-largest business district in the nation. As described above, the Proposed Action would be consistent with, and would reflect the implementation of, New York City and State policy since September 11 of strengthening Lower Manhattan as an office center.

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The substantial employment and visitation generated by the redevelopment of the Project Site would add to the consumer base of both existing retail in Lower Manhattan and the new retail space at the Project Site. In addition, the new retail space would generate the “critical mass” of retail required to capture much of the unrealized consumer spending in Lower Manhattan. For many city residents, workers, and visitors, the area surrounding the Project Site does not contain the amount and type of destination retail that would merit a dedicated shopping trip to the area; instead, other locations with a greater retail concentration, or a greater diversity in retail options, are visited. The retail presence at the Project Site could be viewed as an anchor for the Lower Manhattan shopping experience, drawing customers to Lower Manhattan, many of which would then proceed to shop at other Lower Manhattan locations.

By 2015, the Proposed Action would reintroduce a hotel to the Project Site, representing approximately 20.5 percent of the total hotel room count for Lower Manhattan. While this new hotel space would compete with existing hotels in Lower Manhattan, the substantial project-generated visitation to Lower Manhattan is expected to have a net benefit on existing hotels, and would therefore not impair their economic viability.

The enormous economic and fiscal benefits generated by the Proposed Action during construction and operation would be the same as described for the Pre-September 11 Scenario above. Construction of the completed building program would create a total of 96,521 person-years of direct and indirect employment in New York City and State. Construction activity would have a total effect on the local economy equal to about \$15.75 billion in New York State, of which \$12.06 billion would occur in New York City. During operation, the combined direct and indirect employment generated by the Proposed Action would be approximately 95,469 to 97,013 full-time equivalent jobs in New York City and State. The total effect from the operation of the Proposed Action is estimated at \$31.17 to \$31.36 billion annually in New York State, of which \$26.77 to \$26.94 billion would occur in New York City. Finally, the completed building program is estimated to generate non-property tax revenues estimated at approximately \$1.17 to \$1.19 billion annually.

E.8 NEIGHBORHOOD CHARACTER

The Proposed Action would result in overall benefits to neighborhood character in both 2009 and 2015.

PRE-SEPTEMBER 11 SCENARIO

The Proposed Action, compared to pre-September 11 conditions, would result in a number of beneficial changes to neighborhood character. By replacing many of the uses that existed before September 11, adding new cultural uses, and creating new open spaces, the Proposed Action would enliven the Project Site and surrounding area.

Freedom Tower and the four additional office towers would create new elements of the skyline, while keeping with building uses, heights, and designs on the WTC Site and the Southern Site prior to September 11 as well as buildings throughout the study area. These towers would block some views across the WTC Site; however, these views were blocked by development on the Project Site prior to September 11.

The Memorial and *the Memorial Center* would attract millions of visitors annually, substantially increasing pedestrian activity at the Project Site and on surrounding streets. *The Memorial would be based on Michael Arad and Peter Walker's "Reflecting Absence" design concept. The*

Memorial plaza would be designed to be a meditative space, belonging both to the city and to the Memorial. Located at street level, the Memorial grounds would become a living part of the fabric of the city. It would serve both to encourage visitors to spend contemplative, reflective time out of doors and to connect the communities which surround it. The Memorial, combined with the other open spaces at the Project Site, would improve pedestrian circulation within and across the WTC Site as compared to pre-September 11 conditions. While some sidewalks and crosswalks immediately adjacent to the WTC Site would be heavily congested during peak periods, this would be comparable to pre-September 11 conditions, and would not adversely affect the overall character of the neighborhood.

While the amount of office space on the Project Site would be less than what existed prior to September 11, there would be additional retail and other amenities that would create a more vibrant presence. Large numbers of new workers and visitors will generate visits at other places of interest throughout Lower Manhattan, supporting area businesses and enlivening the streets and neighborhoods surrounding the Project Site.

The increased traffic levels expected throughout the area as a result of the Proposed Action would have some effect on neighborhood character, but not to a degree that they would constitute a significant adverse impact. This is primarily because most of the traffic impacts would occur on streets already burdened with high levels of traffic, and mitigation measures have been identified to help relieve some of this congestion. The extension of Fulton and Greenwich Streets through the former superblock configuration of the WTC Site would restore that portion of Lower Manhattan's street grid, connecting areas north-to-south and east-to-west that would facilitate vehicular access within and around the site, as well as throughout Lower Manhattan.

The proposed redevelopment of the Project Site—coupled with existing financial incentives and other physical improvements planned for Lower Manhattan—would constitute a clear signal to residents and commercial businesses that the city and state are committed to attracting and supporting new investments in Lower Manhattan that, in turn, would help encourage a vibrant, bustling, and overall attractive area for the long term.

CURRENT CONDITIONS SCENARIO

Undoubtedly, the Proposed Action would result in substantial changes to the character of the Project Site and the surrounding neighborhoods Compared to current conditions. This is one of the goals of the Proposed Action, which includes revitalizing Lower Manhattan as a center of commercial, residential, and cultural activity to help make the area a lively environment, with a Memorial at its heart to honor and remember the victims of the attacks. Overall, substantial positive effects on neighborhood character at the Project Site and throughout the study area and all of Lower Manhattan are expected to result from the Proposed Action.

The Proposed Action would be in keeping with the traditional character of the Project Site and surrounding area, which is located in a densely developed urban setting. The amenities associated with the Proposed Action would make the area livelier and would serve as a key component of the broader initiative to make Lower Manhattan a more attractive place to live, work, and visit. By removing the post-disaster blighted conditions that currently exist at the Project Site and replacing them with the Memorial and *the Memorial Center*, new cultural uses, open spaces, office buildings, retail, and hotel and conference facilities, the Proposed Action would help to revitalize the Project Site and the surrounding neighborhoods.

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As noted above, The Memorial and *the Memorial Center* would attract millions of visitors annually, substantially increasing pedestrian activity at the Project Site and on surrounding streets. *The Memorial plaza would be designed to be a meditative space. The Memorial grounds would not be isolated from the rest of the city, but a living part of it. The Memorial, combined with the other open spaces at the Project Site, would facilitate pedestrian circulation within and across the WTC Site, connecting the neighborhoods which surround it.* While some sidewalks and crosswalks immediately adjacent to the WTC Site would be heavily congested during peak periods, this would not adversely affect the overall character of the neighborhood.

Freedom Tower would reintroduce a very tall, modern structure to the Project Site. Along with the four additional office towers, it would restore the Lower Manhattan skyline while keeping with building uses, heights, and designs typical of the study area that exist in juxtaposition with smaller-scale and historic buildings. While it would block certain views across the WTC Site, it would not block unique view corridors or unique views of visual resources, or otherwise adversely affect neighborhood character.

The retail presence at the Project Site could be an anchor for the Lower Manhattan shopping experience, drawing customers to Lower Manhattan, many of whom would then proceed to shop at other Lower Manhattan locations.

Projected traffic conditions in the area are expected to worsen at a number of locations. However, this traffic would not result in a significant change to neighborhood character because many streets are already burdened with high levels of traffic. The extension of Fulton and Greenwich Streets through the former superblock configuration of the WTC Site would restore that portion of Lower Manhattan's street grid, connecting areas north-to-south and east-to-west, which would connect neighborhoods on every side of the Project Site. It would also create new view corridors and restore the street linkage between historic resources to the north and south of the WTC Site.

The proposed redevelopment of the Project Site, coupled with existing financial incentives and other physical improvements planned for Lower Manhattan, would represent a clear signal to residents and businesses that the city and state are committed to attracting and supporting new investments in Lower Manhattan that, in turn, would help encourage a vibrant, bustling, and overall attractive area for the long term.

E.9 HAZARDOUS MATERIALS

No significant adverse impacts related to hazardous materials would result from the Proposed Action in 2009 or 2015, *as discussed below.*

The evaluation of hazardous materials at the Project Site revealed that no significant adverse impacts related to hazardous materials are anticipated due to the Proposed Action. Hazardous materials identified at the Project Site include PAHs and metals in soil, asbestos and dust from the events of September 11 adhered to the surfaces of structures and low concentrations of volatile organic compounds (VOCs) present in groundwater. During construction they would be managed or isolated to protect public health and the environment. Construction measures, including the implementation of site-specific Health and Safety Plans (HASPs), dust control measures, contaminated soil and groundwater management plans, and abatement of hazardous building materials prior to construction, would aid in the avoidance of adverse health impacts to workers and the general public. Because hazardous materials would be

abated, managed or remediated during construction, no significant adverse impacts are expected during either the construction or operational phases of the Proposed Action.

Following acquisition of 130 Liberty Street as part of the Proposed Action, further testing for hazardous materials would be conducted at the site, contaminated dust, debris and materials would be removed from the building on that site, and the building would be deconstructed. The deconstruction plan would provide site-specific protocols to be followed during the removal of any contaminated dust, debris, and materials from the interior of the building. Although it is not anticipated that the building would contain structural ACM or hazardous concentrations of contaminants, materials within the building would be evaluated further and disposed of in accordance with all applicable federal, state, and local regulations. In addition, a site-specific HASP would also be implemented at all times.

E.10 INFRASTRUCTURE

In both 2009 and 2015 analysis years, the Proposed Action would result in reduced infrastructure demand and usage for water supply, sanitary sewage, stormwater runoff, solid waste, and energy, compared with pre-September 11 levels. The reduction in demand and usage would result from both significantly less office development on the Project Site and the implementation of the *Sustainable Design Guidelines*.

PRE-SEPTEMBER 11 SCENARIO

Table S-3 summarizes the totals for infrastructure demand in the Pre-September 11 Scenario 2009 and 2015. Please note that while there are anticipated solid waste reductions with the implementation of green measures, there is no quantifiable measure for such reductions at this time.

**Table S-3
Infrastructure Demand for Pre-September 11 Scenario**

	2009 Without the Proposed Action	2009 with the Proposed Action	2009 with the Proposed Action (with Sustainable Design Guidelines Reduction)	2015 Without the Proposed Action	2015 with the Proposed Action ¹	2015 with the Proposed Action (with Sustainable Design Guidelines Reduction)
Water supply and sewage generation in gallons per day (gpd)	1,382,500	546,174	417,174	1,382,500	1,434,314	1,037,024
Solid waste in tons per week	355	291	No specific total reduction*	368	497	No specific total reduction*
Energy in British Thermal Units (BTUs)	9,948 x 10 ⁸	3,021 x 10 ⁸	2,684 x 10 ⁸	10,337 x 10 ⁸	9,937 x 10 ⁸	8,072 x 10 ⁸
Notes:	¹ While there are anticipated solid waste reductions with the implementation of the <i>Sustainable Design Guidelines</i> , there is no quantifiable measure for such reductions at this time.					

CURRENT CONDITIONS SCENARIO

Table S-4 summarizes the totals for infrastructure demand in the Current Conditions Scenario 2009 and 2015. Please note that while there are anticipated solid waste reductions with the implementation of green measures, there is not a quantifiable measure for such reductions at this time.

**Table S-4
Infrastructure Demand for Current Conditions Scenario**

	2009 Without the Proposed Action	2009 with the Proposed Action	2009 with the Proposed Action (with Sustainable Design Guidelines Reduction)	2015 Without the Proposed Action	2015 with the Proposed Action¹	2015 with the Proposed Action (with Sustainable Design Guidelines Reduction)²
Water supply and sewage generation (gallons per day)	<i>Negligible</i>	546,174	417,174	190,000	1,434,314	1,037,024
Solid waste (tons per week)	<i>Negligible</i>	291	No specific total reduction*	49	497	No specific total reduction*
Energy (BTUs)	<i>Negligible</i>	$3,201 \times 10^8$	$2,684 \times 10^8$	$1,479 \times 10^8$	$9,937 \times 10^8$	$8,072 \times 10^8$
Notes:	¹ While there are anticipated solid waste reductions with the implementation of the <i>Sustainable Design Guidelines</i> , there is no quantifiable measure for such reductions at this time.					

E.11 TRAFFIC AND PARKING

The Proposed Action would have significant traffic impacts in both 2009 and 2015, as described below.

PRE-SEPTEMBER 11 SCENARIO

The Proposed Action would generate a substantial volume of vehicular activity. Under highly conservative assumptions, the Proposed Action would generate an estimated 1,300 to 1,700 peak hour vehicle trips in 2009 and an estimated additional 850 to 1,250 vehicle trips in 2015. *On an areawide basis*, the Proposed Action would represent an increase of approximately 5 percent over traffic volumes that would have been expected in the future had the events of September 11 not occurred. These trips would reflect both the reduced traffic from office space included in the Proposed Action compared to pre-September 11 conditions and the increased traffic associated with both the Memorial and other uses on the Project Site. *Specific high volume traffic carriers and streets on the immediate periphery of the Project Site would have high volume increases higher than the areawide average of 5 percent.*

When added to traffic generated by the background development projects, the Proposed Action would have significant traffic impacts at up to 18 of the 40 locations analyzed for 2009 conditions and up to 25 of the 40 locations in 2015. Based on criteria set forth in the *CEQR Technical Manual*, “significant impacts” include increases in average vehicle delays as short as one to five seconds. All significant impacts generated by the Proposed Action would require mitigation analyses, particularly along the Route 9A corridor, near the northeast corner of the WTC Site, at the portals of the Holland Tunnel on Canal Street, and at other locations interspersed in the area. As discussed in “Mitigation Measures,” most but not all significant traffic impacts can be mitigated by standard traffic capacity improvement measures.

The parking to be provided under the Proposed Action is expected to be sufficient to accommodate projected needs.

CURRENT CONDITIONS SCENARIO

As a result of the events of September 11, current traffic volumes are significantly lower than before the disaster—about 15 to 25 percent lower, as noted above—and several streets in Lower

Manhattan are closed for security purposes or ongoing construction, including streets bordering the WTC Site on its northern and southern sides. However, currently planned projects would generate about 1,000 to 1,400 vehicle trips in the peak traffic hours by 2009, and 2,500 to 3,000 vehicle trips by 2015, about a 30 to 40 percent increase overall by 2015. The traffic generated by the Proposed Action would increase volumes by about 10 to 15 percent over 2015 No Action levels, in addition to the 30 to 40 percent increase that would occur to the north, south, and east even without redevelopment on the Project Site.

The Proposed Action also includes the extension of Greenwich and Fulton Streets through the former superblock configuration of the WTC Site, which would restore that portion of Lower Manhattan's street grid. The extension of these two streets through the site connecting areas north-to-south and east-to-west would facilitate vehicular access in the area, particularly access to the Memorial, which is expected to be a major attraction and activity generator.

The 1,200- to 1,400-space underground parking garage to be provided as part of the Proposed Action would be available for use by office tenants, and would be sufficient to accommodate that parking demand.

E.12 TRANSIT AND PEDESTRIANS

Under the Pre-September 11 Scenario, the Proposed Action would not result in a significant adverse impact on transit in 2009 or 2015. However, there would be significant adverse impacts at certain pedestrian crosswalks in both 2009 and 2015; some of these impacts could be minimized but not fully mitigated.

PRE-SEPTEMBER 11 SCENARIO

Transit

The subway trips projected to be generated by the Proposed Action in 2009 and 2015 would increase the demand on the subway lines serving the Project Site. Each subway element within these stations was evaluated to determine their projected level of service during the AM and PM peak periods. Based on a comparison between the future with the Proposed Action and the future without the Proposed Action under the Pre-September 11 Scenario, none of these elements would be significantly impacted by the Proposed Action in either 2009 or 2015. In terms of subway line-haul capacity, none of the subway lines serving the Project Site would be significantly impacted by the Proposed Action in either 2009 or 2015.

The number of bus trips projected to be generated by the Proposed Action in 2009 and 2015 would increase the demand for local and express buses serving the Project Site. It is anticipated that most of the demand would be accommodated by unused capacity on such bus routes and that the Proposed Action would not have any significant adverse effect on bus service. NYCT routinely evaluates bus operations and would be expected to determine whether routing or frequencies need to be adjusted in 2009 and 2015 to accommodate any isolated excesses in demand on specific local or express routes.

The number of ferry trips projected to be generated by the Proposed Action in 2009 and 2015 would be less than the ferry trips generated as a result of the WTC PATH Terminal closure from 2001 to 2003. The capacity of the World Financial Center ferry terminal is expected to be increased prior to 2015, and that terminal could accommodate an increase in ferry demand. The private ferry operators serving the World Financial Center ferry terminal could adjust service in 2009 and 2015 to accommodate increased demand.

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Pedestrians

Pedestrian analyses were performed for subway stairways, ramps, escalators, and turnstiles. The analysis of 2009 and 2015 assumed that the construction of the Fulton Street Transit Center and the permanent WTC PATH Terminal would be completed and operational. Based upon a comparison between the future with the Proposed Action and the future without the Proposed Action under the Pre-September 11 Scenario, none of the station elements would be significantly adversely affected by the Proposed Action in either 2009 or 2015. Pedestrian analyses were also performed for street-level crosswalks and sidewalk locations in the vicinity of the Project Site. Separate analyses were performed at the Church Street and Liberty Street intersection both with and without the underground connection between the WTC Site and Liberty Plaza.

The Proposed Action would locate building entrances on the northern part of the WTC Site in closer proximity to Vesey Street than was the case pre-September 11. As a result, more pedestrian traffic is anticipated within the Vesey Street corridor. All pedestrian access to Tower 5 south of Liberty Street would be at-grade. Consequently, a significant number of pedestrians would be assigned to the Greenwich Street and Liberty Street intersection. The sidewalks along Vesey Street, Greenwich Street, and Liberty Street can adequately accommodate these anticipated increases in pedestrian traffic.

However, based upon a comparison between the future with the Proposed Action and the future without the Proposed Action under the Pre-September 11 Scenario, *eight* crosswalks would experience significant impacts in 2009 as a result of the Proposed Action. As discussed in "Mitigation Measures," *five* of these impacts could be mitigated by widening the crosswalks. The other *three* crosswalks could not be fully mitigated but could be widened to a maximum of 20 feet to minimize the effect of the Proposed Action.

In 2015, the Proposed Action would result in significant impacts at *13* crosswalks, of which *seven* could be mitigated by widening the crosswalks. The other *six* crosswalks that could not be fully mitigated could be widened to a maximum of 20 feet to minimize the effect of the Proposed Action. Although the Proposed Action would cause some unmitigated crosswalk impacts in 2009 and 2015, pedestrians would be able to cross streets at these crosswalk locations with slightly more peak hour congestion than under pre-September 11 conditions but with little or no appreciable change in crossing time.

CURRENT CONDITIONS SCENARIO

As a result of the events of September 11, current transit and pedestrian volumes in the vicinity of the WTC Site are significantly lower than before the disaster. The transit and pedestrian volumes that will be generated by development projects currently in the planning or construction process are even more extensive than those that were under consideration before the events of September 11. Based on a comparison between the future with the Proposed Action and the future without the Proposed Action under the Current Conditions Scenario, more substantial increases in transit and pedestrian volumes will occur than were projected under the Pre-September 11 Scenario.

Transit

Pedestrian analyses were also performed for subway stairways, ramps, escalators, and turnstiles for the Current Conditions Scenario in 2009 and 2015. Based on a comparison between the future with the Proposed Action and the future without the Proposed Action under the Current Conditions Scenario, none of these elements would be significantly impacted by

the Proposed Action in 2009. However, one of these elements would be impacted by the Proposed Action in 2015. In terms of subway line-haul capacity, none of the subway lines serving the Project Site would be significantly impacted by the Proposed Action in either 2009 or 2015. MTA/NYCT routinely evaluates bus operations and would be expected to determine whether routing or frequencies need to be adjusted in 2009 and 2015 to accommodate any isolated excesses in demand on specific local or express routes. The private ferry operators serving the World Financial Center ferry terminal could adjust service in 2009 and 2015 to accommodate increased demand.

Pedestrians

Pedestrian analyses were also performed for street-level crosswalks and sidewalk locations in the vicinity of the Project Site under the Current Conditions Scenario. The sidewalks along Vesey, Greenwich, and Liberty Streets can adequately accommodate these anticipated increases in pedestrian traffic. However, based upon a comparison between the future with the Proposed Action and the future without the Proposed Action under the Current Conditions Scenario, 11 crosswalks would experience significant impacts in 2009 as a result of the Proposed Action. In 2015, the Proposed Action would result in significant impacts at 24 crosswalks during the peak periods analyzed.

E.13 AIR QUALITY

Operation of the Proposed Action is not predicted to cause any significant adverse air quality impacts in either 2009 or 2015, or to cause any exceedance of National Ambient Air Quality Standard (NAAQS) in either of those years.

PRE-SEPTEMBER 11 SCENARIO

No significant adverse impacts were predicted during the operational phase of the Proposed Action. Four locations were analyzed for potential air quality impacts (Liberty Street, Albany Street and Vesey Street at Route 9A, and the proposed bus loading area at Greenwich Street from Vesey to Liberty Streets). Using a conservative screening approach, maximum predicted changes in future 8-hour average carbon monoxide (CO) increments from the Proposed Action ranged from a slight decrease to 0.6 parts per million (ppm), with the highest predicted total concentration, including background, of 5.7 ppm. Predicted changes in concentrations of fine respirable particulate matter (PM_{2.5}) smaller than 2.5 micrometers (µm) ranged from no change to an increase of 0.2 micrograms per cubic meter (µg/m³) on a 24-hour average basis, and from 0.05 µg/m³ on an annual average neighborhood scale. Predicted change in concentrations of respirable particulate matter (PM₁₀) smaller than 10 µm ranged from a slight decrease to a maximum of 9.3 µg/m³ on a 24-hour average basis, and from 0.1 µg/m³ to 3.9 µg/m³ on an annual average basis.

The modeling for this scenario was conducted assuming at-grade construction of Route 9A; it is expected that the increments with the short bypass alternative for Route 9A reconstruction would be higher but would not be significant and, as with the at-grade alternative, would not result in exceedances of the NAAQS.

CURRENT CONDITIONS SCENARIO

Under this scenario, maximum predicted future 8-hour average CO increments ranged from 0.1 ppm to 2.0 ppm, with the highest predicted total concentration of 6.8 ppm; these values were

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predicted using the same conservative screening approach. Predicted changes in $PM_{2.5}$ concentrations ranged from $0.1 \mu\text{g}/\text{m}^3$ to $0.9 \mu\text{g}/\text{m}^3$ on a 24-hour average, and *on an annual average* from $0.01 \mu\text{g}/\text{m}^3$ to $0.06 \mu\text{g}/\text{m}^3$. Predicted change in maximum 24-hour average concentrations ranged from $0.3 \mu\text{g}/\text{m}^3$ to $10.2 \mu\text{g}/\text{m}^3$ and *on an annual average* from $0.17 \mu\text{g}/\text{m}^3$ to $4.0 \mu\text{g}/\text{m}^3$.

E.14 NOISE

Based on CEQR and FTA guidelines (whenever applicable), the Proposed Action would not result in any significant adverse mobile or stationary source noise impacts in 2009 or 2015.

As part of the Proposed Action's noise analysis, continuous 24-hour noise measurements and short-term 20-minute equivalent sound levels (L_{eq}) were conducted at 24 sites to provide a comprehensive baseline of noise levels adjacent to the Project Site. The sites include locations where the Proposed Action would have the greatest potential to increase ambient noise levels and cause an impact. The analysis concluded that the maximum noise level increase at these measurement sites with the Proposed Action would be 2 dBA or less, which is not considered significant. Therefore, there would be no significant noise impacts from mobile sources with the Proposed Action in either scenario in 2009 and 2015.

In addition, there would be no significant impacts in 2009 or 2015 from the Proposed Action's stationary noise sources, which would include heating, ventilation, and air conditioning (HVAC) systems, mechanical equipment, and the wind turbines on top of Freedom Tower. All stationary sources would use sufficient applicable noise reduction devices to comply with applicable noise regulations and standards.

As with noise in pre-September 11 and 2003 current conditions, noise levels at the proposed sensitive receptors within the Project Site, including the Memorial and memorial-related uses, performing arts center, hotel, and museum, would exceed the City Environmental Protection Order-City Environmental Quality Review (CEPO-CEQR) guideline level. It would be very difficult, if not impossible, to incorporate feasible mitigation measures that would reduce noise levels at the outdoor areas, including parks and Memorial, to CEPO-CEQR recommended threshold levels. However, future noise levels at the proposed parks and Memorial would be comparable to the levels in existing parks in New York City, including City Hall Park, Bowling Green Park and Battery Park.

Future noise levels attributable to the operation (mobile and stationary sources) of the Proposed Action at the Memorial site would be 71 dBA in 2009 and 69 dBA in 2015, slightly exceeding the HUD Site Acceptability Standards of 65 dBA, just as current noise levels do. Based on HUD Policy, 5-10 dBA attenuation would normally be required for the proposed Memorial site. Although details of the Memorial design are not available, it is anticipated that, through noise reduction features and careful design measures, noise levels at the Memorial would be able to meet or approach the HUD Site Acceptability Criteria by the time the Proposed Action is completed and operational.

Although the proposed bus parking garage was included as part of the Proposed Action, a separate noise analysis was also conducted for the proposed bus garage at the Project Site based on FTA guidelines in case FTA funding is sought. The future noise levels associated with the garage operations would be substantially less than the FTA impact threshold criteria. Therefore, it is concluded that there would be no significant noise impact associated with the proposed bus garage.

E.15 COASTAL ZONE

The Proposed Action would not result in any impacts to the coastal zone in 2009 and 2015.

The Proposed Action would entail construction and of the operation of program elements within the coastal zone. Many of the program elements existed prior to September 11. Given the location of the Proposed Action within the coastal zone, a coastal consistency determination is required.

Construction activities occurring within the Project Site and along the Hudson River shoreline would result in unavoidable, temporary impacts in the coastal zone. However, no construction activity is contemplated directly within the shoreline or waterfront area along the Hudson River or New York Harbor. While no new activities are envisioned in the Hudson River or New York Harbor itself, reuse of the Hudson River pump station and associated intake and outfall structures located along the shoreline, and the withdrawal of Hudson River water for cooling purposes are part of the Proposed Action.

The Proposed Action reflects a commitment to consistency and support with coastal policies. The Proposed Action would contribute to the New York City Waterfront Revitalization Program's goals of enlivening the waterfront and attracting the public to the city's coastal areas, and the new towers would significantly contribute to the skyline of Lower Manhattan.

E.16 FLOODPLAIN

The Proposed Action would not adversely affect the floodplain's ability to contain flood waters or exacerbate flooding conditions on the Project Site or its immediate vicinity. As a result, the Proposed Action would have no significant adverse impacts on floodplains in 2009 and 2015.

Of the Proposed Action's approximately 4 acres located within the 100-year floodplain, approximately 3.05 acres would be unpaved. Paved areas would total approximately 0.95 acres, including portions of the Memorial, Liberty Street, sidewalks, and rooftops of the Freedom Tower and the performing arts center. The Proposed Action would not increase the amount of impervious surfaces on the Project Site. Rather, the Proposed Action would introduce 3.05 acres of pervious surfaces to the floodplain where none existed prior to September 11. The pervious surfaces to the floodplain would consist of the western portion of the Memorial Area and Liberty Park on the Southern Site block bounded by Route 9A, Liberty, Washington, and Cedar Streets (currently used for construction staging and contractor parking). Although located outside of the floodplain, the Southern Site block bounded by Washington, Liberty, Greenwich, and Cedar (extension) Streets would also replace a portion of the paved plaza that existed prior to September 11 with usable open space that would likely include pervious surfaces or natural vegetation, such as grass. In addition, all structures would be flood-proofed by the extension of the existing bathtub and construction of a new bathtub in the eastern side of the WTC Site.

Furthermore, construction of the Proposed Action within the 100-year-old floodplain is the only practicable alternative that would provide a mixed-use site that includes a Memorial to honor the victims of the terrorist attacks while also re-establishing the Project Site as a locus of commerce, cultural space, and amenities.

E.17 NATURAL RESOURCES

The Proposed Action would not be expected to result in significant adverse impacts to water quality in 2009 or 2015 under either the Pre-September 11 or Current Conditions Scenarios. The Proposed Action would result in some *loss of aquatic organisms impinged or entrained at the Hudson River cooling water intake system (CWIS)*. Under accepted standards for assessing such impacts, those losses would not be deemed significant in either 2009 or 2015 under either scenario, so long as intake flows at the CWIS remained at or below pre-September 11 levels. Under these standards, losses of aquatic biota could result in significant adverse impacts in 2015, if withdrawal volumes approach the CWIS design flow.

NYSDEC, however, has indicated that it regards any loss of fish from pump station operations as adverse and that it therefore believes that the Proposed Action is likely to have significant adverse impacts on aquatic biota in both 2009 and 2015, even if CWIS intake flows remain well below pre-September 11 levels. Because of NYSDEC's view, LMDC and the Port Authority will explore a range of alternative measures to reduce or mitigate such impacts as the detailed design of elements of the Proposed Action are developed.

Because the Proposed Action expects to collect, retain, and reuse much of the rainfall on the Project Site, stormwater discharges to the combined sewer system would be reduced from pre-September 11 conditions and would not have a significant adverse impact under either the Pre-September 11 or Current Conditions Scenario. Potential bird strikes as a result of the Proposed Action would be reduced from or approximately the same as pre-September 11 conditions and would not represent a significant adverse impact under either the Current Conditions or Pre-September 11 Scenario.

E.18 RADIOFREQUENCY ELECTROMAGNETIC FIELDS

The buildings of the Proposed Action are being designed to accommodate a variety of rooftop telecommunications and broadcast services. In addition, they may contain cellular and other communication services. These facilities will create radiofrequency electromagnetic fields (RFEMF). The Proposed Action would not result in any significant adverse impacts from RFEMF and would not pose human health risks.

PRE-SEPTEMBER 11 SCENARIO

With the Proposed Action, a variety of rooftop TV and radio broadcast facilities, microwave, and other telecommunication are expected to be built. RFEMFs with the Proposed Action would be expected to be comparable to levels that existed before September 11. RFEMF with the Proposed Action, and with the pre-September 11 facilities at the Project Site, would be at levels below those specified in applicable guidelines and standards, and below the levels that would result in any adverse health effects. Consequently, the Proposed Action would not result in any significant adverse RFEMF impacts.

CURRENT CONDITIONS SCENARIO

Currently, there are no rooftop and other significant telecommunications or broadcast facilities located at the Project Site. With the Proposed Action, a variety of rooftop TV and radio broadcast facilities, microwave, and other telecommunication would be built. These facilities would be designed so that RFEMF levels would be below those specified in applicable

guidelines and standards, and below the levels that would result in any adverse health effects. Consequently, the Proposed Action would not result in any significant adverse RFEMF impacts.

E.19 ENVIRONMENTAL JUSTICE

During construction and operation of the Proposed Action, issues of particular importance to low-income and minority populations include: human health and quality-of-life effects related to construction at Project Site and construction truck traffic off-site; continued availability of community facilities, services, and open space; economic vitality and job opportunities; preservation/enhancement of community character and cohesion; indirect residential and business displacements arising from secondary development or change in community character; human health impacts of the infrastructure needed to support the Proposed Action; and cumulative effect of the Proposed Action and other construction and improvement projects in the next decade in Lower Manhattan.

The environmental justice analysis indicates that the Proposed Action would not produce disproportionately high or adverse effects on low-income or minority communities. The proportion of low-income and minority residents in the primary study area is lower than that of Lower Manhattan, Manhattan, or New York City, indicating a low potential for impacts to communities of concern in the area. The portion of Chinatown within the secondary study area represents a community of concern for environmental justice purposes. This community is, however, farther removed from the Project Site and would not be subject to disproportionately high or adverse impacts during the construction or operational periods.

This evaluation of environmental justice issues demonstrates that:

- The Proposed Action would not result in disproportionately high or adverse human health or quality-of-life impacts to any communities of concern. Demographic and income conditions along routes necessary for construction-related truck traffic are similar to those overall in Lower Manhattan. The overall increase in truck traffic is expected to be low. The increase in traffic along these existing truck corridors in communities of concern would not be disproportionately greater than that for other portions of the study areas.
- Evaluation of community and open space facility capacity and access indicates that no disproportionate impacts on communities of concern in the two study areas would result.
- Construction activity would produce economic benefits in terms of output and jobs during the 10-year construction period. Similarly, completion of the Proposed Action is expected to improve economic vitality and increase the number of job opportunities. This would benefit a wide range of residents and businesses, including low-income and minority communities. Jobs created during the operation of the Proposed Action are expected to encompass a wide range of skills, wage levels, and occupations in office, retail, government agency, and cultural facilities employment.
- An evaluation of the potential for indirect displacement of residents and businesses in the study areas found that no significant impacts would result from the Proposed Action in 2009 or 2015. The Proposed Action would enhance community character in the primary study area and Lower Manhattan in general as the vacant site is replaced with a WTC Memorial, cultural facilities, open space, and other elements to create a mixed use development that would help restore Lower Manhattan. These new uses would be consistent with and supportive of existing and future land uses and community character.

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- In 2009, the Proposed Action would result in lower infrastructure usage, compared with pre-September 11 levels. In 2015, the level of infrastructure use would be comparable to pre-September 11 levels as build-out of the Proposed Action is reached. When compared with the Current Conditions Scenario, the Proposed Action would require additional water, sewer, solid waste, and energy resources. Additional facilities required to meet future need would be subject to individual environmental review and permitting as appropriate.
- The cumulative benefits resulting from the Proposed Action, in combination with other access, infrastructure and community enhancements expected in Lower Manhattan through 2015 would support the long-range goals of the City of New York to recover from the terrorist attacks, revitalize Lower Manhattan, promote a diverse 24-hour residential and business community, and enhance quality-of-life and community character.

E.20 CONSTRUCTION

The rebuilding of the WTC would take place over approximately 12 years, from 2004 to 2015. The most intense period of activity is anticipated to occur between the third quarter of 2004 and fourth quarter of 2008 with a peak period occurring in 2006.

While the Proposed Action alone would be a significant construction project in Lower Manhattan, several other projects are also anticipated to occur in the area immediately during the 2004–2015 period. Three of the other major projects are transportation-related construction projects including the permanent WTC PATH Terminal on the WTC Site, Route 9A–Lower Manhattan Reconstruction, and the Fulton Street Transit Center; all three projects are anticipated to begin in 2004 and be completed in 2008. A fourth major project, construction of the South Ferry Subway Terminal, is anticipated to occur during the same time period but is located approximately a half mile to the south of the WTC Site. In addition to the transportation-related projects, other projects such as street reconstruction and private residential and commercial development are anticipated to occur during the 2004–2015 period.

Taken together temporally and spatially, the construction activities of this major project would affect change in “normal,” everyday activities for residents, workers, and visitors to the Project Site and Lower Manhattan, particularly during the peak construction period 2006. The potential cumulative effects from the five major projects occurring in and around the Project Site are analyzed from several perspectives.

ACCESS AND CIRCULATION

The 2006 future without the Proposed Action (consisting of the four major Lower Manhattan transportation recovery projects plus background growth) traffic analysis results were compared with the 2006 future with the Proposed Action (the four transportation recovery projects and the Proposed Action) to determine the relative change in level of service between the two scenarios for the AM, midday, and PM peak hours.

The 2006 future without the Proposed Action was compared with the 2006 future with the Proposed Action to determine the impact of the Proposed Action’s generated construction traffic on the study area for the AM, midday, and PM peak hours. A total of six intersections were identified with impacts as a result of construction vehicles attributable to the Proposed Action. These intersections include: Vesey Street/Route 9A during the AM peak hour; Chambers Street/Church Street during the AM and PM peak hours; Barclay Street/Church Street during the

AM peak hour; Cortlandt Street/Church Street during the midday peak hour; Canal Street/Broadway during the PM peak hour; and Worth Street/Broadway during the AM, midday, and PM peak hours. Mitigation measures for these construction impacts are discussed in Chapter 22, "Mitigation Measures."

AIR QUALITY

No significant adverse impacts on particulate matter were predicted along the Proposed Action's construction access routes, and no significant adverse impacts were predicted on overall respirable particulate matter (PM₁₀) concentrations in the vicinity of the construction sites. However, *absent mitigation*, the predicted maximum increases in fine respirable particulate matter (PM_{2.5}) concentrations, due to the Proposed Action alone and the cumulative impact of the Proposed Action and the other major Lower Manhattan recovery projects were substantially higher than the interim guidance threshold values for both annual and 24-hour average. Under the worst-case conditions, it was predicted that, *absent mitigation*, the cumulative impact of the Proposed Action and the other major reconstruction projects would substantially exceed 24-hour average PM_{2.5} National Ambient Air Quality Standard. *While NO₂ levels would not exceed the NAAQS, a significant adverse impact on NO₂ concentrations was predicted, absent mitigation, immediately adjacent to the construction site.* Possible mitigation for these impacts is discussed in Chapter 22, "Mitigation Measures," *which identifies measures that would significantly reduce these concentrations and the extent of any such impacts.*

Regional inventories of PM₁₀, NO_x, and VOC direct and indirect emissions from the construction of the Proposed Action are presented.

NOISE

Both the 2006 future without the Proposed Action scenario (consisting of the four major Lower Manhattan transportation recovery projects) and the 2006 future with the Proposed Action scenario (consisting of the four major Lower Manhattan transportation recovery projects and the Proposed Action) were compared against each other for potential noise level increases. The evaluation was conducted based on CEQR, NYSDEC, FTA guidelines and criteria to determine the relative change in noise levels.

Under the 2006 future without the Proposed Action, traffic volumes would not change substantially from 2003 existing and pre-September 11 conditions, except for sites 16 and 17 on Barclay Street, which would carry construction related vehicles and trucks associated with other major construction activities in 2006. As a result, noise level increases associated with mobile (vehicular) sources are not expected to increase substantially (defined as 3 dBA or greater) at most receptor sites, except for sites 16 and 17 on Barclay Street.

Under the 2006 future without the Proposed Action, noise levels attributed to construction activities other than mobile sources (e.g. trucks and cars to and from the Project Site) would exceed the CEQR construction noise impact thresholds at 12 sites, as the result of construction activities associated with all other major construction projects in the area. In addition, peak 8-hour noise levels would exceed FTA criteria at sites 4, 11, 13, 14, and 21. Peak 30-day noise levels would also exceed FTA criteria at site 14.

Under the 2006 future with the Proposed Action, noise levels during the peak construction 2006 took into account increased noise from any traffic (i.e. truck hauling, driving to work site, detouring and diversion related) associated with the major transportation recovery projects and

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the Proposed Action. Noise impacts are anticipated to occur from mobile sources at site 11 on Liberty Street, sites 16 and 17 on Barclay Street for the future with the Proposed Action scenario.

Noise levels attributed to construction activities other than mobile sources (e.g. trucks, cars to and from the Project Site) would exceed CEQR criteria at all receptor locations evaluated, except for sites 1, 12, and 18–20. In addition, peak 8-hour noise levels would exceed FTA criteria at sites 4, 6 through 11, 13 through 15, 21, and 22. Peak 30-day noise levels would also exceed FTA criteria at sites 4, 7 through 11, and 14 for this future with the Proposed Action scenario.

VIBRATION

The vibration impacts associated with the permanent WTC PATH Terminal, Route 9A Reconstruction and Fulton Street Transit Center were evaluated. No significant vibration impacts are anticipated at the receptor sites evaluated. Peak vibration levels attributed to the construction of the Proposed Action would not exceed 0.12 inches per second (ips) at any sensitive receptors evaluated during the peak construction period of 2006. Therefore, significant vibration impacts during the construction of the Proposed Action are not expected to occur.

ECONOMIC EFFECTS

The major construction projects that would be occurring in 2006 would all generate major economic benefits. In particular the Proposed Action is estimated to generate about 4,136 person-years of construction employment and about 6,373 person-years of employment in the city and about 7,853 person-years of employment in the state; construction activity equal to about \$1.33 billion in the state, of which \$1.02 would occur in the city; and tax revenues, exclusive of property-related payment, equal to \$53.09 million.

Planning for construction of all the major projects has taken into account access to businesses and other uses in the area. *New York State Department of Transportation* (NYSDOT) and the Port Authority have completed temporary access across Vesey Street between Church Street and Battery Park City that includes a temporary pedestrian bridge and a protected pedestrian walkway at-grade.

LMDC and the Port Authority are working together to minimize disruptions to businesses during construction of the Proposed Action. Many of the buildings and businesses to the north and south of the Project Site (the areas closest to the proposed construction) were damaged and closed due to the terrorist attacks on September 11. However, some businesses south of the Project Site that have reopened or are expected to open, may be adversely affected by construction noise and air quality. On the other hand, the businesses would also likely benefit from the large number of construction workers. Church Street would remain open throughout the construction period, although the western lane may be closed for much of the time, as well as portions of Church Street between Vesey and Dey Streets. It is not expected that access to retail uses or other businesses on the east side of Church Street in this area would be restricted so much that the businesses would be adversely impacted.

CULTURAL RESOURCES

The pedestrian connection to the World Financial Center would be constructed through the Hudson River Bulkhead as part of the permanent WTC PATH Terminal project. Alteration of the bulkhead would require mitigation based on a Programmatic Agreement (previously established for Hudson River Park). Some limited areas of the eastern side of the WTC Site and of the Southern Site would require testing and monitoring, respectively to avoid adverse impacts

to archaeological resources. Analysis as part of the environmental review for the permanent WTC PATH Terminal would insure the avoidance of any potential impacts to archaeological resources in the location of the potential below grade pedestrian connection under Church Street from the permanent WTC PATH Terminal to Liberty Plaza. Taken cumulatively, no significant adverse impacts to archaeological resources would be anticipated from the Proposed Action and the other major construction projects.

Construction of the Proposed Action has the potential to cause damage to nearby historic resources from ground-borne vibrations, dewatering (for the bathtub on the east side of the site and for the expansion of the existing bathtub to the south), and other activities. To avoid any adverse impacts to standing structures throughout the construction period, construction protection plans would be developed in consultation with the New York State Historic Preservation Officer. Taken cumulatively, it is not expected that there would be any adverse impacts to historic resources adjacent to the Project Site.

Construction activities on the WTC Site have the potential to adversely affect some of the remaining remnants from the former WTC Complex. To minimize or mitigate any such effects from the Proposed Action, LMDC has incorporated into the proposed Programmatic Agreement, referred to in Chapter 5, "Historic Resources," a series of commitments with respect to the future treatment of such remnants and procedures for consulting with the New York State Historic Preservation Officer (SHPO) and identified consulting parties concerning such treatment. It is expected that the sponsors of other Lower Manhattan Recovery Projects that might have the potential for similar effects on such remnants would enter into similar arrangements or take comparable actions to avoid or mitigate such impacts as well.

E.21 MITIGATION MEASURES

The preceding sections of this Executive Summary describe the Proposed Action and its expected environmental impacts in a broad range of potential impact areas. In some areas—land use, urban design, visual resources, neighborhood character, socioeconomic conditions, infrastructure, and energy efficiency—the Proposed Action is expected to have clear benefits. In other areas, such as historic and archaeological resources and hazardous materials, the Proposed Action incorporates measures to avoid any potential adverse impacts.

In some areas, however, the Proposed Action would have one or more significant adverse impacts that would require mitigation measures to avoid or reduce such impacts. Those mitigation measures, and their expected effectiveness in avoiding or reducing adverse impacts, are described in detail below.

ARCHAEOLOGICAL RESOURCES

Three areas of the Project Site were found to be potentially sensitive for historic period archaeological resources. The northeast and southeast corners of the WTC Site as well as the portion of the Southern Site between Route 9A and Washington Street may be sensitive for historic period archaeological resources, including shaft features (such as privies, cisterns, wells and cesspools) predating the 1850s as well as wharf and/or cribbing features. To avoid or reduce to the extent practicable potential impacts on these resources the Proposed Action would include Phase IB investigation. On the Southern Site, the Phase IB investigations would consist of archaeological monitoring during construction.

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TRAFFIC AND PARKING

The Proposed Action would result in significant traffic impacts requiring an analysis of improvement measures needed to mitigate the impacts. The vast majority of locations analyzed as part of the GEIS would either not be significantly impacted or could be mitigated with standard traffic capacity improvements, including: signal phasing and/or timing modifications; prohibiting on-street parking at the approaches to a number of critical intersections to add a travel lane at the intersection; enforcing existing parking prohibitions to ensure that traffic lanes are available to moving traffic and are not blocked during key peak hours; lane re-striping and intersection channelization changes to make more efficient use of available street widths; relocating pedestrian crosswalks and bus stops to reduce frictions between travel modes; and others.

Under projected year 2009 Build conditions, 24 of the 42 intersections analyzed in the AM peak hour (including existing intersections and newly created intersections as part of the Proposed Action) would not be significantly impacted, 15 could be mitigated via the standard traffic engineering measures described above, and three intersections could either be partially mitigated or remain unmitigated by these types of measures. In the midday peak hour, 26 intersections would not be significantly impacted, 13 would be mitigated, and three would be partially mitigated or remain unmitigated. In the PM peak hour, 24 intersections would not be significantly impacted, 16 would be mitigated, and two would be partially mitigated or remain unmitigated.

Under projected year 2015 Build conditions, 18 of the 42 intersections analyzed in the AM peak hour would not be significantly impacted, 20 could be mitigated via the types of standard traffic engineering measures described above, and four intersections could either be partially mitigated or remain unmitigated by these types of measures. In the midday peak hour, 21 intersections would not be significantly impacted, 14 would be mitigated, and seven would be partially mitigated or remain unmitigated. In the PM peak hour, 18 intersections would not be significantly impacted, 19 would be mitigated, and five would be partially mitigated or remain unmitigated.

Additional improvements and more areawide measures would need to be considered to fully mitigate those intersections that could not be mitigated by the more standard and localized traffic improvements. Such measures could include an area wide traffic management strategy aimed at directing motorists to routes where additional capacity is available to accommodate traffic better than congested routes, particularly by advising motorists via intelligent transportation systems (ITS) signage at the portals to Lower Manhattan, such as the Brooklyn Battery Tunnel, Holland Tunnel, and the southbound FDR Drive, and Route 9A. They could also include parking pricing strategies aimed at diverting motorists from driving to and from the area in the peak hours, and encourage use of earlier and later “shoulder hours,” particularly for work trips made by car. Measures could also include investigation of street direction reversals, or conversions of some two-way streets such as Vesey Street to one-way flow, to provide more local traffic-handling capacity in the area. Development of a coordinated traffic and parking management strategy for Lower Manhattan would have the potential to reduce the potential for significant impacts and for unmitigated impacts.

One set of street direction changes was identified and evaluated during the period between completion of the DGEIS and this FGEIS. One such measure was making Vesey Street one-way eastbound between Route 9A and Church Street, which would help ameliorate conditions along Vesey Street, but would shift traffic burdens to other westbound streets. Also included

was widening the ramp to the underground parking garage along Liberty Street in order to allow for two-directional traffic, i.e., in and out. There are localized improvements and impacts from this plan, but there is considerable promise for the responsible agencies to continue their development of this plan further as project planning continues.

PEDESTRIAN CONDITIONS

In 2009, eight crosswalks would have significant impacts as a result of the Proposed Action. At five of these locations, the impacts could be mitigated by widening the crosswalks. The other three crosswalks—at Church and Vesey Streets in the AM and PM peak period—could not be fully mitigated, but they could be widened to a maximum of 20 feet to minimize the effect of the Proposed Action.

In 2015, the Proposed Action would result in significant impacts at 13 crosswalks, seven of which could be mitigated by widening the crosswalks. The other six crosswalks that could not be fully mitigated—crosswalks at Church and Vesey Streets in the AM and PM period; at Church and Liberty Streets (without an underground connection) in the AM peak period; and at Greenwich and Liberty Streets in the AM, midday, and PM peak periods—could be widened to a maximum of 20 feet to minimize the effect of the Proposed Action. Although the Proposed Action would cause some crosswalk impacts in 2009 and 2015 that could not be mitigated, pedestrians would be able to cross streets at these crosswalk locations with slightly more peak hour congestion but with little or no appreciable change in crossing time.

NOISE

Under the Pre-September 11 Scenario, the maximum noise level increases related to mobile sources associated with the Proposed Action in both 2009 and 2015 would be 1 decibel (dBA) or less. Because an increase of 3 dBA in noise levels (the threshold for significant noise impacts) is barely perceptible, the Proposed Action would not have significant noise impacts from mobile sources in either year. Potential stationary sources of noise would include heating, ventilation, and air conditioning (HVAC) systems, mechanical equipments, and wind turbines on top of Freedom Tower. The mechanical equipment and systems would utilize noise reduction devices to comply with applicable noise regulations and standards, as set forth in New York City Noise Code, subchapter 6, Section 24-243, Ambient Noise Quality Zone Criteria and Standards. Noise associated with the wind turbines, air tempering equipment, and ventilation shafts would be insignificant and would be masked by the background noise from street traffic and other noises typical for an urban environment. The Proposed Action would therefore not result in any significant noise impacts from stationary sources in either 2009 or 2015.

Future noise levels attributable to the operation (mobile and stationary sources) of the Proposed Action at the Memorial site would be 71 dBA in 2009 and 69 dBA in 2015, exceeding the HUD Site Acceptability Standards of 65 dBA, as current noise levels do. Based on HUD policy, 5-10 dBA attenuation would normally be required for the proposed Memorial site. It is anticipated that, through noise features and careful design measures, noise levels at the Memorial would be able to meet or approach the HUD Site Acceptability Criteria by the time the Proposed Action is completed and operational.

A noise analysis was conducted for a bus garage at the Project Site using FTA methodology for assessing noise impacts of transit facilities. Future noise levels associated with garage operations would be substantially below the thresholds used by the FTA for transit facilities.

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CONSTRUCTION

The potential cumulative effects from the five major projects occurring in and around the Project Site were analyzed from several perspectives. The purpose of this analysis was to assess the combined impacts of similar activities occurring at the same time within the several projects, particularly during the 2006 peak period of construction in Lower Manhattan. Specific areas identified for such analysis include: *access* and circulation, air quality, noise and vibration, economic effects, and cultural resources.

Access and Circulation

Six intersections were identified with significant traffic impacts as a result of construction vehicles attributable to the Proposed Action. These intersections include Vesey Street/Route 9A during the AM peak hour, Chambers Street/Church Street during the AM and PM peak hours, Barclay Street/Church Street during the PM peak hour, and Worth Street/Broadway during the AM, midday, and PM peak hours. Mitigation measures for these construction impacts are discussed in Chapter 22, "Mitigation Measures."

Air Quality

No significant adverse impacts on particulate matter were predicted along the Proposed Action's construction access routes, and no significant adverse impacts were predicted for overall PM₁₀ concentrations in the vicinity of the construction sites. However, the predicted maximum increases in fine respirable particulate matter (PM_{2.5}) concentrations due to the Proposed Action alone and due to the cumulative impact of the Proposed Action with the other major reconstruction projects were substantially higher than New York City's interim guidance threshold values for both annual and 24-hour average PM_{2.5} concentrations. Under worst-case meteorological and construction conditions, it was predicted that the combined concentrations of the Proposed Action and the other major recovery projects, when added to maximum background levels, would substantially exceed EPA's 24-hour average PM_{2.5} National Ambient Air Quality Standard at one or more receptor locations near the Project Site. Possible mitigation for this impact is discussed in Chapter 22, "Mitigation Measures."

Noise

Noise levels during the peak construction year of 2006 took into account increased noise from any traffic associated with both the major transportation recovery projects and the Proposed Action. Significant noise impacts are anticipated to occur from mobile sources at one site on Liberty Street and two sites on Barclay Street. Noise levels attributed to construction activities other than mobile sources would exceed CEQR criteria at all but two receptor locations evaluated. In addition, peak 8-hour noise levels would exceed FTA criteria at approximately one-half the sites; peak 30-day noise levels would also exceed FTA criteria at six sites. Mitigation for these impacts is discussed in Chapter 22, "Mitigation Measures."

No significant adverse vibration impacts during the construction of the Proposed Action are expected.

Economic Effects

The Proposed Action is estimated to generate the following benefits in the 2006 construction analysis: about 4,136 person-years construction employment and about 6,373 person-years of employment in the city and about 7,853 person-years of employment in the state; construction

activity equal to about \$1.33 billion in the state, of which \$1.02 billion would occur in the city; and tax revenues, exclusive of property-related payment, equal to \$53.09 million.

LMDC and the Port Authority are working together to minimize disruptions to business during construction of the Proposed Action. Many of the buildings and businesses to the north and south of the Project Site (the areas closest to the proposed construction) were damaged and closed due to the terrorist attacks on September 11. However, some businesses south of the Project Site that have reopened or are expected to open may be adversely affected by construction noise and air quality. On the other hand, they would also likely benefit from the large number of construction workers present in the area. Church Street would remain open through the construction period, although the western lane may be closed for much of the time, and uses or other businesses on the east side of Church Street in this area would *not* be so frequently restricted as to adversely impact such businesses.

Cultural Resources

Some limited areas of the eastern side of the WTC Site and the Southern Site would require testing and monitoring, respectively, to avoid adverse impacts to archaeological resources. No significant adverse impacts to archaeological resources would be anticipated from the Proposed Action and other major construction projects.

To avoid any adverse impacts to standing historic structures throughout the construction period, construction protection plans would be developed in consultation with the New York State Historic Preservation Officer. No adverse impacts to historic resources adjacent to the Project Site are expected.

E.22 ALTERNATIVES

This section describes and analyzes alternatives to the Proposed Action. Each alternative is compared with the Proposed Action in terms of the substantive environmental impacts detailed throughout the GEIS and summarized *earlier* in this Executive Summary.

NO ACTION ALTERNATIVE

In the No Action Alternative, none of the proposed development would take place, and the WTC Site would be left in approximately its present condition after completion of the permanent WTC PATH Terminal and interim improvements. The *Southern Site* would not be redeveloped with office and open space uses as part of the Proposed Action under this alternative. It is assumed that if market conditions warrant their redevelopment, the *Southern Site* would be redeveloped with office uses independent of the Proposed Action.

Overall, with this alternative the WTC Site would remain substantially underutilized and would not achieve the purpose and need of the Proposed Action, would not realize a significant redevelopment opportunity for Lower Manhattan in general and the WTC Site in particular, and would not restore commercial space, employment, and open space and other amenities to the area. Most importantly, the primary goal of creating a Memorial on the site would not be met. The history of the site and resources of the area would not be recognized; and providing no memorial would result in a significant adverse impact to the neighborhood character of Lower Manhattan.

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RESTORATION ALTERNATIVE

The Restoration Alternative would restore the WTC Site substantially as it existed before September 11, 2001. Under this alternative, two towers approximating the original Twin Towers would be developed on the WTC Site. The Southern Site would be redeveloped independently by its respective owners. As with the other alternatives, the permanent WTC PATH Terminal and interim improvements would also be completed independently.

A significant question raised by this alternative is its potential financial uncertainty: namely, whether tenants could be found to occupy the top floors of the redeveloped towers in light of the events of September 11. There are also significantly reduced open space ratios under this alternative as compared with the Proposed Action. Like the Proposed Action, this alternative would seek to avoid encroaching on the footprints of the former towers. In preserving the footprints, the two new towers would be shifted to the north and east of the site. As a result, not enough space would remain on the site to create open space comparable to Austin J. Tobin Plaza.

This alternative also would not integrate design elements into the surrounding neighborhood. The Southern Site would be redeveloped without the mitigation measures incorporated into the Proposed Action, which could result in potential adverse impacts on historic and archaeological resources under this alternative.

THINK WORLD CULTURAL CENTER

The World Cultural Center design would center around two open-lattice towers built around the footprints of the former towers. In each tower, a memorial would be located toward the top of the latticework, with other cultural uses including a museum and performing arts center below. A series of pedestrian bridges would cross through the site, intersect at the heart of the two towers, and extend across Route 9A to BPC. Commercial development would take place in office towers surrounding the memorial site. Fulton and Greenwich Streets would be reopened to pedestrian and vehicular traffic. The area south of Liberty Street would contain a mix of office, hotel, and retail uses.

A significant difference between the Proposed Action and this alternative is the use of the Southern Site along Liberty Street, which under this alternative would be developed with buildings instead of being converted into open space. No significant impacts to land use would be expected, but open space conditions in the area would be diminished since the quality and quantity of open space under this alternative would be less.

Preliminary estimates for this alternative have revealed a high cost for construction and infrastructure development. There are also issues of structural compatibility with the permanent WTC PATH Terminal. In addition, it is likely that the construction and operational costs for the cultural tenants of the towers would have required provision of subsidies.

MEMORIAL ONLY ALTERNATIVE

Under this alternative, development would be limited on the WTC Site to the Memorial as well as museum and open space uses. There would be no office, retail, non-Memorial cultural uses, or other such uses. Under this alternative, Greenwich and Fulton Streets would not be extended, and the *Southern Site* would not be included as part of the Project Site.

This alternative would fulfill part of the need for the Proposed Action through the creation of a Memorial occupying nearly the entire WTC Site (along with the independent permanent WTC

PATH Terminal and other improvements). With this alternative, however, the WTC Site would not achieve the full purpose and need of the Proposed Action. It would not result in a significant redevelopment opportunity for Lower Manhattan in general and the WTC Site in particular, and would not restore commercial space, employment, and open space and other amenities to the area. By not developing cultural, commercial, and community resources, it would fail to turn Lower Manhattan into the vibrant space that was called for in a significant amount of public response to the redevelopment plans. None of the other project benefits and potential impacts identified for the Proposed Action (described earlier under each separate technical assessment) would be realized.

WTC SITE ONLY ALTERNATIVE

The WTC Site Only Alternative would locate the entire program of the Proposed Action on the 16-acre WTC Site; the *Southern Site* would not be included but could be redeveloped independently at some time in the future. Under this alternative, the WTC Site would include up to 10 million square feet of commercial office space in four or five towers, as well as other uses.

The site plan would be similar to that of the Proposed Action in that Towers 1 through 4 would be in approximately the same locations. However, there would be no development south of Liberty Street, and each of the buildings under this alternative would be larger compared to those under the Proposed Action.

This alternative would have the same amount of open space on the WTC Site as the Proposed Action; however, there would be no open space on the Southern Site. Compared to the Proposed Action, this would result in less open space as well as fewer associated benefits to neighborhood character. Since the Southern Site would be developed by its respective owners under this alternative, without the mitigation measures incorporated into the Proposed Action, potential adverse impacts could occur under this alternative to historic and archaeological resources.

By eliminating development of the Southern Site, there would also be less space available for infrastructure and parking amenities. The only development option for a parking facility on the WTC Site would encroach upon the footprints, the Memorial, or both. Alternatively, no parking at all could be included on the WTC site.

ENHANCED GREEN CONSTRUCTION ALTERNATIVE

Many environmental management practices, construction practices, and design measures have been incorporated into the Proposed Action. LMDC has sought to advance sustainable environmental excellence in design, construction and function of buildings and related infrastructure at the WTC Site. The specific goals that have been identified include: to identify green building guidelines to be followed in redevelopment; to minimize energy consumption and air emissions resulting from energy consumption and traffic; to optimize water usage; to plan for efficient waste removal and movement of goods; and to provide quality open green space for public use and appreciation.

The *Sustainable Design Guidelines* (see current draft in Appendix A) for the Project Site establish a blueprint for sustainable design to be incorporated into the future structures and practices. The guidelines address the overall objectives for potential sustainable measures on the Project Site. These include air quality, energy conservation, water quality and conservation, material conservation, solar resource management, and construction practices.

Since many sustainable design measures have been incorporated into the Proposed Action, including wind turbines proposed for Freedom Tower, this alternative considers the

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environmental benefits and costs of noteworthy measures and practices *not* already incorporated into the Proposed Action, and describes the reasons why they have not been employed.

Movement of Goods and Waste via PATH

Ways to enhance goods delivery and waste management have been examined by LMDC and the Port Authority. One consideration that the public has expressed interest in seeing is the handling of goods and waste by using the PATH lines that run under the WTC Site.

Due to the nature of PATH's construction and scheduling methods, however, attempting to create a mixed-use service incorporating waste removal with PATH's public transportation service would be costly and would diminish the capacity and attractiveness of PATH service. It would also eliminate the potential for necessary maintenance activities and would increase the risk of suspended passenger service.

Overall, the Port Authority/PATH does not consider the use of the PATH system for goods movement and waste removal to be in the public interest, and this alternative is not considered feasible.

Waterborne Goods and Waste Handling

Waterborne transportation is an alternative that might offer benefits in the form of reduced traffic congestion and improved air quality. However, the Project Site is not directly accessible by water for goods movement, and some form of access would need to be established. Suppliers or distributors sending goods to the site would also have to have such access. Waste transfer would require creation of a marine transfer station, which raises issues of compatibility with other waterfront land uses, odors, and conveyance of materials from the Project Site to the transfer station.

Bio-Fuel and Composting

Through anaerobic digestion, waste can be broken down into a methane-rich gas and burned to generate electricity. Additional byproducts are water and compost. It is estimated that a bio-fuel plant would require approximately 100,000 square feet, would process 130 tons of waste and 800 gallons of water a day, and could generate 1 to 2 megawatt hours (MWh) of electricity. Although it would provide some benefits, given the severe space constraints of the site, this option has not been selected for implementation.

Enhanced Cogeneration

As noted below, LMDC could explore the possibility of locating a cogeneration facility on the Project Site as project design continues. A full analysis of a 30-megawatt (MW) centralized cogeneration facility or smaller individualized generation plants is provided below. LMDC is also considering the possibility of the construction of a larger cogeneration facility on the project site, such as a facility that could provide up to 70 MW of clean power for all the uses under the Proposed Action. While this alternative would have higher emissions than a smaller cogeneration facility, the emissions per kilowatt hour of electricity would likely be less. The predicted impacts to ambient air quality from a 30 MW cogeneration facility are well below ambient air quality standards and significant impact levels. In addition, the impacts are well below the NYCDEP and NYSDEC PM_{2.5} interim guidance thresholds. Impacts from the 70 MW are likewise expected to be less than these thresholds.

COGENERATION ALTERNATIVE

A cogeneration facility would be constructed on the Project Site under this alternative to serve as a source of energy for the Proposed Action. Cogeneration involves the simultaneous production of both electric and thermal energy from a single source of fuel. Cogeneration is considered a more efficient use of power generated by fossil fuel than that available through reliance on local electric grids. A cogeneration facility would also add an increased level of reliability in the case of a local or regional power failure.

With the exception of the cogeneration facility, this alternative would have the same basic program elements and site design as the Proposed Action. Therefore, its effects would be largely the same except in the technical areas of infrastructure, air quality, and noise.

REDUCED IMPACT ALTERNATIVE

A Reduced Impact Alternative would seek to reduce or vary the use, density, and timing of one or more major components of the Proposed Action in order to reduce or avoid unmitigated significant environmental impacts of the Proposed Action in 2009 and 2015, while still satisfying the overall purpose and need of the Proposed Action. As the analyses in Chapter 13A, “Traffic and Parking,” Chapter 13B, “Transit and Pedestrians;” Chapter 21, “Construction Impacts,” and Chapter 22, “Mitigation Measures,” makes clear, the principal adverse environmental impacts of the Proposed Action reflect (1) high background traffic levels in the vicinity of the Project Site in both 2009 and 2015; (2) the addition of a tremendous number of visitor trips to the Memorial in both of these years; and (3) the cumulative effects of the Proposed Action and other Lower Manhattan recovery projects during the 2006 construction period.

Defining a Reduced Impact Alternative therefore presents a number of challenges. The Memorial and museum are fundamental to the goals of the Proposed Action, but so are the office, retail, and cultural uses that seek to revitalize Lower Manhattan and contribute to the renewal of its neighborhoods. Commercial office space within the Project Site has already been effectively reduced by approximately 15 percent below pre-September 11 levels because of the proposed inclusion of the Southern Site within the Project Site. For this reason, a Reduced Impact Alternative might seek to reduce either the retail, hotel, and conference facility or cultural spaces within the Proposed Action or to defer for a year or more construction in order to reduce noise and air quality impacts in 2006.

Preliminary analysis of potential traffic, noise and construction impacts from such an alternative indicated, however, that there would continue to be significant impacts in each of these areas, even with the substantial reduction of one or more of such uses. For example, the vehicular traffic generated even with a 40 percent reduction of retail uses and a reduced hotel and conference facility would be only 5-10 percent lower than with the Proposed Action and would likely produce about the same number of significant impacts as the Proposed Action.

On balance, a Reduced Impact Alternative is unlikely to sufficiently reduce traffic and construction impacts to avoid or mitigate any of the Proposed Action’s significant environmental impacts. However, such an alternative could make more difficult the realization of the Proposed Action’s goals. Depending on market conditions, such an alternative would reduce the economic benefits to the state and city and would also reduce the employment opportunities in Lower Manhattan, compared with the Proposed Action. Depending on the configuration of the remaining retail space, this alternative could reduce the opportunity for street-level retail on the Project Site. Construction of essential foundation components of the Proposed Action that are

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scheduled to occur in 2006 could not be deferred. Deferral of such construction beyond 2006 would only increase or prolong noise levels in subsequent years, when the Memorial is in operation, and could also delay or limit the ability of the Proposed Action to contribute to the renewed economic vitality of Lower Manhattan.

AT-GRADE ACCESS ALTERNATIVE

Under this alternative, vehicular circulation for Freedom Tower, the performing arts center, and cultural uses, as well as trucks servicing the Memorial and Memorial Center, would be separated from the remainder of the Project Site's below-grade network. Truck elevators would transport trucks to below-grade loading areas. Similarly, passenger autos for Freedom Tower employees would use at-grade elevators to access below-grade parking. Other features and components of this alternative would be the same as with the Proposed Action.

Delivery vehicles would enter along the south side of Vesey Street between Washington and Greenwich Streets and take elevators down to the loading docks. Prior to entering the elevator area, vehicles would be inspected along the east curb lane of Washington Street between Barclay and Vesey Streets, or at another location to be selected on or in the immediate vicinity of the site. Additional queuing and possibly curbside drop-offs and pick-ups would need to be accommodated along Barclay and Vesey Streets. Trucks would move eastbound on Vesey Street, northbound on Church Street, and westbound on Barclay Street. A signal would be added at the intersection of Vesey and Washington Streets. Trucks could also approach the Washington Street screening area by traveling eastbound on Murray Street, southbound on Greenwich Street, and westbound on Barclay Street.

Overall, this alternative would permit construction of Freedom Tower and the performing arts center to proceed in advance of completion of the larger sub-grade infrastructure, access, and loading facilities planned for the balance of the Project Site, and could permit earlier completion of the Memorial, Memorial Center and cultural facilities. By reducing the required sub-grade vehicle connections between the Southern Site and the northern portion of the WTC Site, this alternative would simplify and reduce construction activities in the sub-grade area between Greenwich Street and Route 9A. In addition to simplifying the construction of these components, this alternative would permit exploration of other uses such as enhanced sustainable components for sub-grade portions of the Proposed Action, including those that would have been associated with expanded sub-grade access and loading facilities. On the other hand, this alternative would result in increased traffic congestion on Vesey, Barclay, and Washington Streets immediately north of the Project Site and would require further analysis and mitigation measures to address that congestion and its potential effect on neighborhood character.

COOLING TOWERS ALTERNATIVE

Under this alternative, individual cooling towers with refrigeration plants would be constructed in each of the office towers and other principal structures of the Proposed Action. A cooling tower removes heat from water that has been used in an air conditioning system. The water is cooled by contact with air, causing a small amount of the water to evaporate and the rest of the water to be cooled. The refrigeration plant contains the condenser, compressor and evaporator. From the refrigeration plant the cooled water circulates throughout the building by pipes and back to the cooling tower. Use of conventional cooling towers would replace the

proposed reactivation of the Hudson River cooling water intake system (CWIS) that served the WTC complex prior to September 11.

For most analysis areas examined in the FGEIS, this alternative would have impacts that would be substantially the same as those under the Proposed Action. However, this alternative would avoid the potential adverse impacts on aquatic organisms of the CWIS described in Chapter 18, "Natural Resources." On the other hand, this alternative would forego the energy efficiency for which the CWIS was designed, would consume significant quantities of potable water and electricity, and would also require substantial amounts of space in each of the office towers and other principal structures of the Proposed Action, with the potential for new or increased adverse impacts on visual resources and shadows.

E.23 UNAVOIDABLE SIGNIFICANT ADVERSE IMPACTS

Unavoidable adverse impacts are defined as those that meet the following two criteria:

- There are no reasonably practicable mitigation measures to eliminate the impact; and
- There are no reasonable alternatives to the Proposed Action that would meet the purpose and need of the action, eliminate the impact, and not cause other or similar significant adverse impacts.

Potential significant adverse impacts identified for the Proposed Action could all be mitigated, as described in Chapter 22, "Mitigation Measures," except for each of the technical areas discussed below.

HISTORIC RESOURCES

LMDC has committed to seek to minimize or mitigate any potentially adverse effects on remnants of the former WTC and has also proposed to enter into a Programmatic Agreement reflecting these commitments. It is likely, however, that some adverse impacts to such remnants could not be fully mitigated and would, therefore, remain as unavoidable impacts of the Proposed Action.

SHADOWS

While both the Twin Towers and the Proposed Action would produce considerable shadows, the Twin Towers cast larger incremental shadow to the west and the Proposed Action would cast larger shadow increments to the east, due to shifting the bulk of development to the east in the Proposed Action in order to reserve the southwest quadrant of the WTC Site, where the original Towers stood, for a Memorial. In the winter Freedom Tower and Tower 2 would cast a large incremental shadow on the already heavily shadowed Washington Market Park. In the late spring through the summer, the Towers 2 through 5 would cast additional shadows on the already heavily shadowed open spaces directly to the east of the WTC and Southern Sites. These significant adverse shadow impacts are unavoidable, given the unique requirements of the Proposed Action, which seeks to create a "critical mass" of mixed-use development to help restore Lower Manhattan as a vibrant central business district that attracts and retains businesses, residents, and visitors. Given the prominence of these new buildings within the Manhattan office market, their exceptional accessibility, and state-of-the-art systems, the additional office space would make the area more attractive to retain existing and attract new businesses, and help to strengthen Lower Manhattan's reputation as a major international economic center.

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TRAFFIC

The Proposed Action would have significant adverse traffic impacts at up to 18 of the 40 locations analyzed for 2009 conditions and up to 25 of the 40 locations in 2015. The vast majority of locations significantly affected by the Proposed Action could be mitigated with standard traffic capacity measures and engineering improvements, as described in Chapter 22, “Mitigation Measures.” However, in both 2009 and 2015 several intersections would be only partially mitigated or would remain unmitigated.

Partially mitigated or unmitigated intersections in the 2009 analysis year as a result of the Proposed Action are located at Route 9A and Vesey Street, Route 9A and the entrance to the Brooklyn Battery Tunnel, Route 9A and Chambers Street, and Canal and Hudson Streets. In 2015, a total of nine intersections are unmitigatable or would remain partially mitigated after implementation of standard traffic capacity measures. These include the four intersections mentioned above for 2009, in addition to several more along Route 9A and along Broadway.

In order to fully mitigate those impacts that could only be partially mitigated under the standard traffic capacity improvement measures and in order to mitigate those impacts that are considered unmitigated, additional areawide traffic management and improvement strategies are considered, as described in Chapter 22. Therefore, it is possible that one or more of the intersections identified as unmitigated or only partially mitigated could be significantly improved via these types of measures. However, it is assumed that several of these intersections would still remain unmitigated or only partially mitigated in the future as a result of the Proposed Action. These significant adverse traffic impacts are unavoidable given the unique requirements of the Proposed Action, which is located in a densely developed, urban setting.

PEDESTRIAN CONDITIONS

A number of crosswalks were identified with impacts in both 2009 and 2015 as a result of the Proposed Action. Of the *eight* crosswalks identified with impacts in 2009, *five* could be mitigated by widening the crosswalks. The other *three* crosswalks could not be fully mitigated but would be widened to a maximum of 20 feet to minimize the effect of the Proposed Action. Similarly, of the *13* crosswalks identified with impacts in 2015, *seven* could be mitigated by widening the crosswalks. The other *six* crosswalks that could not be fully mitigated would be widened to a maximum of 20 feet. However, even with these unmitigatable crosswalk impacts, pedestrians would be able to cross streets at the impacted crosswalk locations with slightly more congested conditions with little or no appreciable change in crossing time. These significant adverse pedestrian impacts are unavoidable given the unique requirements of the Proposed Action.

The Memorial and *Memorial Center* by themselves would attract millions of visitors annually, substantially increasing pedestrian activity at the Project Site and on surrounding streets. These visitors combined with new office workers, area residents, and additional users of the new cultural and open space amenities and retail shops developed as part of the Proposed Action, would help to meet one of the main purposes of the Proposed Action—to create a more lively environment and reestablish Lower Manhattan as a vibrant central business district.

CONSTRUCTION AIR QUALITY

As described in Chapter 22, “Mitigation Measures,” a number of measures will be employed to mitigate expected air quality impacts during the construction period. In particular, LMDC and the other sponsors of Lower Manhattan Recovery Projects would cooperate through the Lower Manhattan Construction Coordination group to mitigate such impacts to the maximum

degree feasible. Nevertheless, there would be a number of such impacts that would not be fully mitigated during the 2006 peak construction period and would, therefore, remain as unavoidable cumulative impacts of the Proposed Action and those other recovery projects, as noted in Chapter 22.

CONSTRUCTION NOISE

As a result of the ongoing construction activities from various projects during the peak construction year in 2006, significant noise impacts are unavoidable at receptor locations in the immediate vicinity of the Project Site. Due to the proximity of the Project Site to sensitive land uses (including residential land uses, parks and the Memorial) the concurrent construction of several large-scale projects within a small geographic area (WTC Memorial and Redevelopment, permanent WTC PATH Terminal, Route 9A, and Fulton Street Transit Center) and the extended duration of many construction activities, significant noise impacts during construction will be unavoidable. These impacts would occur for a considerable period of time—several years for the construction of the Memorial and Freedom Tower, and up to 10 years for the Towers 2, 3, 4, and 5 at the Project Site.

Chapter 22 presents information on potential measures considered to mitigate noise impacts. It should be noted that at several locations, existing ambient noise levels prior to September 11 were already above those specified in CEQR, FTA, and HUD impact criteria and continue to be so under existing conditions. Consequently, reducing construction noise to below such impact criteria levels would not be practicable because the construction noise would still be exceeded by the ambient noise levels. Finally, the dense urban setting with mixed uses makes developing and implementing cost-effective feasible mitigation measures a challenge.

Various mitigation strategies are being developed by LMDC in coordination with other sponsors of the other major Lower Manhattan Projects, including the Port Authority, MTA, and NYSDOT, the Net Lessee and key agencies, including HUD, FTA, NYSDEC, NYCDOT, NYCDEP, and Community Board 1. The basis for the strategies being developed is formed by the *Sustainable Design Guidelines* and the Environmental Performance Commitments (EPCs). Both provide measures for the Proposed Action that are designed to avoid, minimize and mitigate potential impacts.

E.24 GROWTH-INDUCING ASPECTS OF THE PROPOSED ACTION

The Proposed Action would provide for the construction of a WTC Memorial and memorial-related improvements, up to 10 million square feet of commercial office space, up to 1 million square feet of retail space, a hotel with up to 150,000 square feet of conference center facilities and up to 800 rooms, new open space areas, museum and cultural facilities, and certain infrastructure improvements. The Proposed Action would introduce a range of new uses to the Project Site, many of which existed prior to September 11, 2001, and all of which are traditional uses that have been central to the vitality and growth of Lower Manhattan, and the Financial District, in particular.

As discussed in Chapter 9, “Socioeconomic Conditions,” the Memorial and *Memorial Center* components alone are expected to generate a peak of 7 to 9 million visits in 2009, the first year of operation. This number would likely drop substantially to an estimated 5.5 million visits in 2015 when all components of the Proposed Action are complete. This new tourism generated by the redeveloped Project Site would generate new visits at other places of interest in Lower Manhattan, supporting area businesses and enlivening the neighborhoods surrounding the

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Project Site. By 2015, the Project Site would have an expected employee population of approximately 40,553, the vast majority of whom (36,800) would be office workers.

This substantial increase in new workers and visitors would likely encourage new development throughout neighborhoods surrounding the Project Site. The Proposed Action, coupled with existing financial incentives and other physical improvements planned for Lower Manhattan, would represent a clear signal to developers, residents, and commercial businesses that the city and state are committed to attracting and supporting new investments in Lower Manhattan. The Proposed Action could induce retailers to locate in close proximity to the Project Site to take advantage of the customers and traffic that would be generated by the Proposed Action. As a result, the Proposed Action would likely stimulate further growth and development throughout Lower Manhattan in addition to those projects already planned or proposed to be developed in the future independently of the Proposed Action.

The Proposed Action would have substantial positive effects on the neighborhoods surrounding the Project Site, reintroducing jobs, services, and amenities that were lost on September 11, 2001, and adding new cultural uses. As intended, the Proposed Action would eliminate the blighting effect of the largely vacant, inaccessible Project Site and transform the site into an appealing, mixed-use development that includes the Memorial and offers cultural, shopping, and open space amenities, and adds thousands of jobs to the Lower Manhattan business district. As discussed in Chapter 3, "Land Use and Public Policy," and Chapter 10, "Neighborhood Character," the proposed uses would be compatible with the surrounding area, and would be consistent with the goals and public policies for the area to create a major center of business, commerce, and culture, that is an attractive place to live, work, and visit. All of these benefits are likely to induce growth in the neighborhoods surrounding the Project Site, and significant development could occur throughout Lower Manhattan as a result of the Proposed Action.

E.25 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There are several resources, both natural and built, that would be expended in the construction and operation of the Proposed Action. These resources include the building materials used in construction of the project; energy in the form of natural gas, petroleum products, and electricity consumed during construction and operation of the building; and the human effort required to develop, construct, and operate various components of the project. They are considered irretrievably committed because their reuse for some other purpose than the project would be impossible or highly unlikely.

The Proposed Action constitutes an irreversible and irretrievable commitment of the site as a land resource, thereby rendering land use for other purposes infeasible. *

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