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Power

Nuclear Development Project

Soil Management Study

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1.0 Purpose / Background / Limitations and Assumptions

1.1 Purpose

The purpose of this report is to develop a preliminary Soil Management Study, Borrow Site Investigation Study, and USACE Land Acquisition Support Study to support nuclear development on the PSEG Nuclear site located in Hancocks Bridge, New Jersey.

The following will be performed as part of this study:

- Development of conceptual excavation and backfill plans, profiles, general quantities and costs associated with a new plant;
- Investigation of potential soil borrow source locations and material costs;
- Development of conceptual soil storage areas on the PSEG Nuclear property to store material received from the new plant excavation and various U.S. Army Corps of Engineers (USACE) Confined Disposal Facilities (CDF) to compensate for potential lost storage capacity at the Artificial Island USACE CDF (Cell 3);
- Development of conceptual layouts and costs associated with site development and transport of material from the offsite USACE CDF's to the proposed soil storage areas on PSEG Nuclear property.

The proposed excavation and backfill methodology defined in this study is based on preliminary engineering details being developed for the PSEG Site Early Site Permit Application (ESPA) as well as information provided to date from the reactor technology vendors. It should be understood that this methodology could change as the project progresses through selection of a reactor technology; selection of a constructor; and COLA preparation.

The cost information and estimates presented in this report are not definitive, detailed budgetary/construction cost estimates. They are indicative estimates using 2010 general construction unit rates utilizing RS Means Construction Cost Data (Ref. 6.3-11) as well as cost information provided by the borrow source material suppliers. The primary value of these estimates is to provide PSEG with a reference point for the potential costs associated with the site development to support the new plant excavation and backfill activities.

1.2 Background

With the development of the ESPA and associated geotechnical investigation program, the site geotechnical characteristics have been identified and defined for the proposed plant location north of the Hope Creek cooling tower. As part of ESPA Section 2.5.4.5, "Excavation and Backfill", conceptual design details have been developed to show a feasible excavation and backfill methodology for the new plant based on the site characteristics.

PSEG has requested S&L to develop a preliminary soil management study, borrow site investigation study and USACE Land Acquisition Support Study as defined in scope sections 2.1, 2.2 and 2.3 below. The soil management study will determine excavation quantities; determine fill quantities; identify location of Seismic Category1/Category 2 fill; assess excavated material for reuse as Seismic Category1/Category 2 fill material; and assess the placement and stockpiling of excavated material on the PSEG Nuclear property. Category 1 backfill would be utilized to directly support safety related structures (vertically and laterally). Category 2 backfill would be utilized to directly support non-safety related structures (vertically and laterally); utilized as area backfill for the remainder of the excavation; and utilized to raise the remainder of the new plant power block area to final plant grade (approximately El. +36.9 feet).

The soil management study will in part, assess the four (4) reactor technologies being considered by PSEG Power. They include:

- Single Unit AREVA US-EPR
- Dual Unit Westinghouse AP1000
- Single Unit Mitsubishi US-APWR
- Single Unit GEH-ABWR

After the fill quantities are determined, this information will then be utilized to perform a preliminary borrow site investigation as defined in the Scope Section 2.2 below.

Additionally, PSEG Power has engaged the United States Army Corps of Engineers (USACE) in discussions for temporary use and or potential acquisition of USACE land (approximately 85 acres) located just north of the current PSEG Nuclear property line. The proposed land area is currently part of a USACE Confined Disposal Facility (CDF) that can be utilized for disposal of dredge spoils. To support these discussions, PSEG requested that S&L assess various scenarios defined in Scope Section 2.3 below with respect to the potential lost capacity of the

USACE Artificial Island CDF (Cell 3) due to temporary and or permanent acquisition of this land by PSEG.

1.3 Limitations and Assumptions

The following are limitations and assumptions associated with the scope of this report. The limitations and assumptions may not be all inclusive:

- The PSEG 2008 Boundaries and Surveys drawing will be utilized as applicable for topography on the PSEG Nuclear property.
- USGS Quad Maps will be utilized as applicable for topography at the USACE Artificial Island, Killcohook and Predricktown CDF locations.
- For the purposes of this soil management study, the existing PSEG Nuclear site grade will be established at EL. = 10' NAVD88.
- For the purposes of this soil management study, the bottom of the basemat for the Non-Safety Related structures (e.g. Turbine Island, Service Buildings, Annex Buildings etc.) will be established at EL. = 20' NAVD88.
- Assessment of the excavated materials will be based on the PSEG ESPA Geotechnical Investigation Program soil borings for the North Site location.
- Excavation and fill quantities will be based on Figures 2, 4, 6 and 8
- Excavation Dewatering and Support Structure installation is not addressed in this study.
- The slope stability assessment is not within the scope of this report.
- Environmental and Construction permitting is not addressed in this study.
- There will be no field visits performed as part of the borrow site investigation.
- River distances between the various facilities (e.g. Artificial Island, Killcohook, Predricktown) will be based on Figure 9.
- The proposed excavation and backfill methodology defined in this study are based on preliminary engineering details being developed for the PSEG Site ESPA. It should be understood that this methodology could change as the project progresses through selection of a reactor technology; selection of a constructor; and COLA preparation.

- This study addresses soil backfill; not lean concrete or roller compacted concrete (RCC). However, preliminary cost information associated with lean concrete and RCC is provided.

- The potential need to relocate the 500 kV transmission towers and lines in the proposed PSEG Nuclear Site Soil Storage area will be identified and noted. Assessment and estimated costs for transmission tower/line relocation is not within the scope of this study.

2.0 Scope

2.1 Soil Management Study

The following will be performed as part of this report:

- Soil Excavation Quantities
  - ➢ Estimate the excavation quantity for each reactor technology plant footprint based on Figures 2, 4, 6 and 8
- Soil Fill Quantities
  - ➢ Estimate the Seismic Category 1 and 2 backfill quantities based on final grade elevations established at El. 12', 24' and 36.9' NAVD88. Elevations 12' and 24' were assumed to establish quantities for a new plant at existing site grade as well as intermediate elevation.
  - ➢ Estimate the Seismic Category 2 backfill quantities, assuming a nominal grade elevation of +15' NAVD88, for the following areas defined on Figures 1, 3, 5 and 7.
    - o Switchyard Areas (Primary and Interposing)
    - o Cooling Tower Area
    - o Batch Plant Area
    - o Construction Laydown Areas
    - o Parking Areas
- Soil Excavation/Fill Volume Summary
  - ➢ Develop a spreadsheet summarizing the total excavation and fill quantities for the areas described above for each of the reactor technologies.
  - ➢ Develop the fill cost estimate for each reactor technology footprint. The unit cost per cubic yard of fill will be derived from the borrow site investigation described below.
- Excavated Material Soil Assessment
  - ➢ Perform a preliminary assessment of the soil properties developed from the soil borings obtained from the north site location as part of the ESPA geotechnical investigation program. This assessment will be utilized to determine the following:

- Preliminary quantities for soil layers within the excavation limits, which are deemed acceptable for potential reuse. An estimated average soil layer thickness will be determined from the ESPA geotechnical investigation program soil borings.
- Potential reuse as Seismic Category 1 backfill material placed beneath and adjacent to safety related structures (e.g. Nuclear Island Structures) as shown on Figures 2, 4, 6 and 8.
- Potential reuse as Category 2 area backfill material placed beneath and adjacent to non-safety related plant structures and to raise the new plant site from the existing site grade (El. +10' NAVD 88) to the finished plant grade elevation (El. +36.9' NAVD88) as shown on Figures 2, 4, 6 and 8. .
- Potential reuse as Category 2 area fill for the Switchyard, Cooling Tower, Batch Plant and Construction Laydown and parking areas as shown on Figures 1, 3, 5 and 7.

2.2 Borrow Site Investigation Study

The following describes the approach that will be utilized for determining potential source(s) of borrow material to be used as granular fill for the new plant site:

- Detailed evaluations of granular backfill material for the new plant site will not be performed until preparation of the COLA. As such, the soil properties for granular fill defined below (Hope Creek UFSAR Section 2.5.4.5.3, Ref. 6.2-11) will be utilized as a guideline for the borrow site investigation:
  - Percent Fines- 3 – 12 percent.
  - Percent Gravel- up to 20 percent.
  - Mean grain size (D_{50}) lower and upper bounds- 0.5 and 1.1 millimeters.
- Perform a literature search to determine potential fill sources:
  - Review Hope Creek UFSAR (Ref. 6.2-11) for their sources of fill material
  - Review Salem UFSAR (Ref. 6.2-12) for their sources of fill material
  - Review geology websites for New Jersey, Delaware, Pennsylvania, and Maryland for Economic Geology information.

- Perform an internet search for potential borrow areas within a 50 mile radius of the site. This would include existing sand and gravel pits currently in operation. This will include parts of New Jersey, Delaware, Pennsylvania, and Maryland.
- Contact quarry/pit owners within a 50 mile radius of the site for potential quantities of available material as well as gradations for these materials. Project-specific use of the borrow material will not be disclosed to quarry/pit owners. Only reference proposed use in the southern New Jersey area.
- Contact up to ten concrete batch plant operators within a 50 mile radius of the site for their sources of sand and aggregate.
- Contact up to four representative DOTs for their sources of sand and aggregate.
- Review potential means of transport to the site from selected potential borrow areas (barge or truck).
- Inquire whether the quarry/pit owner can contract transport of borrow material. In addition obtain a budgetary price per cubic yard per mile or per hour of material transported from the quarry/pit to the southern New Jersey region (e.g. Salem County). S&L will determine the mileage from the quarry/pit and calculate the estimated transportation costs.
- Set up a meeting with former Bechtel Civil Construction Superintendent for Hope Creek construction to gain insight with respect to the Hope Creek excavation and backfill approach (meeting to be coordinated by PSEG Power).
- Develop a spreadsheet summarizing the following:
  - Location and pit name
  - Type of material
  - Material cost
  - Transportation cost

2.3 USACE Land Acquisition Support Study

The following describes the scope of work to support the potential use and/or acquisition of the USACE land shown on Figure 10:

- Develop a conceptual design, size, depth, and estimated cost for the development of a PSEG Site Soil Storage Area(s) for [redacted] (cubic yards). The area will be on PSEG property to the east of the existing facilities in areas shown on Figures 10, 11, 12, 13 and 14. No additional wetland fill is allowable except for plant facilities. The conceptual soil storage area(s) will include proposed drainage, outfall, diking, and materials management features necessary to allow storage of material received from the new plant excavation and various U.S. Army Corps of Engineers (USACE) Confined Disposal Facilities (CDF) to compensate for potential lost storage capacity at the Artificial Island USACE CDF. Conceptual sketches and details will be developed for this effort.

  The following USACE documents will be used as guides for developing the conceptual sketches and details.

  - EM 1110-2-1913 CECW-EG Design and Construction of Levees, 30 April 2000 (Ref. 6.3-2)
  - EM 1110-2-5025 CECW-EH-D Dredging and Dredged Material Disposal 25 March 1983 (Ref. 6.3-3)
  - EM 1110-2-5057 CECW-EH-D Confinement of Dredged Material 30 September 1987 (Ref. 6.3-4)
  - Technical Report DS-78-10 GUIDELINES FOR DESIGNING, OPERATING, AND MANAGING DREDGED MATERIAL CONTAINMENT AREAS January 1987 (Ref. 6.3-5)

- Develop a soils management / transport plan for the cases described below. The plan will include costs for mobilization and site development on the PSEG Nuclear property to receive material quantities from the CDF facilities defined below. Material transportation costs will be developed on a per unit basis (e.g. per CY):

- Case 1

  Develop a cost estimate for the site development of the Artificial Island CDF Cells 1 and 2 to relocate 1 - 3M CYs of soil to the proposed PSEG onsite soil storage area(s) by:

  a. Truck
  b. Slurry Pumping

- Case 2

  Develop a cost estimate for the site development of the Killcohook CDF to transport 1 - 3M CYs of soil from the USACE Killcohook CDF to the proposed PSEG Nuclear onsite soil storage area(s) by:

  a. Truck
  b. Barge

- Case 3

  Develop a cost estimate for the site development of the Pedricktown CDF to transport 1 - 3M CYs of soil from the USACE Predricktown CDF to the proposed PSEG Nuclear onsite soil storage area(s) by:

  a. Truck
  b. Barge

The following truck and barge sizes are assumed (based on sizes defined in the Conceptual Barge facilities report SL-009924, Ref. 6.3-12):

Truck: 20 CY
Raw Material Barge: 2000 ton, 200'long x 35' wide x 13' deep

3.0 Evaluations

3.1 Soil Management Study – Excavation and Fill Assessment

3.1.1 General Excavation and Fill Approach

Excavation down to a competent founding layer and backfilling the excavation is required to support the construction of a new nuclear power plant at the PSEG Nuclear Site. In order to accommodate potential flooding due to the Probable Maximum Hurricane, the high point of finished grade (HPFG) elevation was established at Elevation 36.9' NAVD88 (Ref. 6.1-1). The HPFG is considered the elevation of the final grade adjacent to the structures. A 2 foot drop in grade elevation from the HPFG to the edge of the top of the fill was assumed to be adequate for plant drainage away from the structures. Each technology has its standard footprint at the final grade level to provide adequate space for the safety related structures (nuclear island) as well as other non-safety related structures located adjacent to the nuclear island. Since this footprint is elevated above the existing ground elevation (approximately Elevation 10' NAVD88), a side slope of 3 horizontal to one vertical (3H:1V) from the final grade down to the existing grade was considered adequate to provide stable slopes for the elevated plant grade. The stability of this slope is not within the scope of this report. The outer limits of the excavation were established as the point where this 3H:1V slope met the existing grade at Elevation 10' (Ref. 6.1-2).

The excavation was divided into two levels. The first shallower excavation was performed from ground surface at Elevation 10' down to the top of the Kirkwood Formation at Elevation -42' NAVD88 (Ref. 6.1-2), which was considered to be able to provide adequate support for the non-safety related Category 2 backfill and associated non-safety related structures. Vertical walls were considered because a seepage barrier will be required to perform excavation under dry conditions and because of limited space to extend slopes from an open excavation approach. The second deeper excavation was extended down to the Vincentown Formation (competent layer) at an Elevation of -67' NAVD88 (Ref. 6.1-2). The limits of this excavation were established by extending a 1 horizontal to 1 vertical (1H:1V) line down from the outside limit of the bottom of the safety related structures to elevation -67'. Vertical excavation walls were also considered at these widths between Elevation -42' and -67' because of the see page considerations and to limit the extent of the excavation. The various safety related structures for each of the four technologies are established at different depths as provided by the vendors (Ref. 6.1-3). Since these bottom elevations and footprints for the various safety related structures differed between the four technologies, the extent of the deeper excavation for each technology varied.

After determination of the overall quantity of material to be excavated, the overall gross quantity of backfill was determined. This included the total excavation down to the competent layer as well as the material required to raise the site from the original ground level at 10' up to final plant finished grade elevation. This backfill material was then split between Category 1 backfill material and Category 2 backfill material. Category 1 backfill material is defined as the material that will be placed beneath the safety related structures from the bottom of the excavation up to the bottom of the structures as well as the material placed between the safety related structures and extending 40' (assumed for this evaluation) outside of the limits of the safety related structures up to the final grade elevation. From this gross Category 1 backfill quantity, the volume of the safety related structures below final grade was subtracted to obtain a net Category 1 backfill quantity. The Category 2 backfill quantity was determined by subtracting the gross Category 1 backfill material quantity from the gross overall backfill quantity. From this gross Category 2 backfill quantity, the volume of the major non-safety related structures was subtracted to obtain the net Category 2 backfill quantity. Since the elevations for the bottom of these non-safety structures are not available, a common bottom of structure was selected at Elevation 20' NAVD88.

This approach was utilized for each of the four technologies to establish the quantities of material for:

- Gross excavation quantity.
- Gross fill quantity up to finished grade.
- Net Category 1 backfill quantity required
- Net Category 2 backfill quantity required.

In addition, PSEG requested that other plant grade elevations be considered in this evaluation. Thus, the above procedure was repeated considering a HPFG at Elevation 12' NAVD88 (high point 2' above existing grade for drainage) and an intermediate HPFG at Elevation 24' NAVD88. The bottom elevations of the various structures were also adjusted accordingly. With the lower HPFG elevation, the overall plant excavation limits are reduced resulting in lower quantities of fill being required. Summaries of the excavation and fill quantities are provided below.

Computer program AUTOCAD CIVIL 3D, 2009 version, # 03.7.818-9.0 was used to determine the cut and fill quantities associated with each technology. Computer ZD5899 was used to perform the calculations.

3.1.2 Single Unit AREVA US-EPR Excavation and Fill Assessment

The plan dimensions for the EPR at the HPFG Elevation of 36.9' NAVD88 are approximately 1432' by 1507'. This area includes the safety related and non safety related structures within the Protect Area (PA) fence. The plant area slopes down from the high point at Elevation 36.9' to Elevation 34.9' at the crest of the embankment. This design will require the excavation of a plan area at existing grade at El. 10' NAVD88 of 1581' by 1656' to accommodate and support the construction of the 3H:1V outside slopes. The outline of this area is shown on Figure 2 and is denoted as the Upper Structure Support. This excavation will be performed to the top of the Kirkwood Formation at approximately Elevation -42'. Since the Kirkwood Formation does not have the required properties to support the safety related structures, an additional excavation down to the competent layer is required, as denoted by the limits of the Lower Support Structure on Figure 2. The green contour lines represent the 1H:1V slope down from the Kirkwood Formation to the level of the competent layer in the Vincentown Formation at Elevation -67' NAVD88. Cross-sections through the various plant structures are also shown on Figure 2. The extent of the limits for the excavation down to the competent layer is determined by the difference in elevation from the bottom of the safety related structures to Elevation -67'. The bottom elevation of the reactor building complex for the EPR is Elevation -4.1' (Ref. 6.1-3) with the elevation of the other safety related structures varying from 31.9' down to 14.9'. The elevation of the non-safety related structures was assumed at 20' NAVD88 for this evaluation since exact elevations are not available.

Table 3.1.6-1 below provides a summary of gross cut and net fill soil quantities for the US-EPR. Excavation and fill costs are provided in Figure 19. The total excavation using the HPFG Elevation at 36.9' will require the removal of approximately [redacted] million cubic yards of material. The amount of material required to fill this excavation and construct the embankment up to elevation 36.9' is [redacted] million cubic yards. This net fill quantity takes into account the volume occupied by only the major safety related and non-safety related structures but does not include any minor foundations; therefore it is a conservative estimate. The fill quantity can be further broken down into Category 1 backfill (material to support the safety related structures) and

Category 2 backfill (material used to backfill around the non-safety related structures and to construct the embankment up to the finished grade elevation). The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. A more detailed breakdown of these quantities is provided on Figure 2.

There is the potential for reuse of the excavated material primarily as Category 2 backfill within the excavation and as general fill for the outlying areas required for construction, such as the cooling tower area, temporary laydown areas, switchyards, and parking/ office areas. With proper separation of the material during the excavation work, some of the material that comprises the Alluvium, Lower Kirkwood Formation and upper Vincentown Formation could potentially be used as Category 1 and Category 2 backfill material. The potential quantity of reusable material is estimated considering average thicknesses for the various formations identified above from the subsurface investigation program performed for the ESP (Ref. 6.2-9 and Ref. 6.2-10). Figure 20 provides a summary of the estimated available quantities of material that could potentially be reused. A total of [redacted] million cubic yards of Alluvium could potentially be used as Category 1 material. However, if segregation is not performed during the excavation, then this material, in conjunction with some of the other excavated material, could be reused as Category 2 material. This estimated quantity for Category 2 use, including the Alluvium, is approximately [redacted] million cubic yards.

Note: The above assessment for potential reuse of excavated material was based on a review of the Category 1 backfill soil characteristics utilized for the construction of Hope Creek. The Category 1 & 2 soil properties/characteristics for the proposed PSEG site will be defined at the COLA stage when a specific reactor technology has been selected. At that time, a detailed analysis could be performed to evaluate the reuse of the excavated material.

Reuse of additional material from the excavation could be utilized as general fill in other outlying areas as noted above. A summary table of the potential quantities for each of these areas is provided on Figures 1 and 21. In summary, a total of [redacted] cubic yards of material could be reused for each foot of fill used to raise the existing grade in the various areas. If all of these areas are raised five feet, [redacted] million cubic yards of the excavated material could potentially be reused on site. In summary, there is a potential to reuse approximately [redacted] million cubic yards of the excavated material (including hydraulic fill and Kirkwood Formation), leaving a total of

[redacted]

approximately [redacted] million cubic yards for disposal at other on-site areas or off-site disposal. The onsite disposal of this material is further discussed in Section 3.3 which considers the southeast area of the property that was not utilized in this on-site fill scenario.

Note: The quantity of potential reusable excavated material defined above was calculated based on HPFG 36.9'. The quantity at the lower HPFG's, either 12' or 24', will be slightly less since the overall plan area at existing grade is smaller as shown on Figure 2. These reduced quantities have not been calculated.

Considering a HPFG at Elevation 12' NAVD88 with the plant grade sloping down to the existing grade of 10' NAVD88 at the perimeter of the PA, the total excavation will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the minimal embankment up to HPFG at Elevation 12' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG at Elevation 12' in comparison to the HPFG at Elevation 36.9', there is an 18% reduction in excavation quantities and a 42% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures considered for HPFG at Elevation 12' are also lowered by the same difference in HPFG, i.e. 24.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 2.

An intermediate HPFG Elevation of 24' NAVD88 with the plant grade sloping down to Elevation 22' at the perimeter of the PA was also considered in this evaluation. The total excavation for this scenario will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the embankment up to the HPFG Elevation 24' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG Elevation at 24' versus a HPFG at Elevation 36.9', there is a 9% reduction in excavation quantities and a 23% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures are also lowered by the same difference in HPFG, i.e. 12.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 2.

3.1.3 Dual Unit Westinghouse AP1000 Excavation and Fill Assessment

The plan dimensions for the dual unit AP1000 at the HPFG Elevation of 36.9' NAVD88 are approximately 900' by 1737'. This area includes the safety related and non-safety related structures within the PA fence. The plant area slopes down from the high point at Elevation 36.9' to Elevation 34.9' at the crest of the embankment. This design will require the excavation of a plan area at existing grade of El. 10' NAVD88 of 1049' by 1886' to accommodate and support the construction of the 3H:1V outside slopes. The outline of this area is shown on Figure 4 and is denoted as the Upper Structure Support. This excavation will be performed to the top of the Kirkwood Formation at approximately Elevation -42'. Since the Kirkwood Formation does not have the required properties to support the safety related structures, an additional excavation down to the competent layer is required, as denoted by the limits of the Lower Support Structure on Figure 4. The green contour lines represent the 1H:1V slope down from the Kirkwood Formation to the level of the competent layer in the Vincentown Formation at Elevation -67' NAVD88. Cross-sections through the various plant structures are also shown on Figure 4. The extent of the limits for the excavation down to the competent layer is determined by the difference in elevation from the bottom of the safety related structures to Elevation -67'. The bottom elevation of the reactor building complex for the AP1000 is Elevation -2.6' (Ref. 6.1-3), which is the only safety-related structure. The elevation of the non-safety related structures was assumed at 20' NAVD88 for this evaluation since exact elevations are not available.

Table 3.1.6-1 below provides a summary of gross cut and net fill soil quantities for the AP1000. Excavation and fill costs are provided in Figure 19. The total excavation using the HPFG Elevation at 36.9' will require the removal of approximately [redacted] million cubic yards of material. The amount of material required to fill this excavation and construct the embankment up to elevation 36.9' is [redacted] million cubic yards. This net fill quantity takes into account the volume occupied by only the major safety related and non-safety related structures but does not include any minor foundations; therefore it is a conservative estimate. The fill quantity can be further broken down into Category 1 backfill (material to support the safety related structures) and Category 2 backfill (material used to backfill around the non-safety related structures and to construct the embankment up to the finished grade elevation). The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. A more detailed breakdown of these quantities is provided on Figure 4.

There is the potential for reuse of the excavated material primarily as Category 2 backfill within the excavation and as general fill for the outlying areas required for construction, such as the cooling tower area, temporary laydown areas, switchyards, and parking/ office areas. With proper separation of the material during the excavation work, some of the material that comprises the Alluvium, Lower Kirkwood Formation and upper Vincentown Formation could potentially be used as Category 1 and Category 2 backfill material. The potential quantity of reusable material is estimated considering average thicknesses for the various formations identified above from the subsurface investigation program performed for the ESP (Ref 6.2-9 and Ref. 6.2-10). Figure 20 provides a summary of the estimated available quantities of material that could potentially be reused. A total of [redacted] million cubic yards of Alluvium could potentially be used as Category 1 material. However, if segregation is not performed during the excavation, then this material, in conjunction with some of the other excavated material, could be reused as Category 2 material. This estimated quantity for Category 2 use, including the Alluvium, is approximately [redacted] million cubic yards.

Note: The above assessment for potential reuse of excavated material was based on a review of the Category 1 backfill soil characteristics utilized for the construction of Hope Creek. The Category 1 & 2 soil properties/characteristics for the proposed PSEG site will be defined at the COLA stage when a specific reactor technology has been selected. At that time, a detailed analysis could be performed to evaluate the reuse of the excavated material.

Reuse of additional material from the excavation could be utilized as general fill in other outlying areas as noted above. A summary table of the potential quantities for each of these areas is provided on Figure 3 and Figure 21. In summary, a total of [redacted] cubic yards of material could be reused for each foot of fill used to raise the existing grade in the various areas. If all of these areas are raised five feet, [redacted] million cubic yards of the excavated material could potentially be reused on site. In summary, there is a potential to reuse approximately [redacted] million cubic yards of the excavated material (including hydraulic fill and Kirkwood Formation), leaving a total of approximately [redacted] million cubic yards for disposal at other on site areas or off site disposal. The on-site disposal of this material is further discussed in Section 3.3, which considers the southeast area of the property that was not utilized in this on-site fill scenario.

Note: The quantity of potential reusable excavated material defined above was calculated based on HPFG 36.9'. The quantity at the lower HPFG's, either 12' or 24', will be slightly less since the overall plan area at existing grade is smaller as shown on Figure 4. These reduced quantities have not been calculated.

Considering a HPFG at Elevation 12' NAVD88 with the plant grade sloping down to the existing grade of 10' NAVD88 at the perimeter of the PA, the total excavation will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the minimal embankment up to HPFG at Elevation 12' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG at Elevation 12' in comparison to the HPFG at Elevation 36.9', there is a 21% reduction in excavation quantities and a 45% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures considered for HPFG at Elevation 12' are also lowered by the same difference in HPFG, i.e. 24.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 4.

An intermediate HPFG Elevation of 24' NAVD88 with the plant grade sloping down to Elevation 22' at the perimeter of the PA was also considered in this evaluation. The total excavation for this scenario will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the embankment up to HPFG at Elevation 24' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG at Elevation 24' versus a HPFG at Elevation 36'9', there is an 11% reduction in excavation quantities and a 24% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures are also lowered by the same difference in HPFG, i.e. 12.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 4.

3.1.4 <u>Single Unit GEH ABWR Excavation and Fill Assessment</u>

The plan dimensions for the ABWR at the HPFG Elevation of 36.9' NAVD88 are approximately 1421' by 1164'. This area includes the safety related and non-safety related structures within the PA fence. The plant area slopes down from the high point at Elevation 36.9' to Elevation 34.9' at the crest of the embankment. This design will require the excavation of a plan area at existing grade at El. 10' NAVD88 of 1570' by 1314' to accommodate and support the construction of the 3H:1V outside slopes. The outline of this area is shown on Figure 6 and is denoted as the Upper Structure Support. This excavation will be performed to the top of the Kirkwood Formation at approximately Elevation -42'. Since the Kirkwood Formation does not have the required properties to support the safety related structures, an additional excavation down to the competent layer is required, as denoted by the limits of the Lower Support Structure on Figure 6. The green contour lines represent the 1H:1V slope down from the Kirkwood Formation to the level of the competent layer in the Vincentown Formation at Elevation -67' NAVD88. Cross-sections through the various plant structures are also shown on Figure 6. The extent of the limits for the excavation down to the competent layer is determined by the difference in elevation from the bottom of the safety related structures to Elevation -67'. The bottom elevation of the reactor building complex for the ABWR is Elevation -47.4' with the elevation of the other safety related structure (Control Building and Ultimate Heat Sink) at Elevations -39.2' and 5.9', respectively (Ref. 6.1-3). The elevation of the non-safety related structures was assumed at 20' NAVD88 for this evaluation since exact elevations are not available.

Table 3.1.6-1 below provides a summary of gross cut and net fill soil quantities for the GEH ABWR. Excavation and fill costs are provided in Figure 19. The total excavation using the HPFG at Elevation 36.9' will require the removal of approximately [redacted] million cubic yards of material. The amount of material required to fill this excavation and construct the embankment up to elevation 36.9' is [redacted] million cubic yards. This net fill quantity takes into account the volume occupied by only the major safety related and non-safety related structures but does not include any minor foundations; therefore it is a conservative estimate. The fill quantity can be further broken down into Category 1 backfill (material to support the safety related structures) and Category 2 backfill (material used to backfill around the non-safety related structures and to construct the embankment up to the finished grade elevation). The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. A more detailed breakdown of these quantities is provided on Figure 6.

There is the potential for reuse of the excavated material primarily as Category 2 backfill within the excavation and as general fill for the outlying areas required for construction, such as the cooling tower area, temporary laydown areas, switchyard, and parking/ office areas. With proper separation of the material during the excavation work, some of the material that

[redacted]

comprises the Alluvium, Lower Kirkwood Formation and upper Vincentown Formation could potentially be used as Category 1 and Category 2 backfill material. The potential quantity of reusable material is estimated considering average thicknesses for the various formations identified above from the subsurface investigation program performed for the ESP (Ref 6.2-9 and Ref. 6.2-10). Figure 20 provides a summary of the estimated available quantities of material that could potentially be reused. A total of [redacted] million cubic yards of Alluvium could potentially be used as Category 1 material. However, if segregation is not performed during the excavation, then this material, in conjunction with some of the other excavated material, could be reused as Category 2 material. This estimated quantity for Category 2 use, including the Alluvium, is approximately [redacted] million cubic yards.

Note: The above assessment for potential reuse of excavated material was based on a review of the Category 1 backfill soil characteristics utilized for the construction of Hope Creek. The Category 1 & 2 soil properties/characteristics for the proposed PSEG site will be defined at the COLA stage when a specific reactor technology has been selected. At that time, a detailed analysis could be performed to evaluate the reuse of the excavated material.

Reuse of additional material from the excavation could be utilized as general fill in other outlying areas as noted above. A summary table of the potential quantities for each of these areas is provided on Figure 5 and Figure 21. In summary, a total of [redacted] cubic yards of material could be reused for each foot of fill used to raise the existing grade in the various areas. If all of these areas are raised five feet, [redacted] million cubic yards of the excavated material could potentially be reused on site. In summary, there is a potential to reuse approximately [redacted] million cubic yards of the excavated material (including hydraulic fill and Kirkwood Formation), leaving a total of approximately [redacted] million cubic yards for disposal at other on-site areas or off-site disposal. The onsite disposal of this material is further discussed in Section 3.3, which considers the southeast area of the property that was not utilized in this on-site fill scenario.

Note: The quantity of potential reusable excavated material defined above was calculated based on HPFG 36.9'. The quantity at the lower HPFG's, either 12' or 24', will be slightly less since the overall plan area at existing grade is smaller as shown on Figure 6. These reduced quantities have not been calculated.

Considering a HPFG at Elevation 12' NAVD88 with the plant grade sloping down to the existing grade of 10' NAVD88 at the perimeter of the PA, the total excavation will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the minimal embankment up to HPFG Elevation at 12' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG at Elevation 12' in comparison to the HPFG at Elevation 36.9', there is a 19% reduction in excavation quantities and a 44% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures considered for the HPFG at Elevation 12' are also lowered by the same difference in HPFG, i.e. 24.9', in this scenario. The bottom of the Reactor Building will be at an elevation of -72.3' for this scenario, which would require an additional 5.3' of excavation beneath the Reactor building into the competent Vincentown formation layer. A more detailed breakdown of these quantities is provided on Figure 6.

An intermediate HPFG Elevation of 24' NAVD88 with the plant grade sloping down to Elevation 22' at the perimeter of the PA was also considered in this evaluation. The total excavation for this scenario will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the embankment up to HPFG Elevation 24' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG Elevation at 24' versus a HPFG at Elevation 36.9', there is a 10% reduction in excavation quantities and a 24% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures are also lowered by the same difference in HPFG, i.e. 12.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 6.

3.1.5 <u>Single Unit Mitsubishi US-APWR Excavation and Fill Assessment</u>

The plan dimensions for the APWR at the HPFG Elevation of 36.9' NAVD88 are approximately 1257' by 1185'. This area includes the safety related and non-safety related structures within the PA fence. The plant area slopes down from its high point at Elevation 36.9' to Elevation 34.9' at the crest of the embankment. This design will require the excavation of a plan area at existing grade of El. 10' NAVD88 of 1406' by 1334' to accommodate and support the construction of the 3H:1V outside slopes. The outline of this area is shown on Figure 8 and is denoted as the Upper Structure Support. This excavation will be performed to the top of the Kirkwood Formation at approximately Elevation -42'. Since the Kirkwood Formation does not have the required properties to support the safety related structures, an additional excavation down to the competent layer is required, as denoted by the limits of the Lower Support Structure on Figure 8. The green contour lines represent the 1H:1V slope down from the Kirkwood Formation to the level of the competent layer in the Vincentown Formation at Elevation -67' NAVD88. Cross-sections through the various plant structures are also shown on Figure 8. The extent of the limits for the excavation down to the competent layer is determined by the difference in elevation from the bottom of the safety related structures to Elevation -67'. The bottom elevation of the reactor building complex for the APWR is Elevation -2.1' with the elevation of the other safety related structures varying from 31.9' down to 5.9' (Ref. 6.1-3). The elevation of the non-safety related structures was assumed at 20' NAVD88 for this evaluation since exact elevations are not available.

Table 3.1.6-1 below provides a summary of gross cut and net fill soil quantities for the US-APWR. Excavation and fill costs are provided in Figure 19. The total excavation using the HPFG at Elevation 36.9' will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the embankment up to elevation 36.9' is [redacted] million cubic yards. This fill quantity takes into account the volume occupied by only the major safety related and non-safety related structures but does not include any minor foundations; therefore it is a conservative estimate. The net fill quantity can be further broken down into Category 1 backfill (material to support the safety related structures) and Category 2 backfill (material used to backfill around the non-safety related structures and to construct the embankment up to the finished grade elevation). The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. A more detailed breakdown of these quantities is provided on Figure 8.

There is the potential for reuse of the excavated material primarily as Category 2 backfill within the excavation and as general fill for the outlying areas required for construction, such as the cooling tower area, temporary laydown areas, switchyard, and parking/ office areas. With proper separation of the material during the excavation work, some of the material that comprises the Alluvium, Lower Kirkwood Formation and upper Vincentown Formation could

[redacted]

potentially be used as Category 1 and Category 2 backfill material. The potential quantity of reusable material is estimated considering average thicknesses for the various formations identified above from the subsurface investigation program performed for the ESP (Ref 6.2-9 and Ref. 6.2-10). Figure 20 provides a summary of the estimated available quantities of material that could potentially be reused. A total of [redacted] million cubic yards of Alluvium could potentially be used as Category 1 material. However, if segregation is not performed during the excavation, then this material, in conjunction with some of the other excavated material, could be reused as Category 2 material. This estimated quantity for Category 2 use, including the Alluvium, is approximately [redacted] million cubic yards.

Note: The above assessment for potential reuse of excavated material was based on a review of the Category 1 backfill soil characteristics utilized for the construction of Hope Creek. The Category 1 & 2 soil properties/characteristics for the proposed PSEG site will be defined at the COLA stage when a specific reactor technology has been selected. At that time, a detailed analysis could be performed to evaluate the reuse of the excavated material.

Reuse of additional material from the excavation could be utilized as general fill in other outlying areas as noted above. A summary table of the potential quantities for each of these areas is provided on Figure 7 and Figure 21. In summary, a total of [redacted] cubic yards of material could be reused for each foot of fill used to raise the existing grade in the various areas. If all of these areas are raised five feet, [redacted] million cubic yards of the excavated material could potentially be reused on site. In summary, there is a potential to reuse approximately [redacted] million cubic yards of the excavated material (including hydraulic fill and Kirkwood Formation), leaving a total of approximately [redacted] million cubic yards for disposal at other on-site areas or off-site disposal. The onsite disposal of this material is further discussed in Section 3.3, which considers the southeast area of the property that was not utilized in this on-site fill scenario.

Note: The quantity of potential reusable excavated material defined above was calculated based on HPFG 36.9'. The quantity at the lower HPFG's, either 12' or 24', will be slightly less since the overall plan area at existing grade is smaller as shown on Figure 8 These reduced quantities have not been calculated.

Considering a HPFG at Elevation 12' NAVD88 with the plant grade sloping down to the existing grade of 10' NAVD88 at the perimeter of the PA, the total excavation will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the minimal embankment up to HPFG at Elevation 12' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG at Elevation 12' in comparison to the HPFG at Elevation 36.9', there is a 19% reduction in excavation quantities and a 42% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures considered for HPFG at Elevation 12' are also lowered by the same difference in HPFG, i.e. 24.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 8.

An intermediate HPFG Elevation at 24' NAVD88 with the plant grade sloping down to Elevation 22' at the perimeter of the PA was also considered in this evaluation. The total excavation for this scenario will require the removal of approximately [redacted] million cubic yards of material. The net amount of material required to fill this excavation and construct the embankment up to HPFG at Elevation 24' is [redacted] million cubic yards. The estimated quantity for the Category 1 material is [redacted] million cubic yards and the estimated quantity for the Category 2 material is [redacted] million cubic yards. Utilizing a HPFG Elevation at 24' versus a HPFG at Elevation 36.9', there is a 10% reduction in excavation quantities and a 23% reduction in fill quantities needed. It should be noted that the elevations of the bottom of the various safety related and non-safety related structures are also lowered by the same difference in HPFG, i.e. 12.9', in this scenario. A more detailed breakdown of these quantities is provided on Figure 8.

3.1.6 <u>Summary of Excavation and Fill Quantities</u>

A summary of the excavation and fill quantities for each reactor technology at High Point Final Grade (HPFG) elevations 36.9', 24' and 12' are provided in Table 3.1.6-1 below.

TABLE 3.1.6-1: SUMMARY OF EXCAVATION AND FILL QUANTITIES

Reactor Technology	HPFG EL (ft)	Gross Cut (cy)	Net Fill (cy)
US-EPR	36.9	[redacted]	[redacted]
	24	[redacted]	[redacted]
	12	[redacted]	[redacted]
AP1000	36.9	[redacted]	[redacted]
	24	[redacted]	[redacted]
	12	[redacted]	[redacted]
ABWR	36.9	[redacted]	[redacted]
	24	[redacted]	[redacted]
	12	[redacted]	[redacted]
US-APWR	36.9	[redacted]	[redacted]
	24	[redacted]	[redacted]
	12	[redacted]	[redacted]

3.2 Borrow Site Investigation Study

3.2.1 General Approach to Borrow Site Investigation

The material that will be removed during the excavation for the new power plant will, in general, not be suitable for reuse as Category 1 backfill material without segregated excavation and stockpiling. As noted in Section 3.1, some of the material may be suitable for reuse as Category 2 backfill or general site fill. Approximately [redacted] million cubic yards of material will be required to fill in the excavation and to construct the embankment for the power plant up to the HPFG at elevation 36.9' NAVD88 (See Figures 2, 4, 6 and 8). Therefore, this study was performed to determine the potential material sources, within a reasonable distance, to supply the required quantity of Category 1 and 2 backfill materials. This material will consist of either a granular material with minimal fines content as described earlier or will be an aggregate – cement mixture similar to lean concrete, roller compacted concrete, or soil cement. The search consisted of locating and contacting sand and gravel suppliers as well as concrete suppliers within a 50 mile radius of the site (See Figure 18). This radius included parts of New Jersey, Delaware, Pennsylvania, and Maryland.

This evaluation began with a literature search to determine the granular fill suppliers for Hope Creek power plant. The former Bechtel Civil Construction Superintendent for Hope Creek construction, now a contractor to PSEG, was also contacted since he was a construction superintendent during the fill placement for the Hope Creek unit. An internet search of existing quarries and material suppliers within the 50 mile radius was also performed. This internet search included a review the New Jersey Department of Transportation (NJDOT) website to review the database of approved aggregate suppliers (Ref. 6.2-1). The NJ publication of Selected Sand, Gravel and Rock Surficial Mining Operations (Ref. 6.2-2) and Maryland Directory of Mineral Producers (Ref. 6.2-3) were also used to identify and evaluate possible sources. Additionally a review of state geological websites and a general internet search was undertaken to identify additional sources. Pertinent source information from these searches is presented in Appendix B.

After compilation of potential borrow sources, telephone contact was attempted with select potential borrow sources. In some cases, the company contacted provided other local aggregate suppliers to add to the contact list. A series of prepared questions were asked of each of these suppliers to determine various aspects of their operations. These questions included:

- Name, location and telephone contact person.
- Type of material produced and available.
- Quantity of material available and daily shipping rate.
- Available transportation facilities.
- Cost of material.
- Cost of transportation of the material to a site in southern New Jersey.

The details of these conversations are provided in Appendix A for each supplier contacted. Contact was established or attempted with a total of 19 borrow sources, with 29 different materials identified and discussed. Twelve of the 19 borrow sources were located in New Jersey, with three in Maryland and two each in Delaware and Pennsylvania.

3.2.2 Prior Borrow Evaluations and Fill Placement

To aid in this study, the prior borrow source studies for Hope Creek were reviewed and the construction superintendent responsible for backfill operations was interviewed as discussed in the following sections.

3.2.2.1 Dames and Moore Evaluation of Structural Backfill - [redacted]

To qualify borrow sources for backfill of the Hope Creek excavation under safety related structures, Dames and Moore prepared a report dated June 17, 1976 (D&M, 1976, Ref. 6.2-4, See Appendix - B). This report documented exploratory activities and laboratory testing of a potential borrow source located on the township line between [redacted], and between the Delaware River and US Route 130 in New Jersey. The borrow site was owned by the USACE and was leased to [redacted]. It should be noted that this site is relatively close (about [redacted]) to a borrow source (identified as [redacted], map key number N1) under consideration for the new project.

The laboratory testing program indicated the static and dynamic properties of the soil tested were suitable as Category 1 fill. Moreover, it was concluded that the dynamic strength properties of the compacted material from this source exceeded the design dynamic strength of the Vincentown Formation.

Dames and Moore also concluded that with selective excavation and an active quality control program, the 37 acre site could supply about [redacted] cubic yards of suitable material.

3.2.2.2 Bechtel Supplementary Borrow Area Investigation for Structural Backfill

In October 1980, Bechtel (Bechtel, 1980, Ref. 6.2-5) published a report for a Supplementary Borrow Area Investigation for Structural Backfill (See Appendix - B). The purpose of this report was to locate and verify two independent sources with sufficient quantities of acceptable borrow material to complete the Category 1 Backfill. It was estimated that an additional [redacted] cubic yards of material was needed to complete the work at the Hope Creek Site. The Bechtel report indicated that the following three sites were evaluated:

- "The [redacted] borrow site is located at the south end of Salem County, New Jersey, and is approximately [redacted] of the Hope Creek Site." (S&L understands that the site is [redacted] of the Hope Creek Site). Based on recent conversations it is estimated that this site was located in the southwest quadrant of [redacted] Roads.
- "The [redacted] Borrow area is located at the South end of Salem County, New Jersey and is approximately [redacted] of the Hope Creek Site." (S&L understands that the site is [redacted] of the Hope Creek Site). S&L did not determine a more precise location of this site. Based on gradation tests, Bechtel concluded that this site was not a suitable borrow source for the Category 1 material.
- "The [redacted] borrow area is located [redacted] of [redacted] Gloucester County, New Jersey and is approximately [redacted] from the Hope Creek Site."

The field exploration, laboratory testing and test fill embankments indicated that borrow materials from the [redacted] and [redacted] sites were considered suitable for Category 1 material. The gradation and cyclic shear strength tests indicated the materials were compatible with the [redacted] material, which had been previously used at the Hope Creek site. Moreover, it was concluded that the cyclic shear strength exceeded the design cyclic shear strength.

Based on the location and lift height that was demonstrated to exceed the compaction requirements, the [redacted] pit was the preferred borrow source.

3.2.2.3 Summary of Prior Borrow Investigation Reports

These prior reports indicate that the native materials of Southern NJ have been used as Category I backfill at the site. Moreover, the reports indicate that three of the four sites tested were considered acceptable borrow sources.

3.2.2.4 Hope Creek Excavation and Fill Placement Activities

To obtain a more complete understanding of the prior work at Hope Creek, the former Bechtel Civil Construction Superintendent [redacted] for Hope Creek construction was interviewed. He served as the Superintendent during placement of the backfill above the founding layer at Hope Creek from circa 1976 to the early 1980s. He was responsible for oversight of backfilling the excavation as well as other site earthwork development projects.

The superintendent did not recall any difficulties with the borrow sources and found the natural sands of southern NJ reasonable to obtain the required compaction.

3.2.3 Potential Aggregate Suppliers

The approximate location of each source contacted is presented on Figure 18, while notes from the interviews regarding each borrow source are presented in Appendix A. The discussions of available supplies presented herein are intended to be representative of current market conditions and are not considered to encompass all available sources. An exhaustive search of potential borrow sources would also require contacting property owners that have obtained the required permits to mine construction materials but have not begun operations. Additionally, a search for older properties that may have retained these permits and contain significant reserves would be appropriate. Appendix B presents pertinent public records and website addresses regarding sand and aggregate production in the area of interest including previous pit and quarry operations. It must be recognized that the construction aggregate market is dynamic and this survey was performed during a period of relatively low demand for construction aggregates and fill. When this project procures the required backfill materials, it is likely that the market conditions will have changed.

Sargent & Lundy also asked several borrow pit/quarry operators if they could accept the unsuitable soils that will be excavated. To protect near surface aquifers from salt contamination, they cannot accept imported material from brackish or saline areas (such as the PSEG site).

[redacted]

3.2.3.1 New Jersey Sand Pit Borrow Sites

Since the Hope Creek Station successfully used natural sands and gravels from southern NJ (as discussed by the former Bechtel Civil Construction Superintendent and recorded in the prior reports), these deposits are considered viable sources. This evaluation included 12 sites in southern NJ, with additional sources present within a reasonable haul distance of the site, which were not considered. Figure 18 depicts the location of the NJ sites, the Map Key numbers N# correlate to the telephone interview records contained in Appendix A. The sites identified in southern NJ primarily contain fine to medium sand with a trace to some small gravel. These deposits are used for engineered fill as well as fine aggregate (sand) in concrete. It should be noted that many of the southern NJ sand pits have an excess quantity of fine sand when screening concrete sand. This fine sand is considered a byproduct and is used as engineered fill.

The approximate location of sandpits is presented on Figure 18. The NJ sandpits considered, ranged from approximately [redacted] road miles from the PSEG Nuclear site. These sites typically have significant acreage under current permits for mining. However, it was reported that none of the NJ sites currently have deep draft barge facilities near the borrow source. One supplier has secured barge facilities in Salem that have both rail and barge access. This facility could be considered to reduce truck traffic to the site. Several potential barge loading facilities could be considered along the Maurice River and at other locations. Since the PSEG site does not have rail access and since barge transportation is not certain, the pricing discussed in Section 4.2 of this report is based on transporting fill via trucks for all NJ sites. Given the quantity of fill required [redacted], exclusive transportation of the material via trucks through southern NJ is not considered viable. To mitigate community impact and transportation costs, further investigation of developing barge loading facilities in local tributaries to the Delaware River or Bay may be warranted.

3.2.3.2 Delaware Borrow Sites

Sargent & Lundy attempted to contact two material suppliers in Delaware. Figure 18 depicts the location of the DE sites considered with Map Key numbers D#. No viable borrow sites with sufficient quantities of material were identified in Delaware.

3.2.3.3 Maryland Borrow Sites

Three borrow locations were considered in Maryland. The MD sites considered included sand, gravel and crushed rock sources. Figure 18 depicts the location of the MD sites contacted with Map Key numbers M1 – M3. The crushed rock materials will likely prove beneficial for concrete coarse aggregate, but may prove too expensive for use as Category 1 or 2 engineered fills. However, the crusher fines and quarry overburden (byproducts) may be an acceptable product at a lesser cost. Although the distance to the primary MD sites is approximately [redacted] by highway, use of the Chesapeake & Delaware Canal (C&D) to transfer barges of aggregate from the Chesapeake Bay to the Delaware River offers several benefits. In addition to eliminating highway congestion leading to the site, it appears barge transportation costs are less than ½ of trucking costs.

3.2.3.4 Pennsylvania Borrow Sites

The two Pennsylvania sites considered have crushed rock products similar to those of MD. Figure 18 depicts the location of the PA sites considered with Map Key numbers P1 - 2. The PA sites contacted are limited to truck and rail transportation. Several sand sources in southern NJ indicated they truck sand to quarry operations in Pennsylvania and haul crushed rock products back to NJ for use in concrete and asphalt mixes, which could reduce the transportation costs.

3.2.3.5 Byproduct Borrow Sites

In addition to the representative sources of both sand and crushed rock, currently available sources of byproducts from the production of specific geo-materials were evaluated. These byproducts included:

- Crusher fines;
- Sands to be excavated during landfill cell construction;
- Overburden from pits and quarries; and
- Excess fine sand from the processing of concrete sand at various sand pits in southern NJ.

Given the origin of these byproducts, they are generally the lower cost materials. However, the potential for high variability in the materials (constituents and properties) as well as the questionable availability (when PSEG is prepared to acquire backfill materials), makes this source of material somewhat less certain. For this study, it is assumed that the byproducts of aggregate manufacturing will be available and some quarry overburden will be available. The use of soils excavated from landfill construction activities may prove problematic unless these materials are procured and stored as they become available. Thus, when the PSEG work becomes more certain, it may be prudent to procure and store acceptable byproduct materials, as they are available. In addition to the potential cost benefits of early procurement and storage, an onsite stockpile could reduce the potential adverse impacts to the schedule and traffic patterns caused by delivery of backfill materials on an as needed basis.

3.2.4 Available Borrow Quantities

At the time of this evaluation, sufficient quantities of material are available in all three fill categories (byproducts of other processes, sands from southern NJ, and crushed rock from MD and PA). It is anticipated that market conditions will not affect the availability of sands and crushed rock products but may impact the availability of byproducts.

Although the constituents are somewhat uncertain, the [redacted] quarry (Key locator M1) has approximately [redacted] cubic yards of overburden that they and the prior quarry operators have stockpiled for many decades. If an investigation confirmed that this material is a viable alternative for Category 1 and/or Category 2 fill, this byproduct could prove very attractive from a pricing and shipping perspective.

3.2.5 Fill Placement

If it is determined that granular material will be used for Category 1 fill, special considerations must be given to fill placement activities.

Construction activities to properly place and compact the fill to achieve the required performance of the Category 1 fill will require diligence. To understand the relationship between placement techniques and in-situ engineering properties, a full scale test embankment is warranted. If this testing program is instituted prior to committing to the type of fill and source of fill, significant construction delays may be avoided. It should be noted that allowable lift thickness, as determined by a test embankment, was one of the criteria used when it was determined the [redacted]pit was the "preferred material" for Hope Creek. An extensive Quality Assurance / Quality Control program for monitoring and testing of the fill will be required.

Since Category 1 fill will support various safety related structures, reliably consistent placement methods and test results are important. It is unlikely that any single source will be capable of providing a consistent quality material within the time constraints mandated by the likely construction schedule. Thus, the use of numerous sources is likely. Given the variations in gradation, moisture content and delivery rates that are likely with numerous sources, a thorough blending and moisture conditioning program (drying or possibly wetting depending upon borrow site conditions) will be required. It is recommended that a program of combining the materials from numerous sources on a single conveyor belt and stock pile with an active stockpile blending program be developed by the contractor if granular fill is used as Category 1 fill. Moreover, special care will be required during periods of wet and/or freezing conditions to avoid failure of the in-situ tests for compaction and shear wave velocity. If the construction schedule requires placement of fills during the winter, significant schedule float and budget contingencies are recommended.

One alternative to avoid the possible weather related difficulties is the use of cementitious fill such as lean concrete, RCC, or soil cement. When mixing these products, the moisture content can be adjusted by withholding mix water when the aggregates are wetter than anticipated. Moreover, slight changes in gradation will likely have less of an impact on the final engineering properties of cement modified fills. Based on construction experience, the increased cost of cement modified fills may be partially offset by labor and compaction savings.

3.3 USACE Land Acquisition Support Study

3.3.1 USACE Land Requirements for Nuclear Development at Artificial Island

To support nuclear development at the PSEG Nuclear site located at Artificial Island (AI), PSEG will need to acquire additional land located north of the existing site property line. The proposed land is owned by the USACE and is part of a three cell CDF that is currently permitted to receive dredge spoils from USACE dredging operations. For the purposes of this study, the CDF cells are identified as cell 1, 2 and 3 (See Figure 15). Based on the Site Utilization Plan (Ref. 6.3-1) being developed for the PSEG Early Site Permit Application (ESPA), approximately 85 acres of USACE land will need to be acquired to site and construct the new plant. Approximately 50 of the 85 acres are located within CDF Cell 3. The USACE has estimated the lost capacity in CDF Cell 3 due to the proposed temporary/permanent land use to be between [redacted] cubic yards

PSEG Power has engaged the USACE in discussions for temporary use and or potential acquisition of this land. To support these discussions, the following scenarios will be assessed to compensate for the potential lost storage capacity of the USACE Artificial Island CDF (Cell 3) due to temporary and or permanent acquisition of this land by PSEG:

- Develop a Soil Storage Area on the PSEG Nuclear property to receive up to [redacted] cubic yards of material (e.g. dredge spoil) from the following sources:
  - New plant excavation (approximately [redacted] million cy)
  - USACE Artificial Island CDF Cells 1 and 2 ([redacted] million cy) or;
  - USACE Killcohook CDF ([redacted] (million cy)or;
  - USACE Pedricktown CDF ([redacted] million cy)

The locations and barge distances for the Killcohook and Pedricktown CDF's with respect to the PSEG Nuclear Site are approximately [redacted] miles, respectively as shown on Figure 9. The distance by truck is approximately [redacted] miles, respectively (See Figure 28).

In addition, primary construction quantities, unit costs and estimates are presented in Figures 24, 26, 27 for the site development and restoration for the AI Soil Storage Area as well as the proposed soil source areas at; AI CDF Cells 1 and 2; Killcohook CDF; and Pedricktown CDF. The cost estimates include loading of the borrow material into trucks/barges at the source locations, transporting and offloading, transporting and stockpiling at the proposed PSEG Nuclear site storage area(s) are shown in Figure 28.

3.3.2 Proposed Artificial Island Soil Storage Area

The proposed soil storage area is located in the former laydown area used for the Salem and Hope Creek Units original construction, at the southeast corner of the PSEG Nuclear site. Creation of a storage area will consider receiving dry soil delivered by truck and barge, and wet soil pumped as dredged slurry. The proposed soil storage area is transected by existing 500Kv transmission lines from the Salem and Hope Creek switchyards. Options to be evaluated include leaving existing transmission towers and lines in place and with the transmission towers being relocated outside of the storage area.

Note: The relocation of the existing 500Kv transmission lines has not been evaluated or estimated as part of this soil management study. Potential settlement of the proposed soil storage area(s) during the placement of the fill material and its impact on the existing transmission tower foundations and adjacent infrastructure (e.g. roadways, underground commodities, etc.) has not been assessed as part of this study.

Estimated storage quantities, as previously mentioned, include [redacted] cubic yards. As indicated, the source areas included in this study are USACE CDFs Artificial Island Cells 1 and 2, Killcohook, and Pedricktown. The source areas are evaluated in Section 3.3.5. Transportation options are evaluated in Section 3.3.6.

3.3.3 Dry Soil Storage Area Design

Figure 10 presents the general layout considered for the Site Storage area(s). Figures 11 and 12 present the proposed soil storage area located at the southeast corner of the PSEG Nuclear property for dry soil storage, with and without transmission lines, respectively. Optional sources for dry (truck or barge transport) soil delivery include the Artificial Island; USACE Cells 1 and 2; new plant excavation; the Killcohook USACE CDF; and the Pedricktown USACE CDF.

3.3.3.1 Dry Storage - Transmission Lines - Remain

For the option with the transmission lines remaining, Figure 11 shows the storage area divided into three distinct areas. The two smaller areas on the south and northwest portions of the storage area will be filled to their maximum capacity. Those peak elevations and volumes are 87 feet high with a storage volume of [redacted] cubic yards and a footprint of [redacted] for Area 1, and 67 feet high with a storage volume of [redacted] cubic yards and a footprint of [redacted] for Area 3 (See Figure 23). The remaining balance needed for the 3 remaining storage volumes are [redacted] cubic yards, [redacted] cubic yards, and [redacted] cubic yards using a footprint of [redacted] for Area 2 (See Figure 23). The balance of the larger area shows the horizontal extent and plateau elevation of the remaining capacity needed for the maximum fill plateaus for each of the [redacted] million cubic yard options. The plateau elevations for [redacted] million cubic yards capacity are approximately 40 feet, 53 feet, and 133 feet, respectively.

Figure 24 presents the Dry-Fill site preparation and restoration quantities and cost for each of the [redacted] million yard storage alternatives assuming existing transmission lines are not relocated.

3.3.3.2 Dry Storage - Transmission Lines - Relocated

For the option with the transmission lines being relocated, Figure 12 shows the entire area being filled uniformly to the horizontal extent and plateau elevations shown for each of the stated quantities. The toe of fill slope and the maximum fill elevations are indicated on the figure. The plateau elevations for [redacted] million cubic yards capacity are 38 feet, 46 feet, and 81 feet respectively (See Figure 23).

A variation to this option is to create the smallest possible footprint and store soil to a maximum practical elevation. For the purpose of this study, it is assumed that the entire available area would be utilized to minimize final elevations of the soil storage area. Further evaluation could be completed using the minimum footprint concept.

Figure 24 presents the dry-fill site preparation restoration quantities and costs for each of the [redacted] million yard storage alternatives assuming existing transmission lines are relocated.

3.3.4 Wet Soil Storage Area Design

Figures 13 and 14 present the soil storage area on the southeast corner of the PSEG property for dredged soil storage, with and without transmission lines. The potential source for dredged soil is from the new plant excavation and Artificial Island USACE CDF Cells 1 and 2, located approximately 2.6 and 1.0 miles northwest of the soil storage area, respectively. Soil within the new plant excavation and CDF cells would be mixed with water and pumped to the storage area.

3.3.4.1 Wet Storage Area - Transmission Lines - Remain

For the option with the transmission lines remaining, Figures 10 and 13 show the storage area divided into three distinct areas. The two smaller areas on the south and northwest portions of the storage area are understood to be filled to their maximum capacity. In this case, the maximum capacity for the smaller areas is determined by an optimization curve. As the containment berms are raised, the available containment volume peaks and then reduces as the berms themselves occupy and thus reduce the available airspace. For example, if the dike height is zero feet, there is zero storage. Similarly if the dike is filled to a peak, there is zero storage. At a specific elevation there is a maximum storage volume created. Three target elevations were analyzed to estimate the optimum dike elevation. At a dike elevation for the south area (Dike Area 3) of 28 feet, a maximum storage volume of [redacted] cubic yards is achieved. Similarly, for the northwest area (Dike Area 1) at dike elevation 32 feet a maximum storage volume of [redacted] cubic yards is achieved (See Figure 25).

Once these two areas are completely filled to their maximum storage capacity, the balance of material is then placed in the remaining open area (Dike Area 2). Similar to the two smaller area approaches, if on-site fill is used to create the berms, at an elevation of 46 feet the maximum storage in the large area (Dike Area 2) is [redacted] cubic yards. Combining the three areas yields a total of [redacted] cubic yards (See Figure 25). Using this approach will not satisfy the required need for [redacted] million cubic yards of storage.

Bringing in soil to build berms further reduces the available storage volume. However, if the berms are constructed from dredged materials – as received - arriving from the AI USACE CDF Cells 1 and 2, the storage volume of Area 2 (largest) would approach the same storage as the 3 area dry storage option. In this case, the remaining needed storage volume could be achieved at similar berm elevations as presented on Figure 11 (must consider dike top road width of 20' as a step). However, the practicality of creating berms to the maximium elevations would have to be evaluated because berm stability is based on the properties of the dried dredged slurry material and water elevation inside the dike. Specific calculations would need to be prepared to determine the maximum safe height of dike.

During the dredging operation, water will drain from the dredged soil and be directed to a final settling basin east of the current access road as shown on Figures 13 and 14. Water will be drained between the three areas via storm sewers to a settling basin. Water in the settling basin will then be decanted from the pond surface and directed back to the Delaware River.

An option that may be considered is to return the decanted water back to the construction site through reverse pumping.

Figure 26 presents the wet fill storage area site development quantities and costs for each of the [redacted] million yard storage alternatives assuming the existing transmission lines remain in place.

3.3.4.2 Wet Storage Area - Transmission Lines - Relocated

For the option where the transmission lines are removed, using the same approach described above for the larger area, Figure 14 presents the required berm height for containment of [redacted] million cubic yards.

As previously discussed, the optimum soil management practice to develop this disposal site option is to utilize on-site soils to form a perimeter containment berm. With this approach the borrowed material balances with the dike fill such that no material needs to be brought in to build berms and no capacity is lost since the volume occupied by the berm construction material is now available in the bottom of the pond. Similar to the individual storage areas, creating the containment berm from on-site material has a limited storage volume. At an approximate berm elevation of 50, the additional storage volume achieved for each additional foot of dike is reduced. At this elevation, the total storage volume approaches [redacted] million cubic yards. [redacted] million and [redacted] million cubic yards of storage are achieved at berm heights of 19 feet and 30 feet respectively. However, if the dredged material is used to construct the berms, the [redacted] million cubic yards of storage are achieved at 37 feet, 51 feet, and 87 feet, respectively.

For the purpose of this study, it is assumed that the berms will be constructed from dredge materials to maximize the storage volume and the quality of the material is sufficient

As material is pumped into the containment area and the soil dries sufficiently, the material will then be used to continue to build the berm higher, providing additional storage capacity. This option is dependent on the time frame to stockpile the drier dredged soil and the drying time required so material can be used for dike construction.

Water will drain from the dredged soil and be directed to a final settling basin east of the current access road as shown on Figures 13 and 14. Water in the settling basin will be decanted from the surface and directed back to the Delaware River.

An option that may be considered is to return the decanted water back to the construction site through reverse pumping.

Depending on the economics of pumping soil and constructing the berms vs cut and fill operations to create the berms, an optimum strategy could be developed.

The total slurry potential storage volume for the entire area assuming the transmission lines are relocated has elevation and storage volumes similar to that of the dry storage option when the transmission lines are relocated.

Figure 26 presents the wet fill storage area site development quantities and costs for each of the [redacted] million yard storage alternatives assuming the existing transmission lines are relocated.

3.3.5 <u>Soil Sources</u>

3.3.5.1 <u>Artificial Island USACE CDF Cells 1 and 2</u>

Figure 15 presents the USACE Artificial Island Cells 1 and 2 CDF as a potential additional dredge volume capacity soil source. The soil material removal can be performed by either dry loading into trucks for transport or pumped as slurry. The area extent for the options of [redacted] million cubic yards of soil are shown as the approximate horizontal maximum limits for both dry and or slurry borrow. Note that the state line between the States of New Jersey and Delaware bisects Cell 1.

Working within the two cells and only removing soil from the New Jersey portion down to 3 feet above river level and without undermining the existing containment dikes, provides a maximum of [redacted] million cubic yards of material to construct the berms (or open volume for replacement with future dredged material). If the borrow area is extended into the State of Delaware section, greater than [redacted] million cubic yards is available. If the borrow area is limited to New Jersey, excavation to –1 foot below river elevation would be required to provide the [redacted] million cubic yards of soil.

Note that there may be some issues associated with placing previously dredged material from Cells 1 and 2 into the subject storage area. It may be interpreted that introducing soil with potential saline concentrations in the new storage area may affect the nearby fresh water wetlands. If pursued, this option may have to be reviewed and approved by the appropriate agencies.

3.3.5.2 USACE CDF at Killcohook

Figure 16 presents the USACE CDF at Killcohook as a potential additional dredge volume capacity source. A USGS 7.5 Minute Quadrangle Map (Ref. 6.3-8) was utilized to depict the source area. The horizontal maximum limits are shown for the options of [redacted] million cubic yards of soil removal. Note that the actual disturbance area will be slightly larger to accommodate stockpiling of stripped topsoil, a truck staging area, a sediment control pond, and a potential barge loading facility. A 5-foot separation above the estimated groundwater level (river elevation) is maintained in the excavated areas for this scenario.

3.3.5.3 USACE CDF at Pedricktown

Figure 17 presents the USACE CDF at Pedricktown as a potential additional dredge volume capacity source. A USGS 7.5 Minute Quadrangle Map (Ref. 6.3-9) was utilized to depict the source area. Based on the approach presented above, horizontal maximum limits are shown for the options of [redacted] million cubic yards of soil removal. Note that the actual disturbance area will be slightly larger to accommodate stockpiling of stripped topsoil, truck staging area, a sediment control pond, and a potential barge loading facility. A 5-foot separation above the estimated ground water (river elevation) is maintained in the excavated areas for this scenario.

Based on the similarities of several of the options (for example source material of [redacted] million and [redacted] cubic yards borrow site preparation and restoration for both Killcohook and Pedricktown having

[redacted]

the same footprint locations) there are several variations where either the same unit costs can be applied or the same total costs. For this study, where there is duplication of unit or total costs, they will be estimated only once and those costs applied to the borrow preparation and restoration, transportation, and storage preparation and restoration across the board.

Restoration of each of the source areas is dependent on timing of future use and is included as an example for the Killcohook and Pedricktown CDFs only because of the potential intended use of AI Cells 1 and 2.

Figure 27 presents the USACE CDF area site preparation and restoration quantities and costs for [redacted] and [redacted] million yards for each of the source areas.

3.3.6 Soil Transportation

As indicated, practical soil transportation options to create additional dredge space at the three source areas includes slurry pumping or trucking from AI cells 1 and 2, and trucking or barge hauling from Killcohook and Pedricktown to the proposed PSEG Nuclear Site soil storage area.

Transportation cost options are presented in Figure 28. To isolate common unit costs between options, the soil movement tasks are broken into the following steps and similar unit costs used for each variation:

Dry Soil Handling for Truck Transport

- Excavate and Load Trucks
- Truck Transport (applied to the distances)
- Unloading trucks and spreading soil
- Soil Compaction

Dry Soil Handling for Barge Transport (not previously covered above)

- Excavate into hopper, convey to barge loading facility
- Barge Transport (applied to the distances)
- Barge Unloading via Clamshell Crane and Trucking 4000 feet
- Dredging for Barge Dock, Channel, and Mooring Cells at source area

Slurry Pumping (not previously covered above)

- Slurry Pump 2.6 miles including Piping
- Regrading/cut/fill using dredged material for dike construction

4.0 Cost Summary

4.1 Soil Management – Excavation and Fill Material Costs

4.1.1 Excavation Costs

Figure 19 presents a breakdown of the indicative cost estimate and quantities of material that will be removed from the excavation for the three HPFG elevations considered in this evaluation for each of the reactor technologies. As summarized in Table 4.1.2-1 below, the AP1000 technology (dual units) will be considered the base unit since it requires the least amount of excavation. Considering a unit cost of [redacted]/cy (Ref. 6.3-11) of material excavated and placed in a disposal area within 1 mile of the site, the estimated total cost of excavation will be approximately $[redacted] million for the [redacted] million cubic yards of material when the plant is located at the HPFG of 36.9'. This cost does not include excavation support structures or dewatering. The EPR requires the largest excavation at a cost of $[redacted] million, approximately 38% more than the AP1000. The cost of excavation for the APWR will be approximately 5% more than the AP1000 and the ABWR will be approximately 11% higher than the AP1000.

4.1.2 Fill Costs

As shown on Figure 19, the AP1000 requires the least amount of fill to be placed for all of the three HPFG elevations. Considering the design HPFG at Elevation 36.9', the estimated cost for importing, handling, placing and compacting [redacted] million cubic yards at a unit cost of $[redacted]/cy would be $[redacted] million. The unit cost of the material includes; material and delivery to the site ($[redacted]/cy, See Figure 22); unloading, onsite transportation (or conveyors) and stockpiling of the material ($[redacted]/cy, Ref. 6.3-11); placement, compaction and testing of the material ($[redacted]/cy, ref. 6.3-11). The delivered material cost is based on granular fill (e.g. byproducts and lower grade material) available from the borrow sources (See Figure 22). As summarized in Table 4.1.2-1 below, the EPR requires the most fill and its relative cost is approximately 38% higher than the AP1000. The fill for the APWR will be 2% more than the AP1000 and the ABWR will be approximately 7% higher than the AP1000.

TABLE 4.1.2-1: SUMMARY OF EXCAVATION AND FILL COST [1, 2]

Reactor Technology	Gross Cut (cy)	Total Cost For Soil Excavation	Net Fill (cy)	Total Cost for Fill Material	Total Cost for Excavation and Backfill
EPR	[redacted]				
AP1000	[redacted]				
ABWR	[redacted]				
APWR	[redacted]				

[1] See Report Figure 19 for a detailed breakdown of unit costs for excavation and fill material
[2] Costs are based on the final plant grade at El. 36.9' NAVD88

Note: From Reference 6.1-4, approximately $[redacted] was estimated for material and installation of ARMOR Stone protection for the raised Power Block area side slopes. This would be in addition to the total cost for excavation and backfill cost identified in Table 4.1.2-1 above.

4.2 Borrow Site Material Costs

The costs of borrow materials is directly related to the amount of processing (blasting, crushing, screening and/or washing) required as well as the shipping distance and methods. The sources considered in this evaluation were selected to present estimated costs for the range of processing and transportation options.

During the telephone interviews with the potential borrow sites, S&L requested preliminary pricing to determine if the fill material costs would become a fatal flaw and stated that the values provided are not considered a bid. S&L requested the suppliers to present the values in 2010 dollars and not account for inflation or escalation. Moreover, S&L stated the budget values would be utilized for a conceptual study and would not be shared with other suppliers. It is expected that competitive bidding will result in slightly more desirable pricing if the market conditions are similar to the current downturn.

As shown in Figure 22, the quarry overburden material from the [redacted] in [redacted], MD presented the lowest cost delivered to the site ($[redacted]/CY) for byproduct material which can be shipped to the site on barges via the C&D Canal. This pricing by [redacted] appears to be driven by a desire to have the material removed from the site since it is stockpiled in an area of future quarry expansion. Concrete sand from the [redacted] quarry in [redacted], MD was the most expensive ($[redacted]/CY) of the granular fills, when shipping costs were estimated.

The following generalizations presented in Table 4.2-1 for the various material types to correlate the relationship of volume to be filled and weight of materials purchased and transported.

TABLE 4.2-1 DENSITY RELATIONSHIP		
Material	Compacted Unit Weight (lbs/ft^3)	Compacted Unit Weight ($tons/yd^3$)
Dense Graded Aggregate (DGA) or Crushed Stone Road Base	135	1.82
Sand and Gravel	125	1.69
Concrete Sand Mason Sand Natural Sand with trace gravel Crusher Screenings (minus 3/8)	120	1.62
Crushed Stone ¾ inch Sandy Overburden	115	1.55

Figure 22 provides the estimated unit cost for each material type from the various borrow sources. Table 4.2-2 below presents the average/median unit cost for the various material types delivered to the site. These costs do not include any unloading or handling costs at the PSEG site. Figure 19 defines the unit costs for material unloading and handling at the PSEG site.

TABLE 4.2-2 SOIL FILL AND CONCRETE MATERIAL UNIT COST		
Material	Estimated Typical Cost Materials Delivered to Site	Point of Delivery
Granular Byproducts such as Mason Sand, Crusher Fines, Overburden or Excess Soil from Landfill Cell Construction	$[redacted] / CY[1]	At Dock or Truck Unloading Point
Southern NJ Sand and Gravel	$ [redacted] / CY[1]	
Crushed Rock Products	$ [redacted] / CY[1]	
Soil Cement	$ [redacted] / CY	Includes Onsite Material Handling, Mixing, Testing and Delivery to the Excavation
RCC or Lean Concrete	$ [redacted] / CY	

1 See Figure 22

It must be recognized that directly comparing costs for cementitious fill and granular fill is not reasonable, since the granular fill will require offloading, on-site transportation, placement, compaction and extensive in place testing, which is not incorporated in the estimated price in Table 4.2-2 above. However, Figure 19 does provide the estimated costs ($[redacted]/cy) for material and handling of the granular fill, which is still significantly less than cementitious materials. The prices, determined below for cementitious materials include offloading, mixing and on-site transportation but does not include placement or testing.

Determining the likely costs for cementitious fill options is somewhat more complicated. Providers were hesitant to offer a budget price since the mix design and rate of placement can affect the material costs. One supplier ([redacted], which owns several portable batch plants) suggested using reasonable material prices and adding $[redacted]/CY for the use of an on-site batch plant, on-site transportation, labor, material testing and mobilization of equipment. Conservatively, this study estimates material (fine aggregates, coarse aggregates and cement) costs and adds $[redacted]/CY for handling and mixing these materials. Based on published pricing for Portland cement (20 city average) in Baltimore and Philadelphia, this study considers Portland cement costs at the site of $100.00/ton (ENR, 2010, page 19, Ref. 6.2-8) or $0.05/lb.

For this evaluation, several different products are considered. Although the following mixes are estimated to provide adequate properties, the ratio of constituents and engineering properties of the hardened mixes must be confirmed with laboratory testing.

- Soil Cement using the natural sands of southern NJ and 2.5 sacks (94 lbs/sack) of Portland cement per cubic yard. (6.7 percent by weight considering compacted density of 130 pcf based on Table 4.1 of ACI, 2009 (Ref. 6.2-6)).
  - Lean concrete or roller compacted concrete (RCC) mixed with a blend of southern NJ natural sands and crushed rock coarse aggregate from MD along with 4 sacks of Portland cement per cubic yard (within the guidelines of Section 2.1 and Table 2.1 of ACI, 1999 (Ref. 6.2-7)).

The following is used to estimate the raw material cost per CY of soil cement:

- 1 CY of NJ sands at $[redacted]/CY; and
- 235 pounds of Portland cement at $[redacted]/lb ($[redacted] for cement in 1 CY of mix);

This equates to a total estimated material cost of $[redacted]/CY ([redacted]). Considering an additional estimate of $[redacted]/CY to handle the materials and mix the soil cement, the total estimated cost of soil cement is $[redacted]/CY, say $[redacted]/CY.

The following is used to estimate the raw material cost per CY of lean concrete or roller compacted concrete:

- 0.75 CY of NJ sands at $[redacted]/CY ($[redacted] for sand in 1 CY of mix);
- 0.5 CY of crushed stone at $[redacted]/CY ($[redacted] for stone in 1 CY of mix);
- 376 pounds of Portland cement at $[redacted]/lb ($[redacted] for cement in 1 CY of mix);

This equates to a total estimated material cost of $[redacted]/CY [[redacted]]. Considering an estimate of an additional $[redacted]/CY to handle the materials and mix the lean concrete or RCC, the total estimated cost of these materials is $[redacted]/CY say $[redacted]/CY.

It should be noted that the use of concrete fill should only be for the Category 1 material directly under safety related structures. Thus, the quantity of concrete would only be a portion of the total fill required for Category 1 backfill as defined on Figures 2, 4, 6 and 8. This pricing considers typical lean concrete with no steel reinforcement. The cost for the other cementitious options of roller compacted concrete or soil cement is considered to be approximately the same for this evaluation.

4.3 USACE Land Acquisition Support Costs

Section 3.3 of this report details the scope associated with developing the PSEG Nuclear site for onsite soil storage capacity to support the excavation of the new power plant as well as potential storage of dredge spoils from USACE CDF's at Artificial Island (CDF cells 1 and 2), Killcohook and Pedricktown (See Figures 9 through 17). As stated previously in Section 3.3, dredge spoils from the USACE CDF's would potentially be placed at the onsite soil storage areas to compensate for the lost storage capacity of Artificial Island USACE CDF Cell 3, to support the location of the new plant. Figure 30 provides a summary of assumptions and clarifications

This section summarizes the cost associated with the site development of the proposed PSEG Nuclear onsite soil storage area(s) as well as the individual USACE CDF sites. In addition, cost estimates have been developed for the transport of material from the various USACE CDF's to the proposed soil storage area(s) on the PSEG Nuclear Property. The unit costs used in these estimates are based on 2010 dollars (Ref. 6.3-11) and do not account for escalation or inflation.

Costs estimates have been developed for the following items:

- Site Development Costs of the PSEG Nuclear Site Soil Storage Area(s) including (See Section 4.3.1 below):
  - Dry Fill Storage Area(s) with transmission lines
  - Dry Fill Storage Area without transmission lines
  - Wet Fill Storage Area(s) with transmission lines
  - Wet Fill Storage Area without transmission lines
- Site Development Costs of the Artificial Island CDF Cells 1 and 2, Killcohook and Pedricktown CDF's for transport of material to the Proposed Soil Storage Area (See Section 4.3.2 below).
- Soil Transportation Costs from Artificial Island CDF Cells 1 and 2, Killcohook and Pedricktown CDF to PSEG Nuclear Site Soil Storage Area (See Section 4.3.3 below).

4.3.1 Site Development Costs of the PSEG Nuclear Site Soil Storage Area(s)

As defined above, site preparation and restoration costs have been developed for the proposed onsite soil storage area(s) for Dry Fill storage utilizing conventional excavation methods (e.g. clamshell, dragline, scrapers, etc.) and Wet Fill Storage if hydraulic dredge excavation methods are utilized (e.g. where the excavated material is pumped as a slurry). The cost for the Wet Fill storage area also includes the cost for preparation and restoration of the associated decanting pond. Site development costs have been estimated with the existing 500 Kv transmission lines remaining in place as well as with the transmission lines relocated. The cost does not include the relocation of the transmission lines. Figures 10 -14 depict the areas of site development for the proposed soil storage area on the PSEG Nuclear property.

Table 4.3.1-1 below summarizes the cost associated with the site preparation and restoration of the proposed Dry Fill and Wet Fill soil storage areas:

TABLE 4.3.1-1: SUMMARY OF COST FOR PROPOSED SOIL STORAGE AREA SITE PREPARATION AND RESTORATION

Soil Storage Area	Estimated Cost
Dry Fill Storage Area (Three Areas) – Transmission Lines - Remain [1]	[redacted]
Dry Fill Storage Area (One Area) – Transmission Lines - Relocated [1]	
Wet Fill Storage Area (Three Areas) – Transmission Lines - Remain [2]	
Wet Fill Storage Area (One Area) – Transmission Lines - Relocated [2]	

[1] **See Figure 24 for a breakdown of the cost.**
[2] **See Figure 26 for a breakdown of the cost.**

4.3.2 Site Development Costs of the USACE CDF's

As defined above, dredge spoils from various USACE CDF's would be removed, transported and stored at the proposed PSEG Nuclear site soil storage area(s). Cost estimates have been prepared for the site preparation and restoration of the subject CDF's for removal of [redacted] million cubic yards of material. Figures 15, 16 and 17 depict the areas for site development within the CDF's.

Table 4.3.2-1 below summarizes the cost associated with the site development of the Artificial Island CDF Cells 1 and 2, Killcohook and Pedricktown CDF's:

TABLE 4.3.2-1: SUMMARY OF COST FOR USACE CDF SITE PREPARATION AND RESTORATION	
USACE CDF's	Estimated Cost
Artificial Island CDF [1]	
Cell 2	[redacted]
Cell 1	
Killicohook and Pedricktown CDF [1,2]	
[redacted] Cubic Yard	[redacted]
[redacted] Cubic Yard	

[1] See Figure 27 for a breakdown of the cost.
[2] Site development costs will be the same for both CDF sites.

4.3.3 Soil Transport Costs from the USACE CDF's to the PSEG Nuclear Site Soil Storage Area

As defined in Section 4.3.2 above, between [redacted] million cubic yards of material would be removed, transported from the subject CDF's and off-loaded and placed at the proposed PSEG Nuclear Site Soil Storage area(s). Cost estimates have been developed for excavation, loading and transport of material via truck and barge from the USACE Killcohook and Pedricktown CDF's to the PSEG Nuclear site. In addition, cost estimates have been developed for transport of material via truck and slurry pumping from the USACE Artificial Island CDF Cells 1 and 2. Figure 9 shows the relative location and distance between USACE CDF locations and the proposed PSEG Nuclear Site Soil Storage area.

Table 4.3.3-1 below summarizes the cost associated with transporting material and storing at the proposed soil storage area(s):

[redacted]

TABLE 4.3.3-1: SUMMARY OF COST FOR MATERIAL TRANSPORT FROM USACE CDF'S TO PROPOSED PSEG NUCLEAR SITE SOIL STORAGE AREA(S)

USACE CDF	Travel Distance to Soil Storage Area (Miles)	Estimated Cost [1, 2]	
Artificial Island CDF		[redacted] (cy)	[redacted] (cy)
Truck Transport	2.6	$[redacted]	$[redacted]
Slurry Pumping Transport	2.6	$[redacted]	$[redacted]
Killcohook CDF			
Truck Transport	20	$[redacted]	$[redacted]
Barge Transport	10	$[redacted]	$[redacted]
Pedricktown CDF			
Truck Transport	30	$[redacted]	$[redacted]
Barge Transport	22	$[redacted]	$[redacted]

[1] See Figure 28 for a breakdown of the cost.

[2] Cost includes excavation and loading at CDF site, transport of material, and offloading, spreading and compacting at the proposed soil storage area.

As shown in Table 4.3.3-1 above, the cost of relocating material from the USACE CDF's to the PSEG Nuclear site soil storage area(s) is significant. There would be a significant cost savings utilizing barge transport. In addition, barge transportation will also aid in mitigating the community impacts from truck traffic.

5.0 Summary

5.1 Summary of Soil Management – Excavation and Fill Assessment

The proposed excavation and backfill methodology defined in this study is based on preliminary engineering details being developed for the PSEG Early Site Permit Application (ESPA) as well as information provided to date from the reactor technology vendors. As discussed in Section 3.1 above, there will be a significant amount of material generated (regardless of the reactor technology selected) due to the excavation depth required to meet the design criteria for founding the safety related and power block structures. While a portion of the excavated material may be utilized for the new plant construction, a majority of the material (as much as [redacted] cy) will have to be stored on the PSEG property or shipped off-site to a permitted Confined Disposal Facility (CDF). The storage of excavated material on the PSEG Nuclear property has been assessed in Sections 3.3 and 4.3 above.

As discuss in Section 3.1 above, the high point final grade (HPFG) elevation for the new plant (regardless of the reactor technology selected) will be at 36.9' (NAVD88) to meet the design criteria for flood protection. This is approximately 27 feet above the existing site grade. The HPFG elevation combined with the excavation size and depth will require a significant amount (as much as [redacted] cy) of engineered fill material to be imported to the PSEG site. Borrow sources and associated cost for fill material have been assessed in Sections 3.2 and 4.2 above and is summarized in Section 5.2 below.

While there is variation in the quantities of excavated and fill material between the reactor technologies, there will be a significant cost (see Figure 19) associated with this phase of construction, regardless of the reactor technology selected. Once a reactor technology and constructor are selected, the overall excavation and backfill methodology, including dewatering, can be defined and definitive cost estimates developed for this phase of the project.

5.2 Summary of Borrow Site Investigation

Information on 29 potential materials from 19 different sources was obtained from telephone interviews (See Appendix A). The price to purchase and deliver the materials to the site varied from $ [redacted] to $[redacted]/CY (See Figure 22). The transportation component of these costs is highly variable source to source. It should be noted that distance from the site as well as availability of barge facilities are the primary variables in the transportation costs. For this evaluation, the transportation cost to deliver the material to the site by truck is estimated to be $[redacted]/ton/hour. This is to say that for sites within a 2 hour roundtrip of the PSEG site, the trucking costs would be on the order of $[redacted]/ton. Transportation costs to deliver material by truck from the nearby southern NJ sandpits are estimated to be about $[redacted]/ton while transportation costs for material delivered by barge from the northern portion of the Chesapeake Bay is estimated to be $[redacted]/ton, based on a conversation with one supplier. Thus, it is desirable to use sources that have barge facilities available, to the extent practical, to reduce transportation costs. Barge transportation will also aid in mitigating the community impacts from truck traffic.

Given the quantity of fill required for this project, it is recommended that numerous sources be contracted to provide the fill. If a single supplier is selected, the logistics required to mine, process and transport the material at a satisfactory rate could expose the project schedule to significant delays. Weather conditions and possible strikes by employees of a sole source provider could drastically affect the supply cycle.

To obtain suitable byproduct materials at the most desirable pricing and to mitigate transportation bottlenecks, PSEG should consider purchasing byproduct soils, such as excess soils from landfill construction, as they are available.

5.3 Summary of USACE Land Acquisition Support Study

As presented in Section 3.3 above, conceptual soil storage area designs were developed to determine the theoretical storage capacity of an onsite (PSEG Nuclear property) soil storage facility. The proposed soil storage area would be utilized to store soil from the new plant excavation (up to [redacted] million cy) as well as soil relocated from various USACE CDF's ([redacted] million cy) to compensate for the lost storage capacity of Artificial Island USACE CDF Cell 3.

As depicted on Figures 10 through 14, the soil storage area(s) would be located in the uplands area located at the southeast corner of the PSEG Nuclear Property. This area was selected since it provided the largest contiguous non-wetland land area on the PSEG Nuclear property. However, because this land area is transected by the 500 kV transmission lines exiting the Salem and Hope Creek switchyards, this area would have to be parceled into three separate storage areas utilizing a 3H:1V side slope in order to avoid the transmission lines and towers.

For the purposes of this study, conceptual storage area designs were also developed with the transmission lines and towers relocated.

For illustration purposes, Figure 11 is used as an example since it represents the most reasonable soil storage area configuration for the proposed location. Three separate soil storage areas, utilizing a 3H:1V side slope were developed. High point plateau elevations were then determined for each area based on storage volumes of [redacted] million cubic yards. The two small areas (Areas 1 and 3) were filled to their theoretical maximum capacity with the balance of soil placed in the largest area (Area 2). Table 5.3-1 below shows the storage capacity and high point plateau (Top) elevation of each area at storage volumes of [redacted]

TABLE 5.3-1: DRY STORAGE: TRANSMISSION LINES REMAIN [1]

	Storage Area Designation			TOTAL STORAGE VOLUME (CY)
	1	2	3	
Footprint (AC)	7	62	16	
Volume (CY)	[redacted]	[redacted]	[redacted]	[redacted]
Top Elevation (FT) [2]	**87**	**40**	**67**	
Volume (CY)	[redacted]	[redacted]	[redacted]	[redacted]
Top Elevation (FT) [2]	**87**	**53**	**67**	
Volume (CY)	[redacted]	[redacted]	[redacted]	[redacted]
Top Elevation (FT) [2]	**87**	**133**	**67**	

million cubic yards.

[1] See Figure 11
[2] NAVD88

Based on a nominal site grade elevation of 10' NAVD88, the high point plateau for storage Areas 1, 2 and 3 at [redacted] million cubic yards of storage volume would be 77', 123' and 57' above the existing site grade respectively. From a practical point of view, this does not seem like a reasonable approach for the following reasons:

- Based on the anticipated soil properties and moisture content of the excavated material, it may not be feasible to stockpile the material to any significant height due to stability of the side slopes.

- Spreading and drying of the material would likely be required before stockpiling and light compaction to obtain the design strength. This would have to be accounted for in the overall construction schedule.
- Stockpiling the proposed material quantities may cause settlement of the soil storage areas which could impact the adjacent transmission tower foundations.
- Large construction equipment operating in close proximity to the 500 kV transmission lines has the potential for impacting the operating units.
- The proposed soil storage area is currently depicted as construction laydown and parking on the ESPA Site Utilization Plan (Ref. 6.3-1). Even with the proposed acquisition of 85 acres of land from the USACE, the PSEG Site is still considered space limited with respect to construction support facilities (e.g. construction laydown and parking).
- The proposed storage area is located at the entrance to the PSEG Nuclear site. The operating plant access road would be directly adjacent to the storage area during the stockpiling activities.

Based on the discussion above, the proposed soil storage area(s) would not be a practical location for storing the quantities of material required to support the new plant construction. As part of the land acquisition discussions with the USACE, PSEG may want to inquire about acquiring additional land at the USACE Artificial Island CDF cells (e.g. all of Cell 2, Cell 3 and possibly portions of Cell 1) to support this phase of construction as well as the overall construction activities. If the additional land cannot be acquired from the USACE, offsite disposal of the excavated material may have to be considered due to the limited space on the PSEG site.

Note: Approximately [redacted] million cubic yards (see Figure 19) of imported backfill material will be required for the new power plant(s). The stockpiling of a portion of this material at the PSEG site will also need to be considered with respect to land allocation.

In addition to the proposed soil storage area(s), development of USACE Artificial Island (Cells 1 and 2), Killcohook and Pedricktown CDF's for relocating [redacted] million cubic yards of soil to the PSEG Nuclear site was addressed. As discussed in Sections 3.3 and 4.3.3, conceptual site layouts are presented in Figures 15, 16 and 17. Cost estimates for the site development of these areas and material transport are presented in Figures 24, 26, 27, 28 and 29. As shown in Table 4.3.2-1 above, the cost for developing these sites is relatively minor. However, the cost to relocate the material is quite significant as shown in Table 4.3.3-1 above.

6.0 References

6.1 Soil Management References

6.1-1 PSEG Early Site Permit Application (ESPA), Rev. C, SSAR Section 2.4.10, *Flooding Protection Requirements*

6.1-2 PSEG Early Site Permit Application (ESPA), Rev. C, SSAR Section 2.5.4.5, *Excavation and Backfill*

6.1-3 PSEG Early Site Permit Application (ESPA), Rev. C, SSAR Table 2.5.4.5-1, *Summary of Nuclear Plant Technologies*

6.1-4 Report SL-009251, Rev. 0, *New Build Project Feasibility Study*, dated November 29, 2007

6.2 Borrow Site Investigation References

6.2-1 NJDOT 2010
New Jersey Department of Transportation Qualified Materials Database, downloaded as functional spreadsheet on February 2, 2010 from http://www.state.nj.us/transportation/eng/materials/qualified/, copied in Appendix B with S&L Columns added to spread sheet.

6.2-2 NJGS 2006
New Jersey Geologic Survey, *Selected Sand, Gravel and Rock Surficial Mining Operations in New Jersey*, Digital Geodata Series DGS05-1, PDF downloaded on February 2, 2010 from http://www.state.nj.us/dep/njgs//geodata/dgs05-1.htm, Included in Appendix B.

6.2-3 MD 1995
Maryland Geologic Survey, *Directory of Mineral Producers in Maryland 1995, Information Circular No 53.*

6.2-4 D&M 1976
Dames and Moore, *Report of Structural - Backfill [redacted] Borrow Source – Proposed Hope Creek Generating Station- Lowers Alloways Creek Township, N.J.*, Job No. 2443-097, Letter Dated June 17, 1976.

6.2-5 Bechtel 1980

Bechtel Corp., *Supplementary Borrow Area Investigation for Structural Backfill – Hope Creek Project*, Job No. 10855, October 1980.

6.2-6 ACI 2009

American Concrete Institute, *Report on Soil Cement*, Report of ACI Committee 230, Report No. ACI 230.1R-09.

6.2-7 ACI 1999

American Concrete Institute, *Roller-Compacted Mass Concrete*, Report of ACI Committee 207, Report No. ACI 207.5R-99.

6.2-8 ENR 2010

Engineering News Record, February 1, 2010

6.2-9 PSEG Early Site Permit Application (ESPA), SSAR Table 2.5.4.1-1, *Summary of ESPA Investigation Stratigraphic Data Elevation at the Top of Formations*

6.2-10 PSEG Early Site Permit Application (ESPA), SSAR Table 2.5.4.2-2, *Summary of Static Indices Laboratory Analysis for Hydraulic Fill (ESPA Investigation)*

6.2-11 Hope Creek Generating Station, *Updated Final Safety Analysis Report* (UFSAR)

6.2-12 Salem Generating Station Unit 1 and 2, *Updated Final Safety Analysis Report* (UFSAR)

6.3 USACE Land Acquisition Support References

6.3-1 PSEG Early Site Permit Application (ESPA), Rev. C, SSAR Figure 1.2-3, *Site Utilization Plan*

6.3-2 US Army Corps of Engineers, EM 1110-2-1913 CECW-EG, *Design and Construction of Levees, 30 April 2000*

6.3-3 US Army Corps of Engineers, EM 1110-2-5025 CECW-EH-D, *Dredging and Dredged Material Disposal, 25 March 1983*

6.3-4 US Army Corps of Engineers, EM 1110-2-5057 CECW-EH-D, *Confinement of Dredged Material, 30 September 1987*

6.3-5 US Army Corps of Engineers, Technical Report DS-78-10, *Guidelines for Designing, Operating, and Managing Dredged Material Containment Areas, January 1987*

6.3-6 New Jersey Department of Transportation (NJDOT), *Soil Erosion and Sediment Control Standards, 2008 Edition*

6.3-7 AKRF, Inc. Design Drawing, *Wetlands Delineation Map*, Rev. 3, dated July 30, 2009.

6.3-8 USGS Delaware City. 7.5 Minute Quadrangle Map.

6.3-9 USGS Marcus Hook. 7.5 Minute Quadrangle Map.

6.3-10 US Army Corps of Engineers guidance document, *EM 1110-2-5026*, dated June 30, 1987

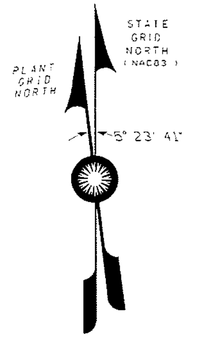
6.3-11 R S Means *"Sitework & Landscape Cost Data"*, Manual, 2010 edition.

6.3-12 Report SL-009924, Rev.0, *Conceptual Barge Facilities and Haul Roads*, dated July 15, 2009

FIGURES AND APPENDICES

Figure 1

Single Unit AREVA US-EPR Area Fill Quantities



AREA FILL QUANTITIES			
AREA	AREVA US-EPR		
	ACREAGE (AC)	VOL. (FROM) (CY)	VOL. (TO) (CY)
SWITCHYARD (PLANT)	14.4	[redacted]	
SWITCHYARD (INTERPOSING)	20.6		
COOLING TOWER AREA	35		
TEMPORARY BATCH PLANT AREA	11.6		
TEMPORARY LAYDOWN AREA	56		
PARKING/OFFICE AREA	16		
TOTALS	156		

NOTES:

1. US-EPR FOOTPRINT SHOWN IS BASED ON THE UNISTAR/AREVA INFORMATION REFERENCED BELOW
2. LOCATION BASED ON US-EPR NORTH PLANT SITE LAYOUT UTILIZING ARMY CORPS OF ENGINEERS (ACOE) LAND DEVELOPED UNDER S&L PROJECT 12310-012
3. SEE SK-12310-020-SMS-001, SHEET 2 OF 2 FOR EXCAVATION DETAILS AND QUANTITIES
4. SEE SK-12310-020-SMS-002, 003 AND 005 FOR SOIL STORAGE AREA VOLUMES
5. AREA TO BE FILLED FROM EL TO EL. SEE TABLE ABOVE

REACTOR TECHNOLOGY FOOTPRINT REFERENCE DOCUMENTS		
DOCUMENT	SOURCE	DATE RECEIVED
[redacted]	RECEIVED AT PSEG AREVA UNISTAR AND BECHTEL MTG IN FREDERICK, MD	2/5/2009

SITE PLAN CAD REFERENCE FILES			
DRAWING	SOURCE	DATE RECEIVED	DESCRIPTION
NORTH.DGN	SAL	4/27/09	UPDATED PROPERTY LINE, PLANT GRID
SALEM2006_PLN.DGN	PSEG	7/29/08	SITE PLAN
INTERSWITCHYRD.DGN	S&L	12/7/2008	INTERPOSING SWITCHYARD

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[redacted]

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CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 1

CAD FILE NAME: SK-12310-020-SMS-001_SHT1.DGN
PREPARED BY: C. FLAMINI
REVIEWED BY: D. KOCUNIK
APPROVED BY: M. SHERVIN

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PSEG Power LLC

PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE

SINGLE UNIT AREVA US-EPR SOIL MANAGEMENT STUDY AREA FILL QUANTITIES

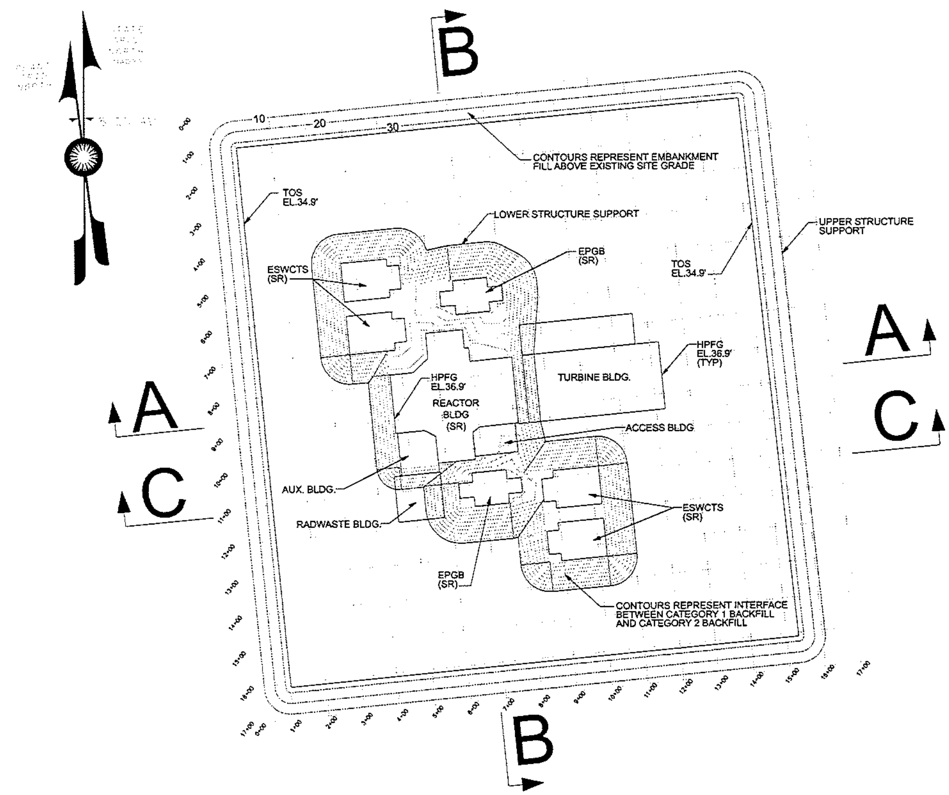
DRAWING NUMBER	REVISION
SK-12310-020-SMS-001	0

SHEET 1 OF 2

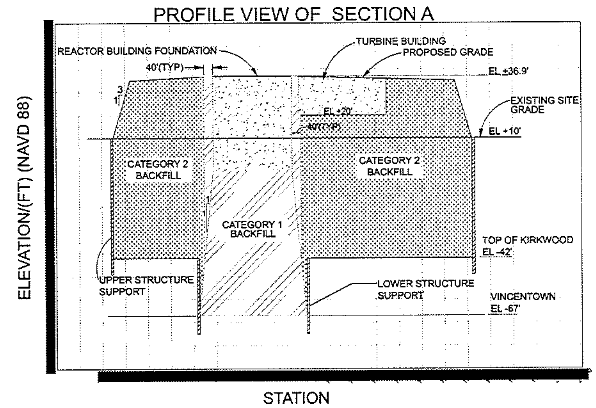
3/11/2010 6:16:29 PM ...\SK-12310-020-SMS-001_SHT1.dgn

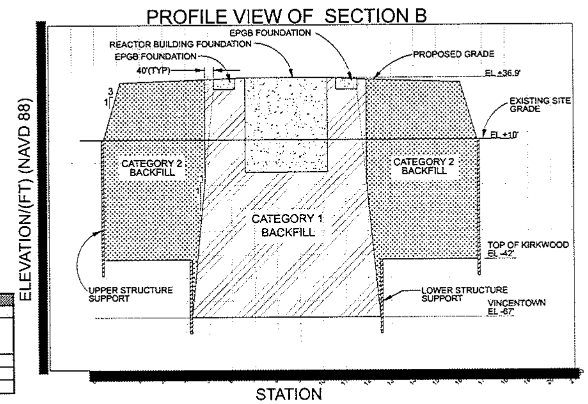
Figure 2

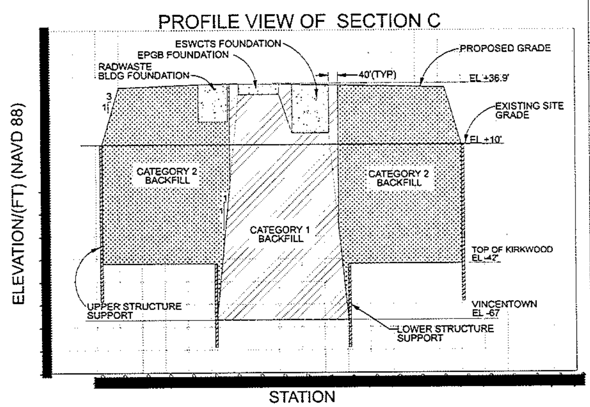
Single Unit AREVA US-EPR Excavation Cut/Fill Quantities



PLAN







	Plan Dimension of El 10' (1)		Cut							
			Existing Ground to Top of Kirkwood				Top of Kirkwood to Vincentown			
Technology (5)	East-West Direction (ft)	North-South Direction (ft)	Top Area	Bottom Area	Depth	Volume	Top Area	Bottom Area	Depth	Volume
EPR (HPFG = 36.9')	[redacted]									yd³
EPR (HPFG = 24')										yd³
EPR (HPFG = 12')										yd³

	GROSS CUT		
Technology (5)	Existing Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Total Cut
EPR (HPFG = 36.9')	[redacted]		yd³
EPR (HPFG = 24')			yd³
EPR (HPFG = 12')			yd³

	GROSS FILL			
Technology (5)	Plant Grade to Exist Grade (3)	Exist. Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Gross Fill (Category 1 & 2)
EPR (HPFG = 36.9')	[redacted]			yd³
EPR (HPFG = 24')				yd³
EPR (HPFG = 12')				yd³

	CATEGORY 1 FILL					
Technology (5)	Gross Fill (Cateory 1 & 2)	Gross Cat 1 Fill (3)	Area of Safety Structures	Avg Depth of Safety Structures	Volume of Safety Structure Foundations	Net Cat 1 Fill
EPR (HPFG = 36.9')	[redacted]					yd³
EPR (HPFG = 24')						yd³
EPR (HPFG = 12')						yd³

	CATEGORY 2 FILL					
Technology (5)	Gross Cat 2 Fill (2)	Area of Non-Safety Structures	Avg Depth of Non-Safety Structures	Volume of Non-Safety Structure Foundations	Net Cat 2 Fill	Total Fill (Cat 1 and 2)
EPR (HPFG = 36.9')	[redacted]					yd³
EPR (HPFG = 24')						yd³
EPR (HPFG = 12')						yd³

1 Dimension Shown Includes Top of Slope Dimension Plus 2 times 3H:1V Side Slope Distances
2 (Gross Category 2 Fill) = (Gross Category 1 and 2 Fill) - (Gross Category 1 Fill)
3 Quantities obtained from Civil 3D
4 For Cut and Fill Cost Information, See Report SL-010093, Table 3 1-1
5 HPFG = High Point of Finish Grade Elevation
6 TOS = Top of Slope

NOT FOR CONSTRUCTION

[redacted]

HOLD INFORMATION

NO.	DATE	DESCRIPTION

RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 2

CAD FILE NAME: SK-12310-020-SMS-001.DGN
PREPARED BY: A. PAAPE
REVIEWED BY: D. KOCUNIK
APPROVED BY: M. SHERVIN

Sargent & Lundy LLC

PSEG Power LLC

PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE

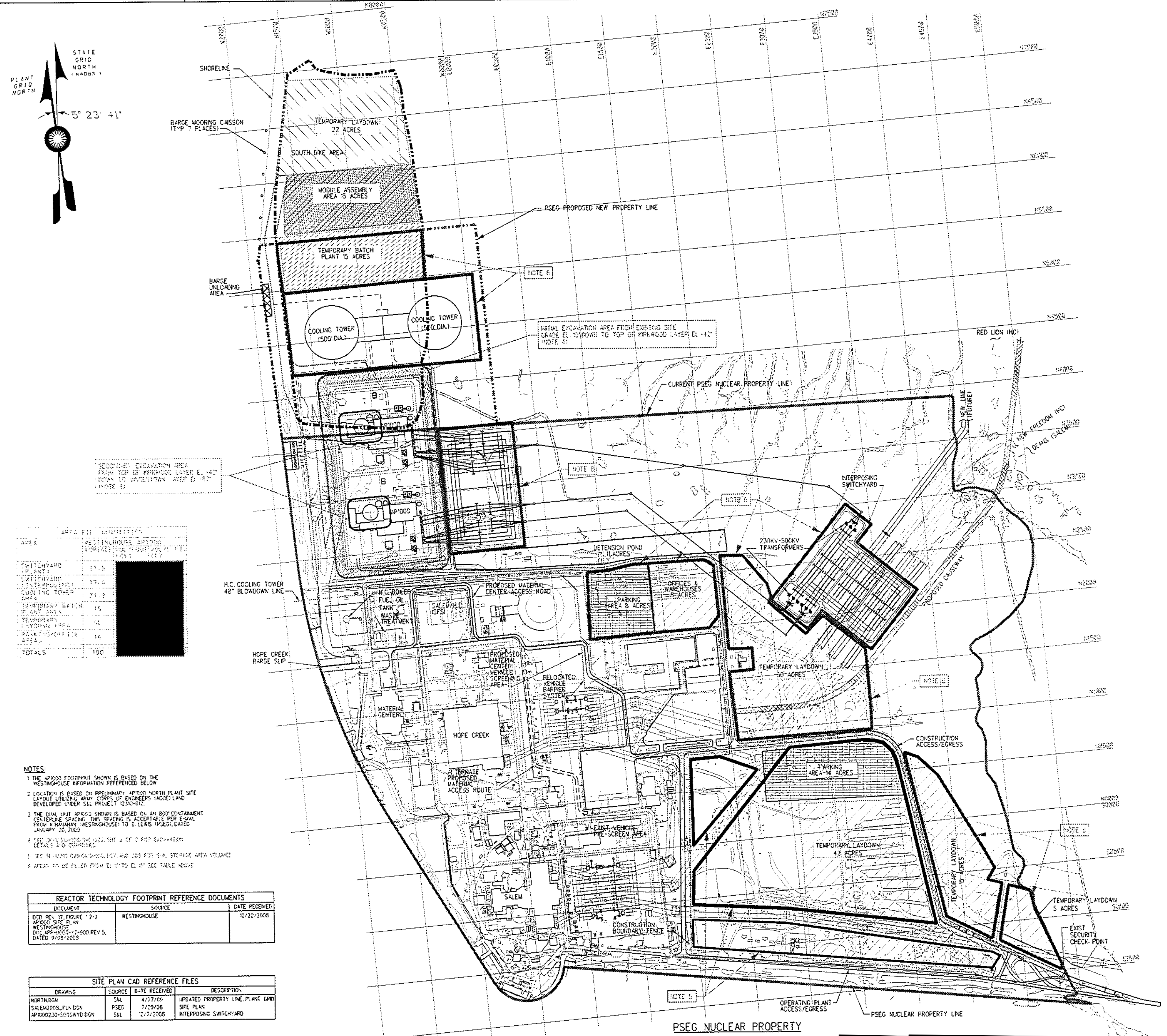
SINGLE UNIT
AREVA US-EPR
SOIL MANAGEMENT STUDY
CUT/FILL QUANTITIES

DRAWING NUMBER	REVISION
SK-12310-020-SMS-001	0

SHEET 2 OF 2

Figure 3

Dual Unit Westinghouse AP1000 Area Fill Quantities



AREA FILL QUANTITIES		
AREA	WESTINGHOUSE AP1000	
	SURFACE AREA	FILL QTY
SWITCHYARD (PLANT)	11.5	[redacted]
SWITCHYARD (INTERPOSING)	17.0	
COOLING TOWER AREA	21.3	
TEMPORARY BATCH PLANT AREA	15	
TEMPORARY LAYDOWN AREA	42	
PARKING/OFFICES AREA	16	
TOTALS	150	

NOTES:

1. THE AP1000 FOOTPRINT SHOWN IS BASED ON THE WESTINGHOUSE INFORMATION REFERENCED BELOW
2. LOCATION IS BASED ON PRELIMINARY AP1000 NORTH PLANT SITE LAYOUT UTILIZING ARMY CORPS OF ENGINEERS (ACOE) LAND DEVELOPED UNDER S&L PROJECT 12310-012.
3. THE DUAL UNIT AP1000 SHOWN IS BASED ON AN 800' CONTAINMENT CENTERLINE SPACING. THIS SPACING IS ACCEPTABLE PER E-MAIL FROM K HANAHAN (WESTINGHOUSE) TO D. LEWIS (PSEG), DATED JANUARY 20, 2009
4. SEE DRAWING SK-12310-020-SMS-002, SHT 2 OF 2 FOR EXCAVATION DETAILS AND QUANTITIES.
5. SEE SK-12310-020-SMS-005, 007, AND 008 FOR SOIL STORAGE AREA VOLUMES
6. AREAS TO BE FILLED FROM EL [illegible] TO EL [illegible] SEE TABLE ABOVE

REACTOR TECHNOLOGY FOOTPRINT REFERENCE DOCUMENTS		
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SITE PLAN CAD REFERENCE FILES			
DRAWING	SOURCE	DATE RECEIVED	DESCRIPTION
NORTH.DGN	S&L	4/27/09	UPDATED PROPERTY LINE, PLANT GRID
SALEM2008_PLN.DGN	PSEG	7/29/08	SITE PLAN
AP1000230-500SWYD.DGN	S&L	12/7/2008	INTERPOSING SWITCHYARD

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0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 3

CAD FILE NAME: SK-12310-020-SMS-002_SHT1.DGN
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REVIEWED BY: D. KOCUNIK
APPROVED BY: M. SHERVIN

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PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE

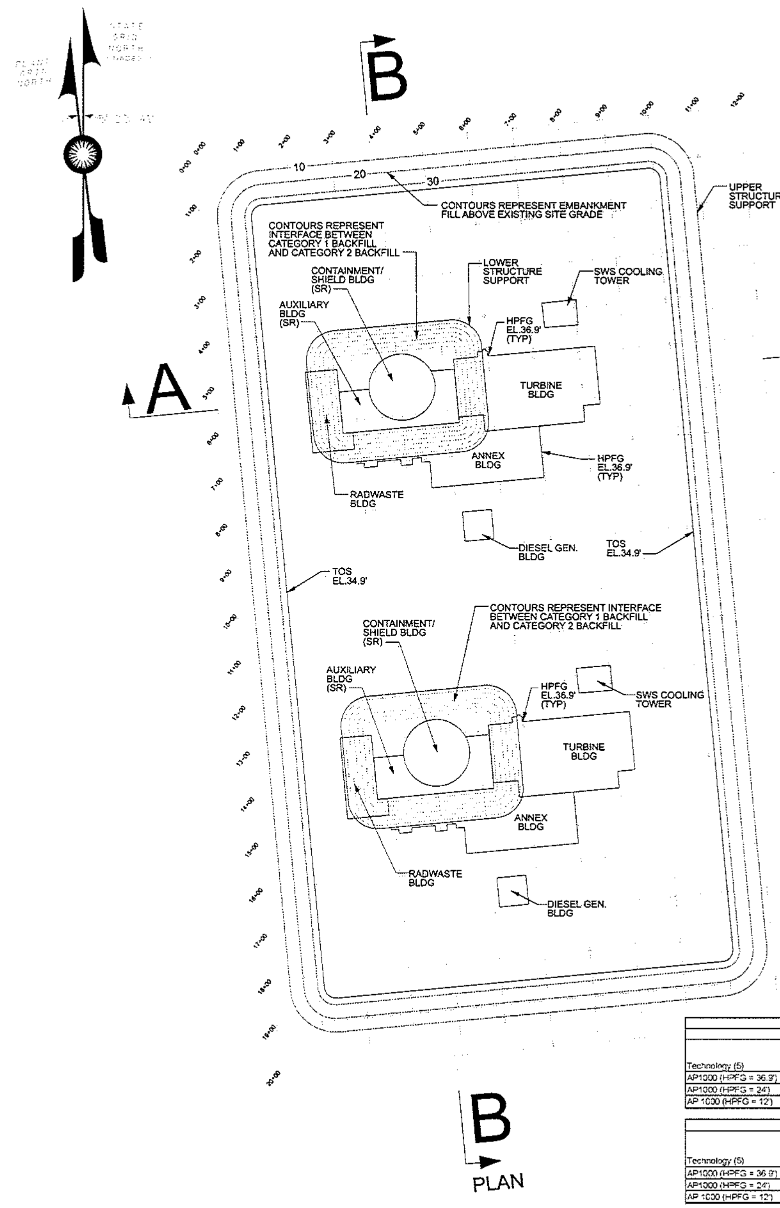
DUAL UNIT WESTINGHOUSE AP1000 SOIL MANAGEMENT STUDY AREA FILL QUANTITIES

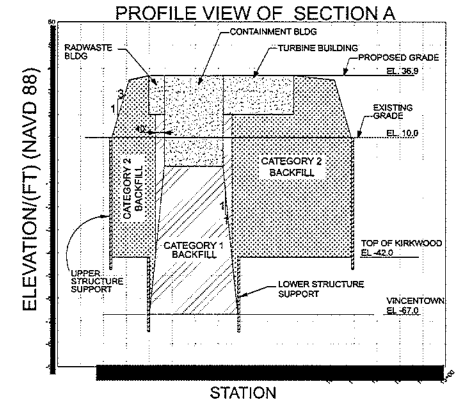
DRAWING NUMBER	REVISION
SK-12310-020-SMS-002	0

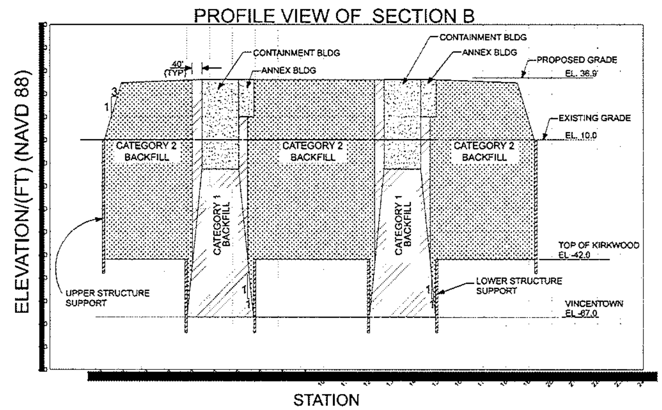
SHEET 1 OF 2

Figure 4

Dual Unit Westinghouse AP1000 Excavation Cut/Fill Quantities







	Plan Dimension at El 10' (1)		Cut							
			Existing Ground to Top of Kirkwood				Top of Kirkwood to Vincentown			
Technology (5)	East-West Direction (ft)	North-South Direction (ft)	Top Area	Bottom Area	Depth	Volume	Top Area	Bottom Area	Depth	Volume
AP1000 (HPFG = 36.9')	[redacted]									yd³
AP1000 (HPFG = 24')	[redacted]									yd³
AP 1000 (HPFG = 12')	[redacted]									yd³

	GROSS CUT		
Technology (5)	Existing Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Total Cut
AP1000 (HPFG = 36.9')	[redacted] yd³	[redacted] yd³	[redacted] yd³
AP1000 (HPFG = 24')	[redacted] yd³	[redacted] yd³	[redacted] yd³
AP 1000 (HPFG = 12')	[redacted] yd³	[redacted] yd³	[redacted] yd³

	GROSS FILL			
Technology (5)	Plant Grade to Exist Grade (3)	Exist. Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Gross Fill (Category 1 & 2)
AP1000 (HPFG = 36.9')	[redacted] yd³	[redacted] yd³	[redacted] yd³	[redacted] yd³
AP1000 (HPFG = 24')	[redacted] yd³	[redacted] yd³	[redacted] yd³	[redacted] yd³
AP 1000 (HPFG = 12')	[redacted] yd³	[redacted] yd³	[redacted] yd³	[redacted] yd³

	CATEGORY 1 FILL					
Technology (5)	Gross Fill (Cateory 1 & 2)	Gross Cat 1 Fill (3)	Area of Safety Structures	Avg Depth of Safety Structures	Volume of Safety Structure Foundations	Net Cat 1 Fill
AP1000 (HPFG = 36.9')	[redacted] yd3	[redacted]				[redacted] yd3
AP1000 (HPFG = 24')	[redacted] yd³	[redacted]				[redacted] yd³
AP 1000 (HPFG = 12')	[redacted] yd³	[redacted]				[redacted] yd³

	CATEGORY 2 FILL					
Technology (5)	Gross Cat 2 Fill (2)	Area of Non-Safety Structures	Avg Depth of Non-Safety Structures	Volume of Non-Safety Structure Foundations	Net Cat 2 Fill	Total Fill (Cat 1 and 2)
AP1000 (HPFG = 36.9')	[redacted] yd³	[redacted]			yd³	[redacted] yd³
AP1000 (HPFG = 24')	[redacted] yd³	[redacted]			yd³	[redacted] yd³
AP 1000 (HPFG = 12')	[redacted] yd³	[redacted]			yd³	[redacted] yd³

1. Dimension Shown Includes Top of Slope Dimension Plus 2 times 3H:1V Side Slope Distances
2. (Gross Category 2 Fill) = (Gross Category 1 and 2 Fill) - (Gross Category 1 Fill)
3. Quantities obtained from Civil 3D
4. For Cut and Fill Cost Information, See Report SL-010093, Table 5.1-1
5. HPFG = High Point of Finish Grade Elevation
6. TOS = Top of Slope

NOT FOR CONSTRUCTION [redacted]

HOLD INFORMATION		
NO.	DATE	DESCRIPTION

RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 4

CAD FILE NAME: SK-12310-020-SMS-002.DGN
PREPARED BY: A. PAAPE
REVIEWED BY: D.KOCUNIK
APPROVED BY: M.SHERVIN

Sargent & Lundy LLC

PSEG Power LLC

PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE

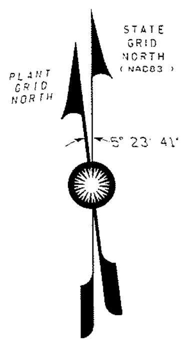
DUAL UNIT WESTINGHOUSE AP1000 SOIL MANAGEMENT STUDY CUT/FILL QUANTITIES

DRAWING NUMBER	REVISION
SK-12310-020-SMS-002	0

SHEET 2 OF 2

Figure 5

Single Unit GEH-ABWR Area Fill Quantities



SECONDARY EXCAVATION AREA FROM TOP OF KIRKWOOD LAYER EL -42' DOWN TO VINCENTOWN LAYER EL -[illegible] (NOTE 3)

INITIAL EXCAVATION AREA FROM EXISTING SITE GRADE EL 10' DOWN TO TOP OF KIRKWOOD LAYER EL -42' (NOTE 3)

AREA FILL QUANTITIES		
AREA	ARMY SURF... AREA	[redacted]
SWITCHYARD (INTERPOSING)	20.8	
COOLING TOWER AREA	[illegible]	
TEMPORARY BATCH PLANT AREA	5	
TEMPORARY LAYDOWN AREA	[illegible]	
PARKING OFFICE AREAS	[illegible]	
TOTALS	152	

NOTES:

1. THE GEH-ABWR FOOTPRINT SHOWN IS BASED ON THE LATEST GEH INFORMATION REFERENCED BELOW
2. LOCATION BASED ON GEH-ABWR NORTH PLANT SITE UTILIZING ARMY CORPS OF ENGINEERS (ACOE) LAND DEVELOPED UNDER S&L PROJECT 12310-012
3. SEE SK-12310-020-SMS-003 SHT 2 OF 2 FOR EXCAVATION DETAIL AND QUANTITIES
4. SEE [illegible] FOR SOIL STORAGE AREA VOLUMES
5. AREAS TO BE RAISED FROM EL [illegible] SEE TABLE ABOVE

REACTOR TECHNOLOGY FOOTPRINT REFERENCE DOCUMENTS		
DOCUMENT	SOURCE	DATE RECEIVED
GEH ABWR SITE PLAN 24136-1Y00-S1001, REV 1	GEH RESPONSE TO PSEG "INITIAL REQUEST FOR INFORMATION DATED AUGUST 28, 2007"	10/29/2007
GEH-ABWR REACTOR BUILDING ARRANGEMENT DRAWING UABWR-1U71-M1002, REV. A	RECEIVED 11/20/2008 AT GEH/PSEG MEETING IN SAN JOSE, CA	11/20/2008
GEH-ABWR CONTROL BUILDING ARRANGEMENT DRAWING UABWR-1U73-M1001, REV. A	RECEIVED 11/20/2008 AT GEH/PSEG MEETING IN SAN JOSE, CA	11/20/2008
GEH-ABWR TURBINE BUILDING ARRANGEMENT DRAWING 3100C24-192	RECEIVED 11/20/2008 AT GEH/PSEG MEETING IN SAN JOSE, CA	11/20/2008
GEH-ABWR SERVICE BUILDING ARRANGEMENT DRAWING UABWR-1U75-M1001, REV. A	RECEIVED 11/20/2008 AT GEH/PSEG MEETING IN SAN JOSE, CA	11/20/2008
GEH-ABWR RADWASTE BUILDING ARRANGEMENT DRAWING ABWR SK-02A, REV 0	RECEIVED 11/20/2008 AT GEH/PSEG MEETING IN SAN JOSE, CA	11/20/2008
DCD SECTION 3.8 SEISMIC CATEGORY 1 STRUCTURES (SR STRUCTURE IDENTIFICATION)	ABWR DESIGN CONTROL DOCUMENT (DCD), REV.0	12/8/2008

SITE PLAN CAD REFERENCE FILES			
DRAWING	SOURCE	DATE RECEIVED	DESCRIPTION
NORTH.DGN	S&L	4/27/09	UPDATED PROPERTY LINE, PLANT GRID
SALEM2008_PLN.DGN	PSEG	7/29/08	SITE PLAN
INNERSWITCHYRD.DGN	S&L	12/7/2008	INTERPOSING SWITCHYARD

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[redacted]

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ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 5

CAD FILE NAME: SK-12310-020-SMS-003_SHT1.DGN
PREPARED BY: C.FLAMINI
REVIEWED BY: D. KOCUNIK
APPROVED BY: M. SHERVIN

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PSEG Power LLC

PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE

SINGLE UNIT GEH-ABWR SOIL MANAGEMENT STUDY AREA FILL QUANTITIES

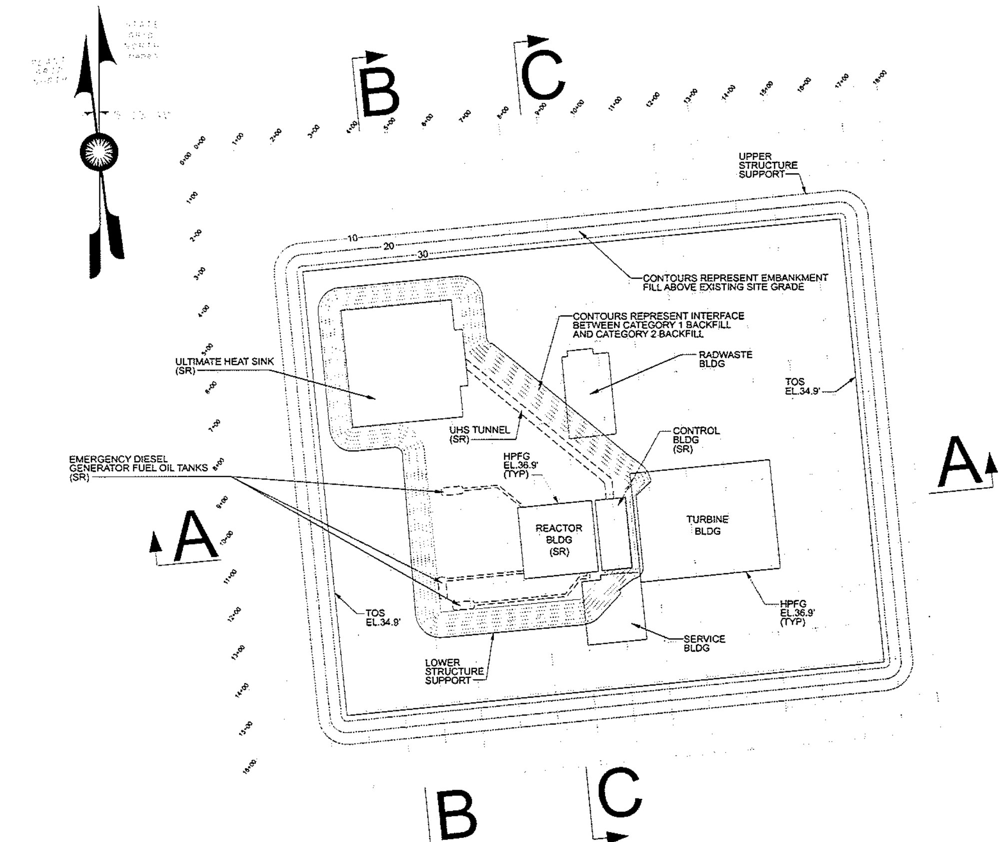
DRAWING NUMBER	REVISION
SK-12310-020-SMS-003	0

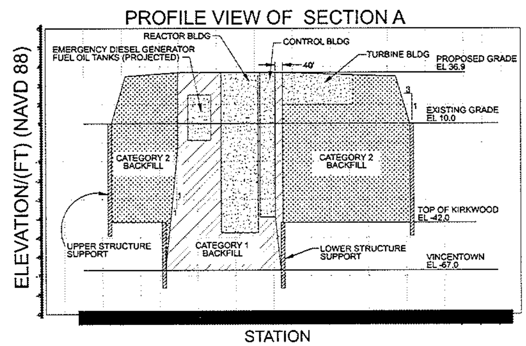
SHEET 1 OF 2

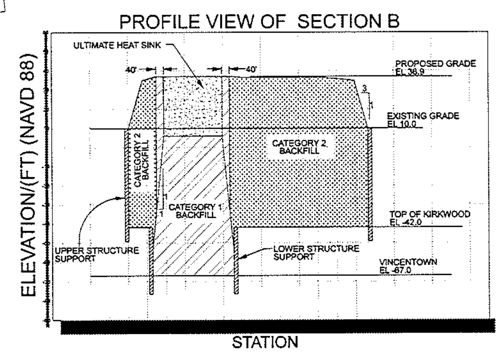
3/11/2010 7:08:46 PM ...SK-12310-020-SMS-003_SHT1.dgn

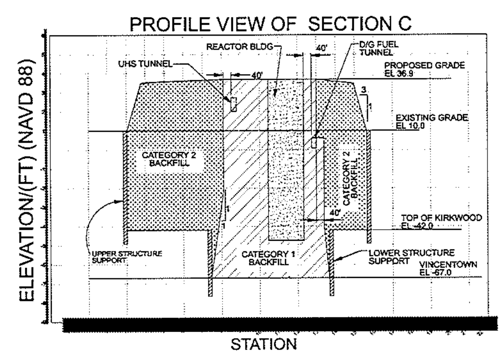
Figure 6

Single Unit GEH-ABWR Excavation Cut/Fill Quantities









	Plan Dimension at El 10' (1)		Cut							
			Existing Ground to Top of Kirkwood				Top of Kirkwood to Vincentown			
Technology (5)	East-West Direction (ft)	North-South Direction (ft)	Top Area	Bottom Area	Depth	Volume	Top Area	Bottom Area	Depth	Volume
ABWR (HPFG = 36.9')	[redacted]									yd³
ABWR (HPFG = 24')										yd³
ABWR (HPFG = 12')										yd³

	GROSS CUT		
Technology (5)	Existing Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Total Cut
ABWR (HPFG = 36.9')	[redacted] yd³	[redacted] yd³	[redacted] yd³
ABWR (HPFG = 24')	yd³	yd³	yd³
ABWR (HPFG = 12')	yd³	yd³	yd³ (7)

	GROSS FILL			
Technology (5)	Plant Grade to Exist Grade (3)	Exist. Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Gross Fill (Category 1 & 2)
ABWR (HPFG = 36.9')	[redacted] yd³	[redacted] yd³	[redacted] yd³	[redacted] yd³
ABWR (HPFG = 24')	yd³	yd³	yd³	yd³
ABWR (HPFG = 12')	yd³	yd³	yd³	yd³ (7)

	CATEGORY 1 FILL					
Technology (5)	Gross Fill (Cateory 1 & 2)	Gross Cat 1 Fill (3)	Area of Safety Structures	Avg Depth of Safety Structures	Volume of Safety Structure Foundations	Net Cat 1 Fill
ABWR (HPFG = 36.9')	[redacted] yd³	[redacted]				[redacted] yd³
ABWR (HPFG = 24')	yd³					yd³
ABWR (HPFG = 12')	yd³ (7)					yd³

	CATEGORY 2 FILL					
Technology (5)	Gross Cat 2 Fill (2)	Area of Non-Safety Structures	Avg Depth of Non-Safety Structures	Volume of Non-Safety Structure Foundations	Net Cat 2 Fill	Total Fill (Cat 1 and 2)
ABWR (HPFG = 36.9')	[redacted]				yd³	[redacted] yd³
ABWR (HPFG = 24')					yd³	yd³
ABWR (HPFG = 12')					yd³	yd³

1. Dimension Shown Includes Top of Slope Dimension Plus 2 times 3H:1V Side Slope Distances
2. (Gross Category 2 Fill) = (Gross Category 1 and 2 Fill) - (Gross Category 1 Fill)
3. Quantities obtained from Civil 3D
4. For Cut and Fill Cost Information, see Report SL-010093
5. HPFG = High Point of Finish Grade Elevation
6. TOS = Top of Slope
7. At HPFG Elevation 12.0, The Bottom of the Reactor Building is below El -67. Additional Excavation from 15' outside the edge of the foundation to Elevation -72.3 is required. Surface Area of Additional Excavation (including 15-ft perimeter width) = 48650 sft x 5.3 ft deep is added.

NOT FOR CONSTRUCTION [redacted]

HOLD INFORMATION

NO.	DATE	DESCRIPTION

RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 6

CAD FILE NAME: SK-12310-020-SMS-003.DGN
PREPARED BY: A. PAAPE
REVIEWED BY: O.KOCUNIK
APPROVED BY: M.SHERVIN

Sargent & Lundy LLC

PSEG Power LLC

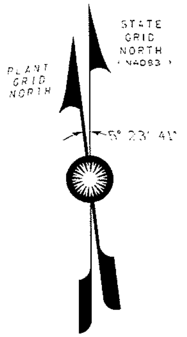
PROJECT
PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE
SINGLE UNIT GEH ABWR SOIL MANAGEMENT STUDY CUT/FILL QUANTITIES

DRAWING NUMBER: SK-12310-020-SMS-003
REVISION: 0
SHEET 2 OF 2

Figure 7

Single Unit Mitsubishi US-APWR Area Fill Quantities



[redacted]

AREA FILL QUANTITIES			
AREA	MITSUBISHI US-APWR		
	ACREAGE	VOL/FOOT (CY)	VOL/X FT. CY
SWITCHYARD (INTERPOSING)	25.8	[redacted]	
COOLING TOWER AREA	41.2		
TEMPORARY BATCH PLANT AREA	20		
TEMPORARY LAYDOWN AREA	51		
PARKING/OFFICES AREAS	18		
TOTALS	148		

NOTES:

1. THE US-APWR FOOTPRINT SHOWN IS BASED ON THE MNES INFORMATION REFERENCED BELOW
2. LOCATION IS BASED ON PRELIMINARY US-APWR NORTH PLANT SITE LAYOUT UTILIZING ARMY CORPS OF ENGINEERS (ACOE) LAND BEING DEVELOPED UNDER S&L PROJECT 12310-012.
3. SEE SK-12310-020-SMS-004, SHT 2 OF 2 FOR EXCAVATION DETAILS AND QUANTITIES.
4. SEE SK-12310-020-SMS-006, 007, AND 008 FOR SOIL STORAGE AREA VOLUMES
5. AREAS TO BE FILLED FROM EL 10' TO EL 15', SEE TABLE ABOVE.

REACTOR TECHNOLOGY FOOTPRINT REFERENCE DOCUMENTS		
DOCUMENT	SOURCE	DATE RECEIVED
RX TECH RFI SECTION 3.1 FIGURE - 3.1A "FOOTPRINT OF THE US-APWR POWER BLOCK"	MNES RESPONSE TO PSEG REACTOR TECHNOLOGY EVALUATION RFI DATED APRIL 7, 2008 (REF PROJECT 12310-002)	4/7/2008
RX TECH RFI, THE STUDY OF DUAL CONSTRUCTION IN SALEM SITE FIGURE - 1 "FOOTPRINT OF THE US-APWR POWER BLOCK"	MNES RESPONSE TO PSEG REACTOR TECHNOLOGY EVALUATION RFI DATED APRIL 7, 2008 (REF PROJECT 12310-002)	4/7/2008
ELECTRONIC AUTOCAD FILE: 10102008 US-APWR SINGLE_SINGLE.DWG	MNES RFI RESPONSE FROM: B. CRAIG (MNES) TO: D. LEWIS (PSEG POWER)	10/10/2008
DCD SECTION 1.2.1.7 PLANT ARRANGEMENT AND STRUCTURE IDENTIFICATION	US-APWR DESIGN CONTROL DOCUMENT (DCD), REV 1	12/8/2008

SITE PLAN CAD REFERENCE FILES			
DRAWING	SOURCE	DATE RECEIVED	DESCRIPTION
NORTH.DGN	S&L	4/27/09	UPDATED PROPERTY LINE, PLANT GRID
SALEM2008_PLN.DGN	PSEG	7/29/09	SITE PLAN
INNERSWITCHYRD.DGN	S&L	12/7/2008	INTERPOSING SWITCHYARD

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[redacted]

HOLD INFORMATION		
NO.	DATE	DESCRIPTION

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RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION

SPECIFICATION: N/A

PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 7

CAD FILE NAME: SK-12310-020-SMS-004_SHT1.DGN

PREPARED BY: C. FLAMINI

REVIEWED BY: D. KOCUNIK

APPROVED BY: M. SHERVIN

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PSEG Power LLC

PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE

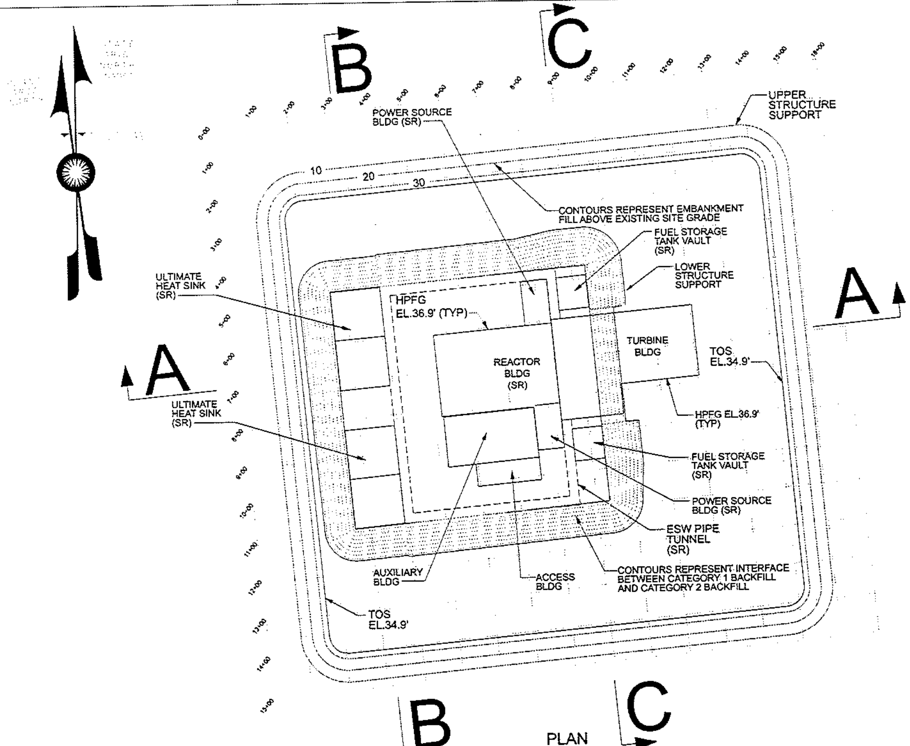
SINGLE UNIT MITSUBISHI US-APWR SOIL MANAGEMENT STUDY AREA FILL QUANTITIES

DRAWING NUMBER	REVISION
SK-12310-020-SMS-004	0

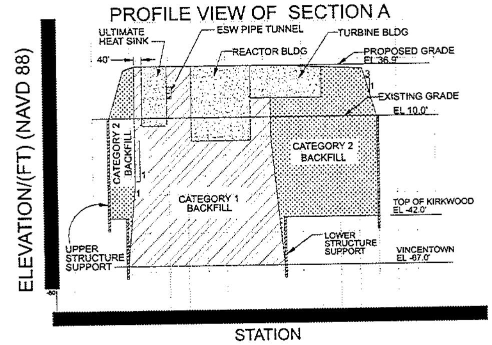
SHEET 1 OF 2

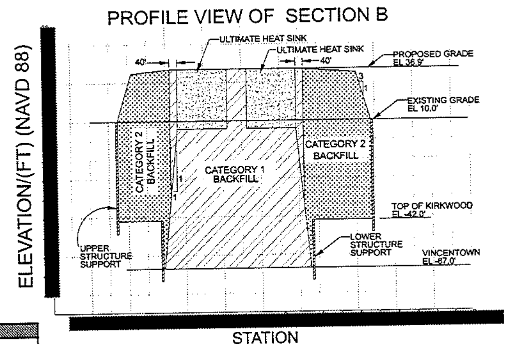
Figure 8

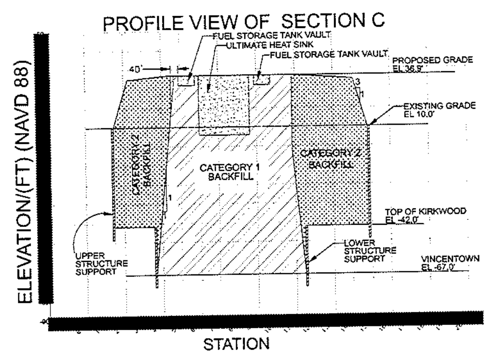
Single Unit Mitsubishi US-APWR Excavation Cut/Fill Quantities



PLAN







	Plant Dimension at El 10' (1)		Cut							
			Existing Ground to Top of Kirkwood				Top of Kirkwood to Vincentown			
Technology (5)	East-West Direction (ft)	North-South Direction (ft)	Top Area	Bottom Area	Depth	Volume	Top Area	Bottom Area	Depth	Volume
APWR (HPFG = 36.9')		[redacted]								yd³
APWR (HPFG = 24')										yd³
APWR (HPFG = 12')										yd³

	GROSS CUT		
Technology (5)	Existing Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Total Cut
APWR (HPFG = 36.9')	[redacted] yd³	[redacted] yd³	[redacted] yd³
APWR (HPFG = 24')	yd³	yd³	yd³
APWR (HPFG = 12')	yd³	yd³	yd³

	GROSS FILL			
Technology (5)	Plant Grade to Exist Grade (3)	Exist. Grade to Top of Kirkwood	Top of Kirkwood to Vincentown	Gross Fill (Category 1 & 2)
APWR (HPFG = 36.9')	[redacted] yd³	[redacted] yd³	[redacted] yd³	[redacted] yd³
APWR (HPFG = 24')	yd³	yd³	yd³	yd³
APWR (HPFG = 12')	yd³	yd³	yd³	yd³

	CATEGORY 1 FILL					
Technology (5)	Gross Fill (Cateory 1 & 2)	Gross Cat 1 Fill (3)	Area of Safety Structures	Avg Depth of Safety Structures	Volume of Safety Structure Foundations	Net Cat 1 Fill
APWR (HPFG = 36.9')	[redacted] yd³	[redacted]			yd³	[redacted] yd³
APWR (HPFG = 24')	yd³				yd³	yd³
APWR (HPFG = 12')	yd³				yd³	yd³

	CATEGORY 2 FILL					
Technology (5)	Gross Cat 2 Fill (2)	Area of Non-Safety Structures	Avg Depth of Non-Safety Structures	Volume of Non-Safety Structure Foundations	Net Cat 2 Fill	Total Fill (Cat 1 and 2)
APWR (HPFG = 36.9')	[redacted] yd³	[redacted]			yd³	[redacted] yd³
APWR (HPFG = 24')	yd³				yd³	yd³
APWR (HPFG = 12')	yd³				yd³	yd³

1. Dimension Shown Includes Top of Slope Dimension Plus 2 times 3H:1V Side Slope Distances.
2. (Gross Category 2 Fill) = (Gross Category 1 and 2 Fill) - (Gross Category 1 Fill)
3. Quantities obtained from Civil 3D
4. For Cut and Fill Cost Information, See Report SL-010093, Table 3.1-1
5. HPFG = High Point of Finish Grade Elevation
6. TOS = Top of Slope

[redacted]

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HOLD INFORMATION

NO.	DATE	DESCRIPTION

RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 8

CAD FILE NAME: SK-12310-020-SMS-004.DGN
PREPARED BY: A. PAAPE
REVIEWED BY: D.KOCUNIK
APPROVED BY: M.SHERVIN

Sargent & Lundy LLC

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PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

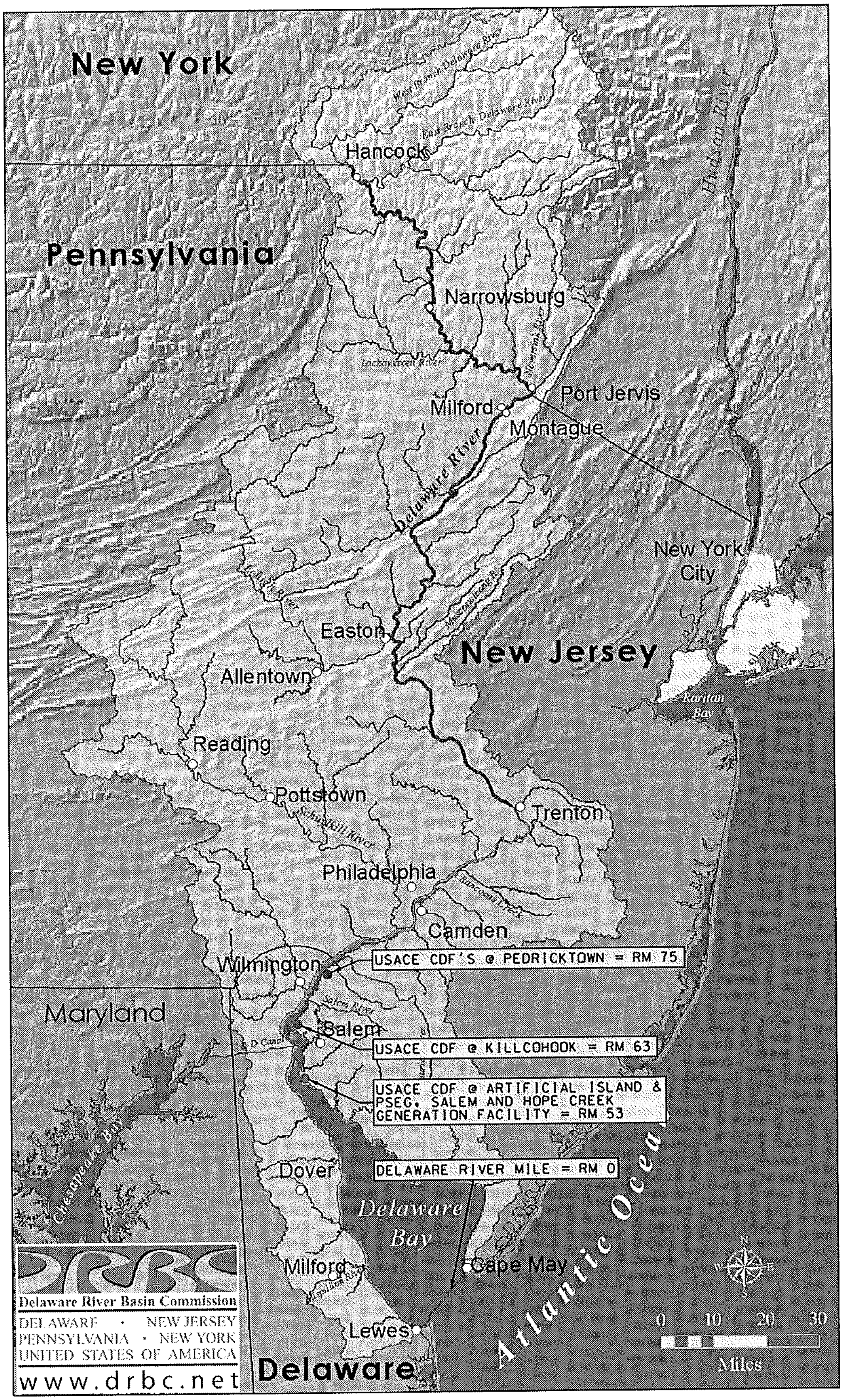
DRAWING TITLE

SINGLE UNIT MITSUBISHI US-APWR SOIL MANAGEMENT STUDY CUT/FILL QUANTITIES

DRAWING NUMBER: SK-12310-020-SMS-004
REVISION: 0
SHEET 2 OF 2

Figure 9

USACE Confined Disposal Facility (CDF) Location Map



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RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	02/05/2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION

SPECIFICATION: N/A

PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 9

CAD FILE NAME: SK-12310-020-SMS-005

PREPARED BY: A. PAAPE

REVIEWED BY: D. DAHLBERG

APPROVED BY: M. SHERVIN

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PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISTION SUPPORT STUDY

DRAWING TITLE

USACE CONFINED DISPOSAL FACILITY (CDF) LOCATION MAP

DRAWING NUMBER	REVISION
SK-12310-020-SMS-005	0

SHEET 1 OF 1

Figure 10

Proposed Soil Storage Area – PSEG Nuclear Site

NOTES:

1. NEW PLANT LOCATION BASED ON DRAWING SK-12310-000-SUP-001.

CONCEPTUAL DESIGN
NOT FOR CONSTRUCTION

PROPOSED PSEG NUCLEAR PROPERTY SOIL STORAGE AREA(S)

[redacted]

GRAPHIC SCALE: 300 0 300 600 1200
DRAWING SCALE 1" = 300'-0"

HOLD INFORMATION

NO.	DATE	DESCRIPTION
△		

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RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	02-05-2010	ISSUED FOR INFORMATION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 10

CAD FILE NAME: sk-12310-020-sms-006.dgn
PREPARED BY: C.CARNATE/A.SLACH
REVIEWED BY: D.DAHLBERG
APPROVED BY: M. SHERVIN

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PROJECT

PSEG NUCLEAR DEVELOPMENT
SOIL MANAGEMENT, BORROW SITE
INVESTIGATION AND USACE
LAND ACQUISITION
SUPPORT STUDY

DRAWING TITLE

PROPOSED SOIL STORAGE AREA
PSEG NUCLEAR SITE

DRAWING NUMBER	REVISION
SK-12310-020-SMS-006	0

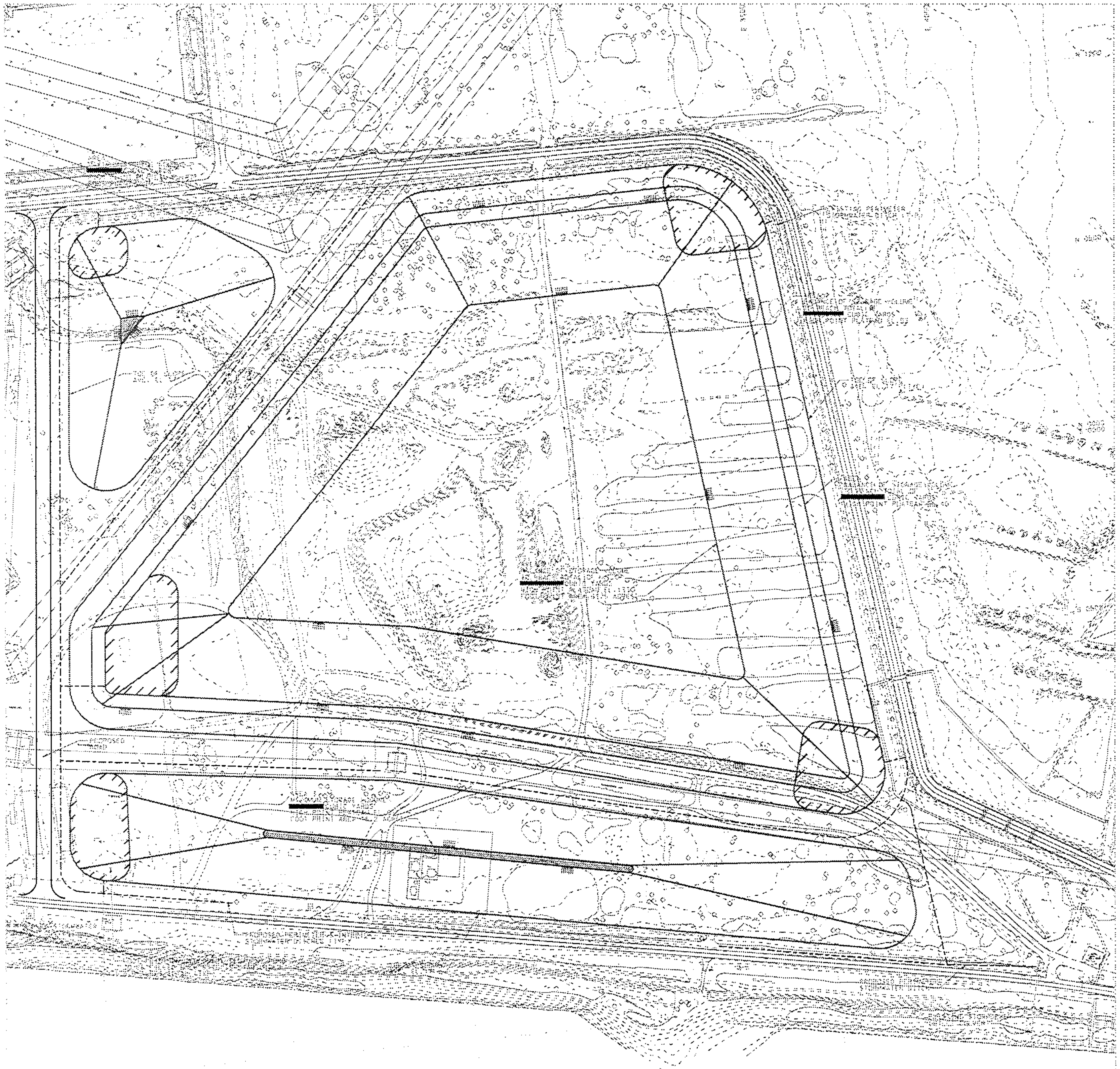
SHEET 1 OF 1

5/4/2010 6:57:01 PM

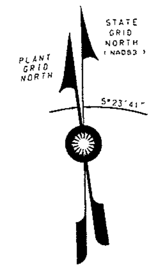
Form GOG-0401-01-03, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 9, Revision Date: 12-19-2003

Figure 11

Dry Fill Storage Area – Transmission Lines Remain



NOTES:
1. BACKGROUND TOPOGRAPHY PROVIDED BY PSEG.
2. ALL ELEVATION REFERENCES ARE NAVD 88.



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GRAPHIC SCALE
DRAWING SCALE
1" = 100'-0"

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NO.	DATE	DESCRIPTION
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ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 11

CAD FILE NAME: SK-12310-020-SMS-007-1
PREPARED BY: A. SLACH
REVIEWED BY: D. DAHLBERG
APPROVED BY: M. SHERVIN

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PROJECT
PSEG NUCLEAR DEVELOPMENT
SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE
DRY FILL
STORAGE AREA
TRANSMISSION LINES REMAIN

DRAWING NUMBER	REVISION
SK-12310-020-SMS-007	0
SHEET 1 OF 2	

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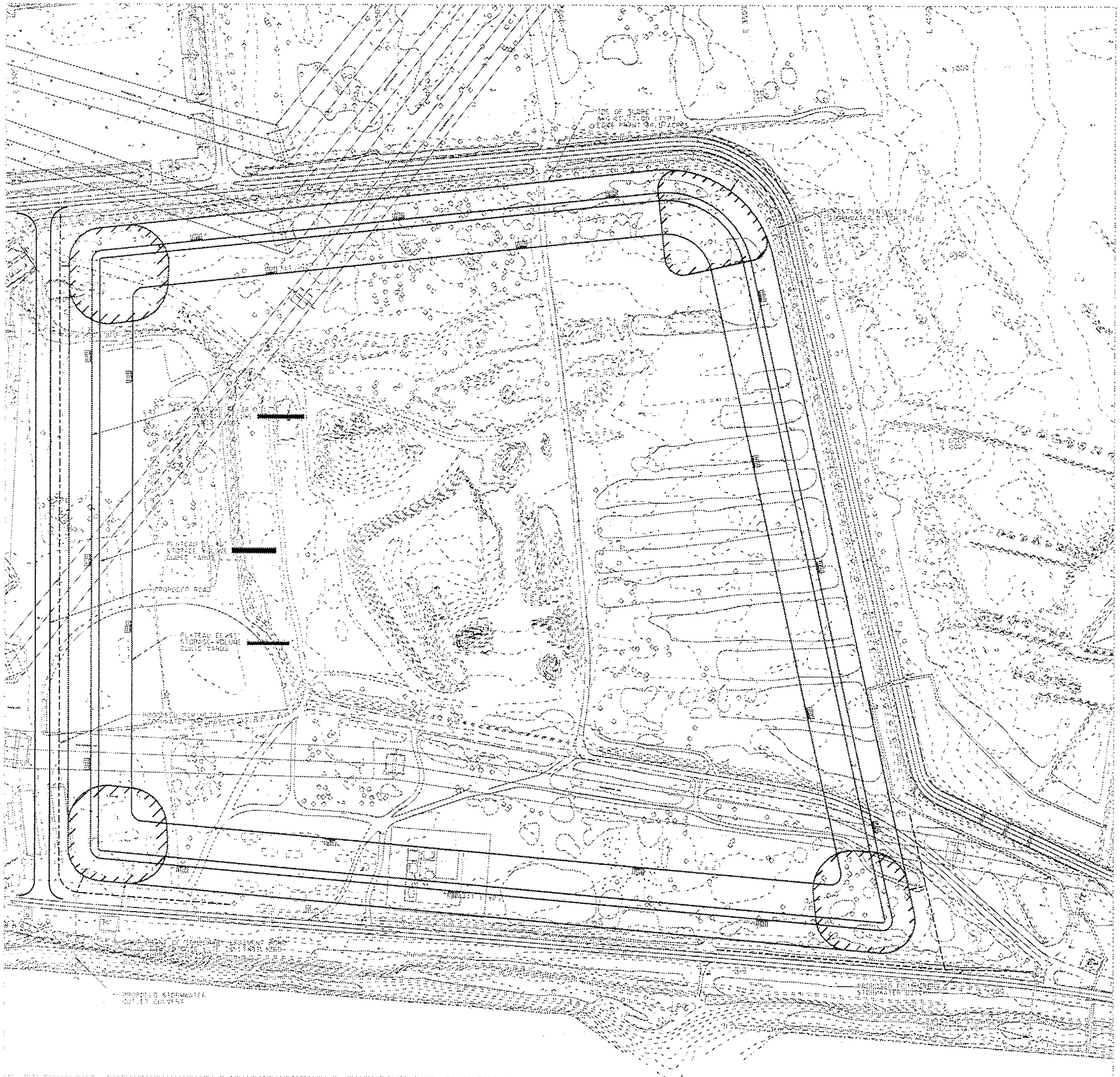
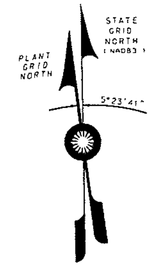
Figure 12

Dry Fill Storage Area – Transmission Lines Relocated



NOTES:
1. BACKGROUND TOPOGRAPHY PROVIDED BY PSEG
2. ALL ELEVATION REFERENCES ARE NAVD 88.



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Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 12

CAD FILE NAME: SK-12310-020-SMS-007-2

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DRAWING TITLE

DRY FILL STORAGE AREA TRANSMISSION LINES RELOCATED

100 0 100 200 300
GRAPHIC SCALE
DRAWING SCALE
1" = 100'-0"

DRAWING NUMBER	REVISION
SK-12310-020-SMS-007	0

SHEET 2 OF 2

3/4/2010 6:36:34 PM
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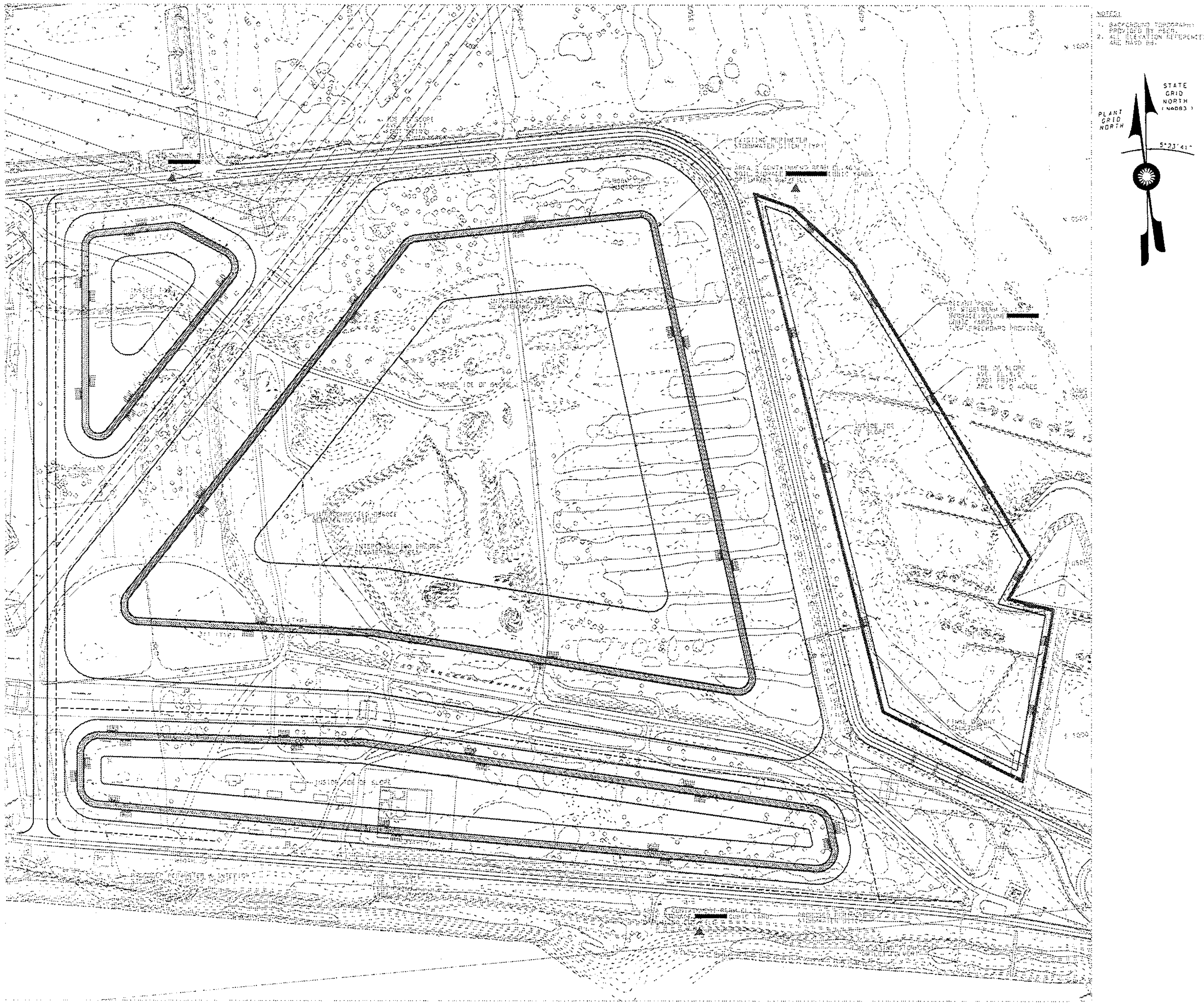
$PINFO1$
FORM G00-0401-01-08, ANSI (IMPERIAL) MICROSTATION BORDER - SIZE E - 34 X 44
REVISION 10, REVISION DATE: 10-16-2009

Figure 13

Wet Fill Storage Area – Transmission Lines Remain



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HOLD INFORMATION		
NO.	DATE	DESCRIPTION
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PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 13

CAD FILE NAME: SK-12310-020-SMS-008-1

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PROJECT

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SOIL MANAGEMENT, BORROW SITE
INVESTIGATION AND USACE
LAND ACQUISTION
SUPPORT STUDY

DRAWING TITLE

WET FILL
STORAGE AREA
TRANSMISSION LINES REMAIN

DRAWING NUMBER	REVISION
SK-12310-020-SMS-008	0
SHEET 1 OF 2	

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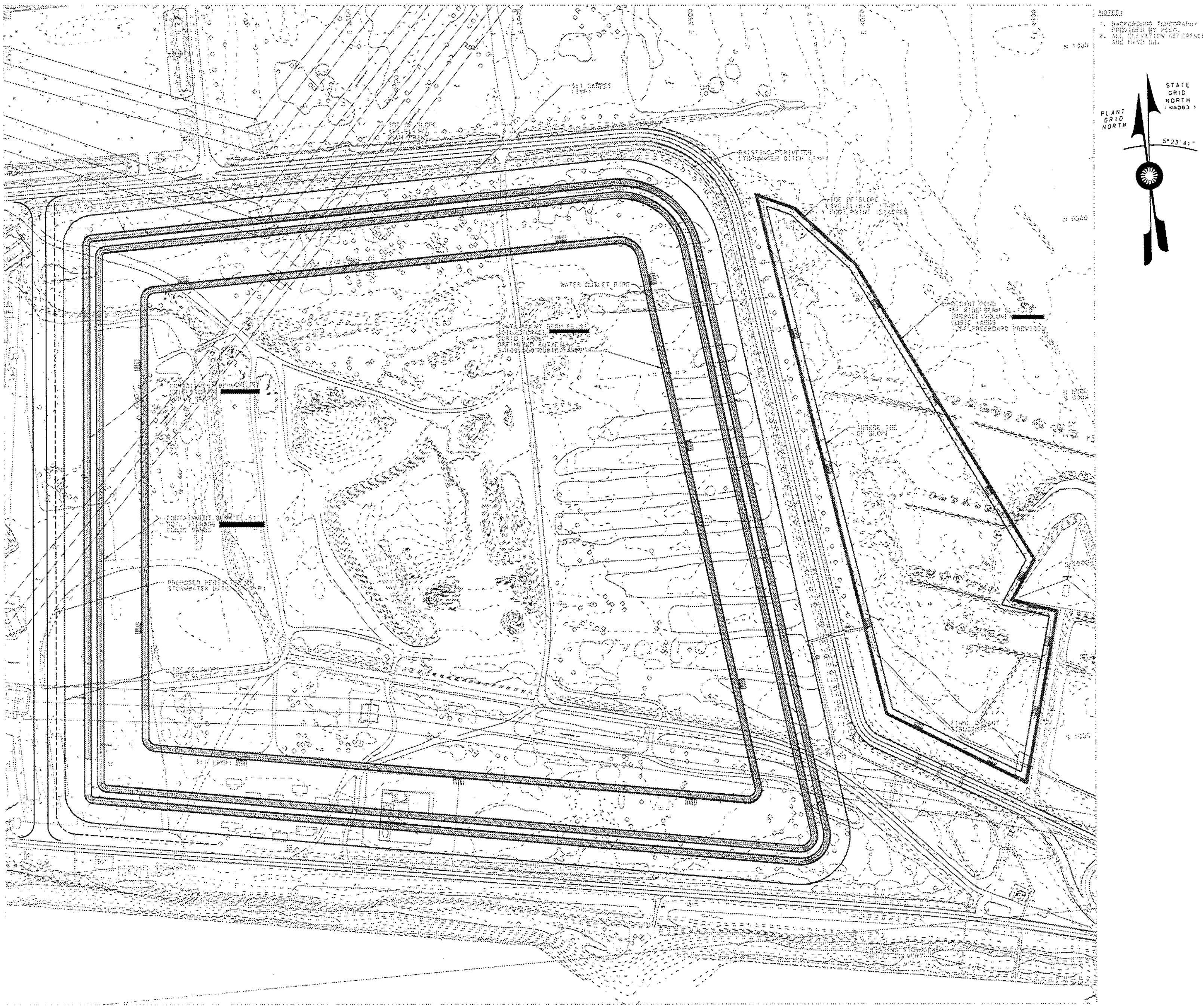
$PINFO1$
FORM 605-0401-01-03, ANSI (IMPERIAL) MICROSTATION BORDER - SIZE E - 34 X 44
REVISION 10, REVISION DATE: 10-16-2009

Figure 14

Wet Fill Storage Area – Transmission Lines Relocated



100 0 100 200 300
GRAPHIC SCALE
DRAWING SCALE
1" = 100'-0"

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SPECIFICATION: N/A
PROJECT NO.: 12310-020

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Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 14

CAD FILE NAME: SK-12310-020-SMS-008-2
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REVIEWED BY: D. DAHLBERG
APPROVED BY: M. SHERVIN

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PROJECT

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SOIL MANAGEMENT, BORROW SITE
INVESTIGATION AND USACE
LAND ACQUISTION
SUPPORT STUDY

DRAWING TITLE

WET FILL
STORAGE AREA
TRANSMISSION LINES RELOCATED

DRAWING NUMBER	REVISION
SK-12310-020-SMS-008	0

SHEET 2 OF 2

$PINFDI$
FORM GDG-0401-01-09, ANSI (IMPERIAL) MICROSTATION BORDER - SIZE E - 34 X 44
REVISION 10, REVISION DATE: 10-16-2009

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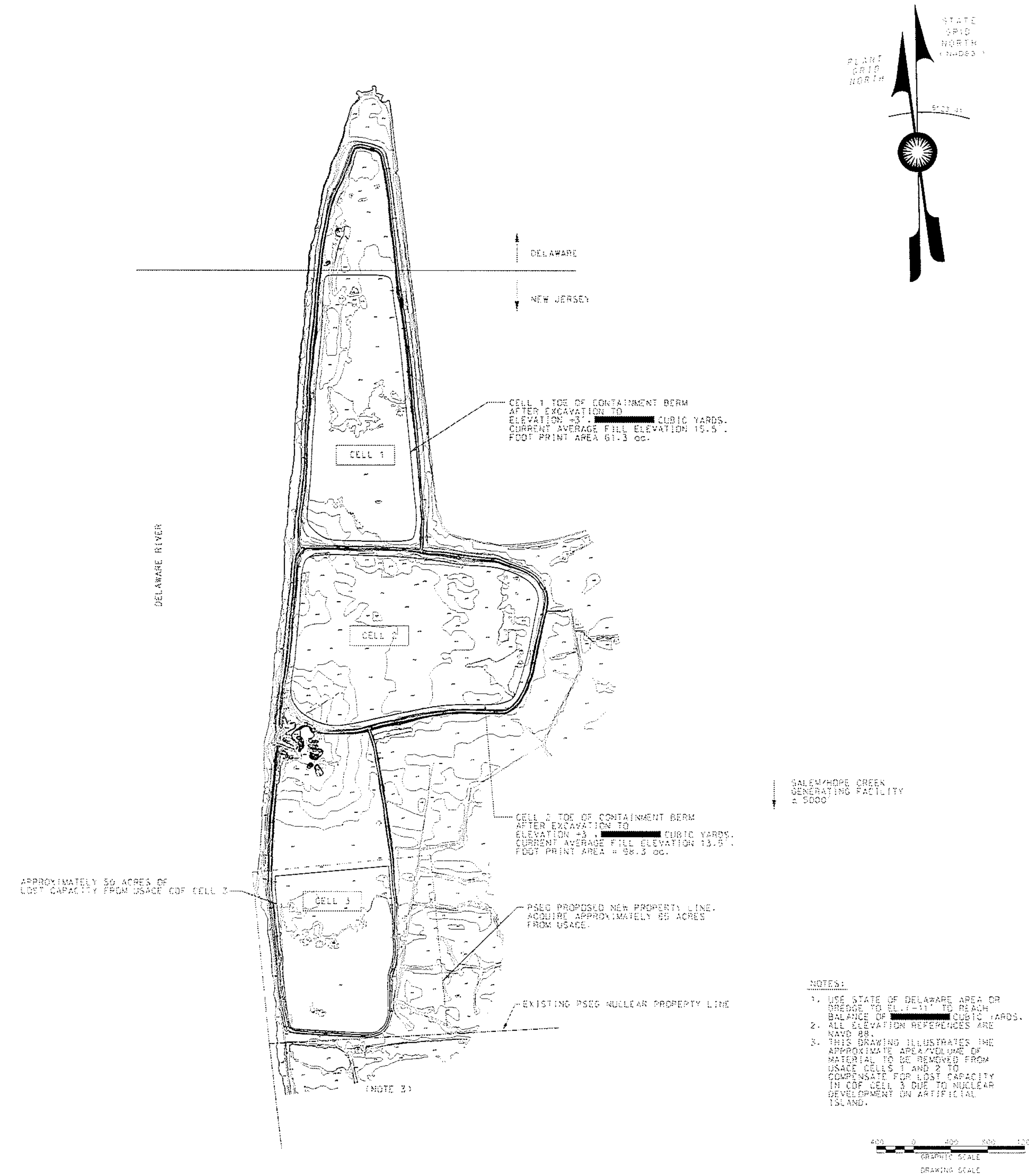
Figure 15

Army Corps of Engineers Artificial Island Confined Disposal Facility Cells 1, 2 & 3



NOTES:
1. USE STATE OF DELAWARE AREA OR DREDGE TO EL.(-11) TO REACH BALANCE OF [redacted] CUBIC YARDS.
2. ALL ELEVATION REFERENCES ARE NAVD 88.
3. THIS DRAWING ILLUSTRATES THE APPROXIMATE AREA/VOLUME OF MATERIAL TO BE REMOVED FROM USACE CELLS 1 AND 2 TO COMPENSATE FOR LOST CAPACITY IN CDF CELL 3 DUE TO NUCLEAR DEVELOPMENT ON ARTIFICIAL ISLAND.

HOLD INFORMATION

NO.	DATE	DESCRIPTION

RELEASE INFORMATION

REV.	DATE	DESCRIPTION

ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, REV. 0
Nuclear Development Project
Soil Management Study
Project No. 12310-020
Figure15

CAD FILE NAME:
PREPARED BY:
REVIEWED BY:
APPROVED BY:

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PROJECT

PSEG NUCLEAR DEVELOPMENT
SOIL MANAGEMENT, BORROW SITE
INVESTIGATION AND USACE
LAND ACQUISITION
SUPPORT STUDY

DRAWING TITLE

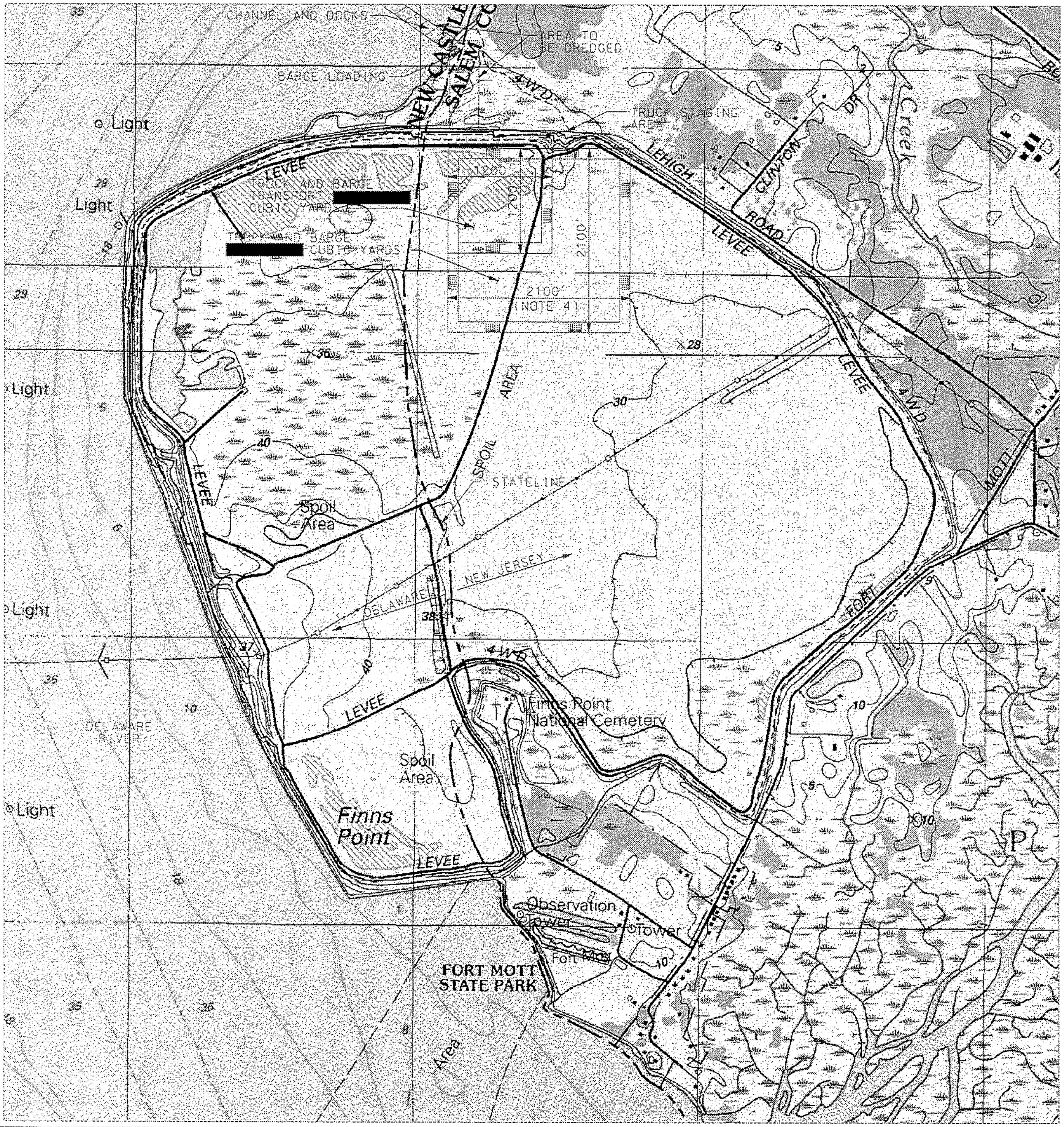
ARTIFICIAL ISLAND
ARMY CORPS OF ENGINEERS
CONFINED DISPOSAL FACILITY
CELLS 1, 2 & 3

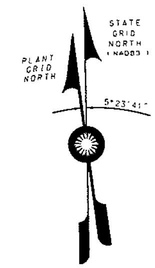
DRAWING NUMBER	REVISION
SK-12310-020-SMS-009	0

SHEET 1 OF 1

Figure 16

Army Corps of Engineers Killcohook Confined Disposal Facility





NOTES:

1. BACKGROUND TOPOGRAPHY FROM USGS DELAWARE CITY, 7.5 MINUTE QUADRANGLE MAP.
6. ELEVATION REFERENCES ARE NAVD 88.

GRAPHIC SCALE: 400 0 400 800 1200

DRAWING SCALE 1" = 400'-0"

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SPECIFICATION: N/A

PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 16

CAD FILE NAME: SK12310-020-SMS-010.DGN

PREPARED BY: A. SLACH

REVIEWED BY: D. DAHLBERG

APPROVED BY: M. SHERVIN

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SOIL MANAGEMENT, BORROW SITE
INVESTIGATION AND USACE
LAND AQUISITION
SUPPORT STUDY

DRAWING TITLE

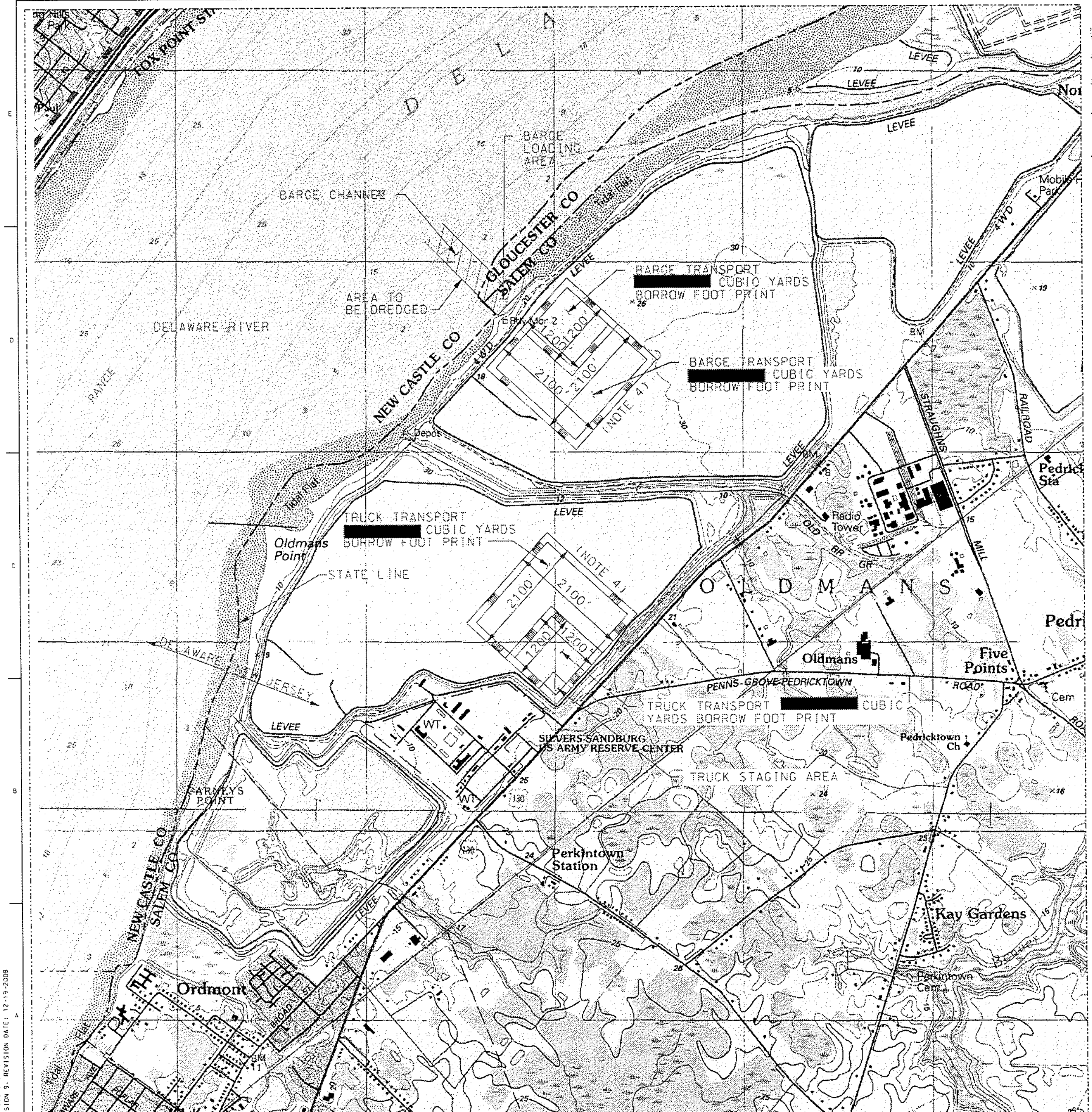
ARMY CORPS OF ENGINEERS
KILLCOHOOK
CONFINED DISPOSAL FACILITY

DRAWING NUMBER	REVISION
SK-12310-020-SMS-010	0

SHEET 1 OF 1

Figure 17

Army Corps of Engineers Pedricktown Confined Disposal Facility



NOTES:
1. BACKGROUND TOPOGRAPHY FROM USGS MARCUS HOOK, 7.5 MINUTE QUADRANGLE MAP.
2. EXCAVATION DEPTHS PROPOSED FROM CURRENT SURFACE ELEVATION (EGL) TO ELEVATION 5' ABOVE ESTIMATED GROUND WATER (RIVER LEVEL).
3. THE USACE CDF AT ARTIFICIAL ISLAND IS LOCATED APPROXIMATELY 22 RIVER OR 30 ROAD MILES SOUTH OF THE PEDRICKTOWN USACE CDF. (SEE SK-12310-020-SMS-010).
4. THIS DRAWING ILLUSTRATES THE APPROXIMATE AREA/VOLUME OF MATERIAL TO BE REMOVED FROM THIS CDF TO COMPENSATE FOR THE LOST CAPACITY OF THE USACE CDF AT ARTIFICIAL ISLAND IN THE SUPPORT OF NUCLEAR DEVELOPMENT AT ARTIFICIAL ISLAND.
5. ELEVATION REFERENCES ARE NAVD 88.

600 0 600 1200 1800
GRAPHIC SCALE
DRAWING SCALE
1" = 600'-0"

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ISSUE PURPOSE: INFORMATION
SPECIFICATION: N/A
PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 17

CAD FILE NAME: SK12310-020-0011.DGN
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PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT BORROW SITE INVESTIGATION AND USACE LAND ACQUISITION SUPPORT STUDY

DRAWING TITLE
ARMY CORPS OF ENGINEERS PEDRICKTOWN CONFINED DISPOSAL FACILITY

DRAWING NUMBER	REVISION
SK-12310-020-SMS-011	0

SHEET 1 OF 1

3/4/2010 6:29:47 PM
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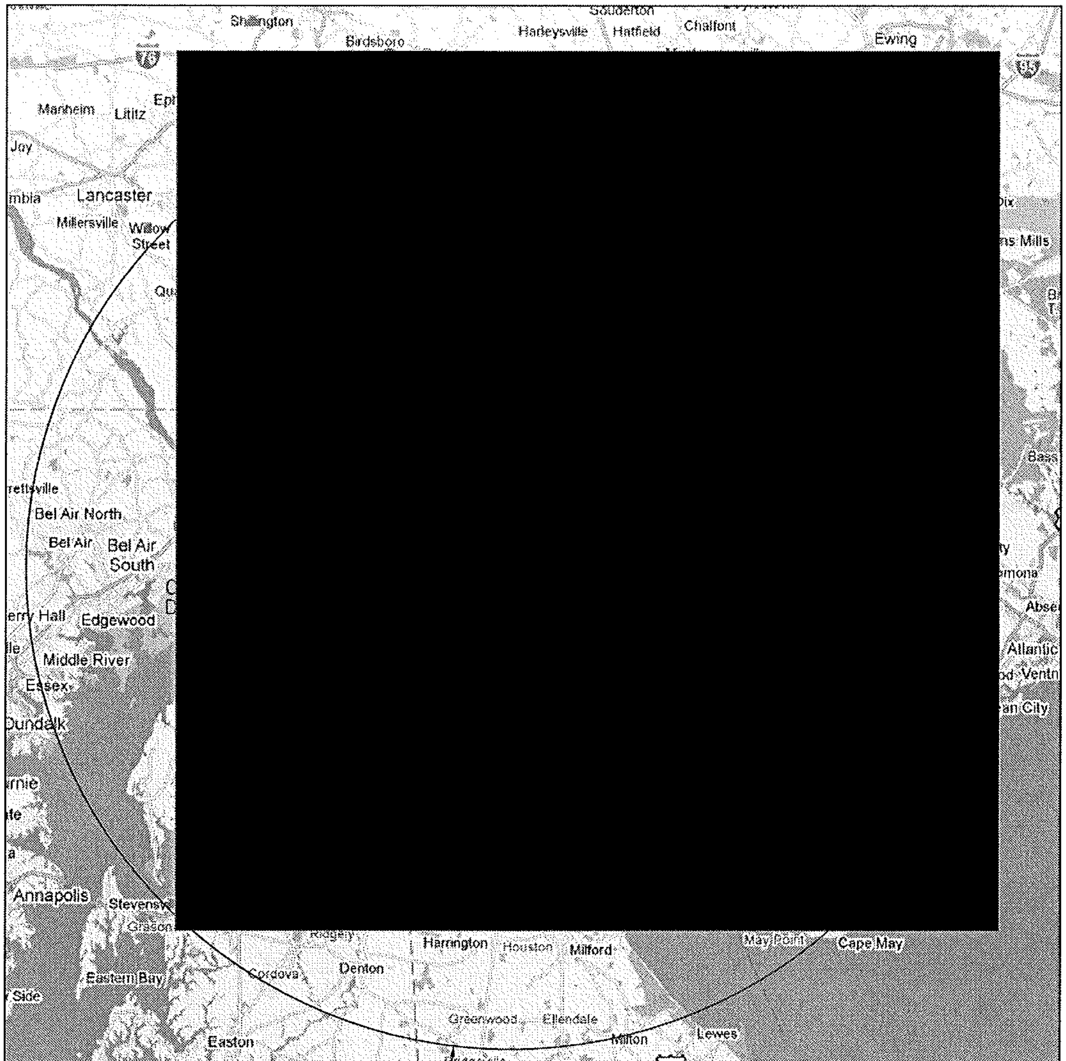
$PINFDI$
FORM GOO-0401-01-08, ANSI (IMPERIAL) MICROSTATION BORDER - SIZE E - 34 X 44
REVISION 9, REVISION DATE: 12-19-2008

Figure 18

Borrow Site Location Map



[redacted]

APPROXIMATE 50 MILE RADIUS

Note: See Figure 22 for Borrow Source Details

BORROW SOURCE LOCATION INFORMATION

LOCATION CODE	BORROW SOURCE NAME	STATE	SOURCE LOCATION	MILES FROM PSEG SITE*
N1	[redacted]	NJ	[redacted]	34 miles via highway
N2				24 miles via highway
N3				24 miles via highway
N4				34 miles via highway
N5				53 miles via highway
N6				40 miles via highway
N7				42 miles via highway
N8				59 miles via highway
N9				54 miles via highway
N10				45 miles via highway
N11				37 miles via highway
N12				12 miles via highway
D1		DE		Limited Resources Not Considered Viable Source
D2		DE		Non-Responsive to Inquiry
M1		MD		60 miles via highway 12 to 15 hours by Barge through C&D Canal
M2		MD		Almost Mined Out Not Interested at this time
M3		MD		56 miles via highway
P1		PA		76 miles via highway
P2		PA		61 miles via highway

* Approximate Mileage calculated from Google Maps

LEGEND

- N1 - NEW JERSEY SITE
- D1 - DELAWARE SITE
- M1 - MARYLAND SITE
- P1 - PENNSYLVANIA SITE

NORTH

0 MI 10 MI 20 MI 30 MI

GRAPHIC SCALE

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SPECIFICATION: N/A

PROJECT NO.: 12310-020

SL-010093, Rev. 0
Nuclear Development Project
Soil Management Study
Project No: 12310-020
Figure 18

CAD FILE NAME: SK-12310-020-SMS-012

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REVIEWED BY: D. NIELSON

APPROVED BY: M. SHERVIN

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PROJECT

PSEG NUCLEAR DEVELOPMENT SOIL MANAGEMENT, BORROW SITE INVESTIGATION AND USACE LAND ACQUISTION SUPPORT STUDY

DRAWING TITLE

BORROW SITE LOCATION MAP

DRAWING NUMBER	REVISION
SK-12310-020-SMS-012	0

SHEET 1 OF 1

Figure 19

Summary of Cost, Gross Cut and Net Fill Quantities

FIGURE 19 SUMMARY OF COST, GROSS CUT AND NET FILL QUANTITIES [5]

	HPFG EL (ft)	Gross Cut (cy)	Cost for Soil Excavation (1)	Net Fill (cy)	Cost for Fill Materials (2)	Cost for Material Unloading & On-Site Stockpiling (3)	Cost for Onsite Loading, Placement In Excavation, Compaction & Testing (4)	Cost for Fill Material	Cost for Excavation and Backfill	Cost for Armor Stone Slope Protection (6)	Total Cost w/Armor Stone
EPR	36.9	[redacted]									
	24										
	12										
AP1000	36.9										
	24										
	12										
ABWR	36.9										
	24										
	12										
APWR	36.9										
	24										
	12										

1 Total Cost for Soil Excavation. This cost includes excavation using conventional methods at $[redacted]/cy (Ref. 6.3-11), transporation up to 1 mile and placement in onsite disposal area.

2 Cost for Fill Materials. This cost includes the cost of using byproduct soil materials at a cost of $[redacted]cy (Ref. Figure 22) and delivery to the on-site barge unloading facility.

3 This cost includes $[redacted]cy (Ref. 6.3-11) for unloading at barge slip and stockpiling material on-site.

4 This cost includes $[redacted]/cy (Ref. 6.3-11) for reloading at site, placing in excavation, compaction and testing.

5 See Figures 2, 4, 6, and 8 for a detailed breakdown of cut and fill volumes

6 From Reference 6.1-4, approximately $[redacted]was estimated for material and installation of ARMOR Stone protection for the raised Power Block area side slopes for the EPR Technology.

Figure 20

Assessment and Quantities of Excavated Soils for Potential Reuse

[redacted]

FIGURE 20 - ASSESSMENT AND QUANTITIES OF EXCAVATED SOILS FOR POTENTIAL REUSE

					Single EPR			Dual AP 1000			Single ABWR			Single APWR		
Layer [1]	**Calculated Average Thickness (ft) [1]**	**Use Thickness (ft)**	**Anticipated Average Percent Passing No. 200 [1]**	**For Potential Use as**	**Cross Sectional Area of Cut (ft^2) [2]**	**Volume of Cut (yd^3)**	**Likely Fill Volume Using 10% Shrinkage (yd^3)**	**Cross Sectional Area of Cut (ft^2) [3]**	**Volume of Cut (yd^3)**	**Likely Fill Volume Using 10% Shrinkage (yd^3)**	**Cross Sectional Area of Cut (ft^2) [4]**	**Volume of Cut (yd^3)**	**Likely Fill Volume Using 10% Shrinkage (yd^3)**	**Cross Sectional Area of Cut (ft^2) [5]**	**Volume of Cut (yd^3)**	**Likely Fill Volume Using 10% Shrinkage (yd^3)**
Alluvium	12.5	10	8	Cat 1 Fill	2,618,000	[redacted]	[redacted]	1,978,000	[redacted]	[redacted]	2,063,000	[redacted]	[redacted]	1,876,000	[redacted]	[redacted]
Lower Kirkwood	3.4	3	17	Cat 2 Fill	535,000	[redacted]	[redacted]	216,000	[redacted]	[redacted]	512,000	[redacted]	[redacted]	663,000	[redacted]	[redacted]
Upper Vincentown	10.9	10	22	Cat 2 Fill	535,000	[redacted]	[redacted]	216,000	[redacted]	[redacted]	512,000	[redacted]	[redacted]	663,000	[redacted]	[redacted]

		Single EPR	Dual AP 1000	Single ABWR	Single APWR
Category 1	Estimated Total Salvaged Material (yd3)	[redacted]	[redacted]	[redacted]	[redacted]
Category 2	Estimated Total Salvaged Material (yd3)	[redacted]	[redacted]	[redacted]	[redacted]
COMBINED TOTAL	**CUBIC YARDS (yd3)**	[redacted]	[redacted]	[redacted]	[redacted]

[1] See References 6.2-9 and 6.2-10
[2] See Figure 2
[3] See Figure 4
[4] See Figure 6
[5] See Figure 8

Figure 21

Fill Quantities for Areas Outside of Power Block

FIGURE 21 - FILL QUANTITIES FOR AREAS OUTSIDE OF POWER BLOCK

AREA	AREVA US-EPR			WESTINGHOUSE AP1000			GEH-ABWR			MITSUBISHI US-APWR		
	Acreage	Vol/foot (CY)	Vol/5 ft. (CY)	Acreage	Vol/foot (CY)	Vol/5 ft. (CY)	Acreage	Vol/foot (CY)	Vol/5 ft. (CY)	Acreage	Vol/foot (CY)	Vol/5 ft. (CY)
Switchyard (Plant)	14.4	[redacted]	[redacted]	17.5	[redacted]	[redacted]	0	[redacted]	[redacted]		[redacted]	[redacted]
Switchyard (Interposing)	20.8	[redacted]	[redacted]	19.6	[redacted]	[redacted]	20.8	[redacted]	[redacted]	20.8	[redacted]	[redacted]
Cooling Tower Area	35	[redacted]	[redacted]	31.9	[redacted]	[redacted]	47.2	[redacted]	[redacted]	41.2	[redacted]	[redacted]
Temporary Batch Plant Area	19.8	[redacted]	[redacted]	15	[redacted]	[redacted]	5	[redacted]	[redacted]	20	[redacted]	[redacted]
Temporary Laydown Area	50	[redacted]	[redacted]	50	[redacted]	[redacted]	63	[redacted]	[redacted]	50	[redacted]	[redacted]
Parking/Office Areas	16	[redacted]	[redacted]	16	[redacted]	[redacted]	16	[redacted]	[redacted]	16	[redacted]	[redacted]
		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]
		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]
TOTAL	**156**	[redacted]	[redacted]	**150**	[redacted]	[redacted]	**152**	[redacted]	[redacted]	**148**	[redacted]	[redacted]

Notes:

[1] Fill quantities in the proposed soil storage area(s) at the southeast corner of the site are not included in this table. See Figure 23 and 25.

[2] Area and Acreage taken from Figures 1, 3, 5 and 7

Figure 22

Summary of Borrow Source Material Costs

FIGURE 22 - SUMMARY OF BORROW SOURCE MATERIAL COSTS

Map[1] Key No.	Pit Name		Transportation Method Considered for Cost Estimate	Material Cost at Source ($ / ton) [2]	Estimated Transportation Cost ($ / ton) [2]	Compacted Unit Weight Cost Factor (tons/cy) [2]	Price with Delivery to Site ($ / CY) [2, 3]
Overburden, Crusher Fines and Sand Byproducts (Availability Contingent Upon Schedule)							
M1	[redacted]	Overburden Soil	Barge	[redacted]	[redacted]	1.55	[redacted]
M1		Crusher Screenings	Barge			1.62	
N1		Overburden Soil	Truck			1.55	
N2		Natural Sand w/Trace Gravel	Truck			1.62	
M3		Mason Sand	Truck			1.62	
P1		Crusher Screenings	Truck			1.62	
			Average Price				
			Median Price				
			Price Used For Fill Material In Evaluation (See Report Figure 19)				[redacted]
Sand and Gravel Products							
N12	[redacted]	Natural Sand w/Trace Gravel	Truck	[redacted]	[redacted]	1.62	[redacted]
N4		Natural Sand w/Trace Gravel	Truck			1.62	
N5		Natural Sand w/Trace Gravel	Truck			1.62	
N6		Natural Sand w/Trace Gravel	Truck			1.62	
N7		Natural Sand w/Trace Gravel	Truck			1.62	
N3		Natural Sand w/Trace Gravel	Truck			1.62	
N2		Natural Sand w/Trace Gravel	Truck			1.62	
N10		Natural Sand w/Trace Gravel	Truck			1.62	
N11		Natural Sand w/Trace Gravel	Truck			1.62	
N8		Natural Sand w/Trace Gravel	Truck			1.62	
N12		Concrete Sand	Truck			1.62	
P1		Natural Sand w/Trace Gravel	Truck			1.62	
N10		Concrete Sand	Truck			1.62	
N11		Concrete Sand	Truck			1.62	
N9		Natural Sand w/Trace Gravel	Truck			1.62	
M3		Concrete Sand	Truck			1.62	
P1		Sand & Gravel (Processed)	Truck			1.69	
M1		Concrete Sand	Barge			1.62	
			Average Price				
			Median Price				
			Lower Third Point	-	-		
			Upper Third Point	-	-		
						Price	
Crushed Stone Products							
M1	[redacted]	Crushed DGA	Barge	[redacted]	[redacted]	1.82	[redacted]
P2		Crushed Stone 3/4 Inch	Truck			1.55	
M1		No. 57 Crushed	Barge			1.55	
P1		Crushed Stone 3/4 Inch	Truck			1.55	
P1		Crushed DGA	Truck			1.82	
			Average Price				
			Median Price				
					Price	Price	
Not Interested or Nonresponsive							
D1	[redacted]						
M2							
D2							

[1] See Figure 18 for Borrow Site Location Map and Appendix - A for Borrow Source Inquiry Sheets

[2] See Report Section 4.2, Table 4.2-1 for Volume/Density Relationship and Cost factors

[3] This cost does not include off-loading and stockpiling material at the PSEG site. See Report Figure 19 for off-loading and stockpiling costs.

Figure 23

Proposed Artificial Island Dry Soil Storage Area Quantity Summary

FIGURE 23
PROPOSED ARTIFICIAL ISLAND DRY SOIL STORAGE AREA
QUANTITY SUMMARY

DRY STORAGE: TRANSMISSION LINES REMAIN [3]

MEASUREMENT	AREA DESIGNATION			TOTAL STORAGE VOLUME (CY)
	1	2	3	
FOOTPRINT (AC)	7	62	16	
VOLUME (CY)	[redacted] [1]			[redacted]
TOP ELEVATION (FT) [2]	**87**	**40**	**67**	
VOLUME (CY)	[redacted] [1]			
TOP ELEVATION (FT) [2]	**87**	**53**	**67**	
VOLUME (CY)	[redacted] [1]			
TOP ELEVATION (FT) [2]	**87**	**133**	**67**	

DRY STORAGE: TRANSMISSION LINES RELOCATED [4]

SINGLE STORAGE AREA			
VOLUME (CY)	[redacted] MILLION	[redacted] MILLION	[redacted] MILLION
TOP ELEVATION (FT) [2]	**38**	**46**	**81**

[1] Maximum storage volume given the footprint and assuming 3:1 side slope. Does not include any drainage terraces on sideslope

[2] Top Elevation = Height of Fill + 17' (Elevation after Footprint is Leveled).

[3] See Figure 11

[4] See Figure 13

Figure 24

PSEG Nuclear Site Soil Storage Area Development

Primary Construction Quantities and Unit Costs (Dry)

Figure 24: PSEG Nuclear Site Soil Storage Area Development Primary Construction Quantities and Unit Costs (Dry)

Dry Storage Area (Three Areas) - Transmission Lines Remain [1]

	Storage Volume (cyd)			Unit	Unit Cost [3]	Total Cost		
	[redacted]					[redacted] (cyd)	[redacted] (cyd)	[redacted] (cyd)
Site Preparation								
Clearing and Grubbing	84.7	84.7	84.7	ac	[redacted]	[redacted]	[redacted]	[redacted]
Strip Topsoil and Stockpile	84.7	84.7	84.7	ac				
Cut and Fill (Level Site)	[redacted]			cyd				
Compaction	[redacted]			cyd				
Site Restoration								
Place Topsoil	84.7	84.7	84.7	ac				
Seed, Fertilize and Mulch	84.7	84.7	84.7	ac				
							Total	

Dry Storage Area (Single Area) - Transmission Lines Relocated [2]

	Storage Volume (cyd)			Unit	Unit Cost [3]	Total Cost		
	[redacted]					[redacted] (cyd)	[redacted] (cyd)	[redacted] (cyd)
Site Preparation								
Clearing and Grubbing	94.5	94.5	94.5	ac	[redacted]	[redacted]	[redacted]	[redacted]
Strip Topsoil and Stockpile	94.5	94.5	94.5	ac				
Cut and Fill (Level Site)	[redacted]			cyd				
Compaction	[redacted]			cyd				
Site Restoration								
Place Topsoil	94.5	94.5	94.5	ac				
Seed, Fertilize and Mulch	94.5	94.5	94.5	ac				
							Total	

[1] See Figure 11

[2] See Figure 12

[3] See reference 6.3-11 for unit costs

Figure 25

Proposed Artificial Island Wet Soil Storage Area Quantity Summary

FIGURE 25
PROPOSED ARTIFICIAL ISLAND WET SOIL STORAGE AREA
QUANTITY SUMMARY

WET STORAGE: TRANSMISSION LINES REMAIN [4]				
	AREA DESIGNATION			TOTAL STORAGE VOLUME (CY)
	1	2	3	
FOOTPRINT (AC)	7	62	16	
VOLUME (CY)	[redacted]		[1]	[redacted]
TOP OF BERM ELEVATION [2] (FT)	32	46	28	
VOLUME (CY)	[redacted]		[1]	
TOP ELEVATION [2] (FT)	32	62	28	
VOLUME (CY)	[redacted]		[1]	
TOP ELEVATION [2] (FT)	32	156	28	

WET STORAGE: TRANSMISSION LINES RELOCATED [5]			
	SINGLE STORAGE AREA 97.9 ACRES		
VOLUME (CY)	[redacted] MILLION	[redacted] MILLION	[redacted] MILLION
TOP OF BERM ELEVATION [2] (FT)	37	51	87

[1] Maximum storage volume given the footprint and assuming 3:1 side slope. Does not include any drainage terraces on sideslope. Bottom of Dredge

[2] Top of Berm Elevation = Height of Berm + 17' (Elevation after Footprint is Leveled).

[3] Storage Volume is calculated assuming the dredged material is used to raise the berm height and dredged soil is placed in the middle. Bottom of dredged soil storage area is then equal to the existing leveled ground = 17'.

[4] See Figure 13

[5] See Figure 14

Figure 26

PSEG Nuclear Site Soil Storage Area Development

Primary Construction Quantities and Unit Costs (Wet)

Figure 26: PSEG Nuclear Site Soil Storage Area Development Primary Construction Quantities and Unit Costs (Wet)

Wet Storage Area (Three Areas) - Transmission Lines Remain[2]

	Storage Volume (cyd)			Unit	Unit Cost[4]	Total Cost		
	[redacted]	[redacted]	[redacted]			[redacted] (cyd)	[redacted] (cyd)	[redacted] (cyd)
Site Preparation								
Clearing and Grubbing	99.7	99.7	99.7	ac	[redacted]	[redacted]	[redacted]	[redacted]
Strip Topsoil and Stockpile	99.7	99.7	99.7	ac				
Cut and Fill[1]	[redacted]			cyd				
Compaction	[redacted]			cyd				
Site Restoration								
Place Topsoil	8.78	13.9	40.02	ac				
Seed, Fertilize and Mulch	8.78	13.9	40.02	ac				
Aggregate Road	12800	12800	12800	lf				
							Total	

Wet Storage Area (Single Area) - Transmission Lines Relocated[3]

	Storage Volume (cyd)			Unit	Unit Cost[4]	Total Cost		
	[redacted]	[redacted]	[redacted]			[redacted] (cyd)	[redacted] (cyd)	[redacted] (cyd)
Site Preparation								
Clearing and Grubbing	109.5	109.5	109.5	ac	[redacted]	[redacted]	[redacted]	[redacted]
Strip Topsoil and Stockpile	109.5	109.5	109.5	ac				
Cut and Fill (Level Site)	[redacted]			cyd				
Compaction	[redacted]			cyd				
Site Restoration								
Place Topsoil	10.1	16.49	36.97	ac				
Seed, Fertilize and Mulch	10.1	16.49	36.97	ac				
Aggregate Road	7380	7116	6400	lf				
							Total	

[1] Quantity includes leveling site to create initial containment berms plus decant pond.

[2] See Figure 13

[3] See Figure 14

[4] See reference 6.3-11 for unit rates

Figure 27

Soil Source Areas, AI Cells 1 & 2, Pedricktown and Killcohook CDF's

Primary Construction Quantities and Unit Costs for Borrow Site Development

Figure 27: Soil Source Areas, AI Cells 1 & 2, Pedricktown, and Killcohook CDF's Primary Construction Quantities and Unit Costs for Site Development

Artificial Island Borrow Site (Dry or Wet Option) [1]

					Total Cost	
	Cell 1	Cell 2	Unit	Unit Cost [3]	Cell 1	Cell 2
Site Preparation				[redacted]	[redacted]	[redacted]
Clearing and Grubbing	61.5	98.5	ac			
Strip Topsoil and Stockpile	61.5	98.5	ac			
				Totals	[redacted]	**$2,120,000**

Pedricktown Borrow Site and Killcohook Borrow Site (Truck or Barge) [2]

	Cut Volume (cyd)				Total Cost	
	[redacted]		Unit	Unit Cost [3]	[redacted]	
Site Preparation				[redacted]	[redacted]	[redacted]
Clearing and Grubbing	33	101.5	ac			
Strip Topsoil and Stockpile	33	101.5	ac			
Dredge for Barge, Dock & Channel	286,000	286,000	cyd			
Site Restoration						
Place Topsoil	33	101.5	ac			
Seed, Fertilize and Mulch	33	101.5	ac			
				Totals		

[1] See Figure 15 for Artificial Island (AI) USACE CDF Cells 1 & 2

[2] See Figures 16 and 17 for Killcohook and Pedricktown USACE CDF

[3] See reference 6.3-11 for unit costs

Figure 28

Soil Transportation, Truck, Barge, Slurry from Source Areas to PSEG Soil Storage Area, Unit Costs and Extensions

Figure 28: Soil Transportation, Truck, Barge, Slurry From Source Areas to Storage Area, Unit Costs and Extensions [5]

Soil Source	Transport		Travel Distance (mi)	Dry Truck Transport Cost				Total Truck Transport Costs		Barge Transport Cost			Dump Soil & Spread (Cost/cy)	Compact Soil (Cost/cyd/12" lifts)	Total Barge Transport Costs		Slurry Pump Soil Including Piping and Plumming (cy)	Regrade Dried Soil On-Site (Cost/cy)	Compact Soil (Cost/cyd/12" lifts)	Total Slurry Transport Costs	
				Excavate & Load Trucks (Cost/cy)	Transport Soil (Cost/cy)	Dump Soil & Spread (Cost/cy)	Compact Soil (Cost/cyd/12" lifts)	1 Million (cy)	3 Million (cy)	Excavate to Load Hopper. Convey to Barge[1] (Cost/cy)	Transport Soil Barge (Cost/cy)	Unload Barge Clamshell into Truck 4000ft (Cost/cy)[2]			1 Million (cy)	3 Million (cy)				1 Million (cy)	3 Million (cy)
Artificial Island USACE Cells CDF 1 & 2	Trucking	Cell 1 and 2	2.6	[redacted]						—	—	—	—	—	—	—	—	—	—		
	Slurry	Cell 1 and 2	2.6	—	—	—	—	—	—	—	—	—	—	—	—	—	[redacted]				
Killcohook USACE CDF	Trucking		20.0	[redacted]						—	—	—	—	—	—	—	—	—	—		
	Barge		10.0	—	—	—	—	—	—	[redacted]							—	—	—		
Pedricktown USACE CDF	Trucking		30.0	[redacted]						—	—	—	—	—	—	—	—	—	—		
	Barge		22.0	—	—	—	—			[redacted]							—	—	—		

[1] Cost includes excavating soil, and placing in a hopper to load barge via conveyor.
[2] Cost includes unloading barge with a clamshell, loading into truck, driving 4000 feet, dumping and compact the material.
[3] Note Economy-of-Scale unit cost difference between [redacted]ds. Conveyor loading costs include barge mooring cell installation.
[4] Note Economy-of-Scale unit cost difference between [redacted]ds slurry pumping.
[5] See reference 6.3-11 for unit costs

Figure 29

Select Summary Costs PSEG Soil Storage Area, Source Areas, and Transportation

FIGURE 29: SELECT SUMMARY COSTS PSEG SOIL STORAGE AREA, SOURCE AREAS, AND TRANSPORTATION

Site Preparation Restoration Costs		Site Preparation Restoration Costs						Transportation Costs					
Artificial Island and Soil Storage Area 3		Source Area											
Maximum Area		Dry Transport Truck		Dry Transport Barge		Dredge Pumping		Dry Transport Truck		Dry Transport Barge		Dredge Pumping	
		[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY	[redacted] CY
[redacted]	USACE CDF Pedricktown	$[redacted] [1]	$[redacted] [1]	$[redacted]	$[redacted]			$[redacted]	$[redacted]	$[redacted]	$[redacted]		
	USACE CDF Killcohook	$	$[redacted] [1]	$[redacted]	$[redacted]			$[redacted]	$[redacted]	$[redacted]	$[redacted]		
	USACE CDF AI Cells 1/2 [2]	$	$[redacted]			$[redacted]	$[redacted]	$[redacted]	$[redacted]			$[redacted]	$[redacted]

[1] Cost does not include barge slip preparation.

[2] Apply left value to dry transport and right value to dredge pumping.

Figure 30

Summary of USACE CDF Site Development Cost Assumptions and Clarifications

Summary of USACE CDF Site Development Cost Assumptions and Clarifications

As presented in the Sections 3.3 and 4.3.3 of this report, preparation, development and restoration quantities and associated costs of a soil storage area at the PSEG Nuclear site for receiving both wet and dry soil options for various quantities have been defined. Also presented are preparation, development and restoration quantities and associated costs for creating additional dredge volume at USACE AI CDF Cells 1 and 2, CDF Killcohook, and CDF Pedricktown. The section presents the assumptions and clarifications associated with the development and restoration of these various sites presented in the Section 3.3 as well as transporting soils from the three sources (e.g. AI CDF Cells 1 & 2, Killcohook CDF and Pedricktown CDF) via truck, barge, and slurry pumping, as applicable.

There are many dozens of options with various combinations of what specific features will or will not be included in an option. As such, only a limited number of options and unit costs are presented in this report. To further evaluate alternative cost and quantity variations, individual unit and total costs presented in this report can be assembled to compare specific selected variations of these combinations.

Assumptions and Clarifications

General Issues for All Options/Locations, as Applicable

1. Erosion control sediment ponds will be within the footprint of the subject soil disturbance area. Erosion control runoff ponds are based on NJDOT requirements of detaining the 2-year, 24 hour storm (3.3 inches). Using the SCS TR-55 (Ref. 6.3-6) method, 2.45 inches runs off from bare soil (during filling operations if dry fill) using soil type C (conservative). Designing a typical 5 foot fluctuating water level pond will then require an approximate area (including berms) of 50 feet by 50 feet for every acre of disturbed area, or about 6% of the work zone.
2. Drainage features shown on drawings such as drainage ditches/swales on the plateaus, side slopes and down slope flumes are conceptual and considered incidental to the overall project costs.
3. Stormwater run-on will be diverted away from the active areas.
4. Borrow areas will be developed with the smallest required footprint.

5. Access roads to the top plateaus are considered incidental to the volume and construction costs.
6. All final grades will have minimum slopes required to provide positive drainage.
7. Existing drainage patterns/features must be maintained.
8. Excavation and fill slopes will be at 3H:1V.
9. Removal and demolition of the existing equipment and structures (not transmission towers) within the storage area is understood to be by others and is similar for all options.

PSEG Property Dry Soil Storage Area

1. Clearing and grubbing of the subject areas for phragmites.
2. Topsoil stripping of the subject areas.
3. Tree removal and disposal is considered incidental.
4. Scale of topographic background drawing provided is not adequate to view contour elevations. Thus elevations are estimated
5. Setbacks from roads match existing features to allow for in-place security features.
6. Drainage pathways are allowed under the transmission lines/corridors
7. Security restrictions including future barriers, access, and line of site are not known at this time and are not included.
8. Although average slopes will be constructed at 3H:1V, intermediate collection/interceptor swales on slopes greater than 100 feet wide will be required. Such volume losses are considered incidental for this level of estimate.
9. Consider with and without transmission lines.
10. Consider [redacted] million cubic yard storage and estimate maximum potential volume.
11. Existing drainage ditches along the north, south, and east perimeter are understood to be sufficient for drainage on those sides of the fill.
12. Toe of berm begins at outside extent of transmission lines (see Figures 11 and 13)
13. Existing soil fill in the storage area will be leveled for the purpose of the volume estimates. Average elevation at 17 feet is assumed with associated cut and fill.

PSEG Property Wet Soil Storage Area

1. Containment berm top is 20 feet wide to accommodate one way traffic and maintenance equipment.
2. Required settling/decanting pond area is primarily dependent on the pumping rate, solids percent, soil size distribution, and effluent requirements. For example, using the USACE guidance document, EM 1110-2-5026, June 30, 1987 (Ref. 6.3-10), an average soil size distribution, 12" pipe pumping velocity at 6 feet per second, with 9.2 lbs/cubic foot solids in the slurry, an approximate 9 acre area would be needed for salt water sediments. The surface area would be approximately 625 feet by 625 feet. The total soil storage area is approximately 100 acres. Therefore, based on these assumptions, 10 percent of the storage area would need to be dedicated to dewatering for each 2,000 gallon per minute dredge/pump operating. During these activities, as the dredged material dries, it would then be used to further raise the containment berms. With two dredge pumps running at this rate, this quantity equates to removal/filling of [redacted] cubic yards per day. By utilizing the entire storage area as a dewatering containment area, including the laydown area across the access road, a filling rate 6 times higher (about 20,000 cubic yards per day) could be accommodated. By comparison, this approximates to 670, 20 ton truck trips per day (considering 1 ton of material is approximately equal to 1.5 cubic yard). For a 24 hour operating day, this compares to a truck delivery every 2 to 2.5 minutes.
3. Clearing and grubbing of the subject areas for phragmites.
4. Topsoil stripping for of the subject areas.
5. Tree removal and disposal is considered incidental.
6. Scale of topographic background drawing provided is not adequate to view contour elevations. Thus elevations are estimated.
7. Setbacks from roads match existing features to allow for in-place security features.
8. Drainage pathways are allowed under the transmission lines/corridors
9. Security restrictions including future barriers, access, and line of site are not known at this time and are not included.

10. Although average slopes will be constructed at 3H:1V, intermediate collection/interceptor swales on slopes greater than 100 feet wide will be required. Such volume losses are considered incidental for this level of estimate.
11. Consider with and without transmission lines.
12. Consider [redacted] million cubic yard storage
13. Existing drainage ditches along the north, south, and east perimeter are understood to be sufficient for drainage on those sides of the fill.
14. Toe of fill is at outside extent of transmission lines. Additional ditches will be added to the west perimeter and along the transmission line corridors for the individual fill cell options as needed.
15. Existing soil fill in the storage area will be leveled for the purpose of the volume estimates. Average elevation at 17 feet is assumed with associated cut and fill.
16. This study assumes the existing Hope Creek barge facilities as well as the proposed barge facilities developed for the ESPA will be available for use.
17. Decanting system construction is included in storage area quantities.

<u>Artificial Island USACE CDF Cells 1 and 2</u>

1. Soil borrow will occur only in the State of New Jersey and will begin on the southern perimeter of Cell 2 until groundwater is reached and then proceed north along the existing berms to limit costs.
2. Existing containment berms are sufficient to act as the sediment and erosion control basin.
3. Clearing and grubbing only includes removal and stockpiling of primarily phragmites.
4. Scale of topographic drawing is not sufficient to view contour elevations.

<u>USACE CDF at Killcohook</u>

1. No soil removal is allowed in Delaware and must be done in New Jersey.
2. Barge loading facility will need to be dredged within the New Jersey State line.
3. A perimeter berm will be maintained to allow for future potential dredge disposal.
4. Borrow area location is the same for truck or barge transport.

5. Existing perimeter drainage controls and features are understood to be sufficient for borrow activities.
6. Clearing and grubbing only includes removal and stockpiling of primarily phragmites.
7. Barge loading facilities for [redacted] million yards at Killcohook and Pedricktown will have the same total cost.
8. Site preparation and restoration costs for [redacted] yards of borrow for Killcohook and Pedricktown have the same total costs.
9. All borrow location loading source areas and storage area unloading, spreading and compaction for trucking option will have the same approximate unit cost in $ per cubic yard for both [redacted] million cubic yards.

<u>USACE CDF at Pedricktown</u>

1. Barge transport borrow area is located on the river side of the facility.
2. Truck transport borrow area is located adjacent to exist road access.
3. Existing perimeter drainage controls and features are understood to be sufficient for borrow activities.
4. A perimeter berm will be maintained to allow for future potential dredge disposal.
5. Clearing and grubbing only includes removal and stockpiling of primarily phragmites.
6. Barge loading facilities for [redacted] million yards at Pedricktown and Killcohook will have the same total cost.
7. Site preparation and restoration costs for [redacted] yards of borrow for Killcohook and Pedricktown, have the same total costs.
8. All borrow location loading source areas and storage area unloading, spreading and compaction for trucking option will have the same approximate unit cost in $ per cubic yard for both [redacted] million cubic yards.

<u>Cost Assumptions:</u>

<u>Ancillary Features Included or Incidental to or included in unit costs:</u>

- Fencing (construction and security)
- Side Slope Interceptor Swales

- Down slope flumes
- Erosion Control Features Including
  - Check Dams
  - Inlet Protection
  - Construction Entrances
  - Rip Rap
  - Sediment Traps
  - Pond Outlets, Manholes, Inlets, Culverts
- On-Site Temporary Construction Roads
- Signage
- Piping/Road Crossings for Dredging Lines
- Truck Staging Areas
- Road cleaning and maintenance

Contractor Costs Not Estimated:

- Construction Offices
- Sanitary Facilities and Utilities
- Construction Debris Disposal
- Construction Parking, Laydown
- Contractor Profit, Overhead, Other Fees
- Overtime
- Per Diems
- Travel
- Lodging
- Taxes
- Escalation
- Interest
- Inflation
- Contingencies
- Freight

Owner Costs Not Estimated:

- Engineering, design, plans, specifications, bidding, contract management
- Construction Observation and Testing
- PSEG Legal
- PSEG administrative

Specific Additional Costs Not Estimated:

- Geotechnical Investigations and Testing
- Contamination Investigations and Remediation
- Costs Associated with Security Clearances/Training
- Surveying
- Traffic Controls and Studies
- Local Fees/Permit Costs
- Unknown Demolition
- Utility Relocation
- Operation and Maintenance
- Contractor Training and Background Research
- Lighting
- As-builts
- Permitting Including
    - Erosion and Sediment Control
    - Storm Water Management Permit
    - Wetlands and Mitigation
    - Highway Access and Safety
    - Other state, federal and local permits

Appendix A

Borrow Source Inquiry Sheets

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N1	
Source Name	[redacted]	[redacted]
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Confidential future landfill site (NJ)	This source is contingent upon construction of landfill at same time as PSEG need, which is unlikely. Not recommended for serious consideration
Type of Material	Sandy overburden	
Current QA Program & Approvals	Not at this time	
Test Data Available	Not at this time	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 + CY per day	
Barge Facilities	Yes	
Material Cost	[redacted]	
Delivery Method	Truck and/or barge	
Transportation	$ [redacted]	Trucking cost
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N2	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 2000 CY / day	
Barge Facilities	Not currently	
Material Cost	[redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N2	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Natural Sand w/Trace Gravel excavated for Landfill Cell Construction	Availability based on construction schedule
Current QA Program & Approvals	Not on this product	
Test Data Available	Not on this product	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 2000 CY / day	
Barge Facilities	Not currently	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N3	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 tons per day	
Barge Facilities	Not at this time	Barge loading facilities may be obtained but will be limited by barge capacity due to low draft conditions.
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N4	
Source Name	[redacted]	[redacted]
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	5,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N5	
Source Name	[redacted]	[redacted]
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	5,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N6	
Source Name	[redacted]	[redacted]
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	5,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N7	
Source Name	[redacted]	[redacted]
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	5,000 tons per day	
Barge Facilities	No	
Material Cost	$[redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N8	
Source Name	[redacted]	[redacted]
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	-	
Barge Facilities	Not currently	They could possibly establish a barge loading facility.
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N9	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Sand w/Trace Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 tons per day	
Barge Facilities	Not at this time	Barge loading facilities may be obtained but will be limited by barge capacity due to low draft conditions.
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N10	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Natural Pit Run Sand	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	[redacted] has approximately 800 acres of land under current ownership and permits. In addition, they have 200 additional acres under permit review.
Max. Daily Shipping Quantity	6,000 Tons per plant	
Barge Facilities	Not currently	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N10	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Washed Concrete Sand	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	[redacted] has approximately 800 acres of land under current ownership and permits. In addition, they have 200 additional acres under permit review.
Max. Daily Shipping Quantity	6,000 Tons per plant	
Barge Facilities	Not currently	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N11	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Washed Concrete Sand	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	[redacted] has approximately 800 acres of land under current ownership and permits. In addition, they have 200 additional acres under permit review.
Max. Daily Shipping Quantity	6,000 Tons per plant	
Barge Facilities	Not currently	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N11	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Pit Run Sand	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	[redacted] has approximately 800 acres of land under current ownership and permits. In addition, they have 200 additional acres under permit review.
Max. Daily Shipping Quantity	6,000 Tons per plant	
Barge Facilities	Not currently	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N12	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Pit Run Sand	
Current QA Program & Approvals	No, but they have been tested	
Test Data Available	Not on this material	
Quantity Available Under Current Permits and Owned Property	[redacted]	[redacted] has approximately 30 acres of land under current ownership and permits. In addition, they have 50 additional acres under permit review. They cannot extend the pit below the water table and are limited to about 50 ft (vertical) of excavation.
Max. Daily Shipping Quantity	3,000 Tons/day	
Barge Facilities	Yes, in Salem	
Material Cost	[redacted]	[redacted] presented a range without any time to evaluate his costs.
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ at [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N12	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Washed Sand for Conc.	
Current QA Program & Approvals	No but they have been tested	
Test Data Available	Not on this material	
Quantity Available Under Current Permits and Owned Property	[redacted]	[redacted] has approximately 30 acres of land under current ownership and permits. In addition, they have 50 additional acres under permit review. They cannot extend the pit below the water table and are limited to about 50 ft (vertical) of excavation.
Max. Daily Shipping Quantity	3,000 Tons/day	
Barge Facilities	Yes, in Salem	
Material Cost	[redacted]	[redacted] presented a range without any time to evaluate his costs.
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ at [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	N12	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Dredge Spoils from ASCOE Crushed screened Construction and Demolition Debris	[redacted] has numerous established and potential sources for soil byproducts that will be available at various times in the future.
Current QA Program & Approvals	No	
Test Data Available	No	
Quantity Available Under Current Permits and Owned Property	variable	
Max. Daily Shipping Quantity	-	
Barge Facilities	Yes, in Salem	
Material Cost	-	
Delivery Method	-	
Transportation	-	
Total Cost Delivered to site	-	
Distance to Site (by map)	-	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	D1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	-	
Current QA Program & Approvals	-	
Test Data Available	-	
Quantity Available Under Current Permits and Owned Property	Has limited resources	Not considered a viable potential source.
Max. Daily Shipping Quantity	-	
Barge Facilities	-	
Material Cost	-	
Delivery Method	-	
Transportation	-	
Total Cost Delivered to site	-	
Distance to Site (by map)	-	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	D2	
Source Name	[redacted]	
Telephone Number		No answer and no return messages. Based on aerial photographs, this facility appears to be inactive but may have significant reserve materials and possible barge access. This source may warrant further investigation as the project develops.
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	-	
Current QA Program & Approvals	-	
Test Data Available	-	
Quantity Available Under Current Permits and Owned Property	-	
Max. Daily Shipping Quantity	-	
Barge Facilities	-	
Material Cost	-	
Delivery Method	-	
Transportation	-	
Total Cost Delivered to site	-	
Distance to Site (by map)	-	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	Soil Overburden	Soils excavated to expose rock at existing quarry. This waste product has accumulated for many years and will be somewhat variable.
Current QA Program & Approvals	Not on this material	
Test Data Available	No	
Quantity Available Under Current Permits and Owned Property	[redacted]	Will likely be partially used at the new [redacted] Plant.
Max. Daily Shipping Quantity	4,000 ton	
Barge Facilities	Yes	At Quarry located on Chesapeake Bay
Material Cost	$ [redacted]	
Delivery Method	Barge	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	Barge [redacted] hours one way	Via C&D Canal

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	Crusher Screening Minus 3/8"	Byproduct of crushing and processing of other materials.
Current QA Program & Approvals	Not on this product	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	Depends on production of other products.	
Max. Daily Shipping Quantity	4,000 ton	
Barge Facilities	Yes	At Quarry located on Chesapeake Bay
Material Cost	$ [redacted]	
Delivery Method	Barge	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	Barge [redacted] hours one way	Via C&D Canal

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	Dense Graded Aggregate Road Base Course	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 ton	
Barge Facilities	Yes	At Quarry located on Chesapeake Bay
Material Cost	$[redacted]	
Delivery Method	Barge	
Transportation	$[redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	Barge [redacted] hours one way	Via C&D Canal

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	No. 57 Coarse Crushed Aggregate.	Coarse crushed rock for concrete.
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 ton	
Barge Facilities	Yes	At Quarry located on Chesapeake Bay
Material Cost	$ [redacted]	
Delivery Method	Barge	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $ [redacted]	
Distance to Site (by map)	Barge [redacted] hours one way	Via C&D Canal

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address	Same	
Type of Material	Concrete Sand	Not produced by [redacted]
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	More than Sufficient	Purchased from another source by [redacted] and shipped from the [redacted] Barge Facilities.
Max. Daily Shipping Quantity	4,000 ton	
Barge Facilities	Yes	At Quarry located on Chesapeake Bay
Material Cost	$ [redacted]	
Delivery Method	Barge	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	Barge [redacted] hours one way	Via C&D Canal

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M2	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	Same	
Type of Material	Clean Sand	
Current QA Program & Approvals	-	
Test Data Available	-	
Quantity Available Under Current Permits and Owned Property	[redacted]	They have relatively small reserves and are not interested in supplying this project.
Max. Daily Shipping Quantity	-	
Barge Facilities	-	
Material Cost	-	
Delivery Method	-	
Transportation	-	
Total Cost Delivered to site	-	
Distance to Site (by map)	-	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M3	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Mason Sand	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 + tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	M3	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	Concrete Sand	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	4,000 + tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway	

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	P1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Natural Bank Run Sand w/Trace Gravel	
Current QA Program & Approvals	Not on this material	
Test Data Available	Not on this material	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 4,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck, Rail or Rail to Barge	
Transportation	$ [redacted]	Estimate based on Trucking
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	[redacted] via highway Can be transported by rail to barge.	This site is over the 50 mile radius from the site. However, based on the potential for rail shipping and relatively low material costs, it is included for consideration.

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	P1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Crusher Screenings	
Current QA Program & Approvals	Not on this material	
Test Data Available	Not on this material	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 4,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck, Rail or Rail to Barge	
Transportation	$ [redacted]	Estimate based on Trucking
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	[redacted] via highway Can be transported by rail to barge.	This site is over the 50 mile radius from the site. However, based on the potential for rail shipping and relatively low material costs, it is included for consideration.

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	P1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Crushed Dense Graded Aggregate (Road Base)	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 4,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck, Rail or Rail to Barge	
Transportation	$ [redacted]	Estimate based on Trucking
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway Can be transported by rail to barge.	This site is over the 50 mile radius from the site. However, based on the potential for rail shipping, it is included for consideration.

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	P1	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	
Type of Material	¾ Crushed Stone for Concrete or Aggregate Fill	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 4,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck, Rail or Rail to Barge	
Transportation	$ [redacted]	Estimate based on Trucking
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway Can be transported by rail to barge.	This site is over the 50 mile radius from the site. However, based on the potential for rail shipping, it is included for consideration

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	P1	
Source Name	[redacted]	
Telephone Number		
Point of Contact		
Corporate Owner		
Mailing Address		
Source Address		
Type of Material	Processed Sand & Gravel	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	> 4,000 tons per day	
Barge Facilities	No	
Material Cost	$ [redacted]	
Delivery Method	Truck, Rail or Rail to Barge	
Transportation	$ [redacted]	Estimate based on Trucking
Total Cost Delivered to site	$ $ [redacted]	
Distance to Site (by map)	[redacted] via highway Can be transported by rail to barge.	This site is over the 50 mile radius from the site. However, based on the potential for rail shipping, it is included for consideration

APPENDIX – A
BORROW SOURCE INQUIRY SHEETS

	Response	S&L COMMENTS
Map Key No.	P2	
Source Name	[redacted]	
Telephone Number	[redacted]	
Point of Contact	[redacted]	
Corporate Owner	[redacted]	
Mailing Address	[redacted]	
Source Address	[redacted]	[redacted] can back haul crushed stone from [redacted] in trucks they use to haul sand to the quarry.
Type of Material	Crushed Stone for Concrete or Engineered Fill	
Current QA Program & Approvals	Yes	
Test Data Available	Yes	
Quantity Available Under Current Permits and Owned Property	[redacted]	
Max. Daily Shipping Quantity	-	
Barge Facilities	Not currently	They could possibly establish a barge loading facility.
Material Cost	$ [redacted]	
Delivery Method	Truck	
Transportation	$ [redacted]	
Total Cost Delivered to site	$ [redacted] $	
Distance to Site (by map)	[redacted] via highway	

Appendix B

Borrow Site Investigation Source Documents

(CD-ROM)