

17.1 INTRODUCTION

17.1.1 CONTEXT

A floodplain is part of an extensive drainage and filtration system and water cycle that serves to contain flood waters from storms. Floodplain areas are divided into two types: 100-year floodplains and 500-year floodplains. The 100-year floodplain, regulated by the Federal Emergency Management Agency (FEMA), is defined as areas that have a 1 percent chance of flooding each year due to storms; areas within the 500-year floodplain would have a 0.2 percent chance of a flood each year exceeding the base flood level. The 100-year floodplain is usually characterized by dry land, but has the potential of being covered with flood water.

Portions of the Project Site *totaling approximately 4 acres* are located within the 100-year floodplain demarcated by FEMA's Flood Insurance Rate Map (FIRM), including:

- Approximately 3 acres of the western portion of the WTC Site located within the excavated "bathtub," an area bounded by Liberty Street, No. 1/9 IRT subway line (Greenwich Street extension), Vesey Street, and Route 9A; *and*
- *Approximately 0.7 acres* of the Southern Site, including the block bounded by Route 9A, and Liberty, Washington, and Cedar Streets, the portion of Liberty Street between Route 9A and Washington Street and *the portion of Washington Street right-of-way* between Liberty and Cedar Streets.

The Hudson River pump station, *which is approximately 0.3 acres in size*, and associated cooling water intake and outfall structures are also located within the floodplain (see Figure 17-1).

An examination of FEMA's FIRM indicates that the Project Site is not located in a floodway. A floodway is the channel of the river that must be kept free of encroachment so that floods can be carried without substantial increases in flood heights.

This chapter addresses potential impacts of the Proposed Action to the 100-year floodplain and its ability to contain water during a 100-year flood.

17.1.2 CONCLUSIONS

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, there would be no significant impacts from activities situated in the floodplain.

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

World Trade Center Memorial and Redevelopment Plan GEIS

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 in 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.

17.2 METHODOLOGY

17.2.1 ANALYSIS SCENARIOS AND YEARS

As discussed in Chapter 2, “Methodology,” this *GEIS* evaluates 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 would 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 would be completed.

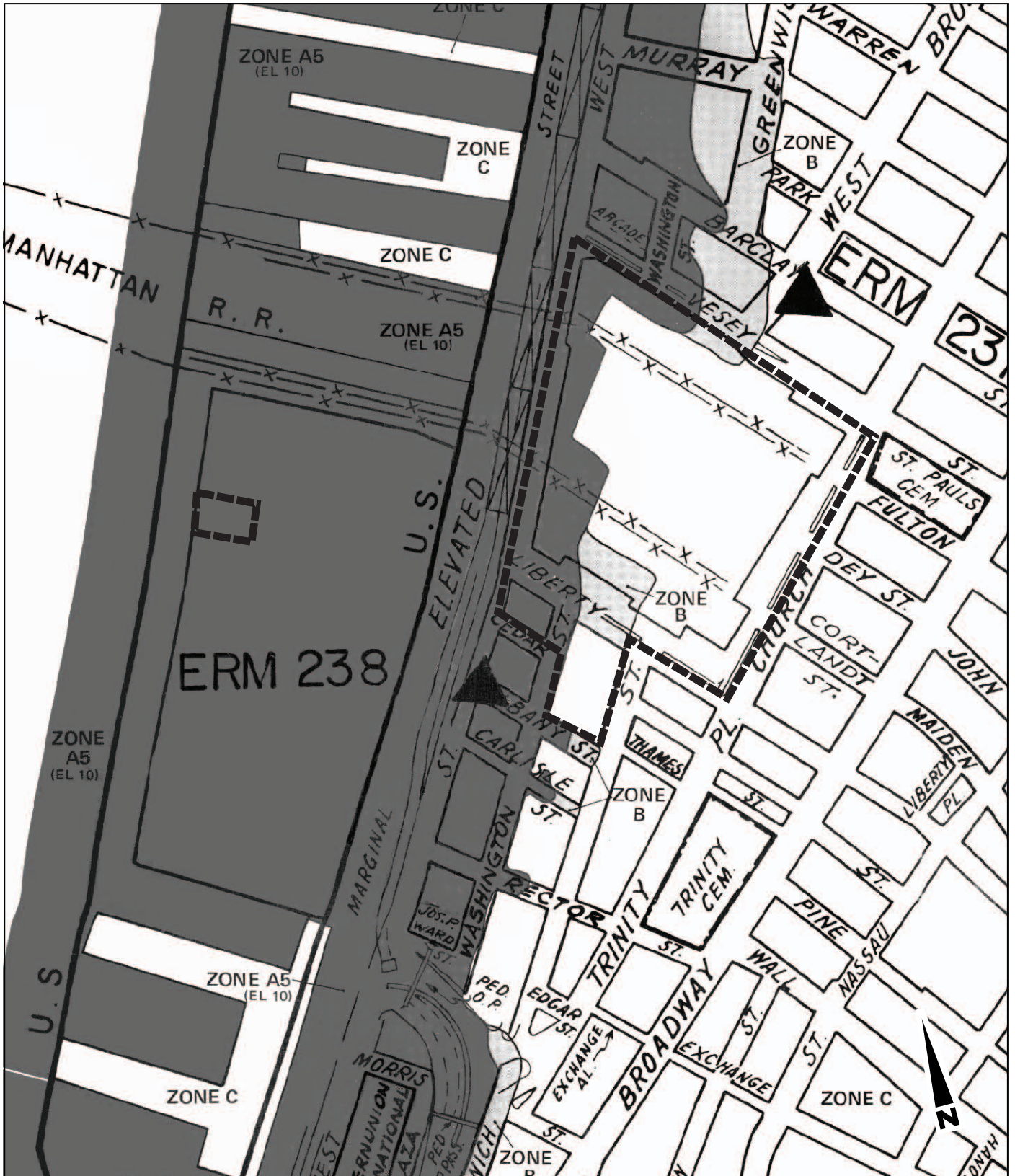
For this chapter, the analysis involves identifying the floodplain according to a detailed map of the area, determining the applicable policies of flood control for new construction and prevention of structural erosion at the Project Site, and evaluating the potential effects of the Proposed Action on the floodplain area.

17.2.2 RELEVANT POLICIES AND REGULATIONS

The United States Department of Housing and Urban Development (HUD), in conjunction with Executive Order (EO) 11988, defines the term floodplain to mean “lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year.”¹ The New York State Department of Environmental Conservation (NYSDEC) defines a flood hazard area as “the land in the floodplain within a city, town or village subject to a 1 percent or greater chance of flooding in any human year.”² The floodplain area is delineated in Figure 17-1.

¹ Executive Order 11988, Floodplain Management, Section 6, May 24, 1977, from HUD website, www.hud.gov:80/offices/cpd/energyenviron/environment/lawsandregs/laws/lawsauthorities/eo/11988.cfm. See also 24 CFR § 55.2(a).

² 6 NYCRR § 502.2(k).



- Project Site
- 100- Year Floodplain (by detailed methods)
- 500- Year Floodplain



NOTE: The paper Flood Insurance Rate Map (FIRM) is FEMA's official document.

Executive Order 11988 and its implementing regulations, 24 CFR Part 55, require federal agencies to consider alternatives to avoid adverse effects and incompatible development in the floodplains. 24 CFR Part 55, “Floodplain Management,” establishes an eight-step process to evaluate the potential effects of any action in a floodplain, including minimizing a proposed action’s impact on floodplains and examining practicable alternatives.¹ HUD’s eight step process includes: determining whether the proposed action is located in a 100-year floodplain; notifying the public at the earliest possible time of a proposal to consider an action in a floodplain; identifying and evaluating practicable alternatives; identifying the potential direct and indirect impacts; designing or modifying the proposed action to minimize the potential adverse impacts by reevaluating the proposed action; publishing a final notice; and implementing the proposed action.

New York Code of Rules and Regulations also require an alternatives analysis. Any projects constructed within the flood hazard area must be consistent with the need to minimize flood damage, and no project can be undertaken until “it is demonstrated that the cumulative effect of the proposed project, when combined with all existing development, will not cause any material flood damage to such existing development.” Certain uses, such as bulk storage of chemicals, large institutional uses, and human habitation, are also prohibited in a flood hazard area due to evacuation concerns.

17.3 CURRENT CONDITIONS SCENARIO

17.3.1 EXISTING CONDITIONS 2003

The WTC Site is currently vacant except for the temporary WTC PATH station (including tunnels, tracks, platform, and entrance) and the No. 1/9 IRT subway line. Except for the temporary WTC PATH station, the WTC Site is currently fenced and there is no public access. The bathtub area located on the western side of the WTC Site has been excavated to approximately 70 feet below street level with a concrete slab foundation. The bathtub walls and concrete slab prevent groundwater inundation of the site at its lowest level.

The eastern side of the WTC Site ranges in depth from street level to approximately 35 feet below street level. Portions of the area on the eastern side are unpaved, with some areas covered by structural elements of the former 4 WTC, 5 WTC, concourse, and Austin J. Tobin Plaza (Tobin Plaza). The northeastern portion of the site is the location of the Port Authority of New York and New Jersey’s (the Port Authority) temporary WTC PATH station, mezzanine, and entry area along Church Street.

Water retention mechanisms within the bathtub currently consist of sump pumps in place prior to September 11 and additional pumps in place to minimize water on the site. Flood protection mechanisms in place include flood protection walls constructed by the Port Authority. At the present time, flood control currently includes the supplemented use of manually sandbagging existing truck ramps in the event of the 100-year flood.

The Southern Site block bounded by Route 9A and Cedar, Liberty, and Washington Streets is a paved construction staging and vehicle parking area at street level. The Southern Site block

¹ 24 CFR § 55.20(c and f).

World Trade Center Memorial and Redevelopment Plan GEIS

bounded by Washington (extension), Liberty, Church, and Cedar Streets consists of a vacant building on the southern portion and a partially excavated unpaved site on the northern portion.

Surface water flows onto and off the Southern Site block, Route 9A, and Cedar, Liberty, and Washington Streets. No flood control mechanisms currently exist on site. Given its slightly higher elevation than adjacent public streets and the WTC Site, surface water tends to run off site.

All public streets that are a part of the Project Site, including Liberty, Church, Greenwich, Cedar, Albany, and Washington Streets and Route 9A, are at street level and have been paved with slight crowns to allow for stormwater discharge into the city's stormwater system. The drainage system in place also serves as its flood control system.

17.3.2 FUTURE WITHOUT THE PROPOSED ACTION 2009—CURRENT CONDITIONS SCENARIO

In 2009 without the Proposed Action, it is assumed for analysis purposes that the WTC Site would remain vacant, with no development on the site except for the permanent WTC PATH Terminal and the continuation of the No. 1/9 IRT subway lines bisecting the WTC Site in a north-south direction. The temporary WTC PATH station is expected to be replaced by the permanent WTC PATH Terminal by the end of 2008. The WTC Site would have the same conditions except for the placement of the permanent terminal building on the central eastern portion of the WTC Site outside the 100-year floodplain. (As a separate action by the Port Authority, the slurry walls in the bathtub would have been rehabilitated and repaired as necessary for the permanent WTC PATH Terminal.) Therefore, there would be no new significant impacts from activities situated in the floodplain, nor would there be an increase in flooding from surface water or groundwater from and onto other surrounding areas. The water retention and flood control characteristics would remain unchanged from current conditions.

The Southern Site block bounded by Liberty, Route 9A, Cedar, and Washington Streets would have the potential to be redeveloped with an office building, with the remainder of the site consisting of paved areas. The 130 Liberty Street block, currently consisting of a vacant building on the southern portion and a partially excavated unpaved area on the northern portion, is assumed to be under construction with a similar building and paved public plaza in this analysis year 2009. Under this scenario, all public streets that are a part of the Project Site, including Liberty, Church, Greenwich, Cedar, Albany, and Washington Streets and Route 9A, would remain at street level.

Therefore, the 2009 without the Proposed Action scenario for the Southern Site would be very similar to current conditions in terms of floodplain management: *the* Site in both scenarios would have the same amount of impervious surfaces. The water retention and flood control characteristics would remain unchanged from current conditions.

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

In 2009, with the Proposed Action, the Memorial, *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 and open space areas, including Wedge of Light Plaza, *the*

PATH Plaza, and Liberty Park, would be complete (see Table 2-1 in Chapter 2, “Methodology”). The sub-grade levels across the Project Site would have been developed as well as the two surface streets, Fulton and Greenwich Streets, and the open spaces. The developed areas would include approximately 10 acres of impervious surfaces, including new Fulton and Greenwich Streets at street level. All developed areas, including public surface streets, would be constructed with appropriate storm drainage systems connected to the city’s stormwater drainage system. Such measures may include the use of stormwater on site as part of a gray water system, as contemplated by the *Sustainable Design Guidelines* in Chapter 1, “Project Description,” and Chapter 12, “Infrastructure” (see current draft in Appendix A).

The Memorial and Liberty Park would be located within the floodplain portion of the WTC Site. While the Memorial may include structures within the 4.19-acre area, it is anticipated that the vast majority of the Memorial, as well as Liberty Park, would consist of pervious surfaces and appropriate drainage systems. The Freedom Tower and performing arts facility proposed for the northwestern portion of the WTC Site would replace existing below-grade remnants of 6 WTC. Water retention and flood control characteristics of adjacent areas within and outside of the floodplain would not change due, in part, to the Memorial. In addition, the Proposed Action would not encourage or support any incompatible development in the area, such as an increase in impervious surfaces in the vicinity of the Project Site.

Alternatives were also considered and evaluated for areas of the Project Site that are located within the floodplain. However, the rebuilding of the WTC Site as a mixed-use center of commerce, public spaces, and culture with a Memorial at its heart would remember and honor the victims of the terrorist attacks while revitalizing Lower Manhattan.

It is anticipated that the Southern Site block would consist of the rebuilt St. Nicholas *Greek Orthodox Church, taking up* approximately a quarter of the Southern Site block. The remainder of the block would consist of the proposed Liberty Park, thus decreasing the impervious surfaces on the block and transforming it into a grass-covered open space with all improvements occurring below grade. No increase in flood levels on the block or adjacent areas is anticipated. The Proposed Action would not result in significant harm to the floodplain and would advance the goals of the project.

17.3.4 FUTURE WITHOUT THE PROPOSED ACTION 2015—CURRENT CONDITIONS SCENARIO

It is assumed that the WTC Site would remain vacant and represent the same conditions as in the year 2009. The permanent WTC PATH Terminal project would include the expansion of PATH platforms and mezzanine and concourse pedestrian connection areas, a portion of which would be located within the 100-year floodplain.

No increase in flooding is expected within the WTC Site or in surrounding areas. Both blocks of the Southern Site would be redeveloped with office buildings flanking Washington Street. *This* development is *not* anticipated to materially change the floodplain and flooding conditions on the Project Site.

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

In 2015 with the Proposed Action, it is assumed that the remaining elements of the Proposed Action would be completed on the WTC Site and the *Southern Site*, including the development of Towers 2, 3, 4, and 5, as well as the hotel. Between 2009 and 2015, conditions as they pertain to the floodplain would not change.

17.4 PRE-SEPTEMBER 11 SCENARIO

17.4.1 BASELINE CONDITIONS

The WTC Site consisted of One and Two World Trade Center, two 9-story buildings (4 and 5 WTC), an 8-story United States Customs House (6 WTC), and a hotel (3 WTC) that surrounded Tobin Plaza. Directly below Tobin Plaza was the Concourse, consisting of a retail mall and transportation hub. All told, over 10 million square feet of office space were located on the WTC Site. The WTC Site also included approximately 400,000 square feet of above-grade, at-grade, and below-grade retail space. Only the former hotel on the southwestern portion of the WTC Site and western portions of Tobin Plaza, both consisting entirely of impervious surfaces, were sited within the floodplain.

The pre-September 11 PATH terminal (including tunnels, tracks, platform, and concourses) also existed in this scenario. Only the tunnels and western portion of the tracks were located within the floodplain.

The Pre-September 11 Scenario also included the St. Nicholas Greek Orthodox Church and a paved parking lot on the Southern Site block bounded by Route 9A and Liberty, Washington (extension), and Cedar Streets, both of which were in the floodplain. The 130 Liberty building and plaza located on the Southern Site block bounded by Washington, Liberty, Church, and Cedar Streets existed pre-September 11 but were not located within the floodplain.

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

With the Pre-September 11 Scenario, it is assumed that the WTC complex comprising the Twin Towers and related buildings would be in place in 2009 and be as active as it was in 2001, prior to September 11. It would contain 10 million square feet of office space, 400,000 square feet of retail space, a 22-story, 820-room hotel, and large public plaza areas. In addition, the pre-September 11 PATH Terminal would continue to operate.

On the Southern Site, 130 Liberty Street is assumed to be an occupied office building with plaza areas and ground-level retail. The block to the west is assumed to remain a parking lot with a small church facing south on Cedar Street.

As a result, it is anticipated that there would be no adverse impacts to the floodplain as there would be no new construction. Therefore, there would be no additional impacts from activities situated in the floodplain, nor would there be an increase in flooding in other surrounding areas.

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

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

In 2009, it is assumed that the Memorial, *Memorial Center*, and cultural facilities would be complete in the southwest quadrant of the WTC Site; Freedom Tower and the performing arts center would be complete in the northwest quadrant; and on the northeast and southeast quadrants the retail uses would be complete. The sub-grade levels across the entire site would have been developed, as well as the two surface streets, *Fulton* and *Greenwich Streets*, and the open spaces. The developed areas would include the replacement of approximately 10 acres of impervious surfaces, including new *Fulton* and *Greenwich Streets* at street level.

An analysis to comply with both 24 CFR Part 55 and 6 NYCRR Part 502, and similar to that conducted in section 17.3.3, is applied for this scenario. The analysis determined that portions of the Proposed Action were located within the 100-year floodplain, including the western portion of the WTC Site *and* a portion of the Southern Site.

Portions of the proposed Memorial and Liberty Park would be located within the floodplain portion of the WTC Site. While the Memorial may include structures within the 4.4-acre area, it is anticipated that a vast majority of the Memorial, as well as Liberty Park, would consist of pervious surfaces and appropriate drainage systems. The Freedom Tower and performing arts center would redevelop the northwest portion of the WTC Site with impervious surfaces at grade. As a result, water retention and flood control characteristics of adjacent areas within and outside of the floodplain would be very similar to site characteristics that existed pre-September 11. In addition, the Proposed Action would not increase the amount of impervious surfaces to the project area or vicinity.

Alternatives to siting program elements within the floodplain were also considered and evaluated for elements of the Proposed Action that are located within the floodplain. Siting the Memorial, cultural uses and the Freedom Tower elsewhere within the WTC Site would not meet the project goals of balancing a mixture of uses on the site. Chapter 23, “Alternatives,” identifies and evaluates potential alternatives to the Proposed Action.

It is noted that the Freedom Tower and performing arts facility would only replace previously existing uses and would not have impacts upon flooding conditions at the site or within the area. The engineering designs for the Freedom Tower and performing arts facility are in the preliminary engineering stages. As this effort progresses, hazard mitigation and reduction methods, if necessary, would be identified for the Project Site using civil and structural engineering and construction solutions.

For the Southern Site block, it is expected that other than the existing *St. Nicholas Greek Orthodox Church*, the proposed Liberty Park would decrease the impervious surfaces on site by transforming the site into a grass covered open space with all improvements occurring below grade. No increase in flood levels on the Project Site or adjacent areas are anticipated. The Proposed Action would not result in significant harm to the floodplain as compared with pre-September 11 conditions.

In 2009 with the Proposed Action, it is anticipated that there would be no adverse impacts to the floodplain, as new construction would replace what existed pre-September 11. Therefore, there would be no additional significant impacts from activities situated in the floodplain, nor would

World Trade Center Memorial and Redevelopment Plan GEIS

there be an increase in flooding in other surrounding areas. The water retention and flood control characteristics would remain unchanged from pre-September 11 conditions. In addition, the Proposed Action would not encourage or support any incompatible development in the area due to independent market forces and the decision-making abilities of owners of individual private and public properties in the area.

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

In this scenario, it is assumed that the Southern Site block of 140 Liberty Street would be developed with a commercial office building. There would be no change in the amount of impervious surfaces on the Project Site, including the Southern Site block. All other conditions would be the same as described in section 17.4.2, “Future Without the Proposed Action 2009.” Under this scenario of pre-September 11 conditions, the former WTC complex would still be in place.

As a result, it is anticipated that there would be no adverse impacts to the floodplain, as new construction would only replace existing impervious surfaces. There would be no additional significant impacts from activities situated in the floodplain or an increase in flooding in other surrounding areas.

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

This analysis compares conditions with the Proposed Action in 2015 to conditions in the future without the Proposed Action based on the Pre-September 11 Scenario.

In 2015 with the Proposed Action, it is assumed that the remaining elements of the Proposed Action would be completed on the WTC Site and the Southern Site including the development of Towers 2, 3, 4, and 5 as well as the hotel. While there would be 7.2 million square feet of office space in addition to the 2.6 million square feet built by 2009, the construction of the four new towers would utilize footprints and foundations already in place when the subgrade and retail areas were completed in 2009. As a result, there would be no significant adverse impact on the floodplain or increase in flooding in other surrounding areas. The water retention and flood control characteristics would remain unchanged from Pre-September 11 Scenario. In addition, the Proposed Action would not encourage or support any incompatible development in the area.

17.5 HUD FLOODPLAIN COMPLIANCE

The analyses provided in this document complies with the floodplain management analyses required under 24 CFR Part 55 (and 6 NYCRR Part 502). This section summarizes the steps taken to reach the conclusion that no significant adverse impacts to the floodplain would result from the Proposed Action.

The analysis determined that portions of the Proposed Site are located within the 100-year floodplain, including the western portion of the WTC Site; a part of the Southern Site block bounded by Route 9A and Liberty, Washington (extension), and Cedar Streets; and the Hudson River pump station and associated intake and outfall structures.

Public notification of plans to construct in a floodplain occurred with the release of the DGEIS to the public and the publishing of a public notice. A copy of the public notice is included in Volume 3.

Practicable site alternatives have been evaluated and been determined not to satisfy the Proposed Action's purpose and need of siting and constructing a WTC Memorial on the WTC Site to commemorate the events of September 11, 2001, and February 26, 1993. Because the locational aspect of the event is paramount to the Memorial itself, relocating the WTC Memorial is not practicable. Further, the analyses find that no mitigation is required because the Proposed Action would not exacerbate flooding conditions within the floodplain, or increase severe flooding or flood risks to adjacent properties within and outside of the floodplain. Because no significant impacts were determined within the WTC Site, Southern Site block (bounded by Route 9A and Liberty, Washington (extension), and Cedar Streets), Liberty Street, and Washington Street, technological alternatives or hazard mitigation measures are not required. Best management practices for storm drainage, however, would be incorporated into the Proposed Action.

*The Proposed Action has been reevaluated in accordance with 24 CFR Part 55. LMDC has determined that 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, there would be no significant adverse impacts from activity situated in the floodplain. While LMDC has evaluated a wide range of alternatives (see Chapter 23), LMDC has determined that there is no practicable alternative that would provide a mixed-use site that includes a Memorial to honor the victims of the terrorist attacks while also reestablishing the Project Site as a locus of commerce, cultural space, and amenities. **