Chapter 8: Hazardous Materials

A. INTRODUCTION

This chapter addresses the potential for the presence of hazardous materials at the project site resulting from previous and existing uses both on-site and in the surrounding area, and the potential risks related to the proposed project with respect to any such hazardous materials.

As described in Chapter 1, "Project Description," the American Museum of Natural History (AMNH or the Museum) is proposing the construction of a new building, the Richard Gilder Center for Science, Education, and Innovation (the Gilder Center). The Gilder Center would be an approximately 203,000-gross-square-foot (gsf) addition on the west side of the Museum complex facing Columbus Avenue.

The new construction would entail subsurface disturbance for a new basement level and foundation elements to an approximate depth of 15 feet below grade, and limited shallow disturbance to an approximately 75,000-square foot (sf) outdoor portion of the project site for new landscaping and walkways.

The potential for hazardous materials to be encountered during proposed project demolition and construction work was evaluated based on a *Phase I Environmental Site Assessment* (ESA) prepared by AKRF, dated November 2016 (see **Appendix E-1**). For purposes of the Phase I report, the project site was conservatively defined (i.e., it examined an area larger than that expected to be disturbed by the proposed project) to consist of portions of the Museum comprising Sections 1, 7A, 8, 11, 11A, 11B, 15, 15A, 16, and 17, Weston Pavilion, the exterior yard and service yard, below-grade space, and an approximately 200,000-sf portion of Theodore Roosevelt Park, which surrounds the Museum. Following the completion of the Phase I assessment, a Subsurface (Phase II) Investigation Sampling Protocol and Health and Safety Plan were drafted, and approved by the New York City Department of Environmental Protection (NYCDEP) (see **Appendix E-2**). The subsurface investigation was conducted in accordance with the approved work plan in March 2017 and summarized in a Subsurface (Phase II) Investigation Report, dated April 2017, updated July 2017 (see **Appendix E-3**). The findings of the Phase II were used to establish construction and post-construction measures to be implemented as part of the proposed project. These measures were documented in a NYCDEP-approved Remedial Action Plan (RAP) and associated Construction Health and Safety Plan (CHASP) (see **Appendix E-4**), which would govern the applicable remedial measures during project construction.

PRINCIPAL CONCLUSIONS

The findings and conclusions of the Phase I and Phase II investigations revealed site conditions that are similar in type and extent of contaminants to many urban areas, including throughout Manhattan. The proposed project would have no known risks with respect to hazardous materials that cannot be controlled through the use of ~~the~~ measures commonly used at construction sites throughout New York City and further described in the RAP and summarized below. These

measures would be implemented prior to, during, and following construction of the proposed project to control or avoid the potential for human or environmental exposure to known or unexpectedly encountered hazardous materials. These measures are also consistent with those that are used to effectively protect human health and the environment at many sites, including sites where contamination types and extent are greater than those identified at the project site.

~~As part of the environmental review process for the proposed project and based on the findings of the Phase I ESA, a Subsurface (Phase II) Investigation was performed in accordance with the NYCDEP-approved work plan to assess subsurface conditions at the project site.~~

~~The Phase II investigation included the collection of soil, groundwater, and soil vapor samples for laboratory analysis, the results of which would be used to establish construction and post-construction measures to be implemented as part of the proposed project. The measures, including pre-construction ACM surveys; soil stockpiling, soil disposal and transportation measures; dust control; contingency measures if additional petroleum storage tanks or other contamination should be unexpectedly encountered; and a minimum two foot clean fill buffer in any landscaped or uncapped areas, would be documented in a NYCDEP-approved Remedial Action Plan (RAP) and associated Construction Health and Safety Plan (CHASP), which would be implemented during project construction.~~

B. EXISTING CONDITIONS

SUBSURFACE CONDITIONS

The project site lies at an elevation of approximately 85 to 90 feet above the North American Vertical Datum (NAVD) of 1988 (an approximation of mean sea level), and generally slopes slightly down to the south-southwest towards the Hudson River. Local topography in portions of Theodore Roosevelt Park slopes towards the east, as was observed during the Phase II investigation. Based on USGS mapping, depth to bedrock in the vicinity of the project site is anticipated to be highly variable (approximately 5 to 35 feet below grade). During the Phase II investigation, evidence of weathered bedrock was observed as shallow as 2 to 3 feet below existing grade (relative to the landscaped area). A Final Environmental Impact Statement (FEIS) for the Planetarium and Northside Project, prepared by AKRF in September 1996, indicated that a subsurface investigation in the northern portion of Theodore Roosevelt Park encountered fill materials throughout the investigated area. Similarly, fill materials may be present beneath the project site. No significant evidence of subsurface contamination was identified in the September 1996 investigation.

The 1996 FEIS indicated that groundwater was encountered between approximately 20 to 30 feet below grade. During the 2017 Phase II investigation, groundwater was encountered at depths ranging from 18 to 23 feet below existing grade (relative to the landscaped areas). Though the local topography noticed in the landscaped area may indicate that groundwater at the Museum might flow towards the east, groundwater in the greater area surrounding the project site is anticipated to flow in a southwesterly direction toward the Hudson River (approximately 3,200 feet west of the project site). Actual water table depth and groundwater flow direction can be affected by many factors including the A/B/C/D Line subway tunnels approximately 450 feet east of the project site (adjacent to the Museum superblock beneath Central Park West), other subsurface features or obstructions such as basements or utilities, and other factors beyond the scope of this assessment. Groundwater in Manhattan is not used as a source of potable water.

HAZARDOUS MATERIALS ASSESSMENT

PHASE I ENVIRONMENTAL SITE ASSESSMENT

The Phase I ESA was conducted in conformance with ASTM Standard E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*. The scope of the Phase I ESA included a reconnaissance of the project site and surrounding area and review of a variety of information sources, including recent and historical Sanborn fire insurance maps, environmental regulatory agency databases identifying state and federally listed sites, and previous reports. The Phase I ESA was reviewed and approved by NYCDEP on February 27, 2017. See **Appendix E-6** for NYCDEP correspondence.

The project site buildings were constructed between 1902 and 2000 as part of Museum expansions, and have been used historically for exhibition, research, and educational purposes and service functions associated with the Museum.

The following ~~findings~~ Recognized Environmental Conditions (RECs)[1] were identified as part of the Phase I ESA:

- Historic and/or current hazardous material storage and use at the project site ~~that might represent environmental concerns,~~ which were further investigated in the Subsurface (Phase II) Investigation included:

  Section 16—One 1,080-gallon diesel fuel oil aboveground storage tank (AST) located within an epoxy-coated room with secondary containment berm (i.e., a low concrete berm constructed around the perimeter of the tank);

  Section 17—One empty 250-gallon parts washer tank formerly containing trichloroethylene (TCE) (which was formerly used to remove lipids and fats from vertebrate zoology specimens), and a 500-gallon double-wall AST day tank located on the first floor (associated with the AST located in Section 16); and

  Exterior yard—Approximately 17 drums (up to 55 gallons) of ethanol, isopropanol, research space waste, and diesel in secured chemical storage sheds. Chemical storage sheds included secondary containment systems, and are regularly inspected to prevent spillage. Floor drains noted in the exterior yard and other areas throughout the project site were reported to be connected to the municipal sewer system but were in good condition with no evidence of releases or spills.

  Regulatory databases identified the Museum as a small quantity generator (SQG) of hazardous waste from 2005 to 2016, and historical large quantity generator (LQG) of hazardous waste from 1984 to 2005. Chemical waste was disposed of off-site in accordance with applicable regulations by Clean Harbors, a permitted chemical waste hauler. The chemical storage areas are New York City Fire Department (FDNY)-permitted, with no evidence of a release noted on or concerning the project site.

  The Museum is registered in the New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage (PBS) database with three ASTs and one underground storage tank (UST). Two of these ASTs are located at the project site. The on-site storage tank controls, including secondary containment in the form of curbs or double-

[1] RECs – Recognized Environmental Concerns, as defined in ASTM 1527-13.

wall construction, interstitial alarms, high level alarms and BMS management were noted with no evidence of a release on or concerning the project site.

- As noted above, the project site buildings were constructed for Museum exhibition, research, educational, and maintenance purposes. Other historical uses of the project site included Section 17 (the Power House) as a coal-fired electric power plant and Section 15 as an auto house (i.e., garage) and power house. During the reconnaissance, no evidence of coal storage or residue was observed and there is, therefore, no present information indicating that the Project is expected to be complicated by the former presence of the power house and auto house uses.
- Due to the former and current use and storage of chemicals at the project site, a potential for subsurface vapor intrusion may exist (this potential is addressed in the Phase II findings discussed further below).

The following additional ~~findings~~*De Minimis* Conditions[2], which are not considered ~~significant environmental concern~~RECs, were identified as part of the Phase I ESA:

- Arsenic-preserved hide storage was noted in dedicated areas on the fifth floor of Section 1, and on the third floor of Section 7A. Arsenic preservation was a common preservation technique for natural history collections used between approximately 1930 and 1990. Preserved hides were stored in designated cabinets.
- The chemical storage area in Section 8 was noted on the fifth floor in an FDNY-permitted room with a secondary containment berm. Chemicals stored included 1 liter to 5 gallons in volume, of 1-butanol, ethyl alcohol, toluene, and other specimen preservation-related solvents, with no record of historic release.
- Chemical storage was noted in Section 11B on the fourth floor and Lower Level and included nitrate film negatives and acetate film roll storage.
- Chemical storage noted in Section 15 in the Ichthyology collections included approximately 300,000 small jars (up to five gallons) of specimens preserved in ethanol or isopropanol, large containers and drums (up to 55 gallons) of ethanol used for specimen preservation, and other containers (generally 15 gallons or less) of organic solvents, and solvent wastes, with no record of historic release.
- Additional chemical storage noted in Section 17 included small containers (up to one gallon) of polyester resins, spray paints, and acids in the exhibition production shop on the fifth floor, with no record of historic release.
- Additional chemical storage noted in the exterior yard included 55-gallon drums of food oil waste, and liquid nitrogen in a 3,000-gallon AST, with no record of historic release.
- A proposed 30,000-gallon UST was shown on 1962 engineering plans for Section 17. However, no documentation of the UST installation was found. Museum representatives do not believe the tank was installed, and the Museum was reported to have converted from coal to Consolidated Edison steam as a heating source around the time the plans were prepared; thus, it appears the proposed UST was never installed.

[2] *De Minimis* Conditions, as defined in ASTM 1527-13.

- One closed-in-place 1,080-gallon double-wall UST with interstitial monitoring and high-level alarm was identified in the exterior yard. This UST was associated with the former 50-gallon day tank AST identified in Section 1.
- The following petroleum storage tanks were located in Museum areas outside of the Phase I study site boundary: one in-service 6,000-gallon double-wall fiberglass reinforced plastic UST and one in-service 200-gallon double-wall AST, both containing diesel fuel and supplying an emergency generator. These tanks were located in a courtyard in the southwestern portion of the Museum. Based on a physical inspection and records review, there was no evidence of current or historic releases, including odors, staining, or spills.
- Based on the age of the Museum and prior subsurface investigations which identified historic fill in the northern portion of Theodore Roosevelt Park, historic fill materials may be present beneath the project site.

The following additional items[3] were identified as part of the Phase I ESA. Provided that the Museum continues to manage these items in accordance with applicable regulatory requirements, the following are not considered significant concerns:

- Based on the age of the Museum, asbestos-containing materials (ACM) may be present. Suspect ACM observed during the reconnaissance included: window glazing and caulking, drywall, plaster, vinyl floor tiles and associated mastic, ceramic tile mastic, suspended ceiling tiles, ventilation duct and thermal pipe insulation, and spray-on fireproofing, generally noted to be in good condition with the exception of surfaces within a former shooting range (below grade, located west-adjacent to the Museum within Theodore Roosevelt Park) and some stairway walls within Section 1. Museum representatives stated that the project site buildings had been surveyed for asbestos and an asbestos management plan was in place. Various abatement activities have been conducted as part of renovations and expansions, and reassessments are conducted prior to any construction activities.
- Based on the age of the Museum, lead-based paint may be present in any areas which were not recently renovated. Painted surfaces were generally noted to be in good condition with the exception of surfaces within a below-grade former shooting range and some stairway walls within Section 1.
- Based on the age of the Museum, any window caulking, electrical equipment, hydraulic equipment, or fluorescent lighting fixtures installed prior to 1979 may contain polychlorinated biphenyls (PCBs). Any fluorescent bulbs and switches may also contain mercury. No obvious leaks or odors were observed in connection with observed equipment or lighting fixtures in viewed accessible areas.

SUBSURFACE (PHASE II) INVESTIGATION

The scope of the Phase II investigation was established in AKRF's Subsurface (Phase II) Investigation Sampling Protocol and Health and Safety Plan, dated February 2017, based on the findings of AKRF's November 2016 Phase I ESA. The scope included the collection of soil, groundwater, and soil vapor samples for laboratory analysis in specific and representative areas of the project site, including locations biased towards areas of potential concern identified as part of the Phase I ESA, such as fuel oil storage, and waste handling and storage areas. On February

[3] Non-Scope Considerations, as defined in ASTM 1527-13.

27, 2017, NYCDEP issued an approval letter for the Subsurface (Phase II) Investigation Sampling Protocol and Health and Safety Plan. The findings of the Phase II investigation were summarized in the Subsurface (Phase II) Investigation Report (see **Appendix E-3**), which was reviewed and approved by NYCDEP on August 29, 2017. See **Appendix E-6** for NYCDEP correspondence.

The Phase II field activities were conducted between March 23 and 30, 2017, and included a geophysical survey, and the advancement of ten (10) soil borings, five (5) temporary groundwater monitoring wells, and seven (7) soil vapor points with the collection and laboratory analysis of soil, groundwater, and soil vapor samples, as described in the Subsurface (Phase II) Investigation Report. Soil sample laboratory analytical results were compared to the NYSDEC 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 Soil Cleanup Objectives (SCOs) for Restricted Residential use (RRSCOs) and Commercial use (CSCOs). Groundwater sample laboratory analytical results were compared to the NYSDEC Technical and Operational Guidance Series (1.1.1): Class GA Ambient Water Quality Standards and Guidance Values (AWQS), including Type E aesthetic standards for protection of freshwaters. Soil vapor laboratory analytical results were compared to the New York State Department of Health (NYSDOH) Air Guidance Values (AGVs) for indoor air quality of the *Final Guidance for Evaluation Soil Vapor Intrusion in the State of New York*, dated October 2006, as revised in the September 2013 and August 2015 fact sheets for tetrachloroethylene (PCE) and trichloroethylene (TCE).

The following findings were identified as part of the Phase II Investigation:

- The geophysical survey did not identify subsurface anomalies to indicate the presence of undocumented USTs.
- Brown fine sand and silt, with some clay was observed from grade surface to the terminus of each boring (between 18 and 25 feet below existing grade relative to the landscaped area). Weathered bedrock was interspersed throughout the sand and silt layer, starting as shallow as 2 feet below existing grade (relative to the grade of the landscaped area).
- During field screening of soil samples, PID readings ranging from approximately 1 to 12 parts per million (ppm) were noted in three soil borings. Soil samples were biased toward intervals with PID detections. No petroleum-like odors, sheens, staining, or other potential signs of soil contamination were observed during the Phase II investigation.
- No volatile organic compounds (VOCs) were detected in soil samples above their respective NYSDEC Part 375 RRSCOs or CSCOs. A trace TCE detection was identified at sample location SB-6 at a depth between 0 and 1 feet below grade. TCE was not detected in any other soil samples. These findings are not indicative of on-site TCE contamination of significance.
- Multiple semivolatile organic compounds (SVOCs), primarily comprising polycyclic aromatic hydrocarbons (PAHs), were detected in 14 of 18 soil samples. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected at concentrations above their respective RRSCOs in soil sample SB-1(1-2)-170329, with the benzo(a)pyrene detection above the CSCO as well. The exceedances were not significantly above the RRSCOs and CSCOs and were at concentrations typical of soil at many urban sites, including throughout Manhattan. These detections ~~would be~~are addressed by the provisions specified in the RAP.

- No metals, PCBs, or pesticides were detected in soil samples above their respective RRSCOs and CSCOs. Metals detections were at concentrations typical of soil at many urban sites, including throughout Manhattan. Pesticides were detected at sampling locations in landscaped areas of the Park, making it likely that the low pesticide detections were attributable to grounds keeping activities. These detections ~~would be~~are addressed by the provisions specified in the RAP.
- Groundwater was observed between approximately 19 and 24 feet below existing grade (relative to the landscaped area) and, based on the presence of weathered bedrock in soil borings, may be attributed to a perched water table. No odors, sheens, or other potential signs of groundwater contamination were observed during the Phase II investigation.
- PCE and cis-1,2-dichloroethylene (cis-1,2-DCE) were detected in one groundwater sample at concentrations slightly above their respective Class GA AWQS. No other VOCs were detected above their respective Class GA AWQS. These detections ~~would be~~are addressed by the provisions specified in the RAP.
- No SVOCs were detected at concentrations above their respective Class GA AWQSs. No PCBs or pesticides were detected in groundwater samples.
- Metals were detected in the filtered and unfiltered groundwater samples, with 21 Class GA AWQS exceedances in unfiltered samples, and 16 Class GA AWQS exceedances in the filtered samples, indicating that concentrations of at least five metals (beryllium, chromium, lead, mercury, and nickel) were attributable to metals absorbed to suspended solids in the unfiltered groundwater samples. The metals detections were typical of groundwater at many urban sites, including throughout Manhattan. These detections ~~would be~~are addressed by the provisions specified in the RAP.
- TCE was detected in soil vapor at one location at a concentration of 4 $\mu g/m^3$, slightly exceeding the NYSDOH Air Guidance Value for indoor air quality of 2 $\mu g/m^3$. No other VOCs were detected above the NYSDOH Air Guidance Values for indoor air quality and the remaining VOC detections were relatively low and typical of soil vapor at many urban sites, including throughout Manhattan. The NYSDOH Air Guidance Values are guidance values for protection of indoor air quality and not intended to be used for direct comparison of soil vapor concentrations, which are expected to decrease due to retardation, decay, and dilution in the subsurface (collectively referred to as site-specific attenuation factors) prior to impacting any enclosed spaces. Based upon the soil vapor sampling data collected as part of the Phase II Investigation and the site-specific attenuation factors, the existing conditions pose a minimal risk for vapor intrusion for the existing building and proposed Gilder Center construction, which ~~would be~~are controlled by the provisions specified in the RAP.

REMEDIAL ACTION PLAN AND CONSTRUCTION HEALTH AND SAFETY PLAN

Based on the findings of the Phase II subsurface investigation, a Remedial Action Plan (RAP) and associated Construction Health and Safety Plan (CHASP) (see **Appendix E-4**) were prepared to summarize environmental mitigation measures which were designed to control or avoid the potential for human or environmental exposure to known or unexpectedly encountered hazardous materials during and following construction of the proposed project. The RAP and CHASP would be implemented throughout the duration of project construction. The RAP and CHASP were approved by NYCDEP on October 19, 2017. See **Appendix E-6** for NYCDEP correspondence.

The RAP and CHASP measures are routinely implemented at construction sites in New York City, and include pre-construction ACM surveys, soil stockpiling, soil disposal and transportation; dust control; contingency measures if additional petroleum storage tanks or other contamination should be unexpectedly encountered; and a minimum two foot clean fill buffer in any landscaped or uncapped areas. Measures outlined in the RAP and CHASP to manage soil, groundwater, and soil vapor during the construction activities are described further below:

- During any subsurface disturbance, surplus excavated soil and debris would be handled and disposed of in accordance with applicable regulatory requirements. All material intended for off-site disposal would be characterized and managed in accordance with the requirements of the intended receiving facility and applicable laws. Evidence of a spill (if any) located or found during future investigation or disturbance would be reported to NYSDEC and addressed in accordance with applicable requirements.
- During construction of the proposed project, any encountered USTs (or buried former ASTs) would be properly closed and/or removed in accordance with applicable regulations.
- Groundwater sampled during the Phase II investigation contained low levels of VOCs. Construction dewatering would be conducted in accordance with NYCDEP sewer discharge requirements.
- The Phase II investigation did not reveal any substantial concerns related to vapor intrusion. However, as the proposed project is expected to extend in to the groundwater table, a NYCDEP-approved waterproofing membrane would be installed as part of foundation construction.

C. THE FUTURE WITHOUT THE PROPOSED PROJECT

In the future without the proposed project, the project site is assumed to remain in its current condition, which does not present any known current or future significant health risks. Legal requirements would need to continue to be followed, including NYSDEC regulations pertaining to petroleum storage tank maintenance, as well as federal, state, and local regulations pertaining to chemical storage and waste management, ACM, lead-based paint, and potentially PCB-containing equipment.

D. THE FUTURE WITH THE PROPOSED PROJECT

The future with the proposed project would involve demolition and limited interior disturbance of project site buildings, and subsurface disturbance for construction of a new Museum addition and associated outdoor improvements in an approximately 75,000-sf adjacent portion of Theodore Roosevelt Park. The findings of the Phase II investigation revealed environmental conditions that are similar in type and extent of contaminants to many urban sites, including throughout Manhattan. Typical of most substantial construction, the construction activities required for the proposed project could increase the risk of exposure to the contamination identified in the Phase II investigation associated primarily with the handling of historic fill material. However, these potential exposure pathways would be eliminated, mitigated, and/or monitored by performing such activities in accordance with the measures prescribed in the RAP and CHASP. These measures are also consistent with those that are used to effectively protect human health and the environment at many sites, including sites where contamination types and magnitudes are greater than those identified at the project site. These measures would be implemented prior to, during, and following construction of the proposed project to control or

avoid the potential for adverse human or environmental exposure to known or unexpectedly encountered hazardous materials.

~~Typical of most substantial construction, these activities could increase the risk of exposure to hazardous materials, which would be controlled or avoided by performing such activities in accordance with the following measures:~~

~~Based on the conclusions of the Phase II subsurface investigation, and prior to the start of the proposed project, a Remedial Action Plan (RAP) and associated Construction Health and Safety Plan (CHASP) were prepared and submitted to the NYCDEP for review and approval, which summarizes environmental mitigation measures, such as including pre-construction ACM surveys, soil stockpiling, soil disposal and transportation; dust control; contingency measures if additional petroleum storage tanks or other contamination should be unexpectedly encountered; and a minimum two-foot clean fill buffer in any landscaped or uncapped areas, designed to control or avoid the potential for human or environmental exposure to known or unexpectedly encountered hazardous materials during and following construction of the proposed project. The RAP and CHASP would be implemented throughout the duration of project construction.~~

- ~~During any subsurface disturbance, surplus excavated soil and debris would be handled and disposed of in accordance with applicable regulatory requirements. All material intended for off-site disposal would be characterized and managed in accordance with the requirements of the intended receiving facility and applicable laws. Evidence of a spill (if any) located or found during future investigation or disturbance would be reported to NYSDEC and addressed in accordance with applicable requirements.~~
- ~~During construction of the proposed project, any unexpectedly encountered USTs (or buried former ASTs) would be properly closed and/or removed in accordance with applicable regulations.~~
- ~~Groundwater sampled during the Phase II investigation contained low levels of VOCs. Construction dewatering during construction would be permitted prior to discharging, and conducted in accordance with NYCDEP sewer discharge requirements.~~
- ~~This investigation did not reveal substantial concerns related to vapor intrusion. However, as the proposed project is expected to extend beyond the observed groundwater table, a waterproofing membrane, such as the sheet-applied Grace Preprufe® product line, would be installed as part of foundation construction.~~

With these measures, the proposed project would not result in any significant adverse impacts related to hazardous materials. ✷