ARCHAEOLOGICAL SENSITIVITY EVALUATION FOR EIGHT WATER POLLUTION CONTROL PLANT EXPANSIONS IN NEW YORK CITY

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WARDS ISLAND

PREHISTORIC EVIDENCE

The proposed location of the dewatering facility at the Wards Island Water Pollution Control Plant in Manhattan evidently does not include any known prehistoric sites. A preliminary search failed to reveal any such sites on Wards or Randalls Islands. Along the adjacent Queens' shore of the East River, two unnamed sites were reported by former New York State Archaeologist, Arthur C. Parker (Parker 1922:P1.208). One is described as a burial and the other as a temporary camp. The aboriginal name for Wards Island was "Tenkenas" (Grumet 1981:56) but the existence of a name for the island does not prove it was occupied.

A study of the topography surrounding the Wards Island W.P.C.P. failed to locate any fresh water sources on this island. This situation would have provided access to the marine resources of the East River but no obvious source of fresh water. These conditions indicate that the proposed location of the Wards Island W.P.C.P. dewatering facility is probably not potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC EVIDENCE

The first European to sail through the channel between Wards and Randalls Islands on the west and what is today Astoria, Queens on the east was the Dutch Commander Adriaen Block. Block was also the first to refer to this channel as "Hellgat", because of its dangerous shoals and conflicting tides. Wards Island (also called Great Barrent, Barn or Buchanan's) was sold by two indian chieftains in 1637 to Director Wouter Van Twiller along with Randalls Island. The 1639 "Manatus" maps show the "Bouwery of Van Twiller, in the Hellgat" and depict a structure on Wards Island. Wards Island was then farmed by Barnet Jensen (Stokes 1915).

In 1667, following the English takeover of New Netherland, the two islands were confiscated by the English government and became known as Great Barn and Little Barn during the English tenure. In 1776 it was occupied by the British who established a camp there. After the Revolutionary War two brothers, Jasper and Bartholomew, bought it and divided it into farms (Kelley 1909:137). A cotton mill that operated there during the War of 1812 was connected to the foot of East 114th Street (Manhattan) by a bridge, the first over the East River (Federal Writers Project 1939:425). The bridge was later destroyed in a storm. The Ward brothers' plans to develop the island proved unsuccessful, and when the mill closed after the War of 1812, the island was practically deserted.

In 1840 100,000 bodies were removed from the site of Bryant Park to a new potter's field on Wards Island. In 1847 a State Emigration Refuge of "the sick and destitute aliens from the Old World" was established there, and after 1860 the island was used as a secondary immigration station until the Ellis Island Station was opened in 1892. By 1872 the City owned the entire island and, by 1885 had established two asylums for the

insane there. After 1892 the Old Emigrant Refuge was converted and taken over by the New York City Asylum for the Insane (ibid; Kelley 1909:137).

By 1939, much of the island was being reclaimed by the Department of Parks for parkland and recreational use, and by 1943 the eighty buildings that formed the institutional community there were evacuated (Federal Writers Project 1939:425). Wards and Randalls Islands were joined for the first time when the New York Connecting Viaduct was built some time prior to 1929. In 1933 the easement for the Triborough Bridge was granted, creating a second connection. In 1939, the city purchased the rights to the Little Hell Gate between the two islands and commenced filling operations at the eastern end of the channel. This operation joined the two islands and has continued to the present, with only a small section of the western end of the channel remaining unfilled today. A Municipal Sewage Disposal Plant, occupying 77.5 acres on the northeast corner of the island, was put into operation by the Department of Sanitation in October, 1937 (ibid.).

The project area lies within what was Little Hell Gate Channel. Although Wards Island and its associated waterways have played an important part in New York City's history, the project area does not appear to contain or be associated with significant cultural resources. The eighteenth century maps examined do not show structures in the project area's vicinity, on the northeast portion of the island (Des Barres 1778: Kitchin 1778). The nineteenth and early twentieth century cartographic sources consistently show that the Island's northwestern portion was not developed. An 1851 map of Hell Gate and its Approaches (U.S. Coast Survey) and Walling's 1860 map both show that construction on the Island had been limited to its northwest portion (see attached Figures).

Maps dating between 1874 and 1914 show the increased public use of the island during this period. Bromley and Robinson's 1879 map and Colton's 1878 and 1881 maps depict and designate the various buildings which housed the Emigration Refuge and Asylums of the Insane built on Wards Island between 1847 and 1880. These were all located to the project area's west and south. The closest structure (unidentified) to the project area depicted on Colton's 1878 map was located approximately 1,000 feet to its south. Viele's 1874 Topographical Map of New York City, although less detailed in its structural information, confirms that development on Wards Island was centered along its western portion during this period.

U.S. Coast and Geodetic Surveys of the area dating between 1857 and 1914 do not show any structures within the Island's northeastern portion. U.S. Coast and Geodetic Surveys of the East River dating between 1937a and 1969 illustrate the gradual filling in of Little Hell Gate, which was near completion by the latter date (see attached Figures). The 1937 Survey shows the first Water Pollution Control PLant on Wards Island, to the study area's south.

As the project area is located within what was Little Hell Gate Channel the potential for shipwrecks at this location was also considered. the Coastal Archaeological Site and Historic Shipping Inventory File, prepared by the Peabody Museum was therefore checked. Although the inventory lists the recording of several historic shipwrecks in Hell Gate, it does not include Little Hell Gate as the site of any shipwrecks (Mulholland 1985). Due to Hell Gate's navigational hazards large-scale operations were undertaken by the government between 1869 and 1885 to explode and remove the reefs which had caused many shipwrecks (Kelley 1909:136). There is no evidence that any such clearing took place within Little Hell Gate as well.
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ANALYSIS OF SOIL BORINGS AND TEST PITS

A series of 28 soil borings conducted in or near the footprints of the proposed dewatering facility during June 1989 as well as 21 mechanically assisted test pits excavated during September and October 1980 were examined as part of our analysis of the Wards Island Water Pollution Control Plant. The 28 soil borings were sampled every five feet using a two inch diameter split spoon two feet in length. All were drilled to bedrock. The test pits were excavated with a backhoe and ranged in depth from eight to over 20 feet. All 49 locations consistently show fill. The test pits contained a fill deposit described as "silty sands with brick, concrete, broken stone, boulders, rocks, cobbles and other hard durable construction debris". This other debris included steel and wood (Ruggiero 1980a:1). The descriptions of the fill within the 28 borings included sand, silt, gravel, brick, concrete, wood, steel, cinders, slag, paper, asphalt, and glass (Warren George Inc. 1989). The fill deposit ranged in thickness from 26 to 37 feet in the borings. The test pits evidently did not penetrate the bottom of this layer. Elevation at these locations ranged from 17.36 to 19.05 feet above the Manhattan datum, so the fill deposit extends to at least 7.38 feet below the datum. Below this layer, a layer of black organic silty clay was usually encountered (ibid.). All this information is consistent with our interpretation of the location of the proposed dewatering building being within the former Little Hell Gate Channel.

CONCLUSIONS

It is our conclusion that the construction of the proposed Dewatering Facility at the Wards Island Water Pollution Control Plant will not impact any prehistoric or historic cultural resources. This location was within the Little Hell Gate Channel until early in the twentieth century, as illustrated on various maps of the eighteenth and nineteenth centuries. All the evidence from the soil boring and test pits excavated confirms this interpretation. The only type of cultural resources that could potentially be impacted here is shipwrecks. However, the federal register of shipwrecks in the New York region includes none within Little Hell Gate, and this register attempted to include all references to wrecks up to 1985. No other references to wrecks within Little Hell Gate were found during our research. Since the Federal Register included

listings for several wrecks in Hell Gate dating to the eighteenth and nineteenth centuries, the absence of listings for Little Hell Gate implies that it is rather unlikely that this portion of the former Little Hell Gate could contain a wreck.

A comparison of the 1909 and 1937 U.S. Coast and Geodetic Survey Maps with the present conditions indicates that the entire proposed dewatering building, fuel oil storage tank, fire pump building, city water and potable water pipes will lie within the filled Little Hellgate channel. The primary sludge, return sludge and sanitary lines will run within this fill and a second area of fill along the east shore of Ward's Island. The electrical conduit, fire water, centrate and drain lines as well as a trench for temporary piping will begin adjacent to the existing aeration tanks and run into the filled Little Hellgate. Although it appears that these lines originate in an area that was originally fast land, this location adjacent to the existing tanks must have been disturbed to at least eleven feet below grade, which is the deepest impact for any of the services.

It is not expected that any potential cultural resources will be impacted if the proposed construction is built as planned.

PREHISTORIC EVIDENCE

Hunts Point is situated in the southeastern part of the Bronx on the East River just opposite Rikers Island. The proposed project area is to the immediate northwest of the tip of Hunt's Point.

The proposed location of the dewatering facility at the Hunts Point Water Pollution Control Plant in the Bronx does not include any known prehistoric sites. However, two prehistoric sites are known to exist within approximately 0.5 miles of this location. Both sites were reported by the early twentieth century historian, Reginald P. Bolton. The nearest site, known as Quinnahung is located 0.3 miles to the north northwest of the proposed expansion location. It is described as a midden with occupation (Bolton 1975:79-80). The next nearest site is known only as Hunts Point and is located 0.4 miles to the north northwest of the project area. It is described as a midden (Bolton 1934:137).

A study of the topography surrounding the Hunts Point W.P.C.P. indicates that this location is just southwest of the Bronx River, a fresh water source that drains into the East River. This situation would have provided a source of fresh water nearby as well as access to the marine resources of the East River. These conditions combined with the existence of two known sites on this point to the north indicate that the proposed location of the Hunts Point W.P.C.P. dewatering facility is potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC ANALYSIS

Hunts Point was called Quinnahung (a long place) by the Indians who sold it to Edward Jessup and John Richardson in 1663. This tract was subdivided into 12 farms known as West Farms. In 1666 it was split equally between Jessup and Richardson by a confirmatory patent of Governor Nicolls. Jessup's portion was inherited by his daughter and son-in-law, Thomas Hunt, who built a home called "The Grange" at the tip of the peninsula in 1668, where Hunts Point Avenue ends.

Richardson's portion of West Farms was inherited by his daughter and son-in-law, Gabriel Leggett, and included Leggett's Point, now the Oak Point Yards. The Leggett mansion was west of Hunts Point Avenue and south of Spofford Street. Three prominent families on the peninsula - the Leggetts, the Foxes and the Tiffanys - descended from this couple.

Thomas Hunt's home, "The Grange", was occupied a century later by the poet Joseph Rodman Drake (1795-1820). It was bought by the City in 1903. The City expanded and improved the site and opened it to the public in 1910 as Joseph Rodman Drake Park.

During most of the nineteenth century the area was characterized by large country estates and meadow land. In 1859 Benjamin Whitlock, a wealthy New York grocer, chose to build his 100 room mansion here. The large houses were abandoned towards the end of the century and demolished be-

tween 1900 and 1910. The southern end of the peninsula remained meadows and a resort area throughout this period. Development of the area began after the turn of the century, primarily as a residential district. Following the 1950s the neighborhood's ethnic character changed and it is now largely an industrial area.

The project area lies within an area between Barretto Point and Hunts Point that was filled in, in stages, between 1914 and 1969. The nineteenth century maps examined depict the area's original shoreline, which formed a small bay between the two points of land (Beers 1867, Walling 1860, Bromley and Robinson 1879). Bromley and Robinson's 1879 map shows that the general area between Barretto Point and Hunts Point was then still largely undeveloped, but depicts a network of proposed roads. Hunts Point is designated "Spofford's Point" here and five structures and landing dock are shown to the point's immediate west within a large property designated alternately "Spofford Estate" and "Hunts Point Farm" (Bromley and Robinson 1879). See attached copies from Walling's 1860 map and the 1874 U.S. Coast and Geodetic Survey for a depiction of the area's early shoreline.

U.S. Coast and Geodetic Surveys dating to 1908 and 1914 do not show any changes in the area's shoreline, and depict scattered structures to the project area's east and west (see attached Figure, U.S.C. & G. 1914). By 1937, however, filling operations in this area had commenced. The 1937 U.S. Coast and Geodetic Survey shows that the area within which the project area is located had been partially filled in, and that the structures shown on earlier maps on Hunts Point and noted above had apparently been demolished (see attached Figure). The 1941 U.S. Coast and Geodetic Survey does not show evidence of further filling in (see attached Figure). The 1950 Sanborn map shows the extent of a second phase of filling in, and the 1969 U.S. Coast and Geodetic Survey shows the completely filled in area as it appears today (see attached Figure). The study area appears to be located on the final, post-1950 fill area.
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ANALYSIS OF SOIL BORINGS

The data logs of a series of 28 soil borings conducted in the footprint of the proposed Hunts Point dewatering facility during June and July 1989 were examined for evidence of potential impacts of this facility to cultural resources. The location of these borings and those discussed later in this section are shown in the attached figure. All borings were sampled every five feet with a two inch sample split spoon for two feet and soil or rock classifications were provided by Warren George, Inc. (1989). The top one to four layers were classified as fill containing silt, sand, gravel, cobbles, rock, concrete, coal, wood, brick, glass, cinders, slag, asphalt, metal, and plastics. The depths were up to 30 feet below surface. The shallowest fill deposit was at least 5.78 feet below datum. The proposed impact depth of the dewatering building at Hunts Point is only 5.5 feet below datum (Hazen and Sawyer, P.C. 1989). Therefore there is no impact proposed below the fill layer. The Fuel Oil

Tank is also in a similar situation. The proposed impact depth is -5.5 feet and the shallowest fill deposit is -8.14 feet below datum. The proposed impacts for the Fire Pump House are limited to 4.0 feet below grade of approximately +2.5 feet. This impact is considerably above the depth of fill in all the borings (ibid.). A second series of 25 soil borings were completed during November 1989 with continuous sampling by split spoons. Borings HP-2 and HP-5 are adjacent to the sludge feed pipe, which will require five foot deep excavation. HP-2 shows at least eight feet of fill and HP-5 six feet, so no impacts are expected. The service water pipe also passes HP-5 and will require a smiliar five foot excavation. This pipe will also create no impact. HP-10 is near the building drain and the potable water pipes, both requiring five feet of excavations. HP-10 shows at least ten feet of fill so no impacts are expected. This is also the case for HP-11 which is adjacent to more of the building drain. The electrical conduit passes HP-8 which shows at least ten feet of fill. The conduit requires an excavation to eight feet so no impact is expected. Boring HP-1 is within the footprint of the prepared sludge storage tank which will require excavation to 24 feet below grade. Unfortunately this boring was only eight feet deep. HP-3, at the location of the effluent water pump, extended to 8.5 feet, but the excavation needed is to sixteen feet. Both borings are too shallow to analyze the thickness of the fill at these locations.

CONCLUSIONS

Based upon the analysis of the soil borings and proposed building plans there is no impact below the level of fill deposit for the Dewatering Building or the Fuel Oil Tank. The Fire Pump House, the sludge feed, centrate return, potable water supply, service water supply, building drains, and the electrical conduit will also create no potential impacts to cultural resources. Because there are known prehistoric sites within one-half mile of the proposed facility, the area is considered generally sensitive for prehistoric archaeological evidence. However it can now be demonstrated that the impacts from the W.P.C.P. are within modern fill deposits, with the exception of the proposed additional sludge storage tank and the effluent water pump. The borings completed at these two locations were both too shallow to allow for analysis of the thickness of the fill deposits. We recommend that additional continuously sampled borings be completed to 25 feet or more at these locations. This should provide evidence of the depth of fill here so the impact analysis can be completed.

PREHISTORIC EVIDENCE

The proposed location of the expansion to the 26th Ward Water Pollution Control Plant in Brooklyn does not include any known prehistoric sites. However, one prehistoric site is known to exist approximately 1 mile to the southwest of this location. This site, which is unnamed, was reported by former New York State Archaeologist Arthur C. Parker (Parker 1922:Plate 179).

A study of the topography surrounding the 26th Ward W.P.C.P. indicates that this location is between Hendrix Creek and Fresh Creek, two fresh water sources that drain into Jamaica Bay. This situation would have provided a source of fresh water nearby as well as access to the marine resources of the bay. These conditions combined with the existence of a known site on a similar drainage course to the southwest indicates that the proposed location of the 26th Ward W.P.C.P. expansion is potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC ANALYSIS

The 26th Ward of Brooklyn is situated on Jamaica Bay, in the eastern part of the borough, close to the Brooklyn - Queens boundary line. The project area lies immediately west of Hendrix Creek. Originally the land along Jamaica Bay was characterized by salt marsh, streams, and small islands (Gimigliano and Church 1980:21). It has developed into a commercial and residential area.

Ward 26 was originally a part of the Dutch town of Flatbush and was known as Oostwout (Armbruster 1912:56). In 1852 Oostwout was separated from Flatbush and acquired town status (ibid.:58). The newly created town of New Lots existed independently until 1886, when it was annexed to the city of Brooklyn (ibid.:56). As a part of Brooklyn, New Lots was organized as Ward 26 (ibid.:19). In 1898 Brooklyn became one of New York City's five boroughs (Landesman 1977:183).

Until the close of the nineteenth century New lots (Ward 26) had remained an agricultural region, but the administrative changes of the 1880s and 1890s were accompanied by socioeconomic developments (Gimigliano and church 1980:25). The changes of the late nineteenth century were, therefore, a major turning point in the area's history. The construction of roads an a bridge brought more residents to Ward 26 in the 1880s (Landesman 1977:167). More extensive development began after 1898, when many new people moved to the vicinity (ibid.:183). The maps help to illustrate the development of Ward 26 during the latter part of the nineteenth century.

Walling's 1860 map shows the project area as marsh (see attached Figure). Beers' 1873 map shows the project area, northwest of Spring Creek, as consisting of unopened streets leading south Toward the marshy lands flanking Jamaica Bay. The property of J. Cozine is shown immediately southeast of the project area, at the edge of the marshes. Beers' 1873 map depicts the area when it was still part of the town of New Lots,

before the changes of the 1880s and 1890s. The only change noted in the vicinity of the project area at this time was the widening of Schenck Avenue by twelve feet in 1874 (Heidenreich 1948:52).

Robinson's 1888 map shows the situation altered only a little. The streets are extended farther to the south into the marshy lands along Jamaica Bay. The project area lies on Smith Avenue and is bounded by Schenck Avenue to the east, Van Siclen to the west, Flatlands to the north, and Van Wicklen to the south.

Colton and Colton's 1890 map and Beers' 1897 map, both showing Brooklyn's wards, puts the project area in the same context, with streets running toward the marshes. The developments of the 1880s and 1890s, therefore, do not seem to have had much impact upon the project area and its vicinity. The development that came after 1898, when the population greatly increased, was probably much more significant. The landfill was, therefore, most likely a product of the development that was taking place early in the twentieth century. This is confirmed by comparison of the 1914 U.S. Coast and Geodetic Surveys which show that by 1940 a canal has been constructed through what was an undeveloped marsh (see attached Figures).

ANALYSIS OF SOIL BORINGS

The data logs of a series of 26 soil borings conducted in the footprint of three of the six structures of the proposed 26th Ward dewatering facility during July 1989 were examined for evidence of potential impacts of this facility to cultural resources. The locations of all borings is shown on the attached figure. All borings were sampled every five feet with a two inch sample split spoon for two feet and soil or rock classifications were provided by Warren George, Inc. (1989). This information was provided for the Dewatering Building, Sludge Storage Tank and Pumping Station. The top one or two strata were classified as fill made up of silt, sand, clay, gravel and wood. This deposit ranged from nine to eighteen feet below surface. The fill deposit in the dewatering building reaches a depth of 9.84 feet below datum. At its shallowest this fill is 1.07 feet above datum. The impact depth of this building is to elevation 5.0 (Hazen-Sawyer 1989). This elevation is assumed to be relative to datum. Since the proposed excavation depth of the dewatering building is above the depth of the fill deposit at its shallowest point there is not impact to cultural resources. A similar situation exists for the pumping building. The soil boring shows fill to a depth of 5.65 feet below datum and the proposed excavation depth is only 2.5 feet below datum. The fuel oil tank is located along the west side of the dewatering building where excavation will be to 18 feet below grade. The nearest two borings indicate fill to between 3.2 and 4.1 feet below grade, so an impact to potential cultural resources is expected here. Boring data is also provided for the sludge storage tank. This boring shows that the fill deposit extends to 2.38 feet below datum. Since the proposed excavation depth is to an elevation of minus sixteen there is a potential impact to cultural resources at this location.

A second series of borings were conducted at the 26th Ward plant during the early part of December 1989. A series of 48 logs were received by Greenhouse Consultants along with a map of their locations. Several of these borings were within the proposed locations of various planned facilities that will have subsurface impacts. Boring B-7 was within the location of the proposed Fire Pump House, which will require excavation to 4.5 feet below grade. B-7 shows a thin layer of black organic silt with roots between 3 and 4 feet below grade, so an impact is expected. Boring B-47 was completed within the footprint of the proposed new Electric Substation. B-47 shows 12 feet of fill (which was the full extent of the boring), but the Substation will require excavation to only five feet below grade so no impact is expected here. Borings B-36 and B-37 were completed within the location of the proposed Settling Tanks. B-36 shows fill to 10 feet below grade lying over coarse sand with some gravel. B-37 shows a similar situation except that the fill extends only to 8 feet below grade. The Settling Tanks will require an excavation to 12 feet so an impact is expected. Borings B-38 through B-40 were within the location of the proposed new Aeration Tanks. B-38 and B-39 were inconclusive in that the soils described were not obviously fill or organic marsh deposits. B-40 contained a thin layer of organic material between 11.5 and 12 feet below grade. The excavation for the Aeration Tanks will be 12 feet so an impact here is also expected.

The centrate return pipe passes borings B-9 and B-28. B-9 shows a seam of black silt at close to 5.3 feet below grade with organic deposits below. B-28 shows grey-brown sand with black silt at 5.7 to 6.0 feet below grade. The centrate return pipe will require an excavation five feet deep so no impact is expected. The building drain lines pass B-26, B-27 and B-28. B-26 shows a layer of black organic silt at 3.0 feet below grade and B-27 a similar layer at 5.6 feet below grade. The building drains will require excavation to 5.0 below grade, so an impact to potential cultural resources may occur near B-26. The service water and potable water lines will also pass near B-28. They require excavations five feet deep so no impacts are expected. The proposed sludge feed and return sludge lines pass B-31 which has fill to four feet below grade lying over sand. These two pipes require excavation to five feet so an impact is expected here. The electrical conduit passes borings B-5 and B-46. B-5 shows construction debris to four feet and layer of uniform grey coarse sand at 5.8 feet below grade. B-46 clearly contains fill to twelve feet below grade. The electrical conduit will need excavation to eight feet below grade so an impact is expected near B-5.

CONCLUSIONS

The historic evidence demonstrates that the area of the proposed 26th Ward dewatering facility is covered by fill which was deposited over marsh and fast land during the twentieth century. The boring data confirms this. The data for the borings done in the footprints of the proposed Dewatering Building and the Pumping Building show that these two

structures will not extend to a depth below the fill layer. However, the data on the Sludge Storage and Fuel Oil Tanks proves that these structures will extend to a depth below the fill deposit and thus be a potential impact to prehistoric cultural resources. Boring evidence provided for the Fire Pump House indicates that although its excavation depth will be only 4.5 feet below grade impacts to potential cultural resources are expected here since the fill is only 3 to 4 feet thick. The new Settling and Aeration Tanks will require excavations to 12 feet below grade where the boring evidence shows fill between 8 and 11.5 feet thick. The new electric conduit requires an excavation eight feet deep which could impact potential cultural resources near boring B-5. Parts of the sludge feed and return sludge lines near boring B-31 will probably penetrate the fill as will the building drain near boring B-26. Therefore all of these new facilities represent potential impacts to prehistoric cultural resources which may lie below these portions of the 26th Ward plant. We recommend that the excavations for the Sludge Storage Tank, the Fuel Oil Tank, the new Electric Conduit, the Aeration Tanks, the Settling Tank, parts of the building drains and sludge feed/return pipes, as well as the Fire Pump House be tested with a series of backhoe trenches. This will serve to determine whether prehistoric resources exist at these specific locations prior to the start of construction.

PREHISTORIC EVIDENCE

The proposed project area is located north of the Manhattan Bridge in the western part of Brooklyn at the Navy Yard. The proposed location of the dewatering facility at the Red Hook Water Pollution Control Plant in the former Brooklyn Navy Yard does not include any known prehistoric sites. However, one prehistoric site is known to exist approximately 0.4 miles to the southwest of this location. This unnamed site was reported by Gabriel Furman over a century ago (Furman 1865:34).

A study of the topography surrounding the Red Hook W.P.C.P. indicates that this location probably includes a former fresh water source that drained into Wallabout and the East River. This situation would have provided a source of fresh water as well as access to the marine resources of the bay and river. These conditions combined with the existence of a known site to the southwest indicates that the proposed location of the Red Hook W.P.C.P. dewatering facility is potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC ANALYSIS

The project area is located in the northwestern corner of the Brooklyn Navy Yard. It is bounded on the east by part of the Navy Yard and by Wallabout Bay, and on the west by Little Street. To the north lies the East River and to the south is a part of the Navy Yard.

The site of the present Navy Yard and project area was settled early. In 1637, one year after the first Dutch settlement in Brooklyn, Joris Jansen de Rapelie purchased 335 acres of land (West 1941:2). "Wallabout," the name of the bay in the immediate vicinity of the Navy Yard, was first settled by Walloons, who were French-speaking Belgians (Ostrander 1894: I:25). Joris Jansen de Rapalje, a Walloon, bought his land at Wallabout from a Jacob van Corlear (ibid.:31). According to Ostrander, there were hunting lodges and temporary trading houses in the vicinity (ibid.:25). There were also farms on which maize was grown (ibid.:58-59). By 1660 the Wallabout residents had constructed a block house on the "Kiekout" or "Lookout", which was the high point of land that overlooked the East River (ibid.:99). This "Lookout" was evidently not within the project area. The Navy Yard site, mainly mud flats and swamps, had two creeks which emptied into Wallabout Bay, one of them called Schenk's or Wallabout Creek (West 1941:1-2). Most of the land stayed in the Rapelie family until 1755 (ibid.:4).

The Remsen family also owned land in the vicinity during the late eighteenth century (West 1941:4; Anniversary Review Committee 1951:n.p.). Remsen's property was on the west side of the present Navy Yard and it included the project area (Anniversary Review Committee 1951:n.p.). There was a stream on Remsen's land which facilitated the construction of a mill. Remsen built a bridge across the millpond, spanning five hundred feet over the southwestern portion of the present Navy Yard (Anniversary Review Comm. 1951; West 1941:4). The maps illustrate well the character of the area at the time of Remsen's ownership. The William L. Clements

Library Map (1778) shows Remsen's Mill, the Mill Pond, the marshes, and the shoreline (see attached Figure). Johnson's 1776 Map indicates the same features, but with less detail. The southern part of the project area was on Remsen's property and was partially under the millpond. Some of it may have included the marshy area to the west of the pond, near the road leading to Remsen's Mill. The northern end of the project area was beyond the present shoreline.

In 1781 John Jackson and his two brothers purchased some land from Cornelius Remsen, who had originally bought it from the Rapelie family (West 1941:6). Eventually most of the Rapelie land was bought up by the Jacksons. The family built a shipyard for themselves on their property.

This part of Brooklyn is significant in Revolutionary War history. One of the Revolutionary War regiments was located Red Hook Point on the north shore of Gowanus Bay (Ostrander 1894 I:225). The area was well-fortified during the war and a chain of defense extended from Wallabout to Gowanus Bay (ibid.:223). Nine thousand patriots under General Greene and General Sullivan were there to contain the British.

The United States Government took an interest in Wallabout Bay at the turn of the nineteenth century. In 1801 the first purchase was made by the Government from the Jackson family for the establishment of a Navy Yard (West 1941:7). More land was sold to the Government in 1824 (by Sarah Schenk), and again in 1848 (ibid.:7-8). The Navy Yard required more space and in 1867 William Ruggles sold 1.44 acres of land which expanded the facility's northwest corner (ibid.:8). Part of Little Street was included in the purchase and, therefore, possibly a piece of the project area. In 1880 the Little Street Pier, two hundred feet long and thirty feet wide, was constructed with its lower part functioning as the foundation of a sewer which traversed the Navy Yard from Flushing Avenue to the East River (ibid.:67-68).

It is important to emphasize that practically all of the Navy Yard's surface is the result of landfilling (West 1941:105). The area, as noted above, was originally covered with swamps and mud flats (ibid.:105-06). The streets were at first paved with cobblestone, but eventually granite, asphalt, concrete, wood block, and brick were used (ibid.:106). The shoreline was extended by fill sometime in the first quarter of the nineteenth century. The change in the project area is illustrated through the 1776 and 1834 maps (Johnson 1776; Martin 1834). Martin's Map (1834) shows the shape of the shoreline as being more even than it was in 1776 (see attached Figure). The shore also extended farther into the East River in 1834 than in 1776. The millpond had been filled in by 1834 as well. Dripps' Map (1850) shows the same situation on the shoreline of the project area as in 1834. The Walling Map of 1860 shows this accumulation of fill as does the 1914 U.S. Coast and Geodetic Survey Map (see attached Figures). It would stand to reason that the shoreline was extended during the War of 1812 as a result of increased activity at the

Navy Yard. More than one hundred ships were prepared for sea and supplied at the Brooklyn Navy Yard during this period (West 1941:57).

On September 26, 1939 21 lots of land (1.48 acres) lying between the Navy Yard Wall and Little Street, appraised at $57,794 were bought from New York City by the Navy Yard (West 1941:8-9). The purchase included parts of United States Street and Evans Street. The newly-acquired land was in the northwest corner of the Navy Yard, possibly including part of the project area (ibid.:24). The Navy built a turret and erection shop on the land as soon as it was purchased (ibid.:22). It was necessary to remove some of the buildings present on the lot. The building at 22 Evans Street, the home of Commandant Lieutenant Jonathan Thorn (1806), was one of the structures that had to be torn down in 1939. It was also necessary to excavate some of the grounds near Evans Street to accommodate construction.
MA

ANALYSIS OF SOIL BORINGS

At the time that this analysis was undertaken, no recent soil borings were available for the locations of the proposed new facilities at the Red Hook Water Pollution Control Plant in the Brooklyn Navy Yard. However, it was possible to infer the location and date range of the landfilling in the vicinity of the proposed construction through an analysis of cartographic data. It was also possible to determine the areas within this fill that were disturbed or removed during the construction of the existing plant.

A comparison of the 1778 and 1834 maps of the project area vicinity (see attached Figures) indicate that the project area was part of Wallabout Bay during the Revolutionary War but was largely filled in by 1834. The extent of the landfill shown on Martin's 1834 map was transferred to a copy of Hazen and Sawyer's "General Intermediate Site Plan" dated October 1983 (see attached Figures). This plan shows the extent of excavations into this fill deposit and the services presently running though it, so only the pre-1834 fill that remained after the construction of the present plant was shown on the overlaid information. The location of this presumably undisturbed fill is shown in black on the plan.

CONCLUSIONS

It is our conclusion that the location of the proposed new facilities, the container loading building and the electrical conduit and piping, at the Red Hook Water Pollution Control Plant is no longer sensitive to the preservation of prehistoric or historic archaeological evidence. This location was once part of Wallabout Bay and probably consisted of tidal mud flats or marshes. Although a prehistoric settlement would be unlikely to be situated here, it is possible that this location was used for temporary or seasonal hunting and fishing activities. During the period between 1778 and 1834 the majority of the project area was filled in. The United States Government purchased all or part of the project area in 1867 and 1939. Sediments under the landfill could contain depo-

sits related to the prehistoric use of the project area. The landfill deposits could contain information relating to the filling of this location, presumably around the beginning of the nineteenth century, and the subsequent uses of the filled land culminating in its use or part of the Brooklyn Navy Yard. Individual objects in the fill may also be of importance. Two Civil War vintage cannons were recovered during the construction of the existing plant (Solecki 1980). Maps received from Stone and Webster Engineering Corporation show the planned facilities located to the north or east of the remaining undisturbed fill deposits shown on the attached figure. It now appears likely that no potential cultural resources will be impacted. All of the proposed new facilities will evidently be located outside of the pre-1834 fill deposits or within portions of that fill previously disturbed by the existing Water Pollution Control Plant.

PREHISTORIC EVIDENCE

Tallman Island is located in northern Queens on the East River shore opposite the Bronx. The proposed location of the expansion to the Tallman Island Water Pollution Control Plant in Queens does not include any known prehistoric sites. However, one prehistoric site is known to exist approximately 0.7 miles to the southwest of this location. This site, known as College Point, was reported by former New York State Archaeologist Arthur C. Parker (Parker 1922: 672).

A study of the topography surrounding the Tallman Island W.P.C.P. indicates that this location is probably just to the west of a former fresh water source that drained into Powell Cove. This situation would have provided a source of fresh water nearby as well as access to the marine resources of the cove and the East River. These conditions combined with the existence of a known site on a drainage course to the southwest indicates that the proposed location of the proposed Tallman Island W.P.C.P. expansion is potentially sensitive to the preservation of prehistoric archaeological evidence, unless it can be proven that the proposed expansion lies on an area of landfill.

HISTORIC ANALYSIS

During its early history the district within which Tallman Island is located was predominantly agricultural. In the seventeenth century this area was the northwestern section of William Lawrence's estate. His descendants sold part of the land here to Eliphalet Stratton, and the village that subsequently grew up was known as Strattonsport. The village was incorporated in 1880 and the name changed to College Point (Kelley 1909:275). College Point fronts Flushing Bay, East River, and Powell's Cove. In early colonial days it was part of Tew's Neck (later called Lawrence's Neck) (Federal Writers' Project 1939:570).

College Point, now a quiet residential area, was a busy industrial community in the second half of the nineteenth century. Flushing Bay and the East River provided quick and cheap transportation for industry and spurred development in College Point and Whitestone, to the project area's south and southwest. Around College Point's rubber works, ribbon mills, toilet goods plants, and brewery lived large numbers of Swiss and German immigrants.

Tallman Island and its immediate vicinity apparently remained sparsely developed during the nineteenth century. Dripps' 1852 map and Walling's 1860 map show one road leading north along Tallman Island's western shore to a structure and dock. On the 1860 map the structure is shown to be the property of a Mrs. Van Wyeck (see attached Figure). The house and dock depicted on these two maps are located to the project area's south southwest. Beers' 1886 map does not show any structures on Tallman Island, but may have omitted the depiction of structures outside the main communities. Wolverton's 1891 map shows that Tallman Island was then owned, for the most part, by an H. Funke and depicts new roads and a dock there. The dock was apparently located just east of the project area.

Bromley and Bromley's 1909 Atlas of the Borough of Queens depicts a complex of several frame structures and one brick structure on Tallman Island. The four larger structures are designated "Hotel," "Dining Hall", "Dancing Pavilion", and "Bowling Alley" (Bromley 1909). The atlas does not supply a name for this "resort" facility or its owner. These structures were all located to the project area's south and southwest. The 1914 U.S. Coast and Geodetic Survey indicates that this recreational and resort facility was no longer in operation by that year and its structures demolished (see attached Figure). The 1914 survey depicts two structures on Tallman Island, located to the project area's southeast.

The 1937 U.S. Coast and Geodetic Survey depicts a group of structures located southeast of the study area, at the end of a road leading south to Powells Cove Boulevard (see attached Figure). The 1937 also shows the ruins of a pier just east of the project area. A pier is shown at this location on U.S. Coast and Geodetic Surveys dating to 1897 and to 1914 (see attached Figure). This late nineteenth century pier was apparently demolished by the 1940s and the new, present day pier was built just east of the earlier pier line.

The 1941 U.S. Coast and Geodetic Survey shows evidence of filling in along the shores of Tallman Island. A comparison between the 1937 and 1941 surveys suggests that the project area is in fact located either partially or completely within this filled in area (see attached figures). The 1941 survey shows that all earlier structures on Tallman Island noted above had been demolished by that date, and depicts the early Water Pollution Control Plant, located to the project area's south southeast. The 1969 U.S. Coast and Geodetic Survey shows that the Water Pollution Control Plant has been expanded to the north where it now includes several tanks adjacent to the project area (see attached Figure). The cartographic evidence examined has shown that no structures were built within or in the immediate vicinity of the project area during or in the historic period. Evidence of a dock or pier constructed near the project area during the latter part of the nineteenth century, would require further investigation to determine its exact location and significance in relation to the study area.
AF

ANALYSIS OF SOIL BORINGS

The data logs of a series of five soil borings conducted in the footprint of the presumed Main Building of the Tallman Island dewatering facility during July 1989 were examined for evidence of potential impacts of this facility to cultural resources. The locations of all borings discussed here are shown on the attached figure. All boring were sampled every five feet with a two inch sample split spoon for two feet and soil or rock classifications were provided by Warren George, Inc. (1989). Only four of the five borings have a fill deposit as the top layer. Three of these have fill deposits shallower than the proposed depth of impact by

the Main Building. A second series of twelve borings was done during October 1989. These also show very similar conditions.

CONCLUSIONS

The proposed Tallman Island dewatering facility is in an area of potential prehistoric sensitivity. The excavation for the Dewatering Building would clearly impact these deposits. This is also the case for the other proposed construction including pipes for filtrate return, sludge feed, service water, potable water and building drains, as well as the electrical conduit. We recommend that a series of four to six backhoe trenches be excavated to determine whether the deposits that will be impacted contain prehistoric archaeological resources.

PREHISTORIC EVIDENCE

The proposed location of the dewatering facility at the Jamaica Water Pollution Control Plant in Queens does not include any known prehistoric sites. However, one prehistoric site is known to exist approximately 1.8 miles to the northeast of this location. This site, known as Baisley's Pond, was reported by former New York State Archaeologist Arthur C. Parker (Parker 1922: 672).

A study of the topography surrounding the Jamaica W.P.C.P. indicates that this location is probably just southeast of a former fresh water source that drained into Jamaica Bay. This situation would have provided a source of fresh water nearby as well as access to the marine resources of the bay. These conditions combined with the existence of a known site on a similar drainage course to the east indicate that the proposed location of the Jamaica W.P.C.P. dewatering facility is potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC ANALYSIS

The communities of Ozone Park, South Ozone Park, and Howard Beach, which surround the project area, were largely rural up until the twentieth century. Ozone Park saw some industrial development during the late nineteenth century, while South Ozone Park developed almost exclusively as a residential area. The project area formed part of an area along Jamaica Bay that, up until the latter part of the nineteenth century, was "dotted by a meager string of fishermen's huts along the northern shore" (Federal Writers Project 1939:587). During the second half of the nineteenth century Howard Beach, to the project area's west, was a popular fishing and boating colony. Houses with boat docks were built along the edges of Hawtree and Shellbank Basins and, as indicated by the late nineteenth century maps, along what had been Bergen Creek, to the project area's immediate west.

The 1845 U.S. Coast Survey of New York Harbor does not show any structures or roads in the project area's vicinity. Dripps' 1852 map depicts two roads near the project area. These roads are often designated Old South Road and Road to Bergen Landing on late nineteenth and early twentieth century cartographic sources. The Road to Bergen Landing ran north-south, ending at the landing that existed on the east side of Bergen Creek, to the study area's southwest. Old South Road ran east-west, joining the Road to Bergen Lading on its west side, approximately 850 feet north of the project area. The portion of the Road to Bergen Landing that extended north of that junction is often also designated Old South Road on the maps examined.

Dripps' 1852, Walling's 1859 and Walling's 1860 map all depict a structure between the east side of Bergen Creek and the end of the Road to Bergen Landing (see attached Figure; Walling 1860). The 1859 map shows one landing of each side of the creek: "Johnson's Landing" on the west and "Rumsen's Landing" on the east. Due to the inherent inaccuracies of these sources it is difficult to determine the project

area's exact location on these. However, it is likely that the structure noted above was located to the project area's south. Beers' 1886 map shows "Bergen Landing", but does not depict any structures in its vicinity.

Bromley and Bromley's 1909 map and Hyde's 1913 map show that many new roads had been laid out in this area by 1909, and that a small community had developed north of what is now 155th Avenue and east of the Road to Bergen Landing. Several frame structures are shown on these maps as located within the Water Pollution Control Plant's boundaries and in the project area's general vicinity. The 1926 Sanborn map shows that many of the structures comprising this community (Richmond Hill Circle) had been demolished by that date and a Sewage Treatment Plant constructed, bounded westerly by 131st Street. The 1926 map depicts the Road to Bergen Landing and the proposed route of present day 130th Street just west of it. This map also shows several unidentified structures lining the east side of the old road.

The study area is located on or in close proximity to a portion of where the Road to Bergen Landing once ran, and to buildings constructed along it between 1886 and 1909. As Beers' 1886 map is neither very accurate nor detailed in its structural information, one cannot exclude the possibility that depictions of structures in this area may have been omitted. It is therefore possible that structures depicted on the 1909 map were built by or prior to 1886. However, as this general area saw little development prior to the turn of this century, it may be safe to assume that the growth of the Richmond Hill Circle community represents a part of this larger pattern or context.

The 1940 U.S. Coast and Geodetic Survey shows this area as it appeared prior to the filling operations which later took place along Jamaica Bay's northern shore and to the construction of JFK Airport, to the project area's east vicinity, as well as a canal to its west which would appear to be the first section of what is now Bergen Basin (see attached Figure). The laying out of a new road system in this area and the construction of the adjacent Water Pollution Control Plant may have disturbed the project area considerably.
AF

ANALYSIS OF SOIL BORINGS

A series of twelve soil borings were completed during July 1989 within the footprint of the proposed dewatering facility at the Jamaica Bay Water Pollution Control Plant. The location of these borings as well as those discussed below are shown on the attached figure. These borings were sampled every five feet using a two inch diameter split spoon two feet in length. All twelve borings show a fill deposit consisting of one to four layers. This deposit includes wood, glass, cinders and concrete. It ranges in thickness from 13.5 to 20 feet. Below this deposit is a layer of black peat with some sand in five cases, and a layer of brown

silty sand in the other six borings. These deposits are typical of former marshes.

The proposed impacts at the Jamaica Bay Water Pollution Control Plant appear to be limited to the new dewatering building and a fuel oil storage tank immediately adjacent along the north side as well as a series of trenches for pipes and electrical conduits. Most of the new building will be built on piles with no basement so the impacts will be limited to approximately four feet below grade. The piles are not considered a significant impact. There will be a basement under one corner of the structure, evidently the southwest corner, with an impact to twelve feet below grade. Along the north side of the structure there will be a fuel oil storage tank requiring an impact 35 feet square to 15 feet below grade. The nearest boring to the proposed fuel oil tank is B-6. This log shows a fill deposit twenty feet thick, so this tank will not disturb any potential resources. Borings B-1 and B-4 are probably within the proposed basement location. B-1 shows fill deposits to twenty feet and B-4 a deposit to sixteen feet below grade. It appears that the basement of the proposed dewatering building will not impact any potential cultural resources (Warren George Inc. 1989:Sheet 7404). A second series of thirteen additional borings were completed during October 1989 by Warren George, Inc. within the footprint of the dewatering building as well as to the north and east. Several of these were adjacent to the proposed pipe and electrical conduit trenches. The various pipes (city water, centrate storm drains, sanitary sewers, effluent water, return sludge and primary sludge) will require excavation to five feet below grade and the electrical conduit to eight feet. These new borings were continuously sampled but ranged in depth from eight to fourteen feet. These depths should have been within the fill deposit(s) and with the exception of B-7 this appeared to be the case. B-7 which is adjacent to the centrate pipe and electrical conduit shows a layer of peat at six feet below grade. The five foot deep centrate pipe will not reach this layer, but the eight foot deep electrical conduit will create a potential impact here. Unfortunately B-7 was only 8.5 deep in total, so it is possible that this peat is redeposited above another layer of fill (Warren George, Inc. 1989 Boring Logs).

CONCLUSIONS

The location of the proposed new facilities at the Jamaica Bay Water Pollution Control Plant is considered sensitive to the preservation of potential cultural resources from both the prehistoric and historic periods. It is considered sensitive to prehistoric resources due to the existence of a known site within 1.8 miles and its situation just southeast of a fresh water source. This location is also within the former course of the Bergen Landing Road. Analysis of the soil borings and depth of impacts indicate that the fill deposits are thicker than the proposed impacts, so these potential resources will not be disturbed with the possible exception of the electrical conduit approximately 300 feet north of the proposed dewatering building. We recommend the one additional continuously sampled boring be completed here to a depth of

twenty feet. This will serve to determine if the peat layer at six feet is natural or redeposited.

PREHISTORIC EVIDENCE

Bowery Bay is located on the Rikers Island Channel on the northern shore of Queens to the west of La Guardia Airport. The proposed project area is located on the shore of a small inlet which feeds into Bowery Bay. There is a promontory on the east side of the inlet just opposite the proposed project area.

The proposed location of the dewatering facility at the Bowery Bay Water Pollution Control Plant in Queens does not include any known prehistoric sites. However, two prehistoric sites are known to exist within approximately 0.5 miles of this location. These sites were reported by former New York State Archaeologist Arthur C. Parker (Parker 1922:672). The nearest site, located approximately 0.3 miles to the southeast, is known as Poor Bowery and described as a midden. The second nearest site is located approximately 0.4 miles to the northwest. It is named Bowery Road after a thoroughfare that no longer exists and is described as a burial site.

A study of the topography surrounding the Bowery Bay W.P.C.P. indicates that this location lies between two former fresh water sources that drained into the East River. This situation would have provided a source of fresh water nearby as well as access to the marine resources of the river. These conditions combined with the existence of known sites on both drainage courses indicate that the proposed location of the Bowery Bay W.P.C.P. dewatering facility is potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC ANALYSIS

The project area is located within the community known as Astoria-Steinway. Astoria and Long Island City are in the western part of Long Island and was settled by both English and Dutch immigrants. This section of Long Island, in Queens County, was know originally as Newtown. Much of this area was included in a 1652 patent granted to William Hallett, who had arrived in Queens from England via Greenwich, Connecticut. The 160 acre property was situated "on Hellegat upon Long Island" (Skal 1908). The village of Astoria, named after John Jacob Astor, was incorporated in 1839. In 1870, Astoria, Hunter's Point, Steinway and Dutch Kills were consolidated with Long Island City.

Industry had been established in the district since its settlement. From the earliest enterprise, the lime-yard established by William Hallett, industrial and transportation growth complemented each other, leading to the area's development as a key manufacturing center. A concentration of industries moved into the area around the cove at Hunter's Point. During the latter part of the nineteenth century and the beginning of the twentieth century a variety of manufacturing firms were established in Steinway.

The cartographic sources examined show that the project area is located within an area that was filled in during the first half of this century.

Walling's 1860 map depicts the early shoreline, indicating that Bowery Bay and many areas along the coast to the project area's east and west were later filled in (see attached Figure). Beer's 1886 map shows several businesses lining the mouth of Steinway Creek, to the study area's southwest. According to the map's Business Directory these businesses were: Oakes Manufacturing Co., manufacturers of dry wood extracts; the warerooms of Steinway & Sons, manufacturers of pianos; George H. Smith, contractor and dealer in coal and wood (Beers 1886).

Steinway, the vicinity of Steinway Street, was named for William Steinway, Manhattan piano manufacturer who in the early 1870s established a branch factory here on a 400 acre site along the Bowery Bay. He was motivated by the desire to remove large numbers of his employees form the influence of labor organizers and to provide additional production facilities (Federal Writers Project 1939:566). William Steinway's dark gray granite mansion, built around 1875, stands on 41st Street between Berrian Boulevard and 19th Avenue, approximately 0.1 miles to the projects area's southwest. The house, acquired by William Steinway during the early 1870s, was designated a landmark on February 15, 1967 (Diamonstein 1988:86). Nearby, on the south side of 20th Avenue east of Steinway Street is the row housing built for the original Steinway "company town". The 1900 Queens Topographical Bureau map and the Bromley and Bromley 1909 atlas also show the Steinway complex and other businesses to the project area's southwest. As does the Beers 1886 map, these early twentieth century cartographic sources depict the early shoreline as running roughly along Berrian Avenue (now Boulevard), to the project area's south. On Bromley's 1909 depiction of the area the high water line is shown as lying, for the most part, south of Berrian Boulevard. This map also shows Steinway Creek (formerly known as Berrian's Creek) in its present day channelized form.

U.S. Coast and Geodetic Surveys dating to 1874 and 1914 both show the area's original shoreline (see attached Figure; U.S.C. & G.S. 1914). Filling operations in this area began sometime between 1914 and 1937. The 1937 U.S. Coast and Geodetic Survey shows partial filling in north of Berrian Boulevard completed by that year (see attached Figure). This map also illustrates the results of major filling operations in this general area, including that which took place around what had been Berrian Island, to the project area's west. U.S. Coast and Geodetic Surveys dating to 1941 and 1969 show some structures north of Berrian Boulevard which presumably formed part of the Water Pollution Control Plant located there (see attached Figures). The 1969 survey shows that filling operations in the project area's immediate vicinity had been completed by that date (see attached Figure).
AF

ANALYSIS OF SOIL BORINGS

The data logs of a series of 12 soil borings conducted in the footprint of the proposed Bowery Bay dewatering facility during July 1989 were examined for evidence of potential impacts of this facility to cultural

resources. The locations of these borings as well as those discussed below are shown on the attached figure. All borings were sampled every five feet with a two inch sample split spoon for two feet and soil or rock classifications were provided by Warren George, Inc. (1989). The top strata was classified as a fill deposit which included silt, sand, gravel, cobbles, brick,wood, cinders, and slag. The depth of this fill deposit ranged from 14 to 23 feet below the surface. Impact depths provided verbally were assumed to be measured from the surface. Other impacts were taken from plan drawings. Impacts from the proposed dewatering building will be to a depth of 4.5 feet below surface and will therefore not reach a depth below the fill deposit. A small basement will be constructed on the north side of the dewatering building requiring an excavation to -5.0 feet. This will be connected to existing facilities through a tunnel requiring excavation to 0 feet. These two planned impacts are very close to borings B-1 and B-2. Boring B-1 shows fill to -6.55 feet and B-2 to -8.77 feet. Since the deepest impact planned near these locations is only to -5.0 feet there is no danger of penetrating the fill deposit. The proposed new potable water supply runs adjacent to this tunnel and requires a five foot excavation, so no impacts associated with this water pipe are expected. A second series of eleven borings and five monitoring wells located adjacent to the proposed dewatering facility as well as to the north and west were completed by Warren George, Inc. during November 1989. These borings were sampled continuously with three inch outside diameter split spoons, and ranged from four to eighteen feet in depth. The deepest of these is B-3 which is within fifty feet of B-6 and B-9 from the July 1989 borings, which show 23 and 19 feet of fill respectively. The new B-3 shows various layers of silty sandy and gravelly sand down to clayey silt with organics and shells just over seventeen feet below surface. This probably represents the surface of the bay sediments. All others were not deep enough to penetrate the fill layers. The deepest impact to the north of the dewatering building will be the two proposed fuel oil tanks. These are about 150 feet further into what was the bay than borings B-1 to B-3 from July 1989. These show nineteen to 21.5 feet of fill, so the fuel oil tanks should not create an impact below the fill. The other proposed construction excavations are for the Rikers Sewer at twelve feet deep and the sump discharge at five feet. The former passes B-2 and B-3 (November 1989) which show greater than twelve feet of fill. The sump discharge passes BW-2 which also shows at least twelve feet of fill, so both pipe trenches will not create impacts.

CONCLUSIONS

Both the historic evidence and boring log data indicate that the proposed Bowery Bay dewatering facility will rise above a fill deposit. None of the proposed impacts will reach to depths below the fill deposit. If they do there is potential impact to prehistoric cultural resources. However data on the depths and locations of the impacts made available on the most recent plans and through personal communications with engineers at Stone and Webster now indicate that the bottom of the fill deposit

will not be penetrated and no potential cultural resources will be affected.

PREHISTORIC EVIDENCE

The proposed project area is located to the immediate north of Great Kills Park on the eastern coast of Staten Island. The proposed location of the expansion to the Oakwood Beach Water Pollution Control Plant in Staten Island does not include any known prehistoric sites. However, one prehistoric site is known to exist approximately 75 yards to the southwest of this location. This site, known as Great Kills or Oakwood, was reported by the early twentieth century archaeologist, Alanson Skinner (Skinner 1909:17). A study of the topography surrounding the Oakwood Beach W.P.C.P. indicates that this location is probably just to the northeast of a former fresh water source consisting of a pond and marsh that drained into Raritan Bay. This situation would have provided a source of fresh water nearby as well as access to the marine resources of the bay. These conditions combined with the existence of a known site on this pond indicates that the proposed location of the proposed Oakwood Beach W.P.C.P. expansion is potentially sensitive to the preservation of prehistoric archaeological evidence.

HISTORIC ANALYSIS

In 1626 Staten Island was purchased from the natives by the Director of the Dutch West India Company (Roberts, Adams, and Farkas 1938:5). David Peters de Vries established the first permanent settlement of Europeans on the island in 1638. The English took over Staten Island in 1664 from the Dutch. Land surveys, initiated under Governor Lovelace, were completed under Andros in 1677. Governor Thomas Dongan divided the colony of New York into counties with Staten Island as Richmond County.

Taylor and Skinner's map of 1781 depicts the vicinity of Great Kills as uninhabited and rather swampy. The Anglo-Hessois (1780-1783) map shows some sparse settlement in the area (see attached Figure). The family name of Cortelyou, which was important in New York's colonial history, appears northwest of Bass Creek among other family names. Structures are shown on the Cortelyou's property.

The 1845 U.S. Coast Survey Charter of New York Harbor (see attached Figure) shows the project area to be part of an undeveloped marsh. Bass Creek and Mill Creek appear on Smith's 1847 map south of the proposed project area. The map indicates two structures on Mill Creek. Walling's 1859 map shows a grist mill to the south of the proposed project area with a road leading north from the mill. Along this road are structures associated with family names. To the east of Bass Creek, near the shore, are two buildings called "fish houses" (Walling 1859).

On Beers' map of 1887 a mill appears to the north of Great Kill. John J. Crooke, the primary landowner in the vicinity, owned property on both sides of Great Kill. North of Crooke's property on the east side of Great Kill is a path leading to his buildings. The path traverses an open area near Bass Creek just to the south of the proposed project area. Crooke's farm appears also on Vermeule and Bien's map of 1890 (see

attached Figure). The Mill Pond appears to the north. This was likely a man-made pond constructed during the late eighteenth century.

Hyde's map of 1906 shows the property of an F. Wermerskirch south of the proposed project area. To the northwest of Wermerskirch is the property of J. Tysen, and south of Tysen is an area with streets laid out. Farther south, on the west side of Great Kills, is some land belonging to a J.C. Crooke. To the northwest of the proposed project area is Oakwood, another section with laid out streets. Fresh meadow and swamp appear on the proposed project area.

The 1910 Topographical Map shows that the project area was within marshland at this time (Borough of Richmond 1910). Drainage ditches are present in the entire vicinity, including the project area. To the immediate east of the project area is an unnamed creek that had been artificially straightened. There is still no evidence of any landfill in or near the project area.

The 1937 U.S. Coast and Geodetic Survey Map shows the same situation (USCGS 1937a). The project area is swampy and there is no evidence of landfill.

The changes begin to show up on the 1944 U.S. Coast and Geodetic Survey Map. According to this map, the filling of the marsh in the project area was in progress. It may be said Positively that the area was filled in for the first time in the early to middle 1940s.
MA

ANALYSIS OF LANDFILL

Information regarding the thickness and nature of the landfill at the Oakwood Beach Water Pollution Control Plant was derived from both the available soil boring logs as well as a comparison of twentieth century topographic data. The 1910 Topographic Map shows that the future site of the Oakwood Plant was a salt meadow with elevations ranging from -0.3 to 1.0 feet relative to the Borough of Richmond datum. The as built plans for the present W.P.C.P. show the location of the proposed facilities on a slope ranging from approximately 8.5 to 17.0 feet above the Borough of Richmond datum. This information indicates that a deposit of landfill of approximately 8 to 16.5 feet in thickness has been added at this location.

A series of 14 soil borings were completed during July and August 1989 (Warren George, Inc. 1989). The locations of these borings as well as those discussed below are shown on the attached figure. These were sampled every five feet using a two inch diameter split spoon two feet in length. Twelve of these borings were within the footprint of the proposed dewatering building, one to the west of this location and the remaining boring to the east under the location of the proposed sludge storage tank. Boring B-13 at the proposed sludge storage tank shows three layers of fill which includes cinders, slag, brick fragment and

glass to 13 feet below grade. The depth of the proposed impact for this tank is nine feet so it appears likely that the excavation here will not penetrate the existing fill. The proposed dewatering facility will have impacts of four to twelve feet below grade as well as a fuel storage tank with a fifteen foot impact immediately adjacent along its eastern side. These impacts will be to -1.0 foot for the fuel oil tank, to -0.5 feet for the basement of the dewatering building which is only under the south corner of this structure and to 10.0 feet for the remainder of the dewatering building, with all depths relative to the Richmond datum. It appears likely from the 1910 Topographic Map that both the fuel oil tank and the dewatering building basement will penetrate the former land surface by 1.0 to 1.5 feet. The boring logs for these locations are inconclusive. For example boring B-12 at the south end of the proposed basement shows three layers of probable fill. The third layer contains glass and brick fragments and extends to 19 feet below grade. This would be deep enough to eliminate the possibility of any impact. Boring B-9 at the opposite end of the basement also shows three layers which may be fill, but the descriptions include no obviously cultural items. This indicates that these second and third layers could be natural. If they are fill deposits then they could extend to 28.5 feet below grade, but only the top 8.5 feet can be confirmed as fill. Since the boring evidence from the first series was not conclusive, the logs from a second series of borings were also analyzed. Three of this second series (B-12, B-13 and B-16) conducted during November 1989 were adjacent to the proposed locations of the fuel oil tank and basement. B-12 shows fill deposits 14 feet thick (including brick at 10 to 11 feet). B-13 shows fill 15 feet thick and glass within the bottom foot, and B-16 shows 14.5 feet of fill with bricks at 14 feet. The proposed basement is located between B-13 and B-16 and will extend to 12 feet below grade. The fuel oil tank will be located about 10 feet east of B-13 and will extend to 15 feet below grade. The basement will not impact the old surface under the fill and the fuel oil tank will extend only to the interface between the fill and the underlying surface.

Three more of the November 1989 borings (B-6, B-7, and B-8) are adjacent to the group of proposed pipes that will service the new dewatering building. The pipes consist of the filtrate return, the sludge feed, the service water, the potable water and the building drains. All will require excavation to five feet below grade. Boring B-6 shows approximately fourteen feet of fill, B-7 has a fill deposit 11.5 feet thick, and B-8 a deposit at least fifteen feet deep. The service water pipe is somewaht longer than the others and runs past borings B-11 and B-12. B-12, discussed above, has fourteen feet of fill. B-11 includes at least ten feet of fill. All these borings include fill deeper than the proposed excavations for the pipes, so no impacts to any potential cultural resurces are expected. The proposed construction also includes an electrical conduit which will be over 1200 feet long and require excavation to eight feet below grade. This conduit passes the November 1989 borings B-7, B-8, B-11 and B-12 which are discussed above and include fill depsoits thicker than eight feet. The remainder of the

electrical conduit passes borings B-1 through B-5 and monitoring well OB-2. The fill in B-1 is only three feet thick, that in B-2 five feet, in B-3 9.5 feet, in B-4 7.7 feet, and in B-5 7.5 feet thick. Monitoring well OB-2 also shows fill three feet thick. In all six locations the fill lies above a layer including black organic material which is described as Meadow Mat/Peat (Warren George, Inc. 1989). The sections of the electrical conduit from its terminus at the substation along the 200 foot segment running to the northwest, from the corner it turns along the next 125 feet of the segment running southwest, as well as the 125 feet of this segment adjacent to the existing sludge building ending where it turns to the northwest again will all penetrate the fill deposits. These three linear segments of the electrical conduit will impact potential cultural resources.

CONCLUSIONS

The location of the proposed dewatering building, sludge storage tank, fuel oil tanks and associated pipe and conduit trenches at the Oakwood Beach Water Pollution Plant must be considered potentially sensitive to the preservation of prehistoric archaeological evidence. It is within 75 yards of a reported prehistoric site and relatively close to both fresh water and marine resources. There is no reason to suspect that this location could preserve historic evidence. It is clearly a former salt meadow and remained in that condition until the 1930s. Analysis of the thickness of the landfill and the locations of the planned impacts indicate that potential prehistoric resources could not be disturbed or destroyed by the basement and fuel oil tank at the dewatering facility. The remainder of this facility will be on piles with only shallow excavation. This is not considered a serious impact. No potential cultural resources are likely to be impacted by this proposed construction of the various service pipes. The electrical conduit will impact the old marsh surface below the fill in three places. We recommend that backhoe trenches be excavated in these three locations to determine if this old marsh surface contains cultural resources.

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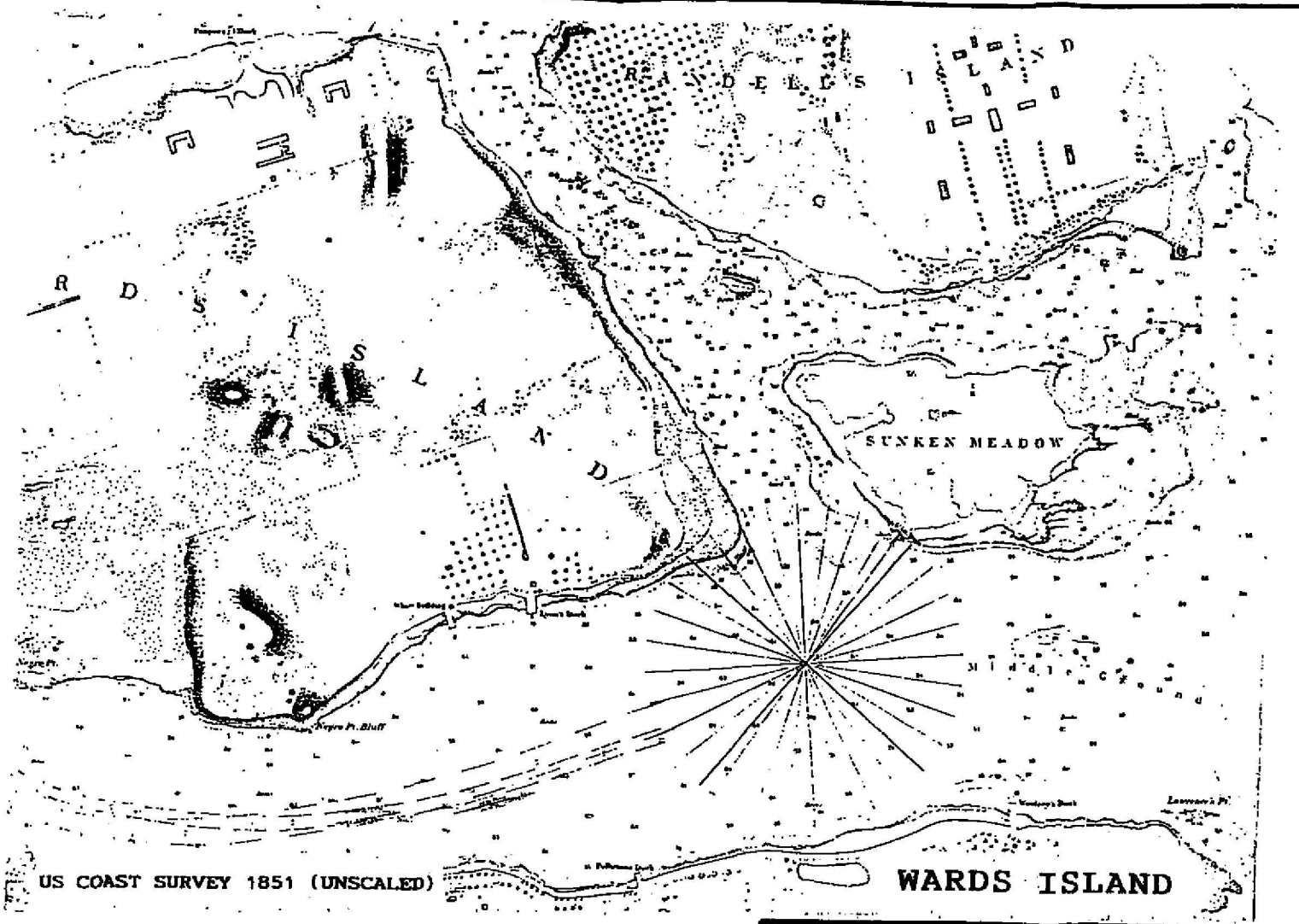

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Wards Island - Archaeological Resources U.S. Coast Survey 1851
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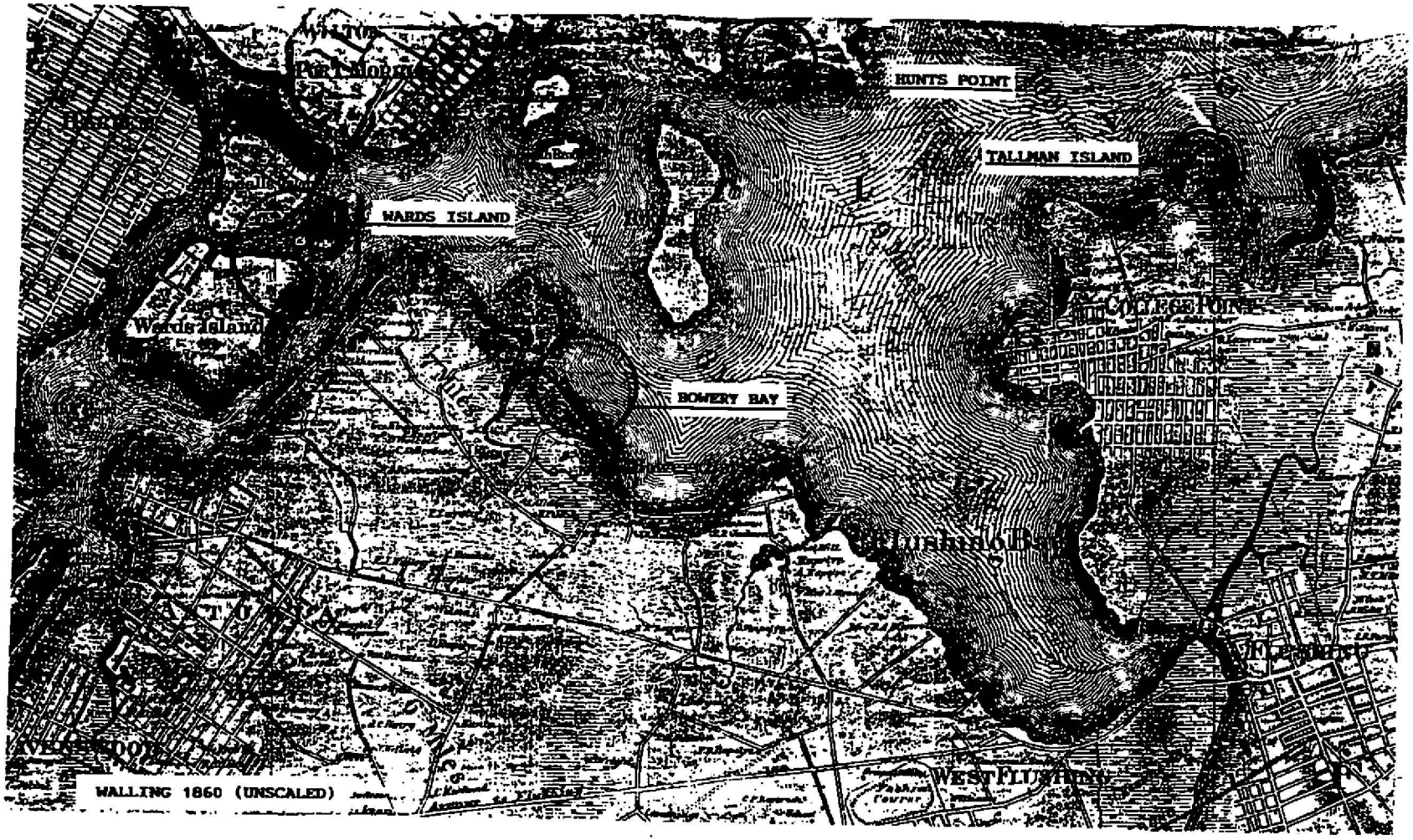

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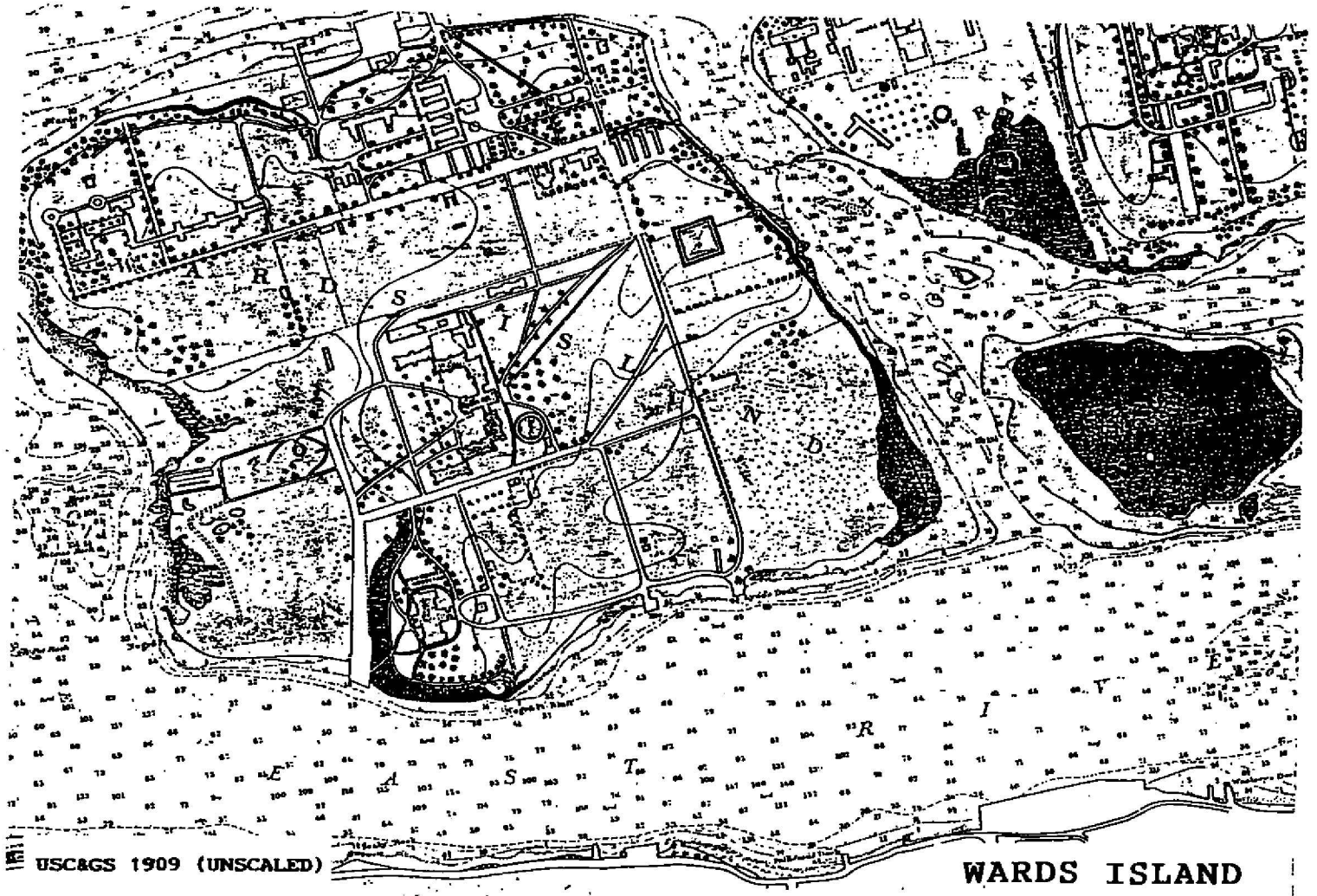

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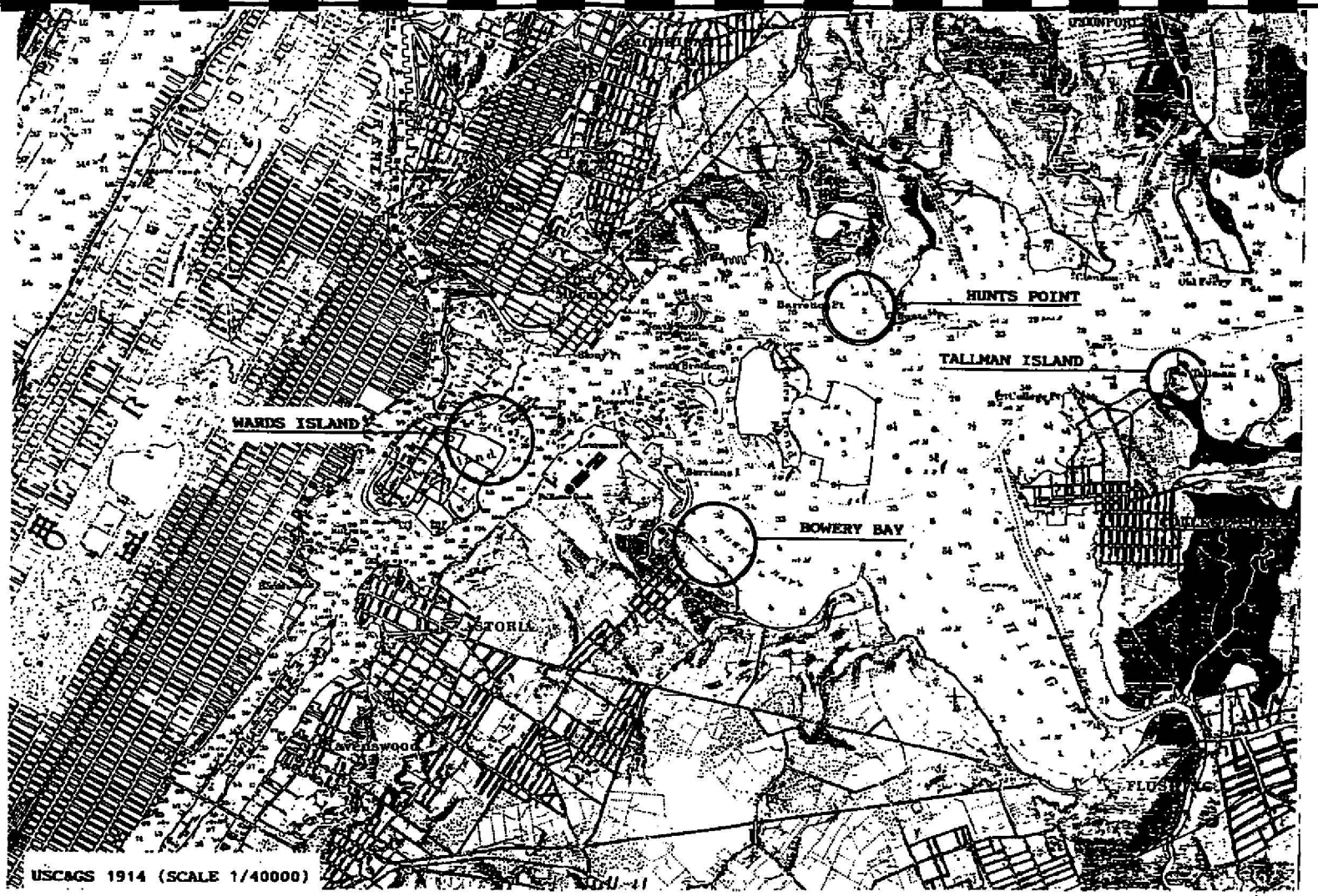

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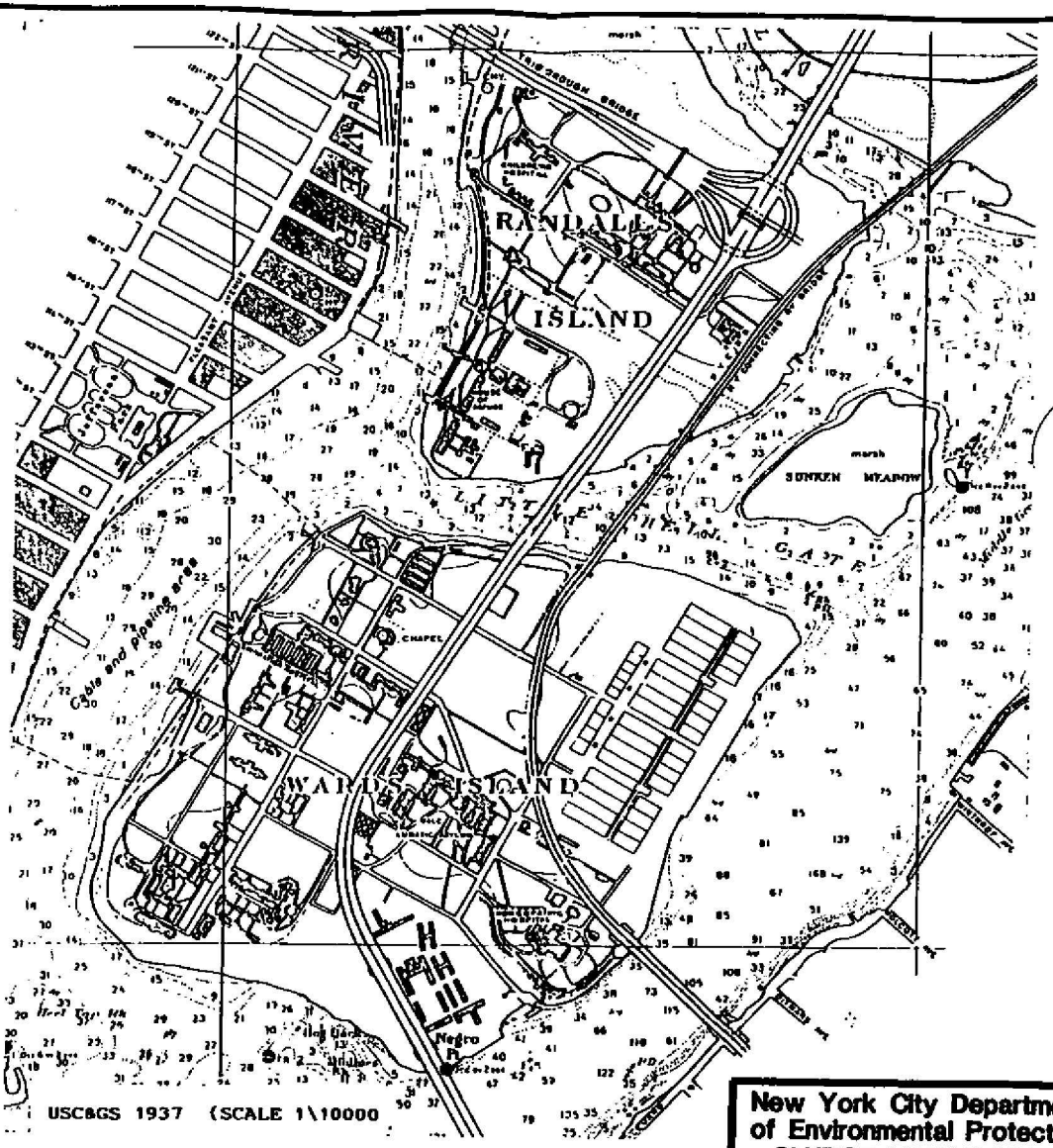

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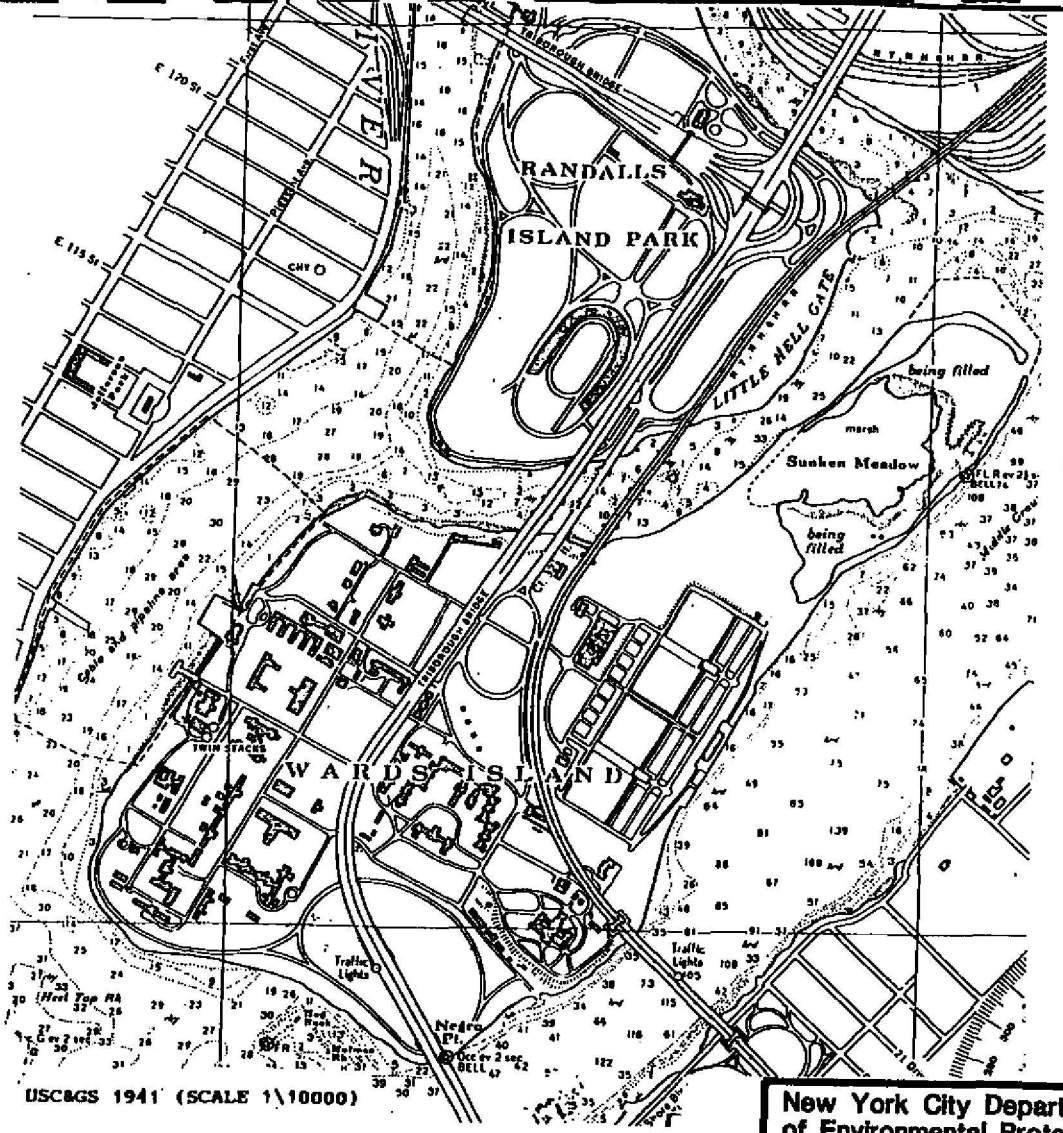

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Wards Island - USC & GS 1941
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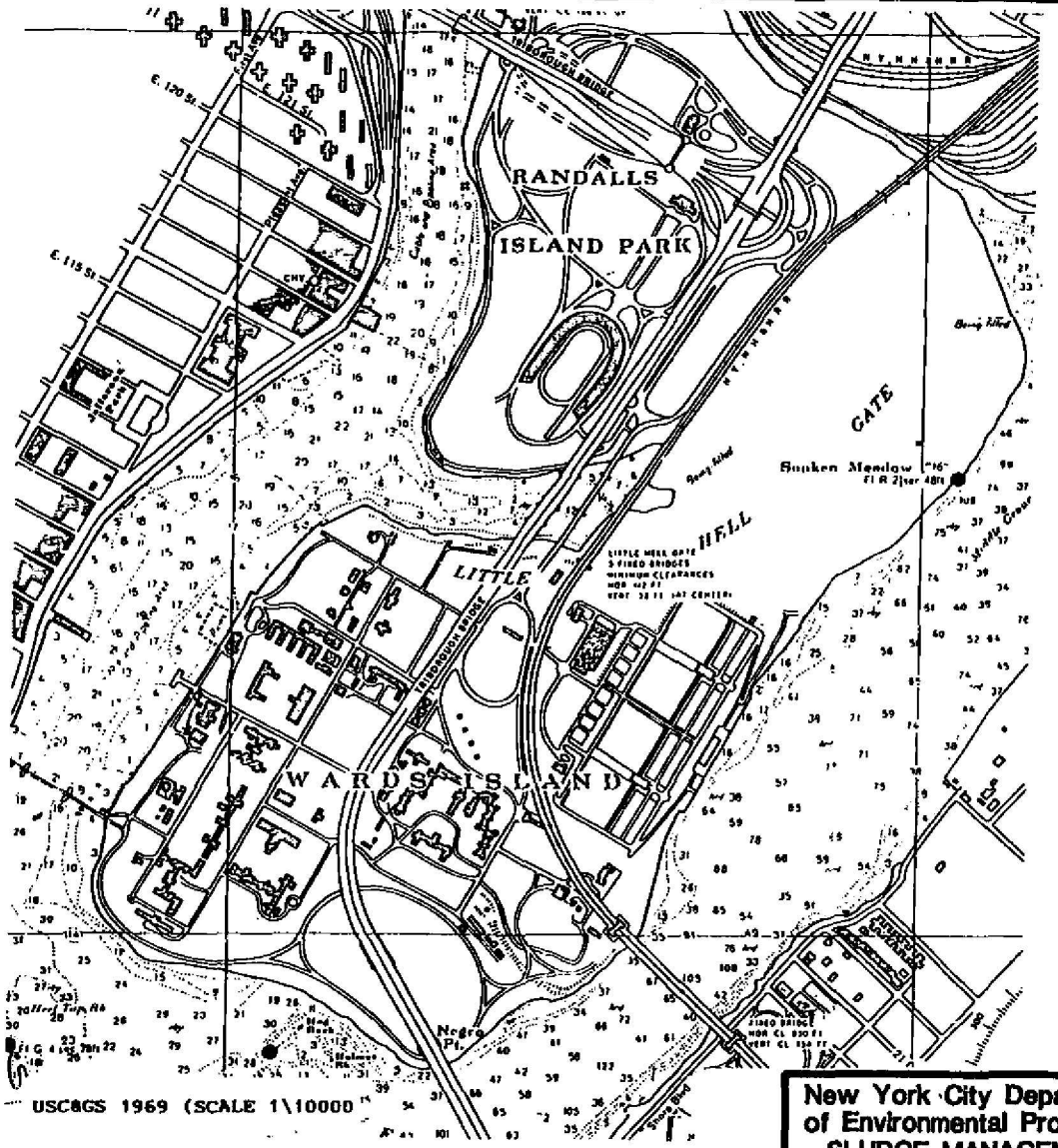

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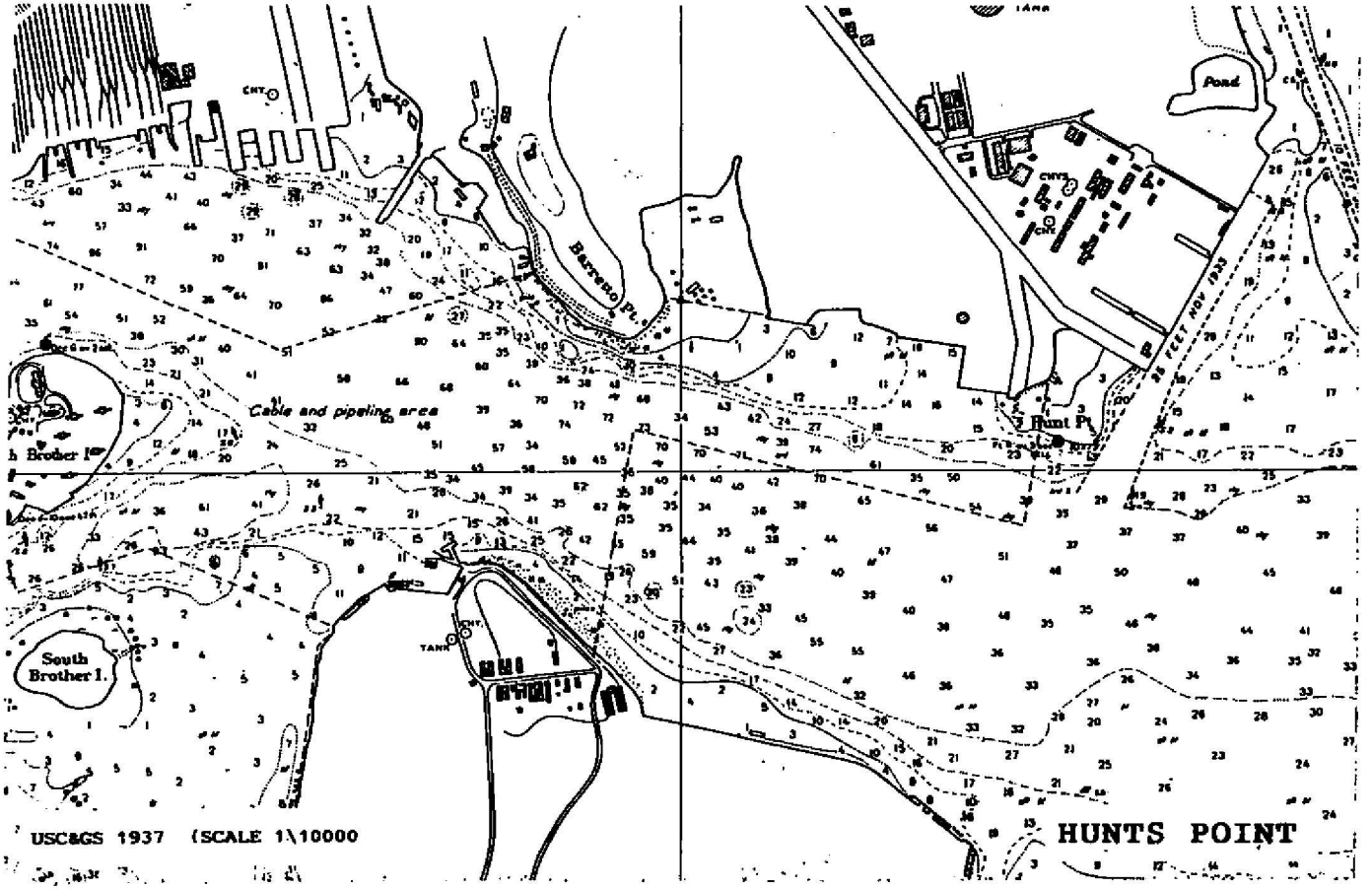

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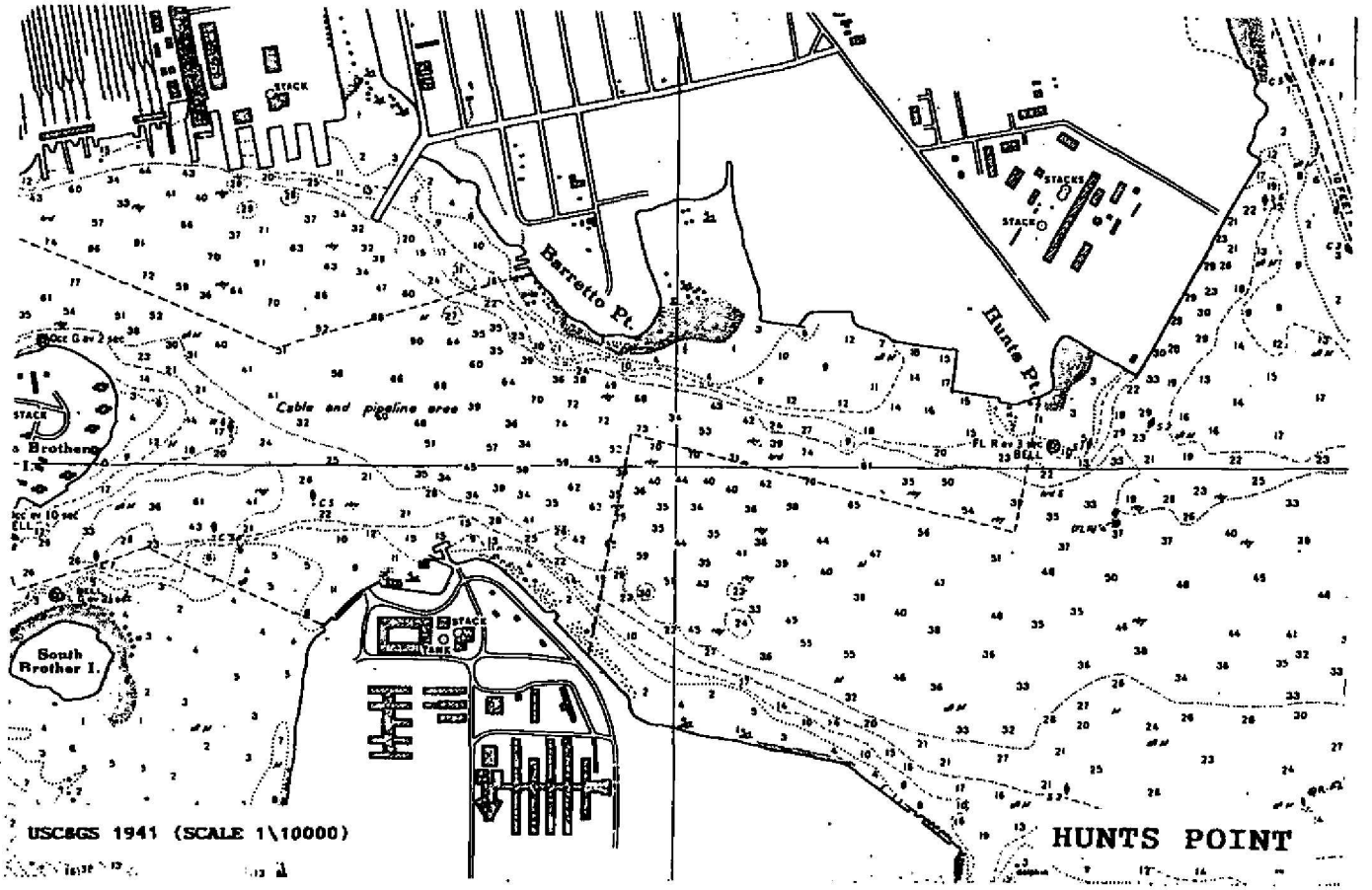

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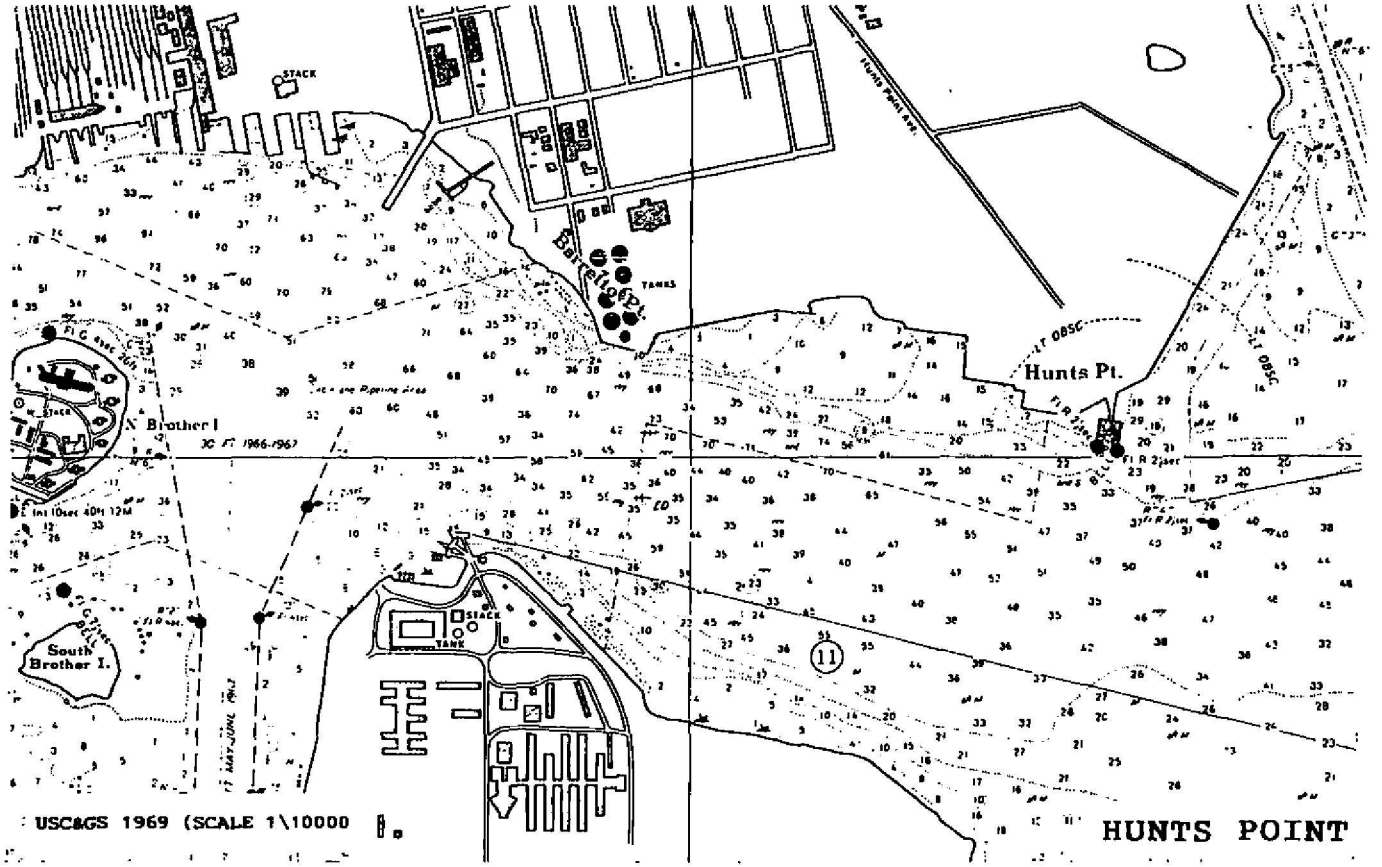

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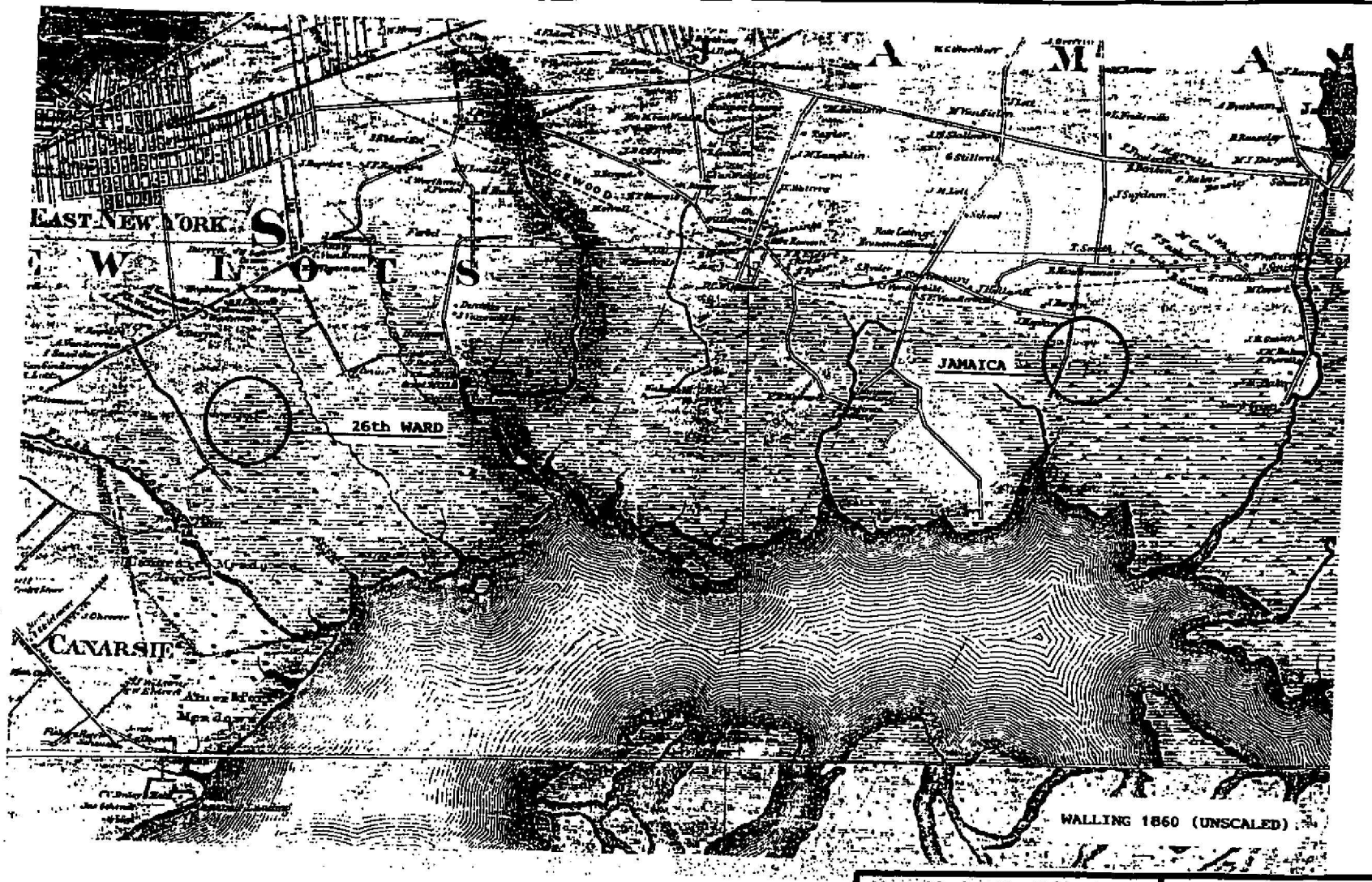

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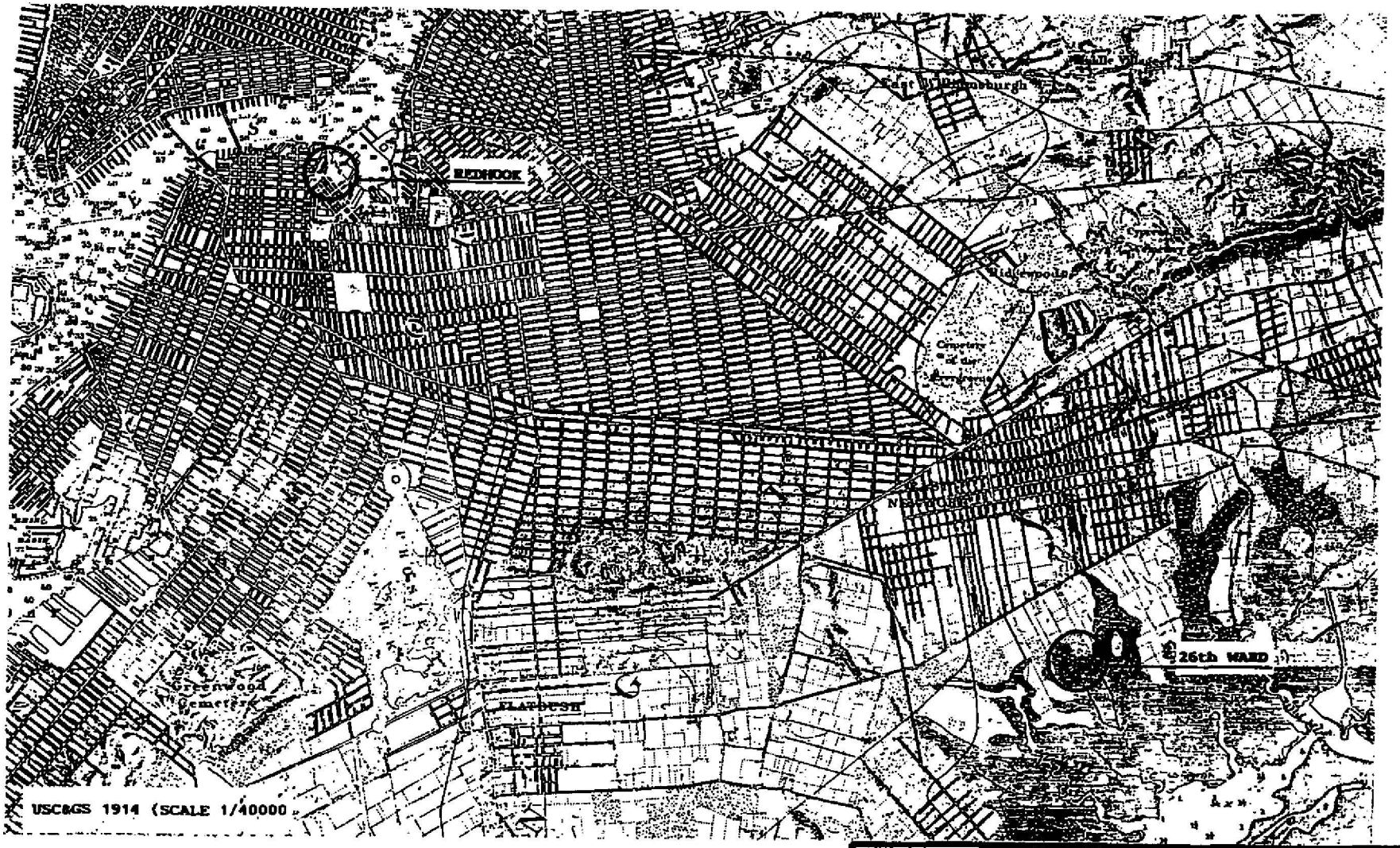

New York City Department of Environmental Protection
SLUDGE MANAGEMENT PLAN
Generic Environmental Impact Statement

USC & GS 1914

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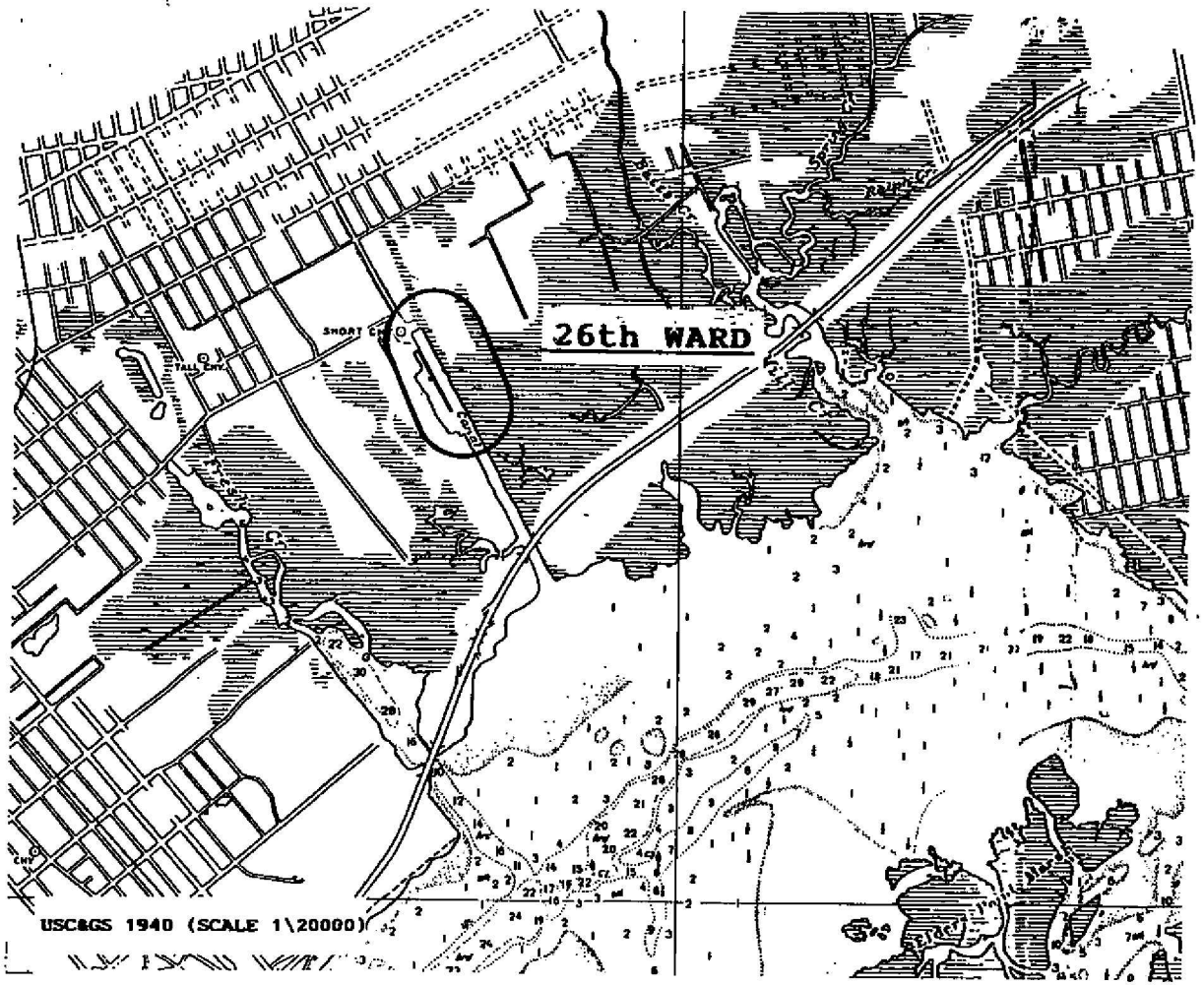

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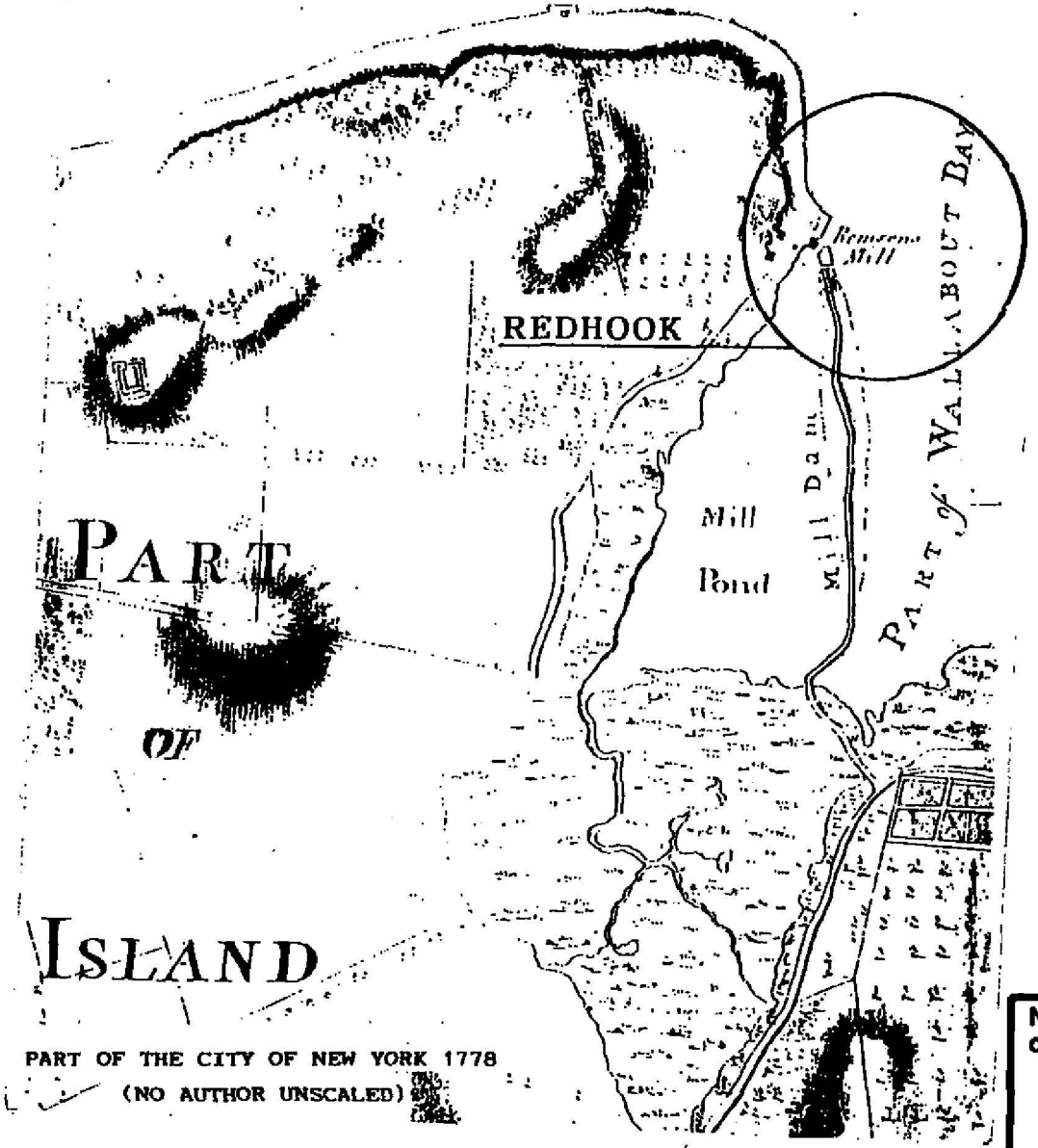

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Red Hook - Part of the City of New York 1778 Figure # 2.3.4.8-1

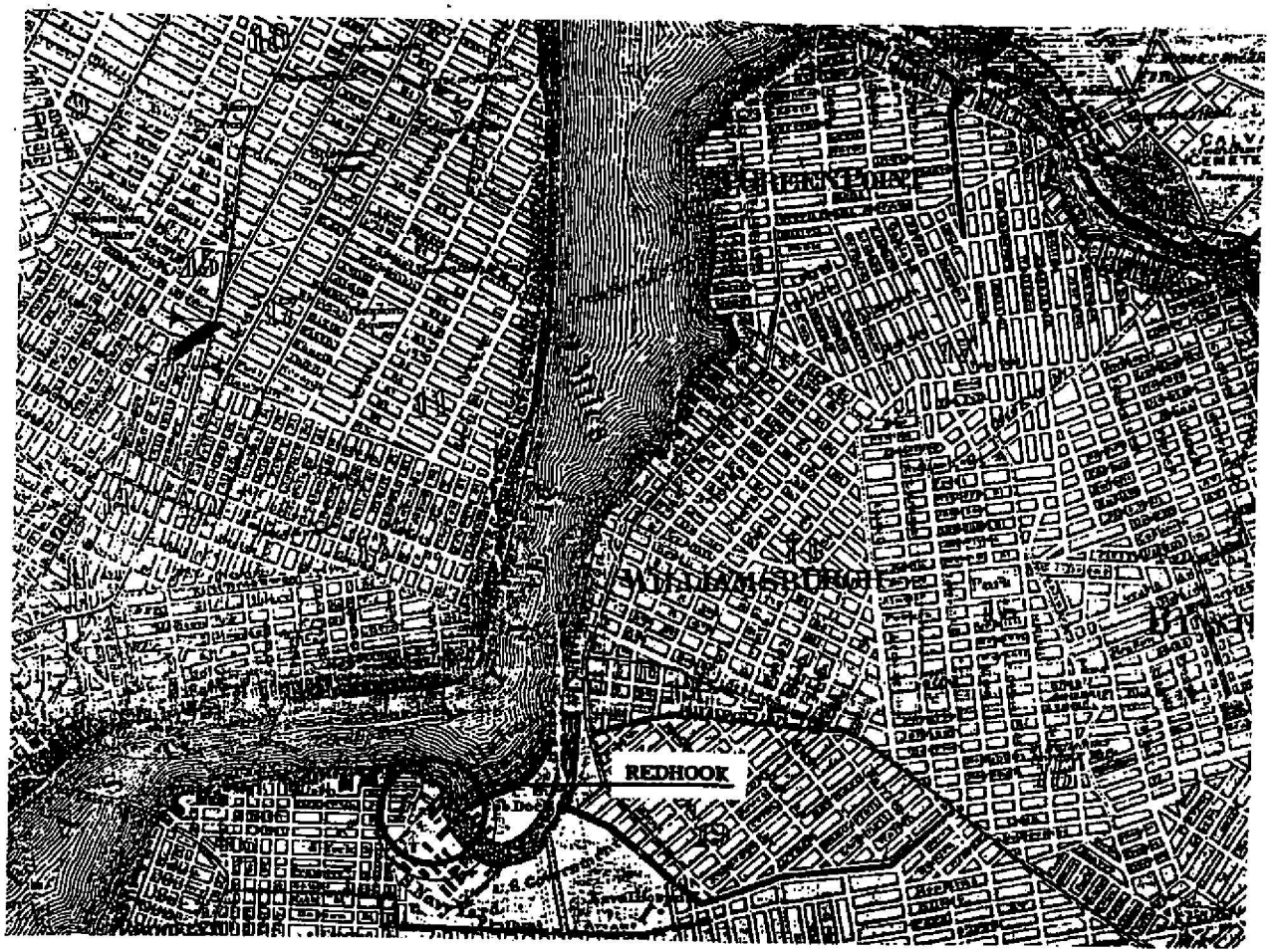

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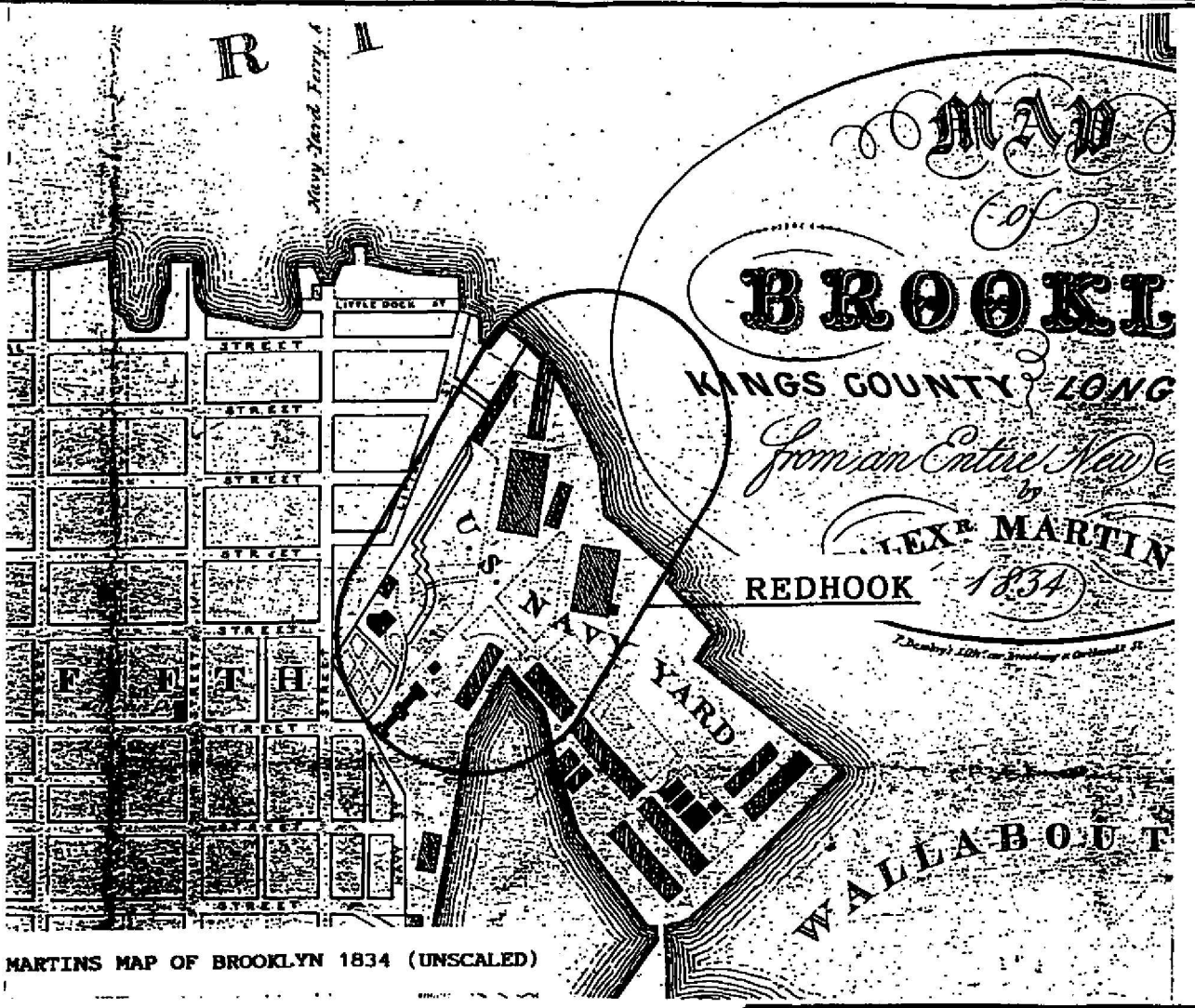
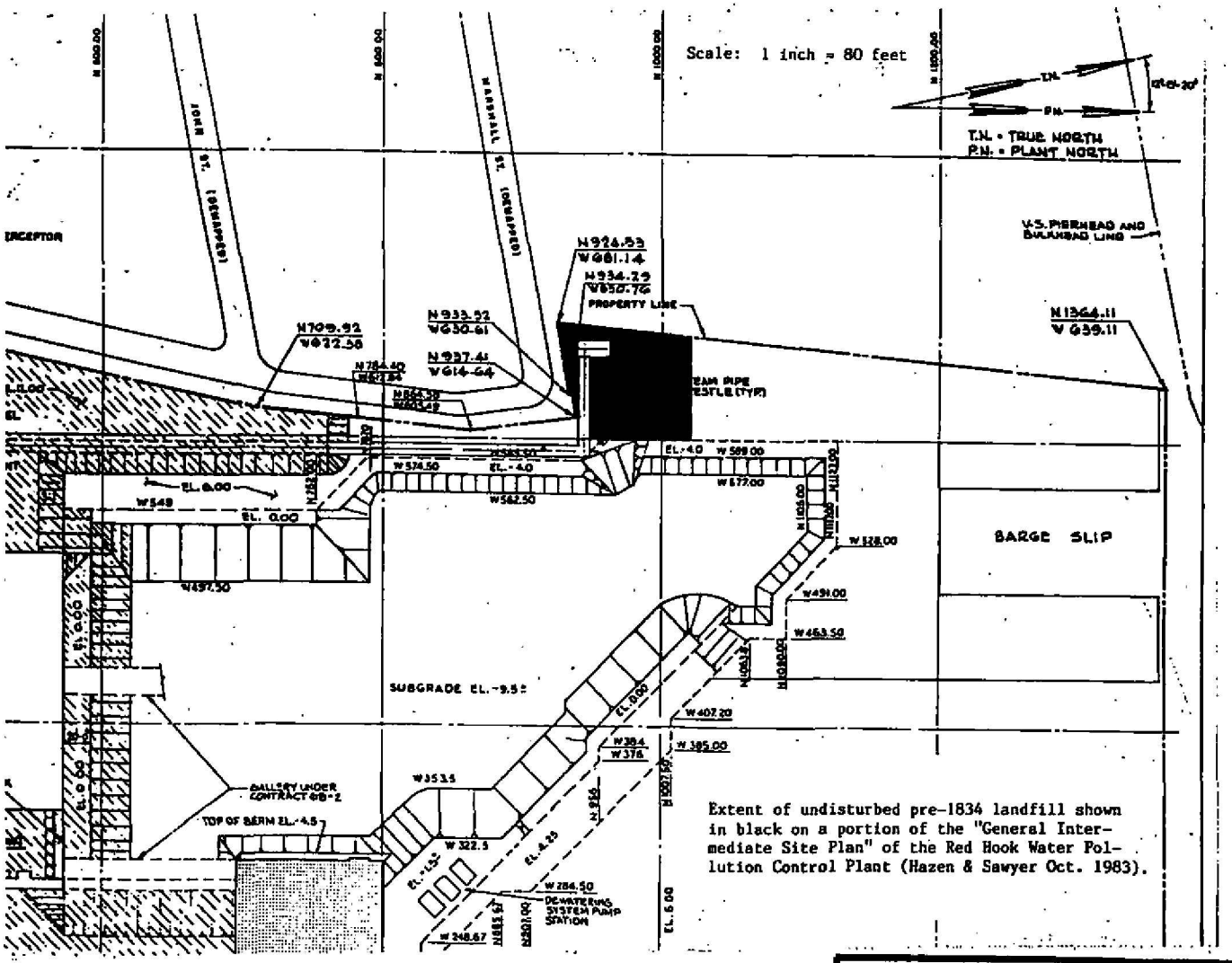
	Figure # 2.3.4.8-2



MARTINS MAP OF BROOKLYN 1834 (UNSCALED)

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Red Hook - Martins Map of Brooklyn 1834 Figure # 2.3.4.8-3



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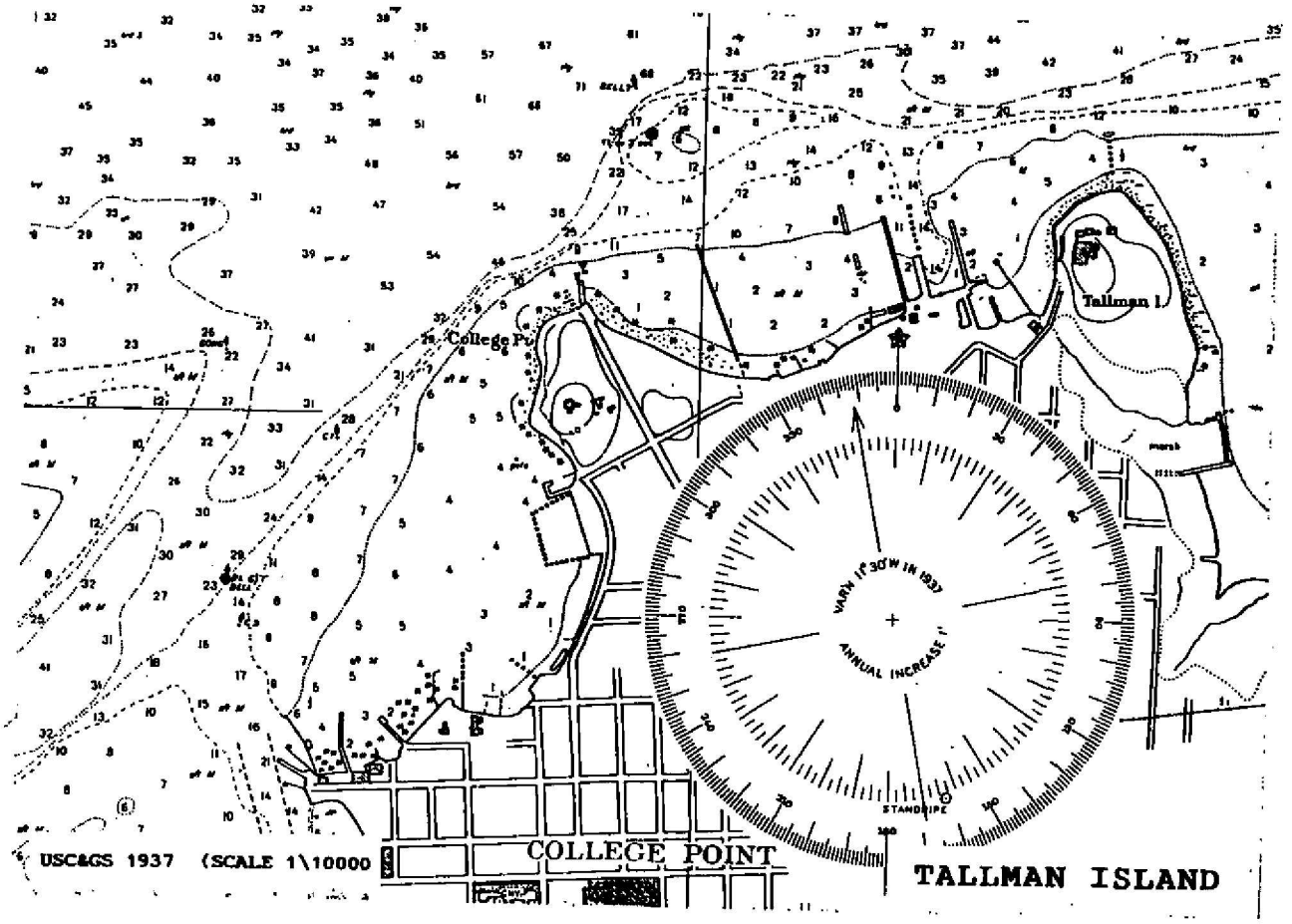

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Tallman Island - USC & GS 1937
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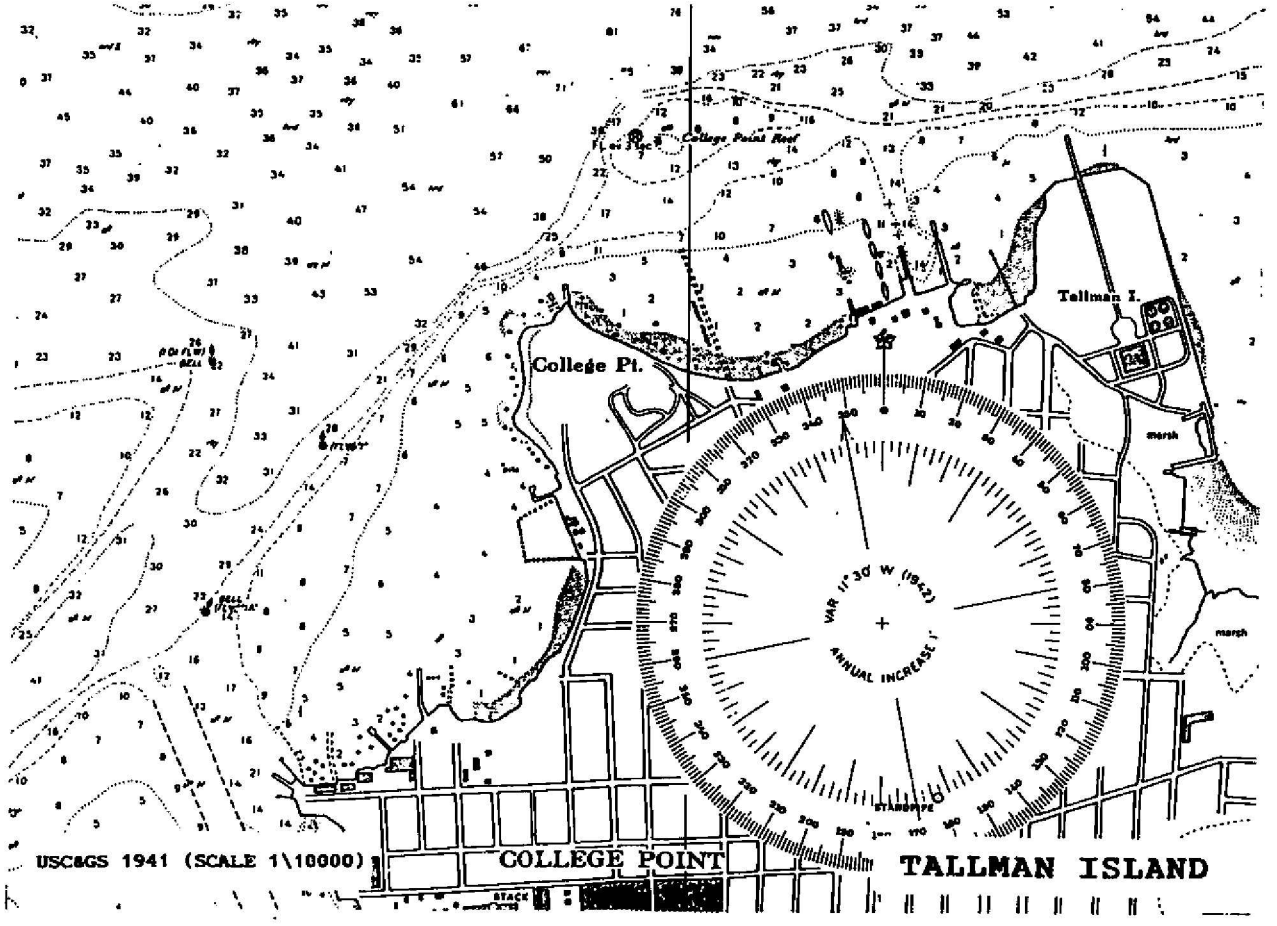

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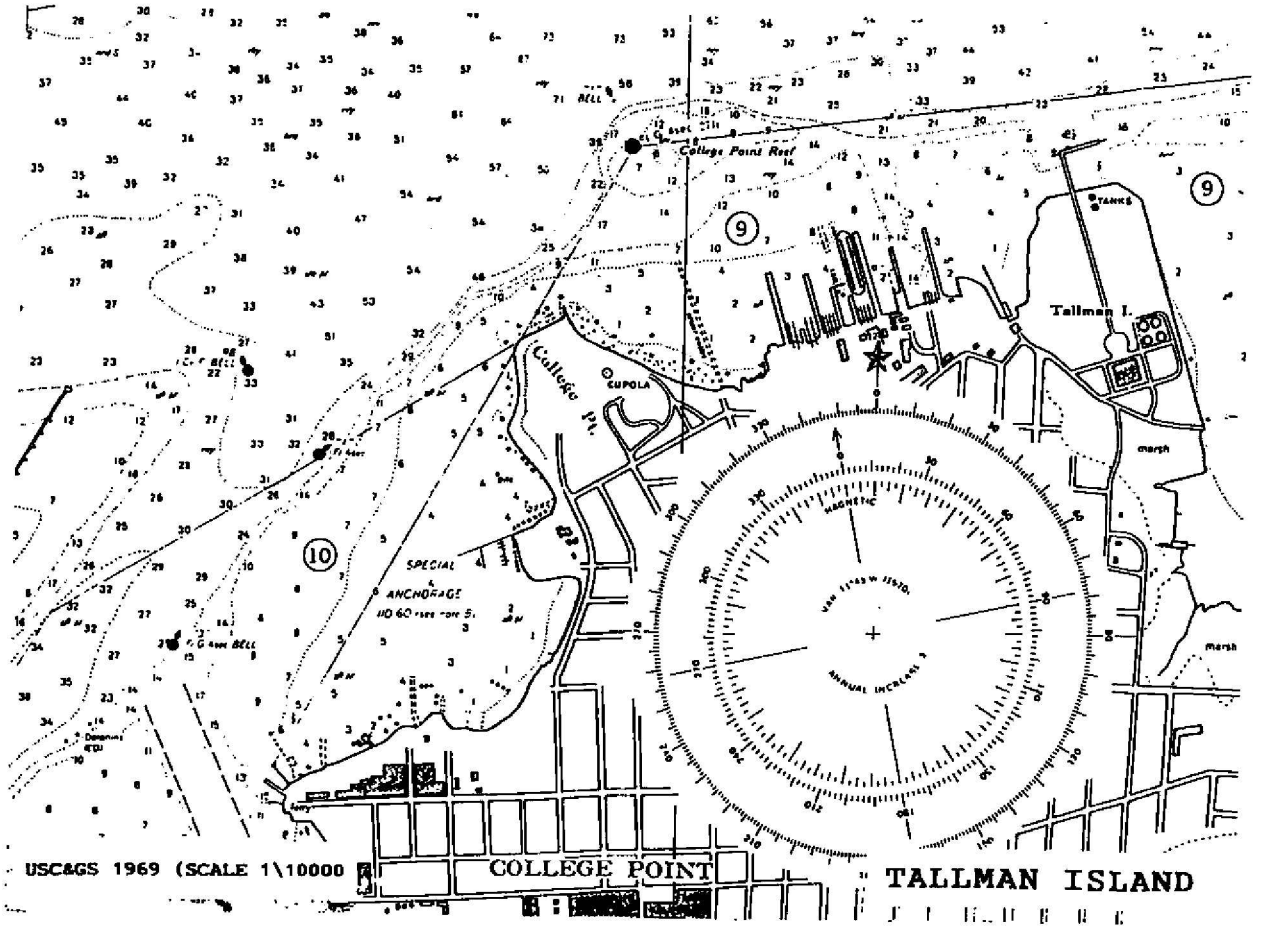
	Figure # 2.3.5.8-2



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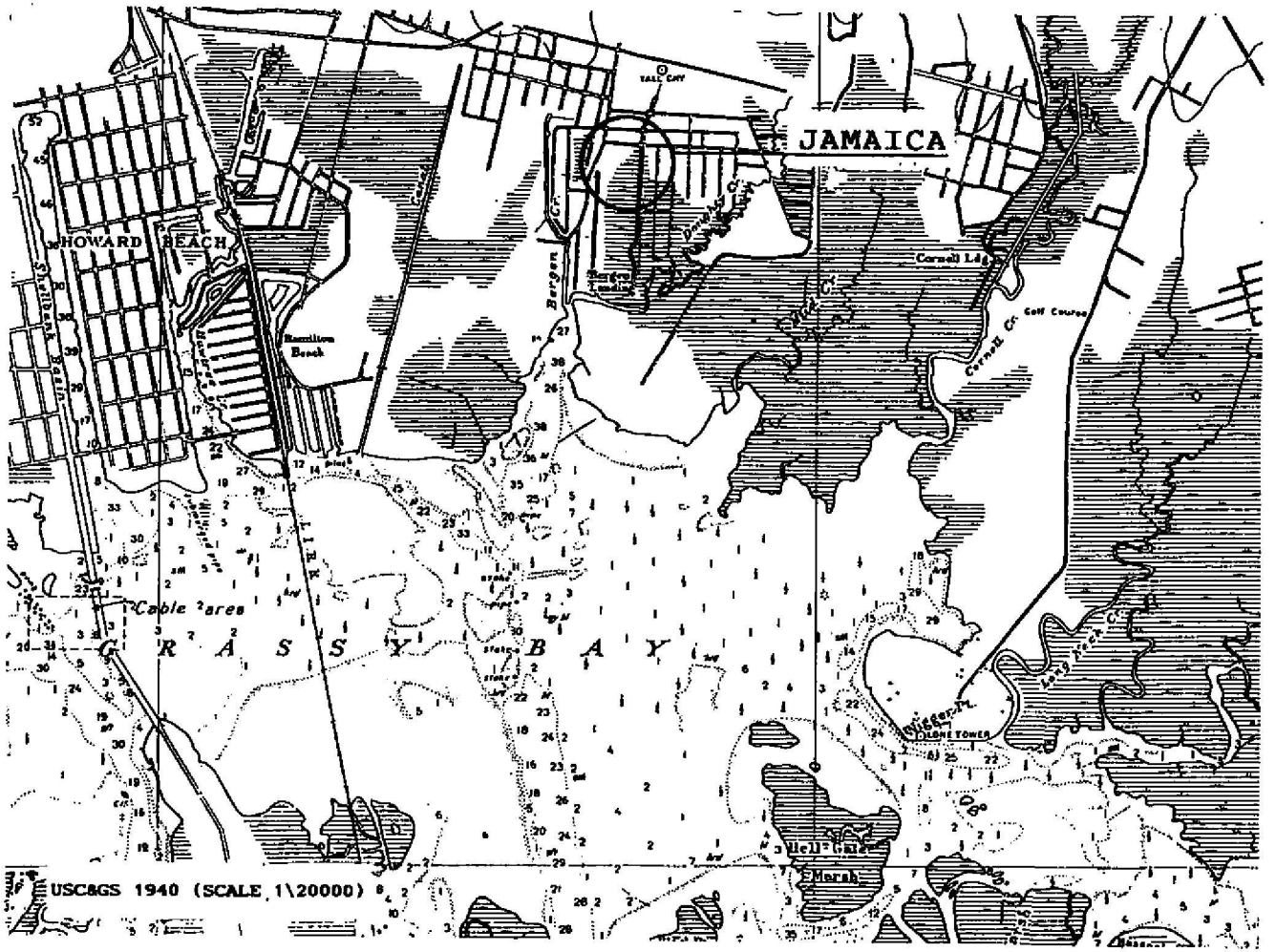
New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Tallman Island - USC & GS 1969
	Figure # 2.3.5.8-3



New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Jamaica - USC & GS 1940	
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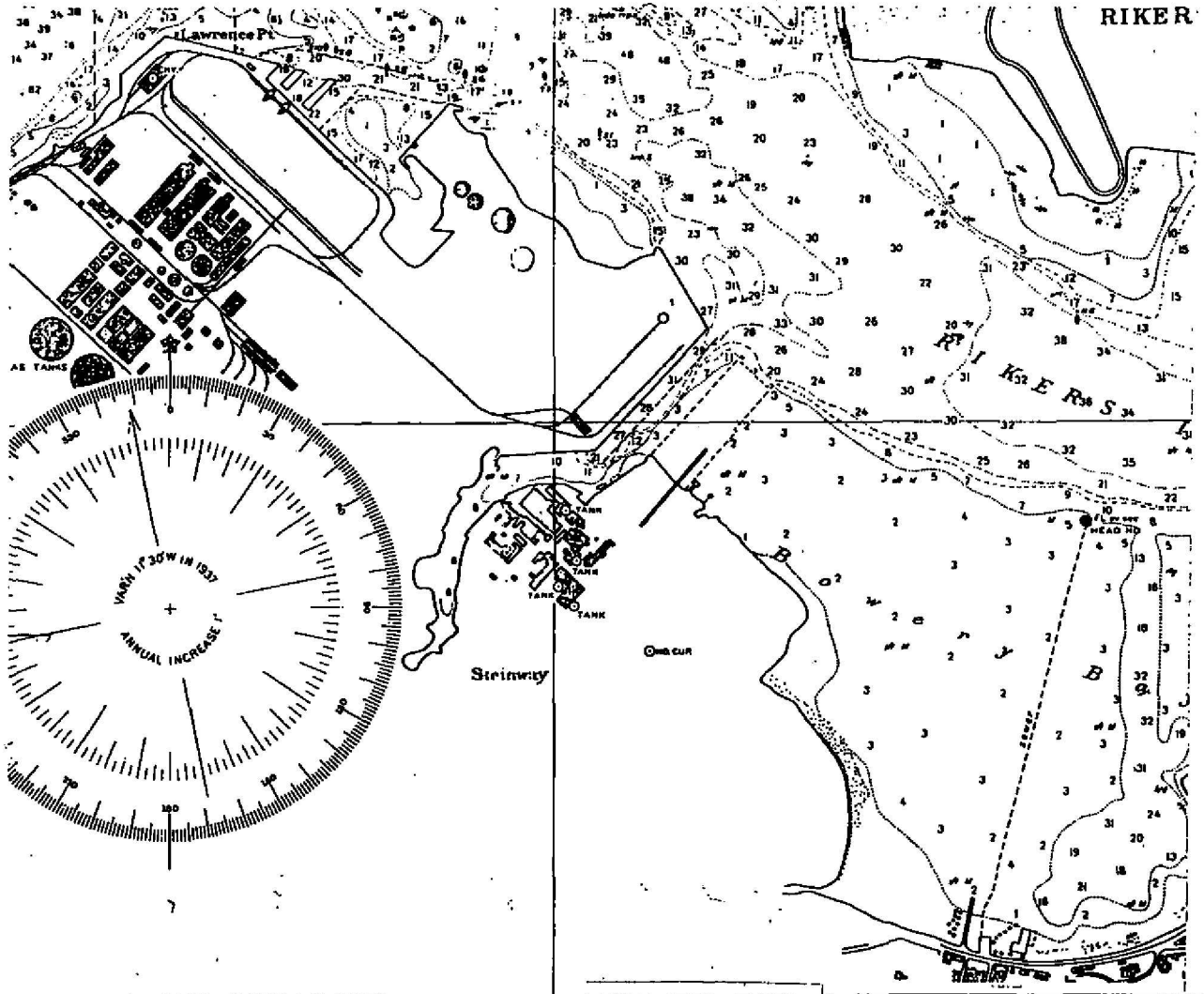

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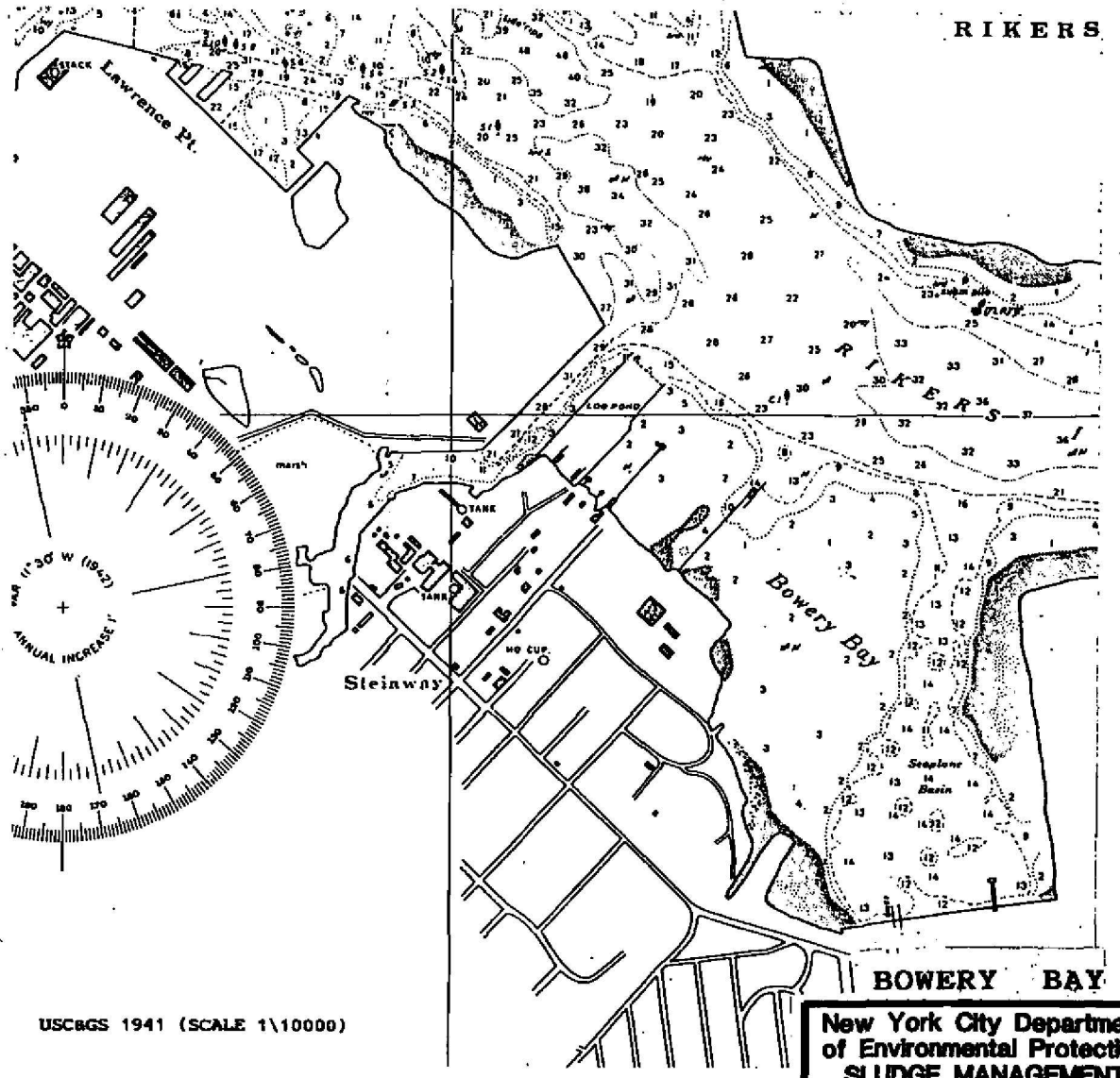
Bowery Bay - USC & GS 1937

Figure # 2.3.7.8-1



USC&GS 1941 (SCALE 1\10000)

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Bowery Bay - USC & GS 1941
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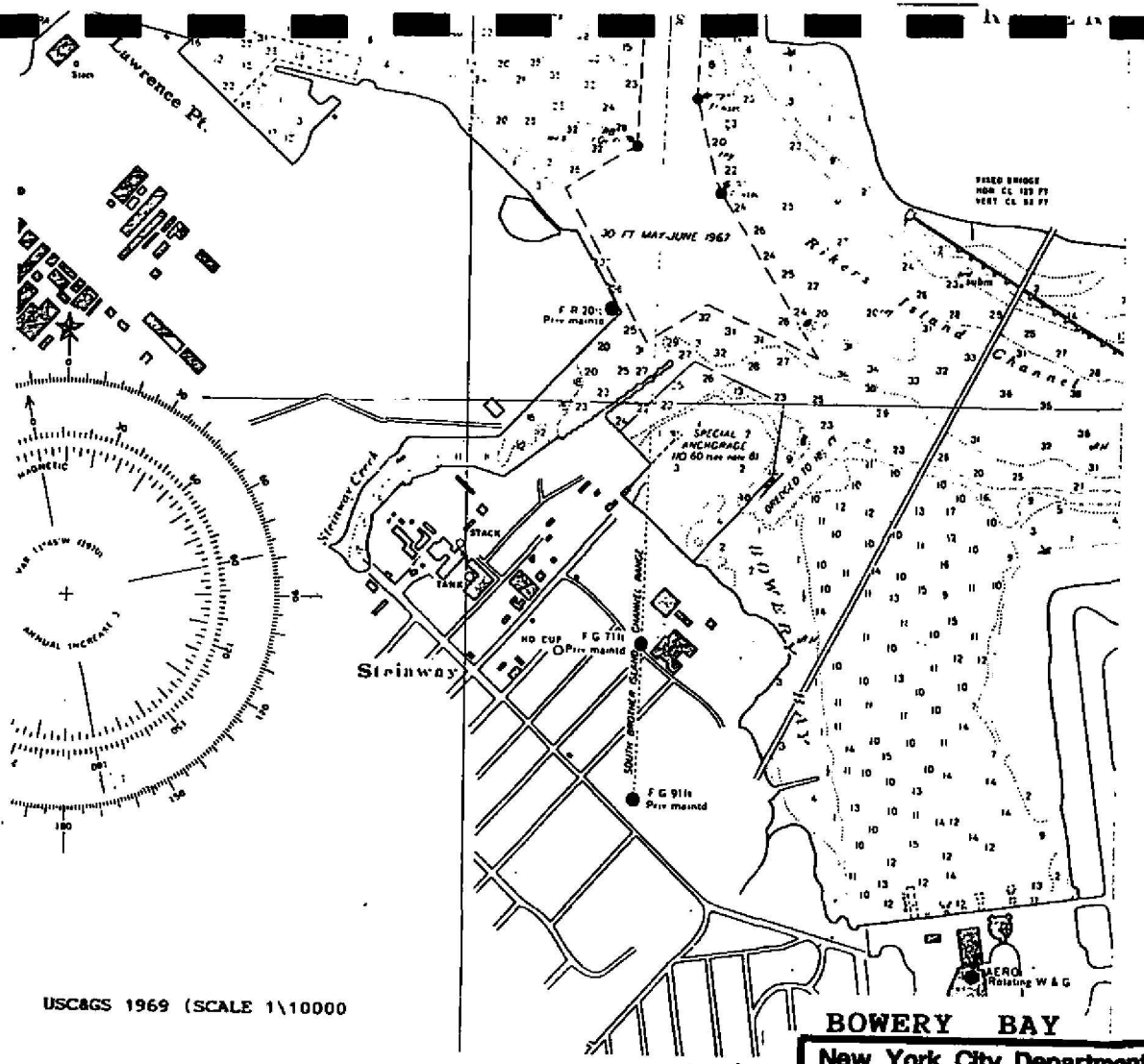
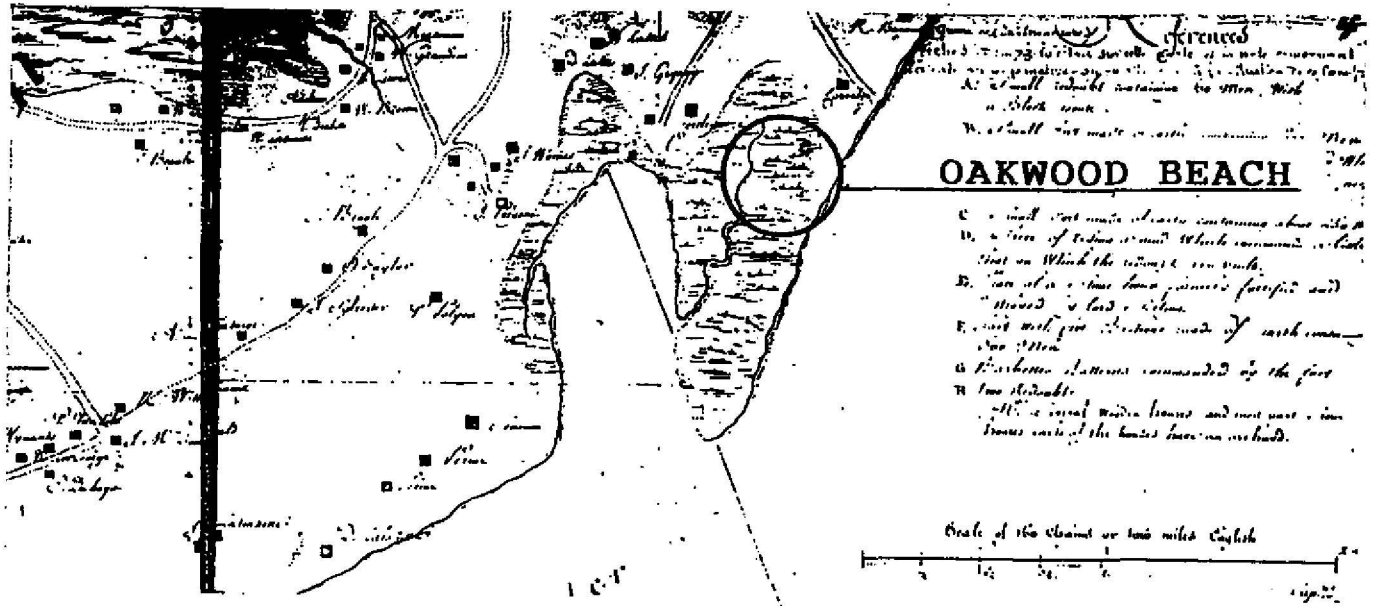


USC&GS 1969 (SCALE 1\10000

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Bowery Bay - USC & GS 1969
	Figure # 2.3.7.8-3

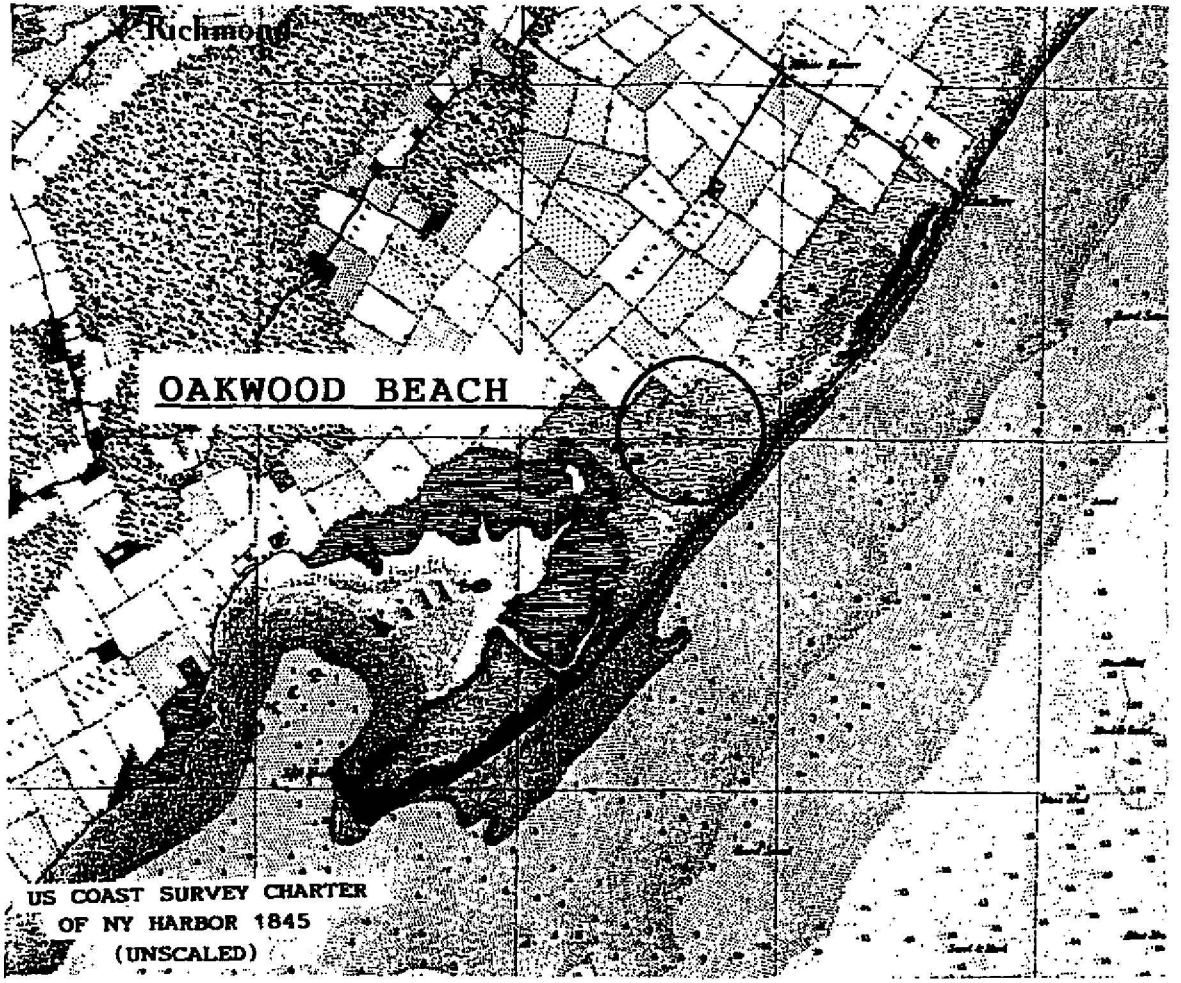


PLAN DU CAMP ANGLO-HESSOIS DANS STATEN ISLAND

BAIE DE NEW YORK DE 1780-1783

(UNSCALED)

New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Oakwood Beach - Anglo - Hessois 1780 -1783 Map
	Figure # 2.3.8.8-1



New York City Department of Environmental Protection SLUDGE MANAGEMENT PLAN Generic Environmental Impact Statement	Oakwood Beach - US Coast Survey Charter of NY Harbor 1845
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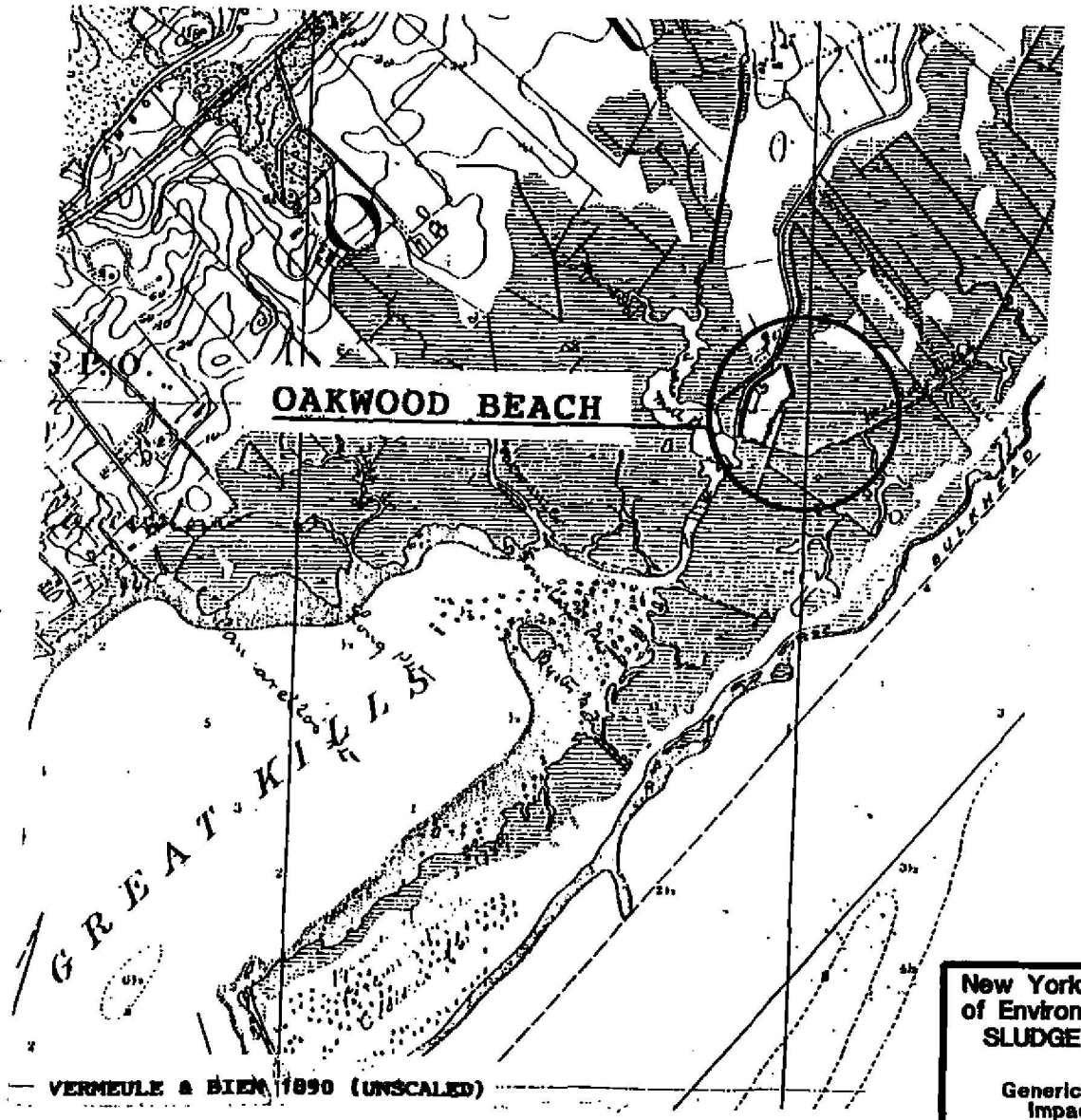

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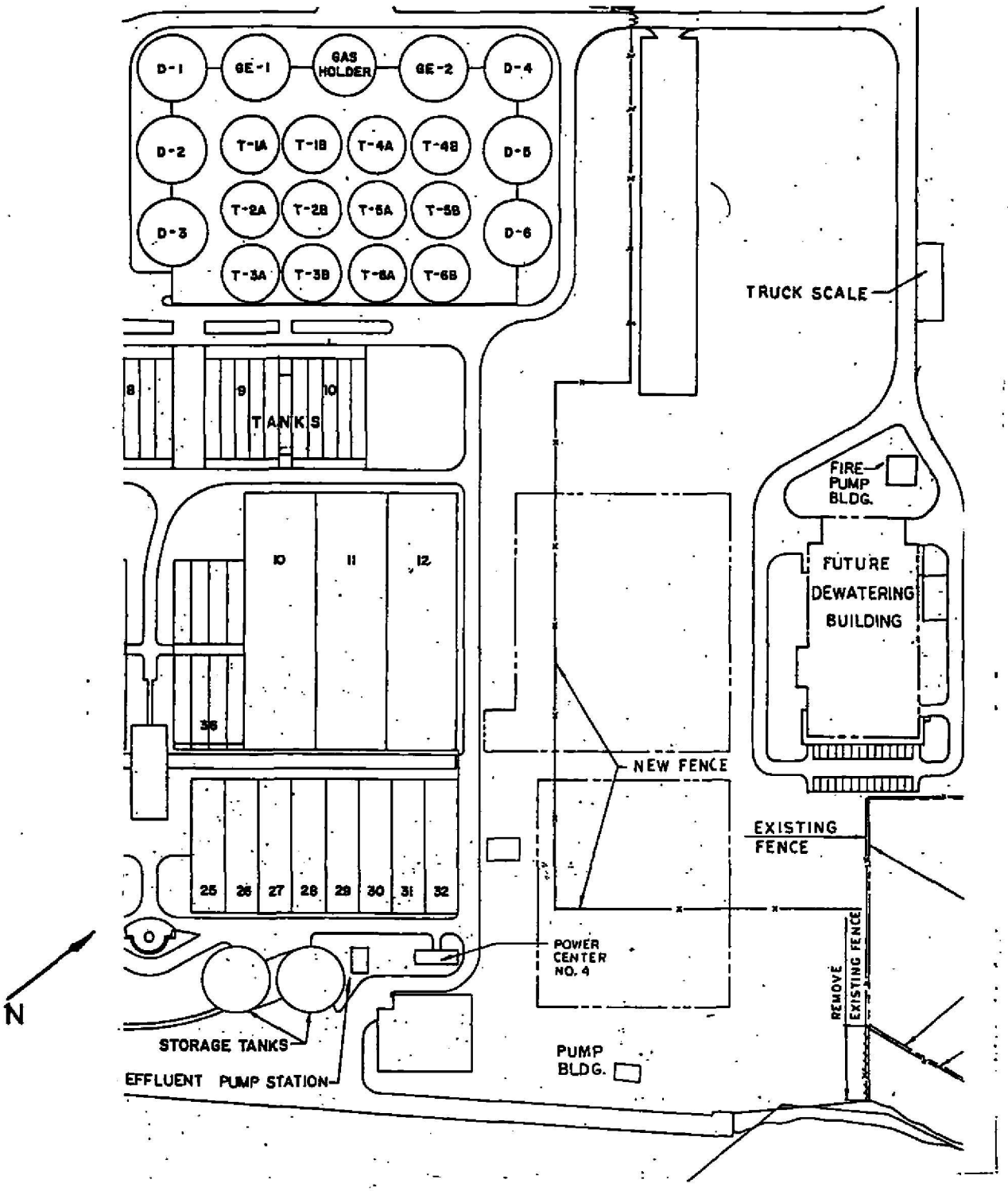
Oakwood Beach - Vermeule & Bien 1890

Figure # 2.3.8.8-3



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SLUDGE MANAGEMENT PLAN

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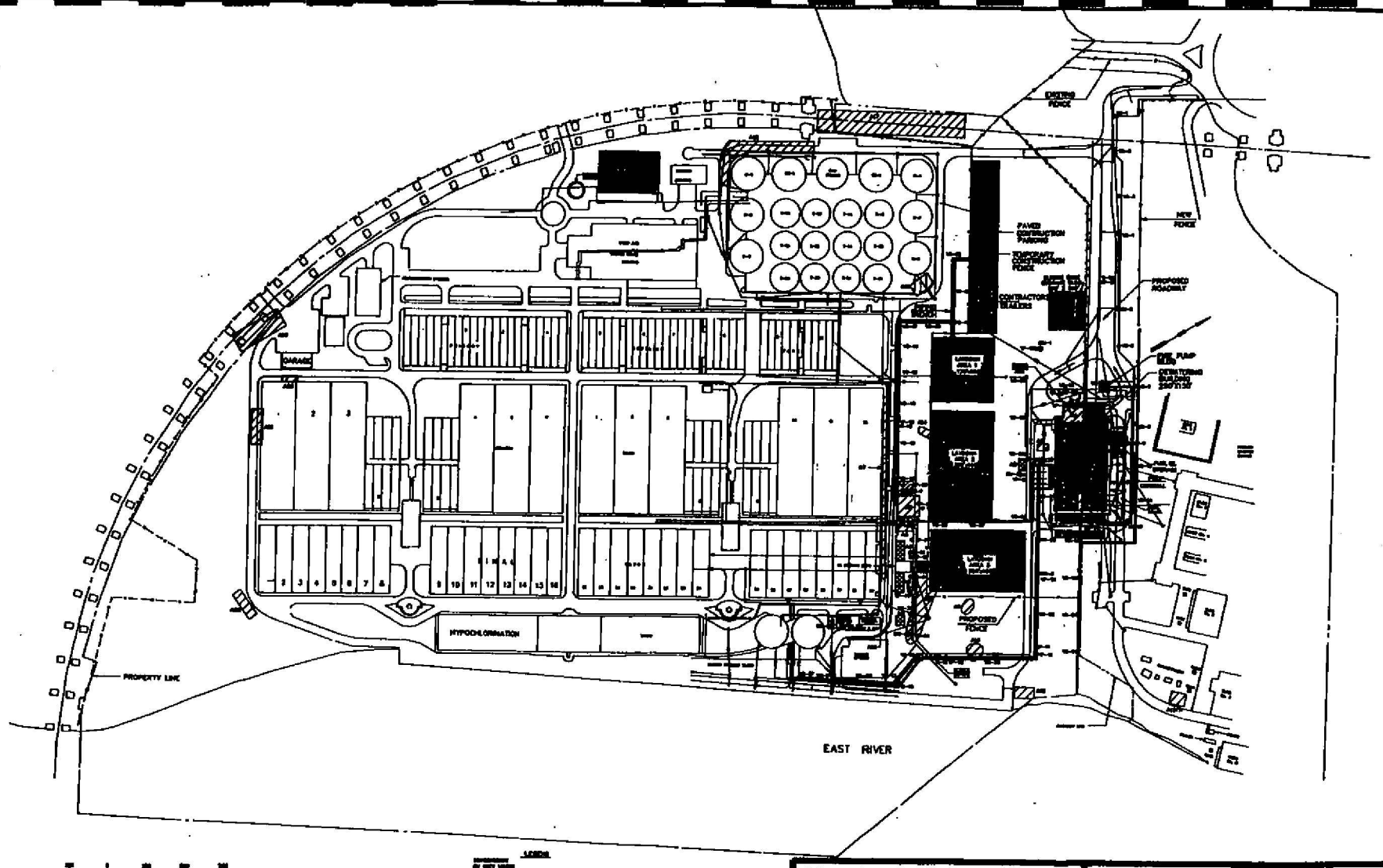
Wards Island WPCP, Manhattan

SITE PLAN OPERATION

Figure *3.3.1-3*



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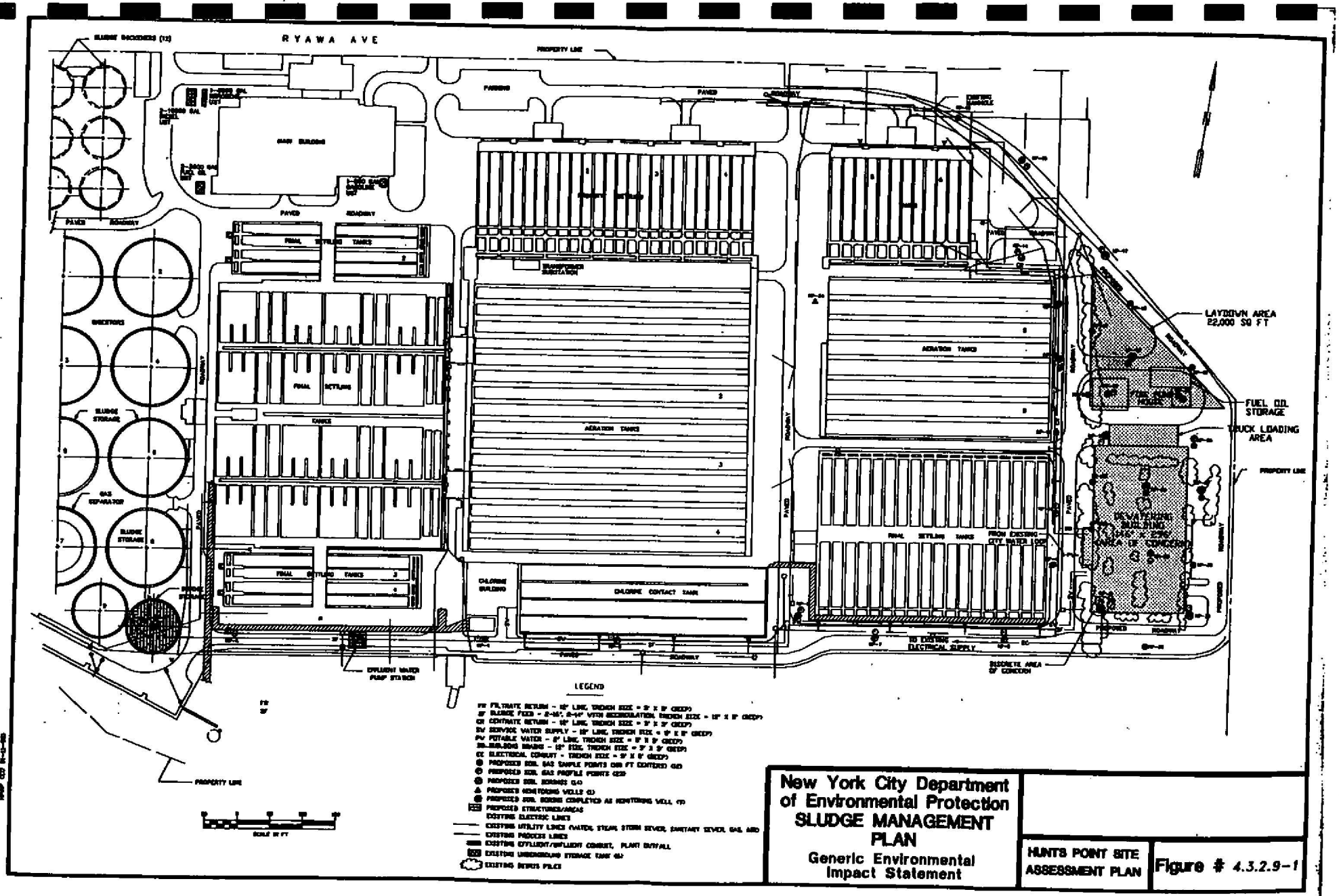
WARDS ISLAND SITE ASSESSMENT PLAN

Figure # 4.3.1.9-1



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SLUDGE MANAGEMENT PLAN
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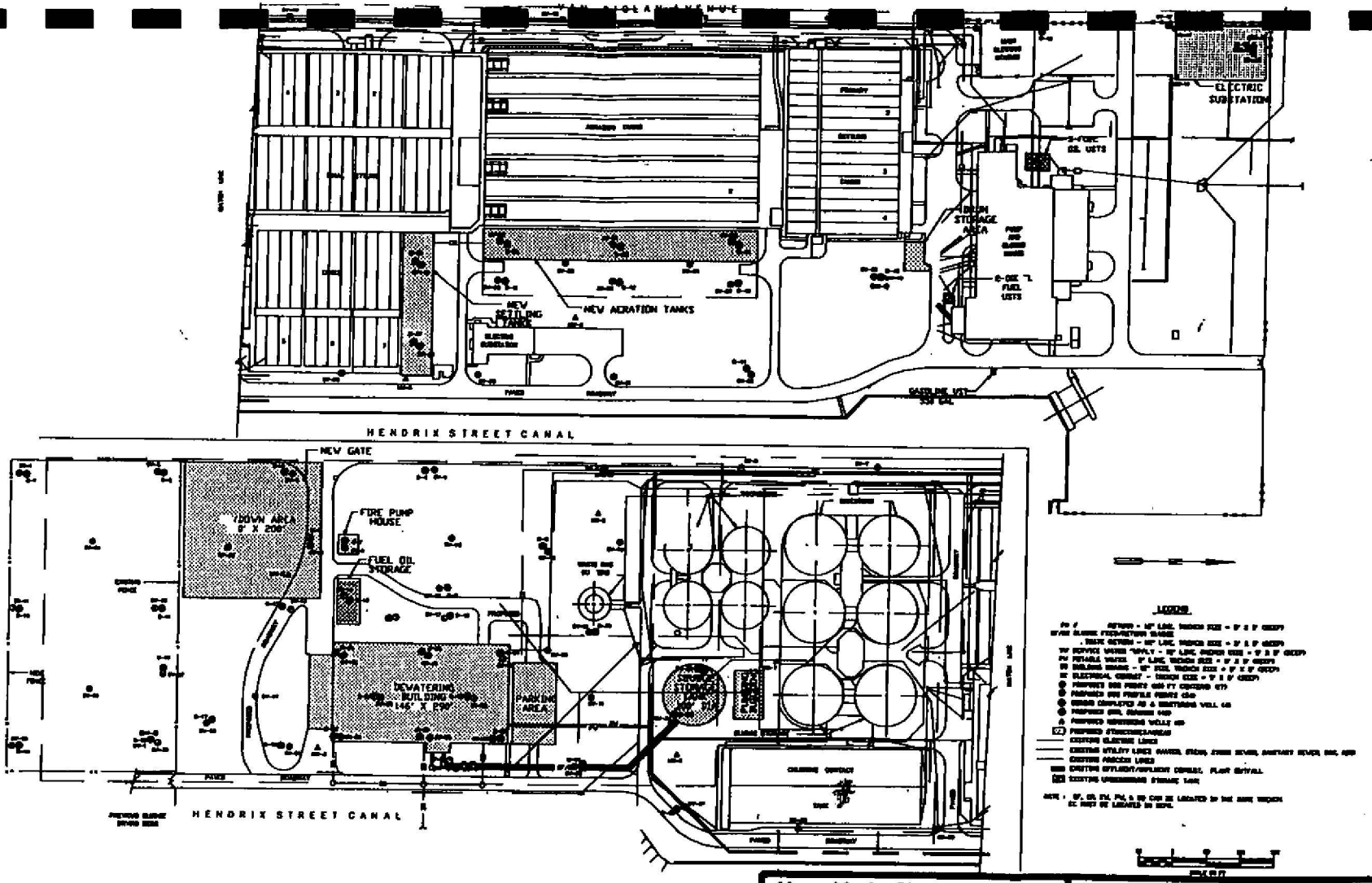
HUNTS POINT SITE ASSESSMENT PLAN

Figure # 4.3.2.9-1



New York City Department of Environmental Protection
SLUDGE MANAGEMENT PLAN
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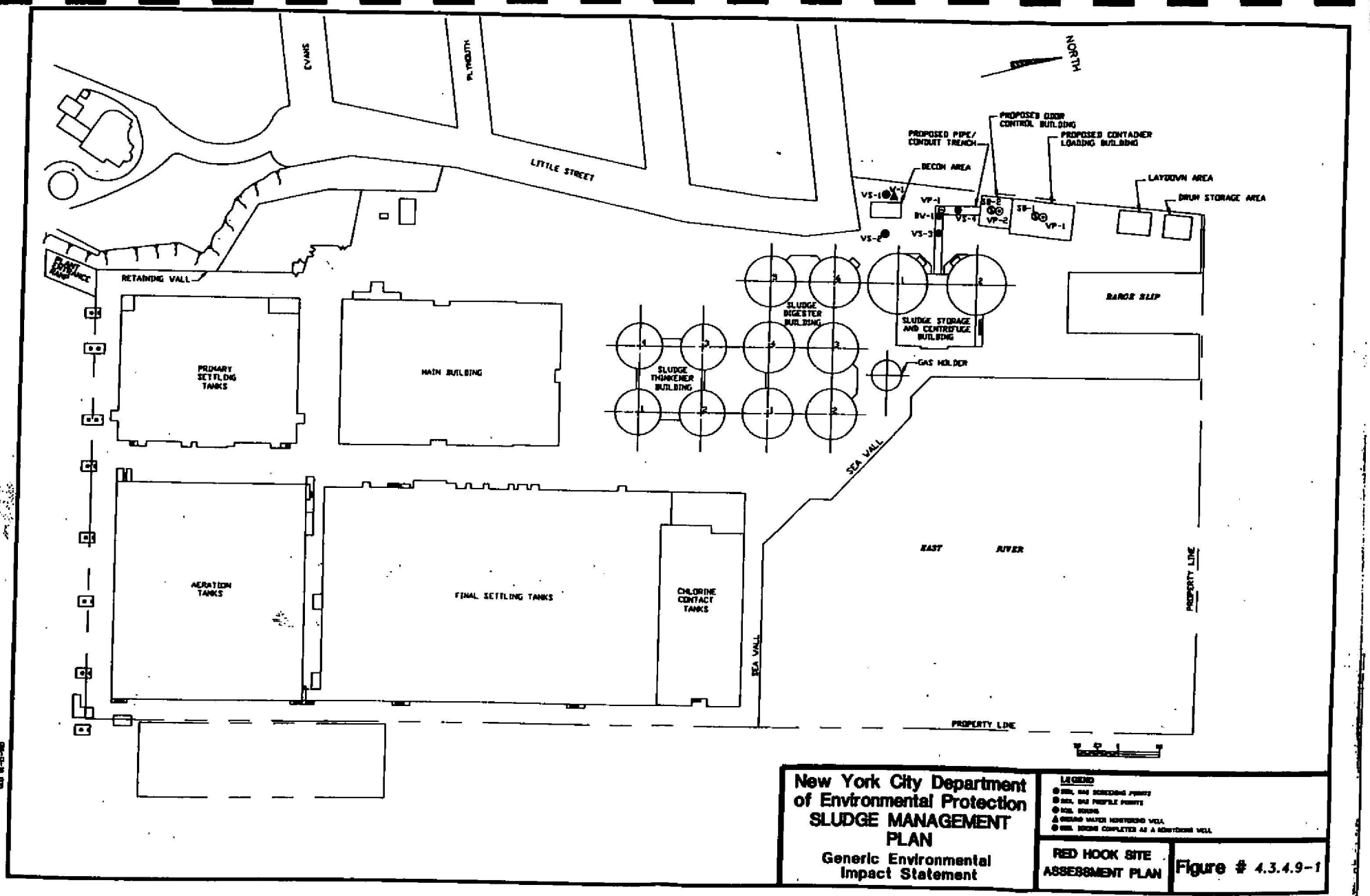
26TH WARD SITE ASSESSMENT PLAN

Figure # 4.3.3.9-1

SMP ED 01-11-90



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SLUDGE MANAGEMENT PLAN

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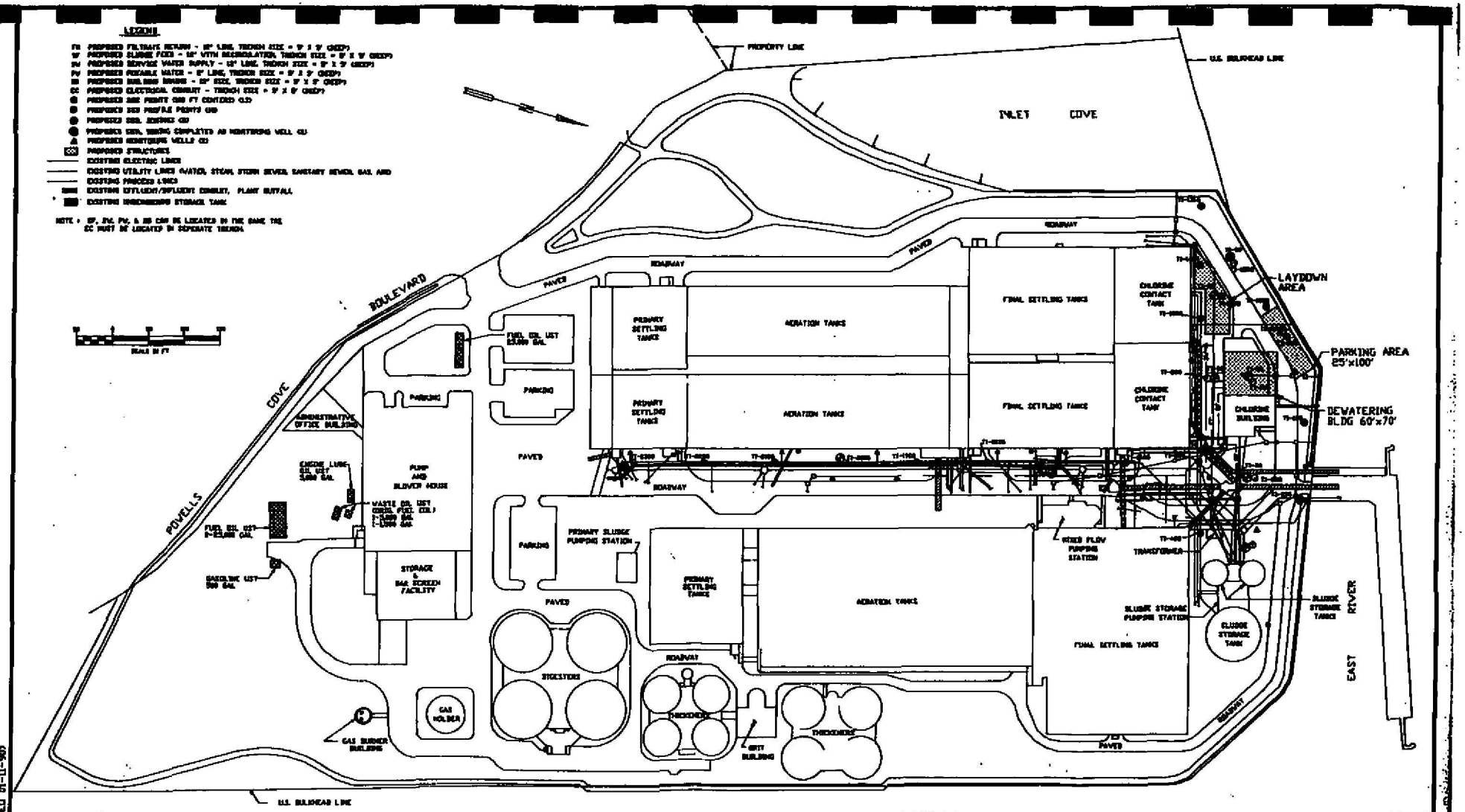
LEGEND

RED HOOK SITE ASSESSMENT PLAN

Figure # 4.3.4.9-1



TIAP (EC) 01-11-90

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SLUDGE MANAGEMENT PLAN
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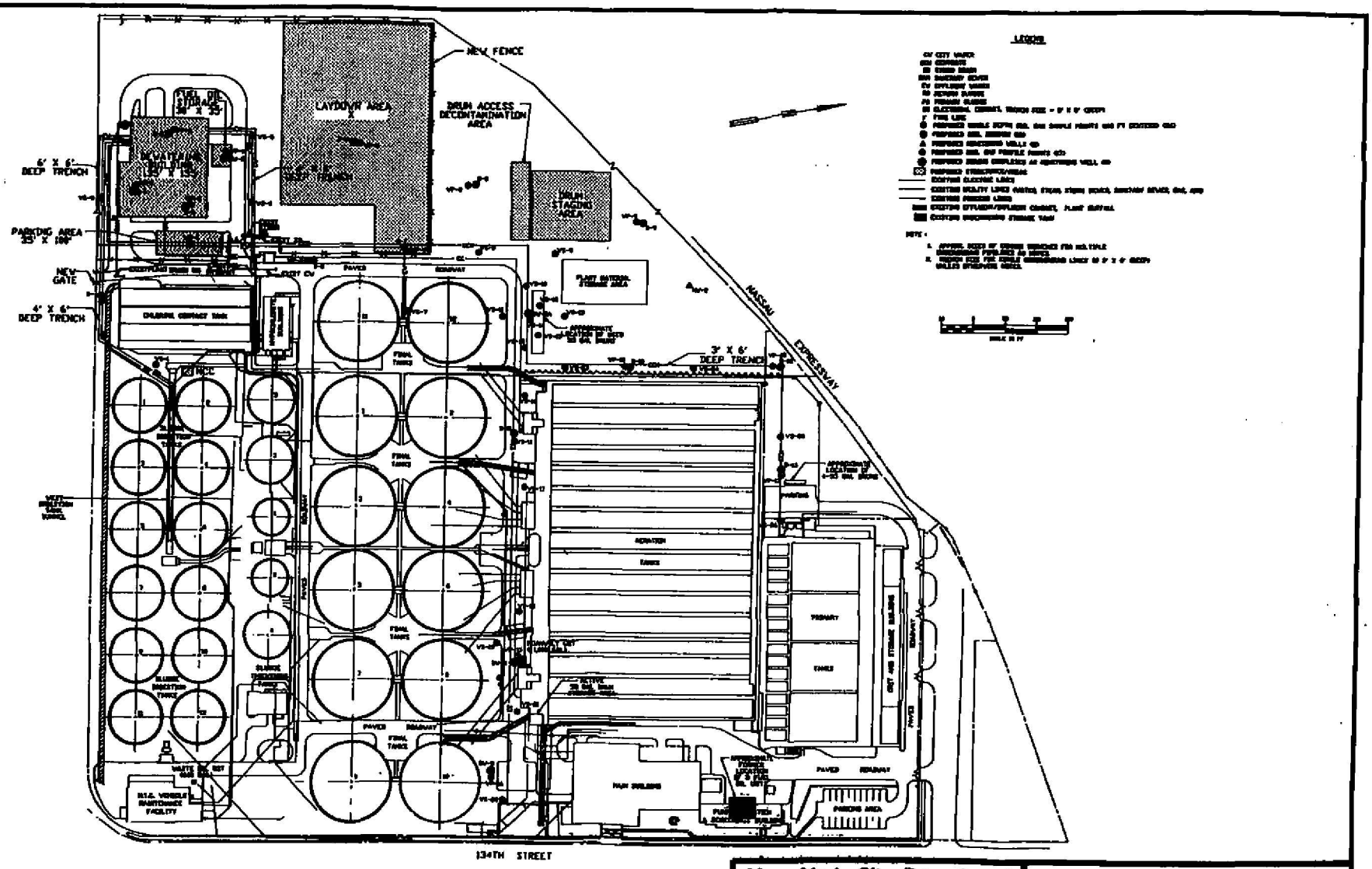
TALLMAN ISLAND SITE ASSESSMENT PLAN

Figure # 4.3.5.9-1



New York City Department of Environmental Protection
SLUDGE MANAGEMENT PLAN
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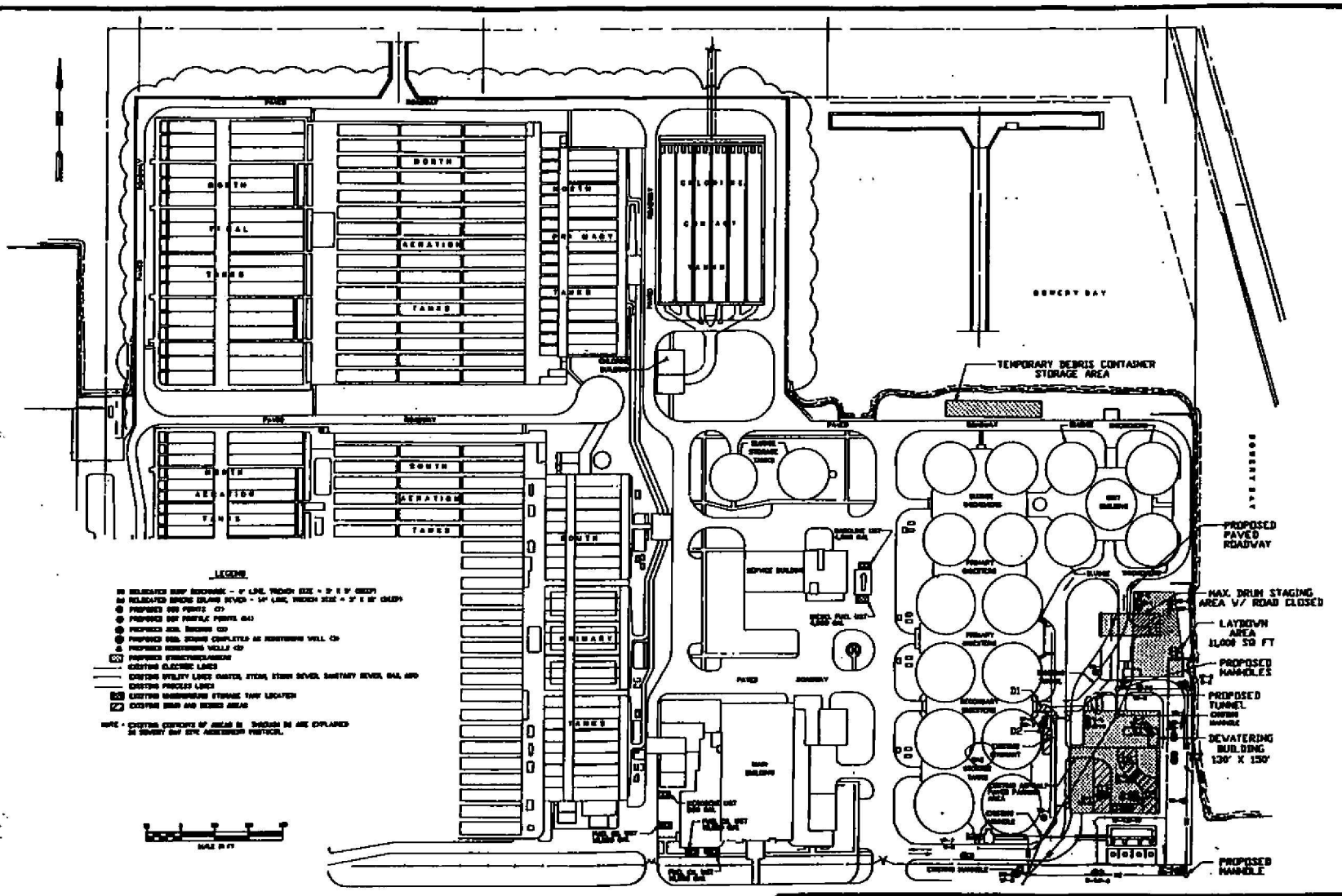
JAMAICA SITE ASSESSMENT PLAN

Figure # 4.3.6.9-1



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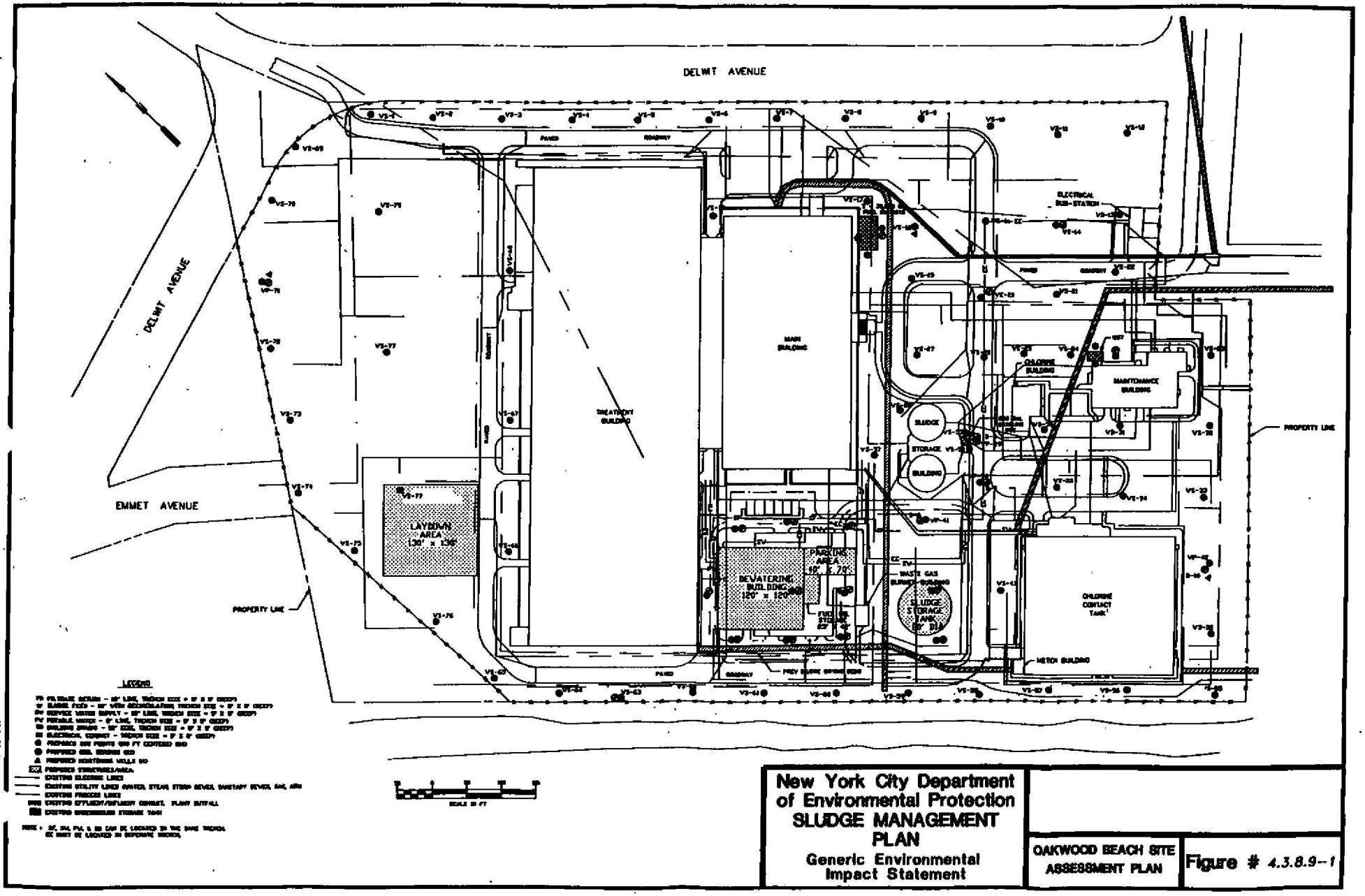
SLUDGE MANAGEMENT PLAN

Generic Environmental Impact Statement

BOWERY BAY SITE ASSESSMENT PLAN

Figure # 4.3.7.9-1

MAP CED 01-11-90



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OAKWOOD BEACH SITE ASSESSMENT PLAN

Figure # 4.3.8.9-1

01-11-90