THE PORT AUTHORITY OF NY & NJ

Engineering Department

Environmental Design Guidelines

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1.0 ENVIRONMENTAL DISCIPLINE

1.1 OVERVIEW

These guidelines are provided as an overview of the Port Authority's design standards. Design details and associated documents outlined in these documents will be provided to the success client.

The Guidelines shall not replace professional design analyses nor are the Guidelines intended to limit innovative design where equal performance in value, safety, and maintenance economy can be demonstrated. The design team shall be responsible for producing designs that comply with the Guidelines in addition to all applicable codes, ordinances, statutes, rules, regulations, and laws. Any conflict between the Guidelines and an applicable code, ordinance, statute, rule, regulation, and/or law shall be addressed with the respective functional chief. The use and inclusion of the Guidelines, specifications, or example drawing details as part of the Contract Documents does not alleviate the design professional from their responsibilities or legal liability for any Contract Documents they create. It is also recognized that the Guidelines are not universally applicable to every project. There may be instances where a guideline may not be appropriate. If the design professional believes that a deviation from the Guidelines is warranted, such a deviation shall be submitted in writing for approval to the respective functional chief.

Environmental Engineering provides design services for the development of construction contracts to support the Capital and Operating Plan, support services for construction field operations, environmental technical review of tenant alteration applications and design and support services for Facility operations.

1.1.1 CONSTRUCTION

During Stage I & II Environmental Engineering involvement typically includes identifying alternatives that will have the least impact to the environment, establishing environmental permit requirements, completing site assessments to evaluate costs for handling contaminated soil or groundwater, performing environmental investigations and identifying regulatory requirements related to property purchases , and to provide support to secure services for the performance of Environmental Assessments as required for large Capital project, in accordance with State and Federal requirements.

During Stage III, typical task required for the preparation of construction contracts include: preparing applications for environmental permits, asbestos and lead paint abatement design, waste disposal requirements, design of soil erosion controls, preparing stormwater pollution prevention plans, establishing dewatering requirements for water discharge, developing soil reuse plans, preparing contract drawings, and developing cost estimates

1.1.2 FACILITY OPERATIONS

Environmental Engineering staff provide support to line department staff to ensure facilities are operating in compliance with State and Federal regulations. Environmental Engineering staff typically are tasked with securing environmental operating permits, developing environmental sections for lease documents, providing technical expertise at lease negotiations, performing site investigations for lease terminations, providing technical expertise at meetings with Regulatory agencies, supporting litigation staff and the design and manage soil and groundwater remediation projects.

1.1.3 TENANT ALTERATION APPLICATIONS

Environmental Engineering reviews tenant alteration applications for compliance with Federal, State and local environmental regulations. If required, we provide technical support at planning and design meetings with tenants.

2.0 FEDERAL AND STATE REGULATIONS

2.1 FEDERAL

Code of Federal Regulations – Title 40: Protection of the Environment

Code of Federal Regulations – Title 29: Occupational Safety and Health Administration

2.2 STATE

2.2.1 NEW YORK

New York Codes, Rules and Regulations – Title 6: Department of Environmental Conservation

New York Codes, Rules and Regulations – Title 12 Part 56: Asbestos

2.2.2 NEW JERSEY

New Jersey Administrative Code – Title 7: Department of Environmental Protection

New Jersey Administrative Code – Title 5 Chapter 23 Subchapter 8: Asbestos Hazard Abatement Subcode

3.0 DESIGN ELEMENTS

3.1 PERMITS

3.1.1 FEDERAL

3.1.1.1 SECTION 9 BRIDGE PERMIT

Activities that require this permit: Construction or modification of any bridge over navigable waters in the United States.

Issued By: United States Coast Guard (USCG)

Processing Procedure:

- Pre-application meeting and consultation
- Application
    - Supplementary Information (if Applicable)
        - NEPA Documentation
        - Biological Assessment/Opinion
        - 401 Water Quality Certificate
        - Coastal Zone Management (CZM) certification
        - State concurrence with CZM consistency certification
        - Names and addresses of adjacent property owner within ½ mile radius
        - Drawings
        - Location Map
        - Title Blocks
- Public Notice / Coordination Letters/ local Notice to Mariners

Application: http://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Marine-Transportation-Systems-CG-5PW/Office-of-Bridge-Programs/Bridge-Permit-Application-Process/ *(1)*

3.1.1.2 NATIONWIDE PERMITS 15 & 3

Activities that require this permit:

- Nationwide Permit No. 15 authorizes discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the United States.
- Nationwide Permit No. 3 is required for the repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification.

Issued By: US Army Corps of Engineers (USACE).

Application:

- New York: Joint Application Form

http://www.dec.ny.gov/docs/permits_ej_operations_pdf/jointapp.pdf (2)

- General Form: http://www.nan.usace.army.mil/Portals/37/docs/regulatory/geninfo/Permitapplications/Eng_Form_4345_2017Sep.pdf?ver=2018-02-08-121317-273 (3)

Supplementary Documentation:

- Photographs of the project vicinity and drawings.
- Location Map
- Project Plans
- Federal Consistency Assessment Form (FCAF)
- 401 Water Quality Certification from NYS DEC

3.1.1.3 ADVANCED APPROVAL CATEGORY

Activities that require this letter: A USCG permit *shall not be required* if FHWA determines that the proposed construction, reconstruction, rehabilitation, or replacement of the federally aided or assisted bridge is over waters that:

- Are not used or are not susceptible to use in their natural condition or by reasonable improvement as a means to transport interstate or foreign commerce
- Are not tidal, or if tidal, used only by recreational boating, fishing, and other small vessels less than 21 feet long. The project falls within the advanced approval category when this is the case and no Section 9 permit is required, but a lighting exemption must be requested.

Issued By*: USCG*

Process Procedure: Upon requesting a bridge permit, the Coast Guard would determine if an Advance Approval Letter is appropriate.

Application: See Bridge Permit

3.1.1.4 SECTION 10 & 404

Activities that require this letter:

- Section 10 (Rivers and Harbors Act): Structures and fills related to construction of the tunnels in navigable waters.
- Section 404 (Clean Water Act): Discharge of dredges or fill material into jurisdictional waters and wetlands of the US.

Issued By: USACE

Application:

- New York: Joint Application Form http://www.dec.ny.gov/docs/permits_ej_operations_pdf/jointapp.pdf (4)
- General Form: http://www.nan.usace.army.mil/Portals/37/docs/regulatory/geninfo/Permitapplications/Eng_Form_4345_2017Sep.pdf?ver=2018-02-08-121317-273 (5)

Supplementary Documentation:

- Photographs of the project vicinity and drawings.

- Location Map
- Project Plans
- Federal Consistency Assessment Form (FCAF)
- 401 Water Quality Certification from NYS DEC
- Practicable alternative considered to avoid, minimize and/or mitigate the proposed project impacts. (for Section 404 only)

3.1.1.5 SECTION 103

Activities that require this permit: Transportation of dredged material for the purpose of dumping it into ocean waters

Issued By: *USACE*

Application:
http://www.nan.usace.army.mil/Portals/37/docs/regulatory/geninfo/Permitapplications/Eng_Form_4345_2017Sep.pdf?ver=2018-02-08-121317-273 *(6)*

Supplementary Documentation:
- Vicinity Map
- Plan View
- Cross Section Map

3.1.2 NEW YORK

3.1.2.1 AIR PERMIT

Activities that require this permit: Releasing contaminants to the air.

Issued By: NYS Department of Environmental Conservation

Application: http://www.dec.ny.gov/chemical/4754.html *(7)*

Supplementary Documentation:
- Plot Plans
- Air Quality Model
- Ambient air monitoring plan/reports
- Stack test protocol/reports
- Continuous emission monitoring plans/QA/QC
- MACT demonstration
- Operational Flexibility
- Analysis of contemporaneous emission

3.1.2.2 COSTAL CONSISTENCY CONCURRENCE

Activities that require this permit: Activities and development affecting coastal resources.

Issued By: NYS Department of State

Processing Procedure:

- Location Map
- Project Plans
- Photographs
- Environmental Assessment Form
- Federal Consistency Assessment Form
    - https://www.dos.ny.gov/opd/programs/pdfs/Consistency/FCAF_fillable.pdf (8)

3.1.2.3 STORMWATER SPDES GENERAL PERMIT

Activities that require this permit: Permits the discharge of stormwater from various types of facilities and actives into ground and surface water.

Issued By: NYS Department of Environmental Conservation

Application: http://www.dec.ny.gov/permits/6287.html *(9)*

Supplementary Documentation:

- USGS topographical map
- General Site Plan that shows the property to be affected by the project
- Environmental Assessment
- Possibly an engineer's report, county health department flow of confirmation letter, and/or waste assimilative capacity analysis.

3.1.2.4 WETLANDS PERMIT

Activities that require this permit: Work in or near wetlands, areas that are transitional between open water and uplands or that may be periodically inundated or saturated requires a wetlands permit.

Issued By: New York Department of Environmental Conservation

Application: Joint Application http://www.dec.ny.gov/docs/permits_ej_operations_pdf/jointapp.pdf *(10)*

Supplementary Documentation:

- Photographs
- Location Map
- Project Plans
- Environmental Assessment
- Permission to Inspect Property Supplement
- Discussion of practicable alternatives considered to avoid, minimize and/or mitigate the proposed project impacts. Justification to why alternatives are not suitable.

3.1.2.5 PROTECTION OF WATERS PERMIT - ARTICLE 15

Activities that require this permit: Excavation or placement fill in navigable waters of the state, below the

mean high water level, including adjacent and contiguous marshes and wetlands.

Issued By: New York Department of Environmental Conservation

Application: Joint Application http://www.dec.ny.gov/docs/permits_ej_operations_pdf/jointapp.pdf *(11)*

Supplementary Documentation:

- Photographs
- Location Map
- Project Plans
- Environmental Assessment
- Permission to Inspect Property Supplement

3.1.2.6 WATER QUALITY CERTIFICATE- SECTION 401

Activities that require this permit: Discharge of dredged or fill material regulated under Section 404 of the Clean Water Act or construction and operation of hydroelectric or major interstate transmission facilities licensed by Federal Energy Regulatory Commission (FERC).

Issued By: New York Department of Environmental Conservation

Application: Joint Application, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/jointapp.pdf *(12)*

Processing Procedure:

- Photographs
- Location Map
- Project Plans
- Environmental Assessment
- Permission to Inspect Property Supplement

3.1.2.7 COASTAL EROSION MANAGEMENT

Activities that require this permit: Construction/modification/restoration of structures; e.g., buildings, docks, piers, wharves, walkways. Excavation, grading, mining, dredging, and deposition of material. Construction/modification/restoration of erosion protection structures (e.g., bulkheads, revetments, groins). Miscellaneous activities such as motor vehicle use and disturbance of bird nesting/breeding areas.

Issued By: New York Department of Environmental Conservation

Application: Joint Application, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/jointapp.pdf *(13)*

Processing Procedure:

- Photographs
- Location Map
- Project Plans

- Environmental Assessment
- Permission to Inspect Property Supplement

3.1.3 NEW JERSEY

3.1.3.1 STORMWATER NJPDES GENERAL PERMIT

Activities that require this permit: Permits the discharge of stormwater from various types of facilities and actives into ground and surface water.

Issued By: New Jersey Department of Environmental Protection

Application: http://www.nj.gov/dep/dwq/forms_surfacewater.htm *(14)*

Supplementary Documentation:

- USGS topographical map
- Stormwater Pollution Prevention Plan (SPPP)

3.1.3.2 UNDERGROUND STORAGE TANK CLOSURE

Activities that require this permit: Use this application for closure activities of all underground storage tanks containing hazardous substances, except for those tanks exempted by N.J.A.C. 7:14B-1.4(b).

Issued By: New Jersey Department of Environmental Protection

Application: http://www.nj.gov/dep/srp/forms/ust/ *(15)*

Supplementary Documentation (if applicable):

- Implementation schedule
- Scaled site map
- Site Investigation Work Plan
- Decommissioning Plan

3.1.3.3 WATERFRONT DEVELOPMENT/ WETLANDS PERMIT

Activities that require this permit:

- Waterfront Development: If you are proposing any development in a tidally flowed waterway anywhere in New Jersey.
- Wetlands: Work in or near wetlands, areas that are transitional between open water and uplands or that may be periodically inundated or saturated requires a wetlands permit.

Issued By: New Jersey Department of Environmental Protection

Processing Procedure:

- LURP Application
    - Supplementary Information (if applicable)
        - Photographs
        - State Plane coordinates

  - Certificate for Filing or Certificate of Compliance from the Pinelands Commission
- Public Notice to newspaper and owners of properties within 20 feet
- Certified list of all owners of property within 200 feet
- Environmental Impact Statement or Compliance Statement
- Evidence of Tidelands Ownership
- Stormwater management
- Development Plans

Application: NJDEP website, http://www.nj.gov/dep/landuse/forms.html/ *(16)*

3.1.3.4 STREAM ENCROACHMENT PERMIT

Activities that require this permit: Most construction activities along streams and in floodplains. Examples include new buildings, roads, bridges, utility lines and stormwater discharges. Storing material, placing fill and clearing vegetation can also be regulated.

Issued By: New Jersey Department of Environmental Protection

Application: LURP-1 application and checklist: http://www.nj.gov/dep/landuse/forms.html *(17)*

Supplementary Documentation:
- Location maps
- Color photographs
- Environmental Report
- State plane coordinates
- Construction plans
- Proof of local notice (if applicable)
- Hydrologic and hydraulic calculations (if applicable)

3.1.3.5 AIR PERMIT

Activities that require this permit: Releasing contaminants to the air.

Issued By: NJ Department of Environmental Protection

Processing Procedure: See New York Air Permit

Application: http://www.state.nj.us/dep/aqpp/downloads/forms/forms.pdf *(18)*

3.1.3.6 COASTAL ZONE POLICY CONSISTENCY (CAFRA)

Activities that require this permit: Activities and development affecting coastal resources.

Issued By: NJ Department of Environmental Protection

Application: LURP application: http://www.nj.gov/dep/landuse/forms.html *(19)*

Processing Procedure:

- Photographs
- Development Plans
- Environmental Impact Statement
- Stormwater Management

3.1.3.7 WATER QUALITY CERTIFICATE

Activities that require this permit: Discharge of dredged or fill material regulated under Section 404 of the Clean Water Act or construction and operation of hydroelectric or major interstate transmission facilities licensed by Federal Energy Regulatory Commission (FERC).

Issued By: NJ Department of Environmental Protection

Application: LURP application: http://www.nj.gov/dep/landuse/forms.html *(20)*

3.1.3.8 SEWER CONNECTION PERMIT

Activities that require this permit: For connection to public sewer line

Issued By: Local Municipality

Application: Varies by municipality

Possible Supplementary Documentation:

- Sketch showing existing plumbing, grease traps, hair interceptors, known underground utilities, drainage, etc., as well as how the connection will be made.

3.1.3.9 SOIL EROSION PERMIT

Activities that require this permit: Construction/modification/restoration of structures; e.g., buildings, docks, piers, wharves, walkways. Excavation, grading, mining, dredging, and deposition of material. Construction/modification/restoration of erosion protection structures (e.g., bulkheads, revetments, groins). Miscellaneous activities such as motor vehicle use and disturbance of bird nesting/breeding areas.

Issued By: New Jersey Natural Resource Conservation Program
Website: http://www.nj.gov/agriculture/divisions/anr/pdf/soilconservationdistricts2017.pdf (21)

3.1.4 NEW YORK CITY

Dewatering/Discharge Instructions (NYCDEP)

Applicants must submit:

1. Cover letter with job description and complete Wastewater Quality Control Application (22)
2. Site plan (to scale) including type and size of public sewer lines, both existing and proposed sewer connections, location of equipment, pumps, pipes, and exact point of discharge (POD).

3. All documents and drawings must have a legend and a New York State Registered Architect's or Professional Engineer's original signature and stamp.
4. Properly sized and approved interceptor/separator/pH neutralization system or other pretreatment system - including specifications, engineering calculations and details.
5. For jobs requiring different types of pretreatment equipment, detailed flow diagrams must be provided.
6. Complete wastewater/groundwater analyses accompanied by chain of custody must be submitted on certified laboratory letterhead.
7. If the proposed discharge/dewatering exceeds 10,000 gallons per day additional Letter of Approval must be obtained from the DEP Division of Connections & Permitting. The contact person is Mr. Suresh Kumar, Associate Project Manager, and can be reached at (718) 595- 5205.
8. Prior to commencement of discharge Applicants must obtain Discharge/Dewatering Permit from respected Borough office contingent to presenting the above Letter(s) of Approval and upfront payment of sewer charges.

All inquiries should be directed to the attention of Mr. Saied Islam, Assistant Mechanical Engineer, at (718) 595-4707.

3.2 WETLANDS DELINEATIONS

The first step is to determine the extent of the project area. If there are or appear to be wetlands on the site, they must be delineated to determine how best to avoid impacting them and to determine the extent of any unavoidable impact. The process of determining the extent of wetlands is referred to as delineating wetlands and the end product, a Wetland Status Report, includes delineation in the form of a map showing wetland boundaries.

Wetland delineations and reports are best produced by consultants specialized in wetlands. However, they can be undertaken by anyone willing to invest the time and effort to do this work.

Developing a report starts with compiling information about the possible presence of wetlands in the area from old maps and reports, photographs, and field visits to the site.

If wetlands are thought to be present, they are delineated in the field. Wetlands are identified by the presence of three parameters: (a) hydrophytic vegetation, (b) hydric soils, and (c) evidence of hydrology. The wetland boundary is flagged in the field. Data sheets (soil conditions, vegetation, hydrological indicators) are filled out and photographs taken of the wetlands and the boundary. The flagged wetland boundary is surveyed using traditional surveying methods of global positioning system (GPS) equipment and plotted on a topographic map with a 2-ft contour interval.

The map and report are then submitted to regulatory agencies to have the wetland boundary confirmed. Each regulatory agency refers to the confirmation by a different name and the time for which the confirmation is effective also varies:

- U.S. Army Corps of Engineers (USACE): Jurisdictional Determination, 5 years, not renewable.
- New Jersey Department of Environmental Protection (NJDEP): Letter of Interpretation, 5 years, renewable once.
- New York State Department of Environmental Conservation (NYSDEC): Confirmation of Wetland Boundary, 10 years, not renewable.

3.3 ENVIRONMENTAL SAMPLING

The NJDEP and NYSDEC have developed several environmental sampling guidance documents. They are as follows:

- NJDEP Field Sampling Procedures Manual (23)
- NJDEP Guidance for Concrete Recycling (01/12/10) (24)
- NYSDEC Sampling Design and Protocols (25)

3.4 ENVIRONMENTAL REPORTS

3.4.1 ENVIRONMENTAL BASELINE REPORT

3.4.1.1 INTRODUCTION

An Environmental Baseline Study (EBS) is an intrusive soil and groundwater investigation conducted to establish the baseline level of potential contaminants in soils and groundwater beneath a concerned site and to assess the extent of contamination of the site.

The EBS efforts should determine the environmental setting and hydro-geological condition of the site at the time of site assessment. The study should provide an overall picture of the existing soil and groundwater conditions in the context of subsurface contamination. Site information and environmental data should be electronically archived in eDocs. This will allow for further monitoring, assessment, updating, and documentation should change in conditions at the site occur.

The purpose of this guideline is to provide tenants and Port Authority of New York & New Jersey staff guidance for conducting EBS for assessing contamination of a site. This guideline should be used in conjunction with the following:

- U.S. Environmental Protection Agency (EPA). August 2000. "Guidance for the Data Quality Objectives Process (EPA QA/G-4)." EPA/600/R-96/055. Washington, DC.
- Wu, S. "Sampling Guidelines and Protocols March 1991." N.Y.S. DEC (New York State Department of Environmental Protection). Albany, NY.

3.4.1.2 RECOMMENDED EBS PROCEDURE

An Environmental Baseline Study may include the following six steps:

- **Step 1. Collection and Review of Existing Site Information:**
  - Site location
  - Site layout
  - Current use of the site and records of waste management, spills, etc.
  - Historic use of the site
- **Step 2. Site Reconnaissance**
  - Verification of the collected site information
  - Identification of potential contaminants of concern (COCs)
  - Identification of areas of potential contamination
- **Step 3. Collection of Existing Site Hydro-Geological Information**

- Surface conditions (e.g., coverings, drainage, potential contaminant pathways)
- Subsurface conditions (e.g., soil type, fill material, local geology, regional geology (e.g., reclaimed land), water table elevation, hydraulic gradient

- **Step 4. Characterization of Subsurface Condition**
  - Installation of boreholes and groundwater monitoring wells
  - Soil and groundwater sampling and analyses
- **Step 5. Determination of Nature and Extent of Subsurface Contamination**
  - Determination and assessment of unsaturated zone contamination, if any
  - Determination and assessment of saturated zone contamination, if any
- **Step 6. Preparation of EBS Report**
  - Executive summary, introduction, field work, quality assurance program, findings, conclusions, recommendations, and supporting documents

3.4.1.3 ACQUISITION OF DATA OR INFORMATION

The data or information needed to conduct an EBS can be acquired from the following sources but not limited to:

- Building plans, permits, licenses, former site activities, etc.
- Aerial photographs, topography maps, and road maps
- Geological maps
- Fire insurance maps, e.g., Sanborn
- Federal/state environmental database searches
- Government agency file searches

Adequacy of data or information should be constantly reviewed and evaluated. When data or information is lacking, or missing, additional data or information acquisition should be considered.

To streamline an EBS, baseline data or information should be collected according to the following criteria:

- Baseline data or information should include the normal range of physical, chemical, or biological conditions of the assessment area with statistical descriptions of that variability. Causes of extreme or unusual value in baseline data or information should be identified and noted.
- Baseline data or information collection should focus on parameters that are directly related to the area being assessed and be as accurate, complete, and representative as possible.
- Baseline data or information should be sufficient for assessing the nature and extent of any contamination on the site.
- Baseline data or information should meet the minimum quality assurance and quality control (QA/QC) criteria as defined in this document as well as any additional site-specific criteria established by regulatory agencies, the tenant, and the Port Authority of New York & New Jersey.

3.4.1.4 IMPLEMENTATION OF THE RECOMMENDED EBS PROCEDURE

This section discusses the practical issues for implementing the recommended six-step EBS. Two publications prepared by the American Society for Testing and Materials (ASTM) can also be consulted

for further information:

- ASTM E 1527-00 "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" or its latest edition.
- ASTM E 1903-97 "Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process" or its latest edition.

3.4.1.5 ENVIRONMENTAL FIELD ACTIVITIES, LABORATORY ANALYSIS, AND SITE ASSESSMENT

Environmental Engineering Unit (EEU) staff conducting an EBS coordinates with Materials Engineering and facility staff for field activities and laboratory analysis. If a tenant or other third party accepts responsibility for the EBS, the consultants they appoint on their behalf must be qualified to undertake the EBS. EEU will check that their consultants are qualified and have proven capability and experience in the site assessment work (including EBS) or other relevant works. The qualified consultants shall be responsible for providing technical support and supervision throughout the progress of the work. The responsible parties or their consultants shall also ensure that only an accredited laboratory is to be engaged for the analyses.

- **Step 1. Collection and Review of Existing Site Information**

  Collect existing site information to help identify potential contamination problems. The following information shall be obtained:

  - Site location.
  - Site layout, including the aboveground and underground facilities and natural features.
  - Current and historical use, if available, of the site, including the types of industry, activities, unit operations, and chemicals used.
  - Current and past waste management practices, if available, that document conditions under which hazardous waste has been managed.

- **Step 2. Site Reconnaissance**

  Perform site reconnaissance to identify visible signs or sources of contamination that exist on the subject site. The following activities can be conducted during a site reconnaissance:

  - Verify that the information collected during the desktop review is reliable and accurate, e.g., current physical setting of the site including the presence of unrecorded structures, topography, etc. The verification shall also check whether there is any change of site use.
  - Inspection of the surface conditions/coverings (surface material and condition, effect on the potential for contaminant ingress).
  - Identify potential contamination problems based on visual observations of the site and surrounding area.
  - The site reconnaissance should provide a general characterization of the property, including an inspection of the entire perimeter of the site. The property should be visually inspected for signs of open burning or dumping; trash; any areas of dead, distressed, or dying vegetation; stained soils; impoundments; seeps; oil slicks or discolorations on surface waters; discernible chemical odors; aboveground storage tanks; vertical pipes; wells casings, or indications of the presence of septic tanks; leach fields and/or underground storage tanks; drums; electrical transformers; and recent soil disturbances such as grading or filling.

- **Step 3. Collection of Existing Site Hydro-Geological Information**

  Collect existing site hydro-geological information is to identify the general surface and subsurface conditions of the site. The following information shall be acquired:

  - Surface conditions, such as the original and current physical site condition, surface drainage condition (e.g., surface types and surface drainage network) and possible exposure pathways.
  - Subsurface conditions, including the general information on stratigraphy, lithology, structural geology, and hydro-geology.

- **Step 4. Characterization of Subsurface Condition**

  Identify data deficiencies between the collected information and the actual hydro-geological conditions and assess the types and concentrations of contaminants in subsurface if present. The characterization work includes the following activities:

  - A Sampling and Analysis Plan (SAP) that indicates number of samples required, type of samples, sampling methods, location of sampling, contaminants of concern, detection limit of analytical instrument, etc. shall be prepared. A minimum reasonable number of boreholes (in accordance with requirements outlined in the following subsection, "Determination of Number of Sampling Locations") shall be drilled and the groundwater monitoring wells are constructed to allow the collection of soil and groundwater samples, gauging depth-to-groundwater.

Determination of Number of Sampling Locations

An integrated approach shall be used to determine the number of boreholes together with the intervals and depths of soil and groundwater sampling. Depending on the accuracy tolerance, a trade-off analysis should be carried out to determine the number of boreholes, number of monitoring wells, and sampling interval and depth along borehole. For detailed information on designing a statistically defensible sampling plan, refer to "Statistical Methods for Environmental Pollution Monitoring" (Gilbert, 1987). A free software tool developed by Pacific Northwest National Laboratory (http://dqo.pnl.gov/) (26)of Richland, Washington can be also be used for designing a defensible sampling plan.

The responsible parties and their qualified consultants shall select the boreholes and monitoring well locations on the basis of providing an accurate assessment of the site characteristics. Groundwater monitoring wells shall be constructed to establish baseline groundwater data related to priority pollutants and other possible contaminants.

Sampling Interval and Depth

Sampling interval shall be decided on the basis of hydro-geological characteristics of the subsurface strata. The sampling depths, intervals, and testing shall be sufficient for assessing and delineating any potential contaminants identified. For the purpose of EBS, the following example scheme is recommended based on sampling practice and the knowledge of subsurface hydro-geological conditions at John F. Kennedy International Airport.

For each borehole at all sites, the first soil sample shall be taken between 1 and 2 ft. below ground level (bgl). Subsequent samples in the borehole shall be screened with a photo-ionization detector at every 2-ft. interval. For each borehole where groundwater is encountered, the borehole should be converted to a monitoring well. One groundwater sample should be collected from each monitoring well for analysis. Specific mention should

be made within the sampling plan for assessing the presence of any contaminants, notably free phase hydrocarbons or indication of similar non-aqueous phase liquids that may reside near the water table surface. In addition, there might be some seasonal or tidal fluctuation in the water table. This should be assessed and commented, where applicable.

Due to heterogeneity and stratified nature of subsurface geology, the exact subsurface hydro- geological conditions will only be known during drilling. The predetermined sampling depth and sampling interval shall be adjusted if necessary as work progresses. If the baseline data obtained from the site characterization are doubtful or disputable, additional site characterization may be necessary.

To facilitate laboratory analysis, only part of the samples collected would be tested. For each borehole, the sampling for analysis/test shall include but not limited to:

- One near-surface soil sample (1 to 2 ft. below top soil strata).
- One soil sample per every stratum (in addition to the near-surface soil sample), particularly including the upper boundary of any layers of low relative permeability (e.g., clay), since there is typically a higher potential for contaminants to accumulate there.
- Within a particular stratum, the soil sample exhibiting the highest PID reading shall be retained for analysis. If no PID readings are exhibited in any of the 2-ft. intervals of that stratum, then retain a sample at mid-depth of that stratum for analysis.
- One soil sample from the saturated zone near the boundary with the unsaturated (i.e., the vadose zone – where the water table is first encountered), since there is a potential for contaminants that are insoluble in water (e.g., free phase hydrocarbons) to accumulate there.
- One groundwater sample.

More samples shall be taken for testing as deemed necessary by the responsible parties and their qualified consultants.

Sampling Methodology and Quality Assurance/Quality Control

Soil and groundwater sampling shall be performed with due consideration of the material compatibility between the major contaminants of concern and the sampler, container and well screen used. The sampling tools and samplers shall be decontaminated prior to and between use as contamination from sampling equipment may contribute significant errors to sampling results. Sampling errors may also be introduced during the sampling steps. During sample collection, cross-contamination may result from poor equipment and apparatus handling or the use of preservatives.

Appropriate QA/QC procedures should be included in the EBS to allow for assessment of the quality of the data collected. The QA/QC measures may include, for example, written field sampling protocol, decontamination procedures, instrument calibration, the preparation and analysis of trip blanks, equipment blanks, duplicate samples, and holding times for sample analysis.

Sample Handling and Preservation

Sample container shall be free of contaminants prior to use and the container material shall be compatible with the sample. Each soil or groundwater sample shall be properly labeled, sealed, preserved and kept following the U.S. Environmental Protection Agency (USEPA) standard procedures. A suitably qualified and accredited laboratory should provide the

appropriate bottles and sample containers for sampling.

Sample Analyses

After delivery to the laboratory, the samples shall be extracted and analyzed within the specified acceptable holding time for the particular analyte. Samples that exceed the relevant holding times shall be rendered unsuitable for analysis. Samples selected for analysis that exceed their respective holding times before analysis, shall be recollected.

Determination of COCs for Sample Analyses

Analyze soil and groundwater samples for PP+40, total xylenes, MTBE, TBA, and TPH.

Methods of Analysis

In general, contaminants present in the samples shall be analyzed using established methods as recommended by the USEPA and/or ASTM.

Note: The concentrations of contaminants analyzed shall be presented in tabulated form. The following information shall be provided:

- Parameters.
- Unit of Measurement.
- Reference Method of Analysis.
- Relevant Action Level.
- Detection Limit.
- Values for each sample or composite sample analyzed (values exceeding a relevant action level shall be highlighted).
- Laboratory qualifiers and dilution factors (if any).

❑ **Step 5. Determination of Nature and Extent of Subsurface Contamination**

The concentrations of COCs determined are then compared with the standard values to determine the extent of contamination of the site for both unsaturated and saturated zones.

Standards of Assessment

Standard values are needed whereby the chemical compound levels found in the soil and groundwater can be matched. The comparison between the actual levels found and the standard values will determine the level and extent of contamination of the site and the appropriate remedial actions to take.

For the EBS purpose, the DEC STARS values are adopted for assessing soil contamination and remediation in New York. In New Jersey, the DEP Soil Cleanup Criteria shall be used.

If the concentration level lie between the intervention value and target value, the site is considered contaminated but the contamination may not be serious enough to warrant a clean-up. Further investigation of the site is required to resolve uncertainties with respect to the possible pollution and its associated risks to determine the need to carry out a clean-up. A risk assessment study may also be required. Detailed information for conducting a risk assessment study can be found in:

- ASTM E 1739-95 “Standard Guide for Risk-Based Corrective Action at Petroleum Release Sites" or its latest edition.

- ASTM E 2081-00 "Standard Guide for Risk-Based Corrective Action at Chemical Release Sites" or its latest edition.
- Petroleum Contaminated Soil Guidance Policy, NYS DEC Guidelines for Assessing and Managing Petroleum Hydrocarbon (August 1992).

- **Step 6. Remediation**
- **Step 7. Certification of Remediated Sites or Letter of "No Further Action"**
- **Step 8. Preparation of EBS Report**

An EBS report shall include but not limited to, coverage of the major components listed below:

- Executive Summary
- Introduction
- Site Setting
- Site Inspection
- Field Work
- Results/Findings
- QA/QC program and results
- Conclusion
- Recommendation
- Supporting Documents

The following summarizes the format of the EBS Report:

- Executive Summary
- Introduction
  - Background
  - Site-Specific Operation
  - Objectives
  - Scope of Work
  - Assessment Methodology
  - Structure of the Report
- Site Setting
  - Site Location and Characteristics
  - Site Layout and Features
  - Site Activities
  - Surrounding Land Uses
  - Topography, Geology, Soils, Fill, Hydrology, and Hydrogeology
  - Site History
- Site Inspection
  - Boundary Conditions
  - Surface Conditions
  - Storage Tanks
  - Other Chemical Use and Storage
  - Drainage
  - Stains, Odors, and Stressed Vegetation
  - Potential COCs and Areas of Concern

  - Sampling and Analysis Plan
- Field Work
  - Bore Hole Installation
  - Soil Sample Collection
  - Monitoring Well Construction and Groundwater Levels
  - Groundwater Sample Collection
  - Laboratory Analyses
- Findings
  - Results and Discussion of Soil Sample Analysis
  - Results and Discussion of Groundwater Sample Analysis
  - Determination of Local and Regional Groundwater Flow
  - Determination of Level of Contamination and Assessment of Potential Impact
- Conclusions
  - Potential Contamination and Impact to the Site Based on Laboratory Analytical Results, Site Inspection, and Other Available Information
  - Likely Nature and Extent of Any Identified Contamination and Impact
- Recommendation
  - Requirements for Remediation, if any
  - Follow-Up Actions, if any
- Supporting Documents
  - Driller's Logs/Reports
  - Site Location Plan
  - Site Layout Plan and Photos Indicating Major/Relevant Features

3.5 REMEDIATION SYSTEMS

Design Guidelines for Conventional Pump & Treat Systems (27)

USACE - Multiphase Extraction Design (28)

3.6 SPECIAL REQUIREMENTS

MEMORANDUM OF AGREEMENTS (MOAS)
MEMORANDUM OF UNDERSTANDING (MOUS)
ADMINISTRATIVE CONSENT ORDERS (ACOS)
CLASSIFICATION EXCEPTION AREAS (CEAS)
DEED OF ENVIRONMENTAL RESTRICTIONS (DERS)
VARIANCES

4.0 STANDARD DETAILS AND NOTES

4.1 STANDARD DETAILS

SOIL STOCKPILE
DEWATERING
SOIL EROSION AND SEDIMENT CONTROL
ASBESTOS ABATEMENT
GROUNDWATER WELLS

4.2 STANDARD NOTES

SOIL DISPOSAL/REUSE
DEWATERING
SOIL EROSION AND SEDIMENT CONTROL
ASBESTOS ABATEMENT
LEAD ABATEMENT

5.0 REFERENCE MATERIAL

5.1 LIMITS AND ACTION LEVELS

5.1.1 NEW JERSEY (DEP)

GROUNDWATER

NJDEP groundwater quality criteria may be found at the following locations:

- Interim Generic Groundwater Quality Criteria (29)
- Specific Groundwater Quality Criteria (30)

SOIL

NJDEP soil limits and action levels may be found at the following locations:

- Soil Cleanup Criteria (31)
- Soil Remediation Standards Tables (32)
- Site-Specific Impact to Groundwater Soil Remediation Standards (33)

Soil cleanup criteria above should be used in conjunction with the following guidance documents:

- Phase in Period Guidance (34)
- Order of Magnitude Guidance (35)

5.1.2 NEW YORK (DEC)

GROUNDWATER

SOIL

NYSDEC soil limits and action levels may be found at the following locations:

- Volatile Organic Compounds (36)
- Semi-Volatile Organic Compounds (37)
- Organic Pesticides/Herbicides and PCBs (38)
- Heavy Metals (39)

5.2 REMEDIATION GUIDANCE AND POLICY REQUIREMENTS

5.2.1 NEW YORK

New York Remediation Guidance and Policy documents are located at the following location:

- NYSDEC Remediation Guidance and Policy Documents (40)

5.3 RCA

- RCRA Groundwater Protection & Cleanup Policies (41)

6.0 REFERENCES

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