MATERIAL TRANSPORTATION ANALYSIS REPORT

For the

Rockaway Park Former Manufactured Gas Plant Site
Rockaway Park, Queens County, New York
Site Number 2-41-029

Submitted to:

KeySpan Corporation
Hicksville, New York 11801

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EXECUTIVE SUMMARY

This Draft Material Transportation Analysis Report (Report) has been prepared for KeySpan Corporation (KeySpan) by Paulus, Sokolowski & Sartor Engineering, PC (PS&SPC) in conjunction with Shaw Environmental & Infrastructure of New York, PC (Shaw) to evaluate alternatives for the transportation of materials to and from the Rockaway Park Former Manufactured Gas Plant (MGP) Site (Site) in anticipation of planned remedial construction at the Site. The planned remedial construction activities will require the transportation of significant volumes of material including contaminated soils, clean fill, and debris associated with former operations and construction materials related to the planned remediation both to and from the Site. As currently designed, all material will be transported to and from the Site using commercial trucks throughout a typical construction day (7:00 am to 5:00 pm). These transportation activities have the potential to result in adverse impacts to the surrounding community. In consideration of these impacts, this Report has been prepared to identify and evaluate potential transportation alternatives.

In April 2006, a draft report entitled *Evaluation of Barge Transportation Costs* (April 2006 Report) was prepared for KeySpan by Shaw. That report presented material transportation issues and costs associated with the barge transport of materials to and from the Site during the planned remedial construction activities. Subsequent to the issuance of the April 2006 Report, this Report was prepared in order to identify and evaluate the full range of viable alternatives required for the off-site disposal of excavated materials and the on-site delivery of clean fill associated with the planned remedial activities. Barging costs identified in the April 2006 Report have been incorporated into this Report.

The Site is located north and west of Rockaway Freeway, east of Beach 108th Street, and north and south of Beach Channel Drive in Rockaway Park, Queens County, New York. The Site encompasses an area of approximately 9.8 acres and includes an inactive KeySpan natural regulator gas station located in the southeastern portion of the Site as well as a vacated, three-story office building and a vacated one-story former workshop building located in the central part of the northern portion of the property and a bulkhead area owned by the City of New York to the north of Beach Channel Drive.

This Report presents an evaluation of various alternatives to transport environmentally impacted soils excavated during the planned remedial construction activities. In addition, this Report presents an evaluation of alternatives to transport clean fill to the Site that will be required to backfill the planned excavation areas. For evaluation purposes, it is estimated that approximately 90,000 in place cubic yards (126,000 tons) of environmentally impacted soil will be removed from the remedial excavation areas and an equivalent volume of clean fill will be required to backfill the excavation areas.

The intent of this evaluation is to identify transportation alternatives that meet a set of specific criteria that have been established for the Site. Among these criteria are constructability (alternatives must be constructed using accepted engineering methods), schedule impacts (alternatives should not negatively impact the existing remedial construction schedule),

regulatory compliance (alternatives must be acceptable to the regulatory agencies) and community impacts (alternatives should minimize potential adverse impacts to the surrounding community).

The alternatives evaluated in this Report have been advanced from an initial screening process that preceded this analysis. The initial screening matrix for both impacted soil and clean fill is included as Appendix A. The alternatives that were not advanced from the initial screening process were eliminated due to constructability issues, potential generation of odors, or physical Site limitations (existing overhead electric transmission lines).

The following alternatives are evaluated in this Report:

Impacted Soil

- Alternative 1A1 – Alternate Truck Routes
- Alternative 1A2 – Time Restrictions for Transport Vehicles
- Alternative 1B1 – Truck to Adjacent Facility
- Alternative 2A3 – Use Containers Through Existing Tunnel
- Alternative 2B1 – Trucking Impacted Soil to the Bulkhead Area
- Alternative 3A1 – Use of On-Site Mobile Thermal Desorption Unit

Clean Fill

- Alternative 1A1 – Alternate Truck Routes
- Alternative 1A2 – Time Restrictions for Transport Vehicles
- Alternative 1B1 – Trucking From Adjacent Facility
- Alternative 2A1 – Convey Backfill Through Existing Tunnel
- Alternative 2A2 – Pneumatically Convey Backfill Through Existing Tunnel
- Alternative 2A4 – Convey Backfill Through Existing Tunnel Using Containers
- Alternative 2B1 – Truck Backfill to Site Area Using Roll Offs or Containers
- Alternative 2B2 – Truck Backfill to Site Area in Bulk
- Alternative 3A1 – Use of On-Site Mobile Thermal Desorption Unit

The recommended alternative for transportation of impacted soil from the Site to approved disposal facilities is “Alternative 1A2 – Time Restrictions for Transport Vehicles”. Based on the results of this analysis, this alternative is constructible, would not present adverse impacts to the project schedule, is regulatory compliant and will reduce the potential adverse impacts to the surrounding residential communities. Under this alternative, transport vehicles would only travel through the surrounding communities during limited daytime hours. These hours would be limited to off-peak hours for existing traffic and during time periods in which residents would most likely be away from their homes. The time period proposed is between the hours of 9:00 AM and 2:00 PM.

The recommended alternative for the transportation of clean fill is "Alternative 1A2 – Time Restrictions for Transport Vehicles". Based on the results of this analysis, this alternative is constructible, would not present adverse impacts to the project schedule, is regulatory compliant and reduces the potential adverse impacts to the surrounding residential communities. Under this alternative, transport vehicles would only travel through the surrounding communities during limited daytime hours. These hours would be limited to off-peak hours for existing traffic and during time periods in which residents are most likely to be away from their homes. The time period proposed is between the hours of 9:00 AM and 2:00 PM.

This Report is organized into four sections. Section 1.0, Introduction, provides an overview of this Report and of the Site. Section 2.0, Material Transportation Analysis for Impacted Soils, describes the evaluated alternatives for transporting impacted soils from the Site to approved disposal facilities. Section 3.0, Material Transportation Analysis for Clean Fill, describes the evaluated alternatives for transporting clean fill from the source locations to the Site. Section 4.0, Evaluation Summary, provides a summary of the alternatives evaluation for both impacted soils and clean fill, Section 5.0, Recommendations, provides the recommended transportation alternative for both impacted soils and clean fill.

1.0 INTRODUCTION

This Draft Material Transportation Analysis Report (Report) has been prepared for KeySpan Corporation (KeySpan) by Paulus, Sokolowski & Sartor Engineering, PC (PS&SPC) in conjunction with Shaw Environmental & Infrastructure of New York, PC (Shaw) to evaluate alternatives for the transportation of materials to and from the Rockaway Park Former Manufactured Gas Plant (MGP) Site (Site) in anticipation of planned remedial construction at the Site. The planned remedial construction activities will require the transportation of significant volumes of material both to and from the Site. As currently designed, all material will be transported to and from the Site using commercial trucks throughout a typical construction day (7:00 am to 5:00 pm). These transportation activities have the potential to result in adverse impacts to the surrounding community. The nature and extent of such impacts will be determined by the transportation alternative(s) selected for the Site.

This Report presents an evaluation of various alternatives to transport environmentally impacted soils and debris excavated during the planned remedial construction activities. In addition, this Report presents an evaluation of alternatives to transport clean fill to the Site that will be required to backfill the planned excavation areas.

In April 2006, a draft report entitled *Evaluation of Barge Transportation Costs* (April 2006 Report) was prepared for KeySpan by Shaw. That report presented costs associated with the barge transport of materials to and from the Site during the planned remedial construction activities. Subsequent to the issuance of the April 2006 Report, this Report was prepared in order to identify and evaluate the full range of viable alternatives for materials transportation. Barging costs identified in the April 2006 Report have been incorporated into this Report.

The materials that require transportation from the Site include excavated impacted soil, removed former industrial foundations and piping, and other remediation wastes (e.g., personal protective equipment, wastewaters, etc.). Materials that require transportation to the Site to support the planned remedial construction activities include clean fill for the remedial excavations; steel sheet piling required to support the excavations; clean fill required to construct a site-wide soil cap; and other miscellaneous materials. Because the bulk of the materials being transported to and from the Site will consist of the impacted soil excavated from the Site and the soil materials required to backfill these excavations, the focus of this Report is on the transportation of these materials. For evaluation purposes, it is estimated that approximately 90,000 in place cubic yards (126,000 tons) of environmentally impacted soil will be removed from the remedial excavation areas and an equivalent volume of clean fill will be required to backfill the excavation areas.

The alternatives evaluated in this Report have been advanced from an initial screening process that preceded this analysis. The initial screening matrix for both impacted soil and clean fill is included as Attachment A. The alternatives that were not advanced from the initial screening process were eliminated due to constructability issues, potential generation of odors, or physical Site limitations (existing overhead electric transmission lines).

1.1 Purpose of Report

The purpose of this Report is to identify and evaluate potential transportation alternatives for the off-site disposal of excavated impacted soil and the delivery of clean fill required to backfill the excavations for evaluation against a set of specific criteria that have been established for the Site. These criteria are identified in Section 1.3 below. Based on the evaluation, alternatives are recommended for both impacted soil and clean fill materials.

1.2 Material Transportation Alternatives

The following alternatives are evaluated in this Report:

Impacted Soil

- Alternative 1A1 – Alternate Truck Routes
- Alternative 1A2 – Time Restrictions for Transport Vehicles
- Alternative 1B1 – Truck to Adjacent Facility for Barging
- Alternative 2A3 – Use Containers Through Existing Tunnel for Barging
- Alternative 2B1 – Trucking Impacted Soil to the Bulkhead Area
- Alternative 3A1 – Use of On-Site Mobile Thermal Desorption Unit

Clean Fill

- Alternative 1A1 – Alternate Truck Routes
- Alternative 1A2 – Time Restrictions for Transport Vehicles
- Alternative 1B1 – Truck From Adjacent Facility after Barge Delivery
- Alternative 2A1 – Convey Backfill Through Existing Tunnel after Barge Delivery
- Alternative 2A2 – Pneumatically Convey Backfill Through Existing Tunnel
- Alternative 2A4 – Convey Backfill Through Existing Tunnel Using Containers
- Alternative 2B1 – Truck Backfill to Site Area Using Roll Offs or Containers
- Alternative 2B2 – Truck Backfill to Site Area in Bulk
- Alternative 3A1 – Use of On-Site Mobile Thermal Desorption Unit

1.3 Evaluation Criteria

The criteria selected for evaluation of each of the identified alternatives are as follows:

- Constructability- the ability of an alternative to be successfully constructed or implemented based on generally accepted engineering practices and technical feasibility. Alternatives which are readily constructible are preferred.
- Impact to the project schedule- the impact of an alternative on the existing planned project construction schedule. Alternatives that do not extend the existing construction schedule are preferred.

- Impacts to the surrounding residential communities- the impact of an alternative on the residential communities in the vicinity of the project based on noise generation, traffic disruptions and emissions of transportation related pollution. Alternatives with the least impacts are preferred.
- Permitting requirements- the permits and approvals necessary to implement an alternative. Alternatives which require the fewest permits/approvals are preferred.
- Estimated incremental construction costs- the estimated additional cost of an alternative above and beyond the current remedial construction cost estimate. Alternatives with the least incremental cost are preferred.
- Regulatory acceptance- the ability of an alternative to be accepted by federal, state and City regulatory agencies. Alternatives which can be readily accepted by the regulatory agencies are preferred.

1.4 Background and Description

The Site is located in Rockaway Park, Queens County, New York in an area located to the north and east of Rockaway Freeway, immediately adjacent and to the west of Beach 108th Street, and immediately adjacent and south of Beach Channel Drive.

Operations at the Site began in the late 1870s. The MGP plant was initially operated by Rockaway Electric Light Company, Town of Hempstead Gas and Electric Company and later by the Queensboro Gas and Electric Company from the late 1870s to 1926. In 1926, Queensboro Gas and Electric Company became a subsidiary of the Long Island Lighting Company (LILCO). LILCO operated the MGP plant from 1926 to approximately 1958 when most of the facilities were demolished. In 1998, KeySpan Corporation acquired the Site through a merger of LILCO and the Brooklyn Union Gas Company.

The Rockaway Park Former MGP encompasses approximately 9.8 acres and currently includes the following:

- An inactive KeySpan natural gas regulator station located in the southeastern portion of the Site, and,

- A vacated three-story office building and a one-story former workshop building located in the north central portion of the Site.

In this Report, the "Site Area" refers to the portion of the Site located to the south of Beach Channel Drive. The "Bulkhead Area" refers to the 0.6 acre strip of land located to the north of Beach Channel Drive and to the south of Jamaica Bay.

The planned remedial construction at the Site includes the following activities:

- Shallow excavation in specified areas to the depth of the groundwater table, approximately 8 feet below grade surface (bgs), to remove environmental impacted material;

- Installation of dense non-aqueous phase liquid (DNAPL) migration barriers along the northern edge of the Site which will extend to a depth of 120 feet bgs in the central portion of the Site and to 50 feet bgs on either side;

- Installation of a DNAPL migration barrier along the Bulkhead Area which will extend to a depth of 70 feet bgs;

- Installation of several passive DNAPL collection wells on-site and within the Bulkhead Area;

- Installation of a soil cover across the entire Site consisting of two feet of clean soil underlain by a geotextile construction barrier; and

- Restoration of excavation/filled areas by grading, placement of topsoil and seeding.

2.0 MATERIAL TRANSPORTATION ANALYSIS FOR IMPACTED SOILS

2.1 Alternative 1A1 – Alternative Truck Routes

Under this alternative, impacted soils will either be loaded into roll-off containers or direct loaded into dump trucks for transportation to an approved disposal facility. Other truck routes were evaluated in an effort to identify alternate routes that can be taken in order to avoid possible adverse impacts to the surrounding residential communities.

2.1.1 Constructability

Because there are residential communities to the east and west of the Site, no local alternate truck routes could be identified. Even though there are several existing routes that trucks can utilize to access the Rockaway Peninsula, the transport trucks will have to travel through the surrounding residential communities in order to access the Site.

2.1.2 Impact to the Project Schedule

Due to the ease to which this alternative can be implemented, there are no anticipated adverse impacts to the project schedule. The number of transport vehicles will need to support the production rate of the remedial excavation.

2.1.3 Community Impact

Due to a lack of local alternate truck routes, this alternative is considered to be not readily constructible. As such, impacts to the surrounding community can not accurately evaluated. However, even if this alternative could be implemented, it would result in the greatest potential for adverse impacts (i.e., increased traffic volume, noise, etc.) to the surrounding communities due to the volume of truck traffic as compared to most of the other alternatives.

2.1.4 Estimated Cost

The total cost for this alternative is approximately $3.8 million. This estimate assumes that approximately 126,000 tons (90,000 cubic yards) of impacted soil requires transportation to an off-site disposal facility and that the unit cost for transportation is approximately $30 per ton. This total cost only includes transportation costs to the disposal facility and does not include excavation, truck loading, or disposal costs.

2.1.5 Regulatory Acceptance

Since this is the typical method in which impacted soils are transported to disposal facilities from remedial cleanup sites, regulatory acceptance of this alternative is considered to be readily obtainable.

2.1.6 Conclusion

The evaluation of this alternative has concluded that this alternative would not have any adverse impacts on the project schedule, is cost effective and is regulatory compliant. However, the alternative is not readily constructible due to the lack of viable alternate truck routes. As such, this alternative does not warrant further consideration.

2.2 Alternative 1A2 – Time Restrictions for Transport Vehicles

Under this alternative, transport vehicles would only travel through the surrounding communities during limited times of the day. These time periods would be during off-peak hours for existing traffic and during time periods in which residents would most likely be away from their homes. The time period proposed is between the hours of 9:00 AM and 2:00 PM.

2.2.1 Constructability

This alternative is readily constructible. However, this alternative would impose construction limitations on the selected remedial contractor. The productivity of the remedial construction would likely be adversely impacted given the reduction in time allowed for loading and off-site disposal of excavated soils. Assuming that one remedial contractor crew can load approximately 4 transport vehicles per hour, the maximum number of transport vehicles loaded in a 5 hour day (9:00 am to 2:00 pm) would be limited to 20. In the event that a second loading operation and crew can be utilized, this estimated production rate may be doubled. The remedial contractor will need to coordinate the remedial construction activities in order to prevent this time restriction from "bottle necking" the project. Because of this influx of the transport trucks into the local roadways, a detailed traffic analysis of the local roadways may be required and traffic mitigation measures (i.e., flag men, police detail, modification of existing traffic signals/signage, etc.) may be required.

2.2.2 Impact to the Project Schedule

Since the maximum number of trucks which can be loaded on a daily basis is limited to 20 assuming use of one remedial contractor crew, the production rate of the remediation construction activities is capped at 400 tons per day (assuming that each transport vehicle has a capacity of 20 tons). Assuming 126,000 tons

(90,000 in place cubic yards) will require disposal, it will take approximately 315 days to dispose of the impacted material under this alternative. Although this schedule is consistent with the current project schedule, schedule flexibility is greatly diminished. The remedial contractor will not have the opportunity to increase production to shorten the overall schedule unless the number of work crews is increased to the extent practical considering site logistics. In addition, site construction delays can not be compensated for by allowing off-site transportation to occur later in the work day.

2.2.3 Community Impact

Due to the influx of transport trucks on the local roadways, this alternative may result in potential adverse impacts to the surrounding communities. However, the potential for adverse impacts is reduced due to the specified period of the day in which the transport vehicles will travel though the communities.

2.2.4 Estimated Cost

The total estimated cost for this alternative is approximately $3.8 million. This estimate assumes that approximately 126,000 tons (90,000 cubic yards) of impacted soil will require transportation to an off-site disposal facility and that the unit cost of transportation is approximately $30 per ton. This total cost only includes transportation costs to the disposal facility and does not include excavation, truck loading, or disposal costs.

2.2.5 Regulatory Acceptance

Since this is the typical method in which impacted soils are transported to disposal facilities on regulated sites, regulatory acceptance of this alternative is not anticipated to be an obstacle.

2.2.6 Conclusion

The evaluation of this alternative has concluded that this alternative is readily constructible. Although the alternative reduces potential schedule flexibility assuming use of one crew, it meets the existing proposed schedule, is both cost effective and regulatory compliant and reduces the potential adverse impacts to the surrounding residential communities. Therefore, this alternative achieves each of the identified evaluation criteria. Further discussions with community representatives would be required to obtain concurrence with this alternative.

2.3 Alternative 1B1 – Truck to Adjacent Facility for Barging

This alternative includes transporting impacted soil to an adjacent facility in sealed roll-offs, dump trailers, or sealed containers for off-site disposal via barging. The adjacent

facilities would need barge access and barge loading equipment. In addition, the adjacent area would need to be proximate to the Site in order to minimize the potential for adverse impacts to the surrounding communities associated with over-the-road transportation. The roll-offs/containers will then be lifted by a truck crane onto barges for transportation to the approved disposal facilities. The containers would then be barged to a dock facility in vicinity of the disposal facility. The roll-offs/containers would be unloaded from the barges using another truck crane and lifted onto transport vehicles. The transport vehicles would then transport the roll-offs/containers to the disposal facility for treatment and final disposal.

2.3.1 Constructability

The only identified facility that is proximate to the Site and has barge accessibility under this alternative is the publicly owned treatment works (POTW) owned and operated by the City of New York and located immediately to the east of the Site. However, the constructability of this alternative is potentially problematic. Even though the POTW has active barge access, it is not known whether the POTW would allow the barging operations to take place. In addition, the facility's current sludge barge operation may preclude locating the numerous barges required to transport impacted material to the selected disposal facility. Consultation with the POTW would be required to warrant further consideration of this alternative.

2.3.2 Impact to the Project Schedule

Because it is unknown whether or not the POTW can facilitate the barging operations, the exact impacts to the project schedule cannot be quantified at this time. Consultation with the POTW would be required to warrant further consideration of this alternative.

2.3.3 Community Impact

Under this alternative, adverse impacts to the surrounding communities are expected to be highly localized (in the immediate vicinity of the Site) and therefore not significant.

2.3.4 Estimated Cost

Because it is unknown whether the POTW can facilitate the barging activities, the estimated cost components (i.e., lease fees, schedule limitations) for this alternative cannot be adequately quantified. However, it is estimated that the transportation costs for this alternative would be similar to that of Alternative 2B1 detailed in Section 2.5.

2.3.5 Regulatory Acceptance

It is not known what existing permits have been obtained for the existing barging operations at the POTW. These permits would most likely require modifications or require supplementation under this alternative.

2.3.6 Conclusion

Due to the lack of information pertaining to the capabilities of the adjacent POTW, the constructability, cost and schedule impacts, and regulatory compliance status of this alternative can not be reliably evaluated. Until consultation with the POTW can be initiated, his alternative cannot be developed and therefore is not advanced for further consideration.

2.4 Alternative 2A3 – Use Containers through Existing Tunnel for Barging

This alternative includes utilizing an existing subsurface tunnel that underlies Beach Channel Drive to transfer waste containers to the Bulkhead Area. Approximately 700 dedicated containers would be utilized for this alternative. Under this alternative, a forklift would be used to carry containers filled with impacted soil through the subsurface tunnel and into the Bulkhead Area. The containers will then be lifted by a truck crane positioned on a dock barge and loaded onto barges for transportation to the approved disposal facilities. The dock barge would be positioned immediately adjacent to the existing bulkhead. The containers would then be barged to a dock facility located in vicinity of the selected disposal facility. The containers would be unloaded from the barges using another truck crane and placed onto transport vehicles. The transport vehicles would then transport the filled containers to the disposal facility for treatment and final disposal.

2.4.1 Constructability

This alternative is considered to be conditionally constructible. The constructability of this alternative is dependent on the following:

- The viability of utilizing the existing subsurface tunnel that underlies Beach Channel Drive;
- The construction of barge loading/unloading dock facility off of the Bulkhead Area; and
- The existence of an unloading dock facility in vicinity to the selected disposal facility.

Under this alternative, the tunnel access points need to be re-opened and the material and groundwater within the interior of the tunnel will require removal to facilitate transporting containers through the tunnel. Continuous groundwater removal may be required to facilitate the conveyance of the containers. In

addition, the existing pipes and pipe rack would require removal under this alternative. This alternative assumes that the structural integrity of the tunnel is sound. The ramp on the main Site area may not require extensive upgrades, but the condition of the ramp within the Bulkhead Area may require extensive upgrades to facilitate the operation of forklifts from the main Site area through the tunnel and up into the Bulkhead Area for loading onto barges.

In order to barge containers from the Bulkhead Area to the selected disposal facilities, a barge loading/unloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. The City of New York owns the existing bulkhead and prohibits utilizing the existing bulkhead to moor dock or transport barges. In addition, upgrades to the Bulkhead Area (i.e., backfilling to a new grade) to facilitate a loading/unloading operation would be prohibited due to potential adverse impacts on the existing bulkhead. The loading/unloading dock facility will consist of stationary dock barge anchored to the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for loading of containers. The truck crane positioned on the dock barge will lift containers that are transferred by forklifts through the tunnel and load them onto the cargo barges.

Penn Terminal located in Philadelphia, Pennsylvania has been identified as an unloading dock facility which is proximate to the approved facilities Clean Earth of Philadelphia (15 miles) and Clean Earth of New Castle Delaware (30 miles). This facility has barge access and has the required equipment necessary to unload the containers from the barges. The capacity of this facility is approximately 3,250 tons per day, so productivity would not be an obstacle.

2.4.2 Impact to the Project Schedule

The requirement for obtaining federal permits for the dock barge may prolong the scheduled mobilization date for the remedial construction activities. It is estimated that the required federal permits will take approximately 6 months to obtain if they are granted. Due to size limitations imposed by the dimensions of the tunnel and the allowable container sizes, this alternative would have an adverse impact to the project schedule. Under this alternative, it is estimated that it will take approximately 2.5 years to transport 90,000 cubic yards of impacted material to the selected disposal facility (not including the duration required to obtain the necessary permits and approvals).

2.4.3 Community Impact

Under this alternative, potential adverse impacts to the surrounding communities are not anticipated. By using the existing subsurface tunnel, traffic flow on Beach Channel Drive will not be hindered during the transportation of impacted soil material to the Bulkhead Area. In addition, barging the material to the dock

facility in vicinity to the selected disposal facility will not impact the community surrounding the Site. However, there may be potential impacts to the communities located between the dock facility and the disposal facility due to the need to transport the material via truck from the dock facility to the disposal facility. In addition, there may be potential impacts to the existing traffic on the waterways between the Site and the dock facility due to the influx of barges used to transported impacted materials from the Site to the disposal facility.

2.4.4 Estimated Cost

The estimated cost for transporting the impacted material off-site using containers loaded onto barges is approximately $7.6 million, not including costs associated with excavation, loading of containers, or disposal costs. Assuming 126,000 tons (90,000 cubic yards) of impacted soil require transportation, the unit cost is approximately $60.32 per ton.

2.4.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area is limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of the dock barge facility within Beach Channel immediately adjacent to the existing bulkhead will also likely require authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste, issued by the United States Army Corp of Engineers (USACOE).

Under this alternative, coordination with the United States Coast Guard (USCG) would be required regarding the dock barge loading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the marking/lighting of the barges moored against the dock barge loading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the New York State Department of Environmental (NYSDEC). The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in impacted soil entering the water thus potentially impacting marine environment and sediments within the waterways.

2.4.6 Conclusion

The evaluation of this alternative has determined that this alternative is conditionally constructible and would significantly reduce the potential adverse impacts to the residential communities surrounding the Site. However, the implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $7.6 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval may not be readily obtainable due to structural stability concerns associated with the existing bulkhead. Finally, the constructability of this alternative is contingent upon the structural integrity and viability of the subsurface tunnel which, at this time, is uncertain. In conclusion, given these uncertainties, this alternative is not advanced for further consideration.

2.5 Alternative 2B1 – Trucking Impacted Soil to the Bulkhead Area in Sealed Roll-offs, Dump Trailers, or Sealed Containers

This alternative includes transporting impacted soil to the Bulkhead Area in sealed roll-offs, dump trailers, or other sealed containers (e.g., drums, carboys, bulk sacks, etc.). Impacted soil would be loaded into these roll-offs/containers and transported via trucks to the Bulkhead Area. The roll-offs/containers will then be lifted by a medium sized truck crane positioned on a dock barge and loaded onto barges for transportation to the disposal facilities. The dock barge would be positioned immediately adjacent to the existing bulkhead. The containers would then be barged to a dock facility in the vicinity of the selected disposal facility. The roll-offs/containers would be unloaded from the barges using another medium sized truck crane and placed onto transport vehicles. The transport vehicles would then convey the filled roll-offs/containers to the disposal facility for treatment and final disposal.

2.5.1 Constructability

This alternative is conditionally constructible in the event that approval is granted by the City of New York, which owns the Bulkhead Area. Under this alternative, transport vehicles will transfer roll-offs/containers from the Site Area to the Bulkhead Area. Loaded trucks would exit the Site through the eastern entrance gate, travel south along Beach 108th Street, proceed west and then north along Rockaway Freeway, then drive east along Beach Channel Drive before making a left turn at the intersection of Beach Channel Drive and Beach 108th Street to gain entrance to eastern end of the Bulkhead Area. The trucks would then exit the Bulkhead Area from the west and then proceed west along Beach Channel Drive, travel south and then east along Rockaway Freeway, turn left onto Beach 108th Street and then enter the Site from Beach 108th Street. Assuming a daily production rate of 500 to 750 tons per day for impacted soil, approximately 25 to

38 round trips per day would be required. Because of this influx of the transport trucks onto the local roadways, a detailed traffic analysis of the impacts to the local roadways would likely be required.

As an additional option, obtaining approval for constructing a temporary cutout in the concrete center island along Beach 108th Street may be necessary to advance this alternative. Transport vehicles could then exit the Site via the gate at Beach 108th Street. The trucks would travel east through the new cutout and travel north along Beach 108th Street. The trucks could then proceed through the traffic light at the intersection of Beach 108th Street and Beach Channel Drive and make a left onto Beach Channel Drive before making a quick right into the Bulkhead Area.

Under this alternative, the Bulkhead Area would need improvements (i.e., entrance gates, haul road, stabilization of side slopes, etc.) in order to facilitate transport trucks ingress and egress. The design for the Bulkhead Area improvements would need to consider turning radii for transport trucks, anticipated truck traffic, and sizing for entrance/exit gates along Beach Channel Drive.

In order to barge roll-offs/containers from the Bulkhead Area to the selected disposal facilities, a barge loading/unloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. However, the City of New York owns the existing bulkhead and prohibits vessel tie-ups to the existing bulkhead (refer to Appendix C). In addition, upgrades to the Bulkhead Area (i.e., backfilling to a new grade) to facilitate a loading/unloading operation would be prohibited due to potential adverse impacts on the existing bulkhead. The loading/unloading dock facility would consist of a stationary dock barge anchored into the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for the loading of containers. A truck crane positioned on the dock barge would transfer the roll-offs/containers from the Bulkhead Area onto the cargo barges.

Penn Terminal located in Philadelphia, Pennsylvania has been identified as an unloading dock facility which is proximate to the approved facilities Clean Earth of Philadelphia (15 miles) and Clean Earth of New Castle Delaware (30 miles). This facility has barge access and has the required equipment necessary to unload the containers from the barges. The capacity of this facility is approximately 3,250 tons per day, so productivity would not be an obstacle.

2.5.2 Impact to the Project Schedule

The requirement to obtain a federal permit authorization may prolong the scheduled mobilization date for the remedial construction activities. It is estimated that the permit authorization may take approximately 6 months to obtain if they are granted. Under this alternative, it is estimated that it will take

approximately 6 months to transport 90,000 cubic yards of impacted material to the selected disposal facility.

2.5.3 Community Impact

Under this alternative, significant adverse impacts to the surrounding communities are not anticipated. However, because the transport vehicles will be utilizing Beach 108th Street, Beach Channel Drive, and Rockaway Freeway during the material transportation to the Bulkhead Area, potential impacts to the existing traffic patterns may result. Because of this influx of transport trucks onto the local roadways, a detailed traffic analysis of local traffic flow patterns is recommended and traffic mitigation measures (i.e., flag men, police detail, modification of existing traffic signals/signage, etc.) may be required.

Barging the material to the dock facility in vicinity to the selected disposal facility will not impact the community surrounding the Site. However, there will be an impact to the communities located between the dock facility and the disposal facility due to the necessity of transporting the material by truck form the from the dock facility to the disposal facility.

2.5.4 Estimated Cost

The estimated cost for transporting the impacted material off-site using roll-offs/containers loaded onto barges is approximately $7.7 million, not including excavation or treatment costs. Assuming 126,000 tons (90,000 cubic yards) of impacted soil require transportation, the unit cost is approximately $61.11 per ton.

2.5.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of the dock barge facility within Beach Channel immediately adjacent to the existing bulkhead will likely require authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste, issued by the USACOE.

Under this alternative, coordination with the USCG would be required regarding the dock barge loading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the

marking/lighting of the barges moored against the dock barge loading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the NYSDEC. The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in impacted soil entering the water thus potentially impacting marine environment and sediments within the waterways.

2.5.6 Conclusion

This evaluation has determined that this alternative is conditionally constructible and will significantly reduce the potential adverse impacts to the residential communities surrounding the Site. Direct impacts to the community will be limited to the immediate Site area to address this limited impact, a detailed Site-specific traffic analysis and Traffic Mitigation Plan may be required. However, implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $7.7 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval will likely not be readily obtainable due to structural stability concerns associated with the existing bulkhead. In conclusion, given both the schedule impacts and the uncertainty of use of the Bulkhead Area, this alternative is not advanced for further consideration.

2.6 Alternative 3A1 – On-Site Mobile Thermal Desorption Unit

Low-Temperature Thermal Desorption (LTTD) is an ex-situ (i.e., out of the ground) remedial technology that uses heat to physically separate petroleum hydrocarbons from excavated soils. Thermal desorbers are designed to heat soils to temperatures sufficient to cause contamination to volatilize and desorb (physically separate) from the soil, but will typically not oxidize them (i.e., incineration). LTTD has generally been accepted as a treatment technology for soils impacted with MGP-related contaminants.

Most desorbers operate at temperatures between 300 degrees F to 1,000 degrees F. The vaporized hydrocarbons are generally treated in a secondary treatment unit (e.g., an afterburner, catalytic oxidation chamber, condenser, or carbon adsorption unit) prior to release to the atmosphere. Afterburners and oxidizers destroy the organic contaminants. Condensers and carbon adsorption units trap organic compounds for subsequent treatment or disposal.

Two common LTTD designs are the rotary dryer and thermal screw. Rotary dryers are horizontal cylinders that can be indirect or direct-fired. The dryer is normally inclined and rotated. For the thermal screw units, screw conveyors or hollow augers are used to transport the soil through an enclosed trough. Hot oil or steam circulates through the auger to indirectly heat the soil. Regardless of the design used, materials to be treated should have low plasticity (i.e., clay content), a moisture content of less than 20% and no material larger than 2 inches in diameter. Because treatment may alter the physical properties of the soil, a geotechnical analysis of the treated soil may be required to ensure that it can support potential re-use of the site. The treated soil may have to be amended to enhance its geotechnical properties.

After leaving the desorber, soils are cooled, re-moistened to control dust, and stabilized (if necessary) to prepare them for reuse.

2.6.1 Constructability

Mobile LTTD units are typically modular and are delivered to a site and are assembled on the site. Special permits may be required to transport the modular units, depending on the delivery route selected. Depending on the size of the unit, at least 0.5 acre is required for the treatment unit and treated soil stockpiles. LTTD units are typically fired by natural gas, LPG or fuel oil. In addition, both a water source (40-60 gallons of water per ton of soil fed is typically needed to quench/humidify the soil) and electricity (operation of the monitoring equipment and related system components) are required.

The Site meets the minimum footprint requirement and has ready access to the required utilities (natural gas, water and electricity).

2.6.2 Impact to the Project Schedule

Although LTTD is generally recognized as an acceptable technology for the treatment of MGP-impacted soils, the NYSDEC and/or New York State Department of Health (NYSDOH) may require pilot testing of the system in which a quantity of soil from the Site is processed through the LTTD system (i.e., a "test burn"). Depending on the availability of the system and regulatory requirements (number of soil samples, residence times and testing of feed soil and treated soil), the pilot test may add 2 to 6 months to the schedule.

The removal of saturated soil containing source material is anticipated. These soils would have to be dewatered or amended to achieve a moisture content of less than 20%. The time require to dewater site soils is not included in the current remedial schedule.

The most significant schedule impact, however, will come from the need to establish air discharge requirements. Although a formal permit is not required for

this Site, all of substantive requirements for obtaining a permit would have to be met. These substantive requirements include establishing contaminant-specific limits, discharge monitoring requirements and operational limitations. Although it is difficult to estimate the schedule impact associated with setting site-specific air discharge requirements, the best case scenario is probably on the order of 6 months.

2.6.3 Community Impact

Use of a LTTD at the Site would significantly reduce, but not eliminate, the number of transport trucks that carry impacted materials.

As discussed, an LTTD is typically operated 24-hours per day, 7 days per week to maximize cost efficiency. This operational schedule is unlikely to be accepted by the community due to potential noise and other impacts associated with round-the-clock site operations.

Finally, there may be the perception in the community that LTTD is equivalent to incineration. Incineration is typically regarded as an undesirable technology due to negative impressions associated with air emissions and treatment residual disposal. Although the two technologies are different, it may be difficult to convey the technical differences of the two technologies to the community residents.

2.6.4 Estimated Cost

There are no transportation costs under this alternative since the impacted soil will be treated on-site. For large volumes of soil (greater than 1,000 yd^3), LTTD soil treatment costs are generally in the range of $30-$60 per ton of impacted soil. This cost does not include costs associated with obtaining permits, excavation, screening of debris, or management of treated soil. Implementation of this alternative may actually result in decreased remediation costs for the project.

2.6.5 Regulatory Acceptance

Given a sufficient allowance in the project schedule, the regulatory issues are likely readily resolvable. As referenced above, air discharge limits will have to be negotiated with the NYSDEC and NYSDOH and air discharge approvals would most likely need to be obtained. It is also possible that the New York City Department of Environmental Protection (NYCDEP) may take an active role in the regulatory review process. Confirmation from the NYSDEC would also have to be obtained to ensure that impacted soil treated on the Site with LTTD technology are granted an exclusion from the New York State hazardous waste regulations.

2.6.6 Conclusion

The evaluation of this alternative has determined that this alternative is constructible, is regulatory compliant and will significantly reduce the potential adverse impacts to the surrounding residential communities caused by the influx of transport trucks. In addition, this alternative would likely not result in increased remedial construction costs. However, this alternative may cause significant delays to the project schedule due to the need for a pilot test demonstration, NYSDEC review and approval, revisions to existing regulatory documents, and due to the limited capacity of the LTTD system. Because of this potential project delays and due to the negative public perception, this alternative has been eliminated from further consideration.

3.0 MATERIAL TRANSPORTATION ANALYSIS FOR CLEAN FILL

3.1 Alternative 1A1 – Alternative Truck Routes

Under this alternative, clean fill will be transported to the Site Area directly from an approved backfill source location utilizing transport trucks. Potential truck routes were evaluated in an effort to identify alternate routes that can be taken in order to avoid possible adverse impacts to residential communities.

3.1.1 Constructability

Because there are residential communities to the east and west of the Site, no alternatives to the preferred route are available. Even though there are several existing routes that trucks can utilize to access the Rockaway Peninsula, the transport trucks will have to travel through the surrounding residential communities in order to access the Site.

3.1.2 Impact to the Project Schedule

Due to the ease to which this alternative can be implemented, there are no anticipated adverse impacts to the project schedule. The number of transport vehicles and resulting loads of backfill will need to support the schedule of the remedial construction activities.

3.1.3 Community Impact

Due to a lack of local alternate truck routes, this alternative is considered to be not readily constructible. As such, impacts to the surrounding community can not be accurately evaluated. However, even if this alternative could be implemented, it would result in the greatest potential for adverse impacts (i.e., increased traffic volume, noise, etc.) to the surrounding communities due to the volume of truck traffic as compared to the other alternatives.

3.1.4 Estimated Cost

The total cost for this alternative is approximately $2.27 million. This estimate assumes that approximately 126,000 tons (90,000 cubic yards) of clean fill is required to backfill the excavation areas during the remedial construction activities and that the unit cost is approximately $18.02 per ton. This total cost only includes transportation costs to the Site from the backfill source location(s) and does not include material handling or compaction costs.

3.1.5 Regulatory Acceptance

Since this is the typical method in which clean fill is transported to remedial construction sites, this alternative is anticipated to be regulatory compliant.

3.1.6 Conclusion

The evaluation of this alternative has concluded that this alternative is cost effective, regulatory compliant and would not have any adverse impacts on the project schedule. However, this alternative is not readily constructible due to the lack of viable alternate truck routes. As such, this alternative is not advanced for further consideration.

3.2 Alternative 1A2 – Time Restrictions for Transport Vehicles

Under this alternative, transport vehicles would only travel through the surrounding communities during limited times of the day. These time periods would be during off-peak hours for existing traffic and during time periods in which residents would likely be away from their homes. The time period proposed is between the hours of 9:00 AM and 2:00 PM.

3.2.1 Constructability

This alternative is readily constructible. However, this alternative would impose construction limitations on the selected remedial contractor. The productivity for backfilling excavations may be impacted given the reduction in time allowed for the transporting and off-loading clean fill. The remedial contractor will be required to coordinate the demand for clean fill with the time restrictions of the transport trucks in order to prevent this time restriction from "bottle necking" the project. Because of the influx of transport trucks onto the local roadways, a detailed traffic analysis of the local roadways may be required and the implementation of traffic mitigation measures (i.e. flag men, police detail, modification of existing traffic signals/signage, etc.) may be required.

3.2.2 Impact to the Project Schedule

There are no anticipated impacts to the project schedule under this alternative. Because the need for clean fill is dependent on the rate of the remedial excavation activities (which is approximately 400 tons per day assuming one crew), the estimated duration for backfill delivery is approximately 315 days. Although this schedule is consistent with the current project schedule, schedule flexibility will be greatly diminished. The remedial contractor will not have the opportunity to increase production to shorten the overall schedule unless the number of work crews is increased to the extent practical considering site logistics. In addition,

site construction delays can not be compensated for by allowing backfill delivery to occur latter in the work day.

3.2.3 Community Impact

Due to the anticipated influx of transport trucks on the local roadways, this alternative may result in potential adverse impacts to the surrounding communities. However, the potential for adverse impacts is reduced due to the specified period of the day in which the transport vehicles will travel though the communities.

3.2.4 Estimated Cost

The total estimated cost for this alternative is approximately $2.27 million. This estimate assumes that approximately 126,000 tons (90,000 cubic yards) of clean fill material will be required to backfill the excavation areas during the remedial construction activities and that the unit cost for transportation is approximately $18.02 per ton. This total cost only includes transportation costs to the Site from the approved backfill source location(s) and does not include handling or compaction costs.

3.2.5 Regulatory Acceptance

Since this is the typical method in which clean fill is transported to remedial construction sites, this alternative is regulatory compliant.

3.2.6 Conclusion

This alternative is readily constructible. Although this alternative reduces potential schedule flexibility assuming use of one crew, it meets the existing proposed schedule, is both cost effective and regulatory compliant and reduces the potential adverse impacts to the surrounding residential communities. Therefore, this alternative achieves each of the identified evaluation criteria. Further discussions with community members would be required for concurrence with this alternative.

3.3 Alternative 1B1 – Trucking from Adjacent Facility after Barge Delivery

This alternative includes transporting clean fill from an adjacent facility in roll-offs or dump trailers for the backfilling of excavations. The adjacent facility would need barge access and barge unloading equipment. In addition, the adjacent area would need to be proximate to the Site in order to minimize the potential for adverse impacts to the surrounding communities associated with over-the-road transportation. The roll-offs or dump trailers would be transported to the adjacent facility via barge before being unloaded by a truck crane positioned on a dock barge. The unloaded roll-off containers or

dump trailers would be trucked over to the Site. The clean fill would be unloaded directly into the excavation area or onto a stockpile. The roll-offs or dump trailers would then be returned to the barge for shipment back to the clean fill source location.

3.3.1 Constructability

The only identified facility proximate to the Site that has barge accessibility under this alternative is the publicly owned treatment works (POTW) owned and operated by the City of New York, and located immediately to the east of the Site. However, the constructability of this alternative is potentially problematic. Even though the POTW has active barge access, it is not known whether the POTW would allow the barging operations to take place. In addition, the facility's current sludge barge operation may preclude locating the numerous barges required to transport clean fill from the backfill source locations. Consultation with the POTW would be required to warrant further consideration of this alternative.

3.3.2 Impact to the Project Schedule

Because it is unknown whether the POTW can facilitate the barging operations, the exact impact to the project schedule cannot be quantified at this time. Consultation with the POTW would be required to warrant further consideration of this alternative.

3.3.3 Community Impact

Under this alternative, adverse impacts to the surrounding communities are expected to be highly localized (in the immediate vicinity of the Site) and therefore not significant.

3.3.4 Estimated Cost

Because it is unknown whether the POTW can facilitate the proposed barging activities, the estimated costs components (i.e., lease fees, schedule limitations) for this alternative cannot be adequately quantified. However, it is estimated that the transportation costs for this alternative would be similar to that of Alternative 1B1 detailed in Section 2.3.

3.3.5 Regulatory Acceptance

It is unknown what permits and/or approvals have been obtained for the existing sludge barging operations at the POTW. These permits would most likely require modifications or require supplementation under this alternative.

3.3.6 Conclusion

Due to the lack of information pertaining to the capabilities of the adjacent POTW, the constructability, cost and schedule impacts, and regulatory compliance status of this alternative can not be readily evaluated. Until consultation with the POTW can be initiated, this alternative cannot be developed and therefore is eliminated from further consideration.

3.4 Alternative 2A1 – Conveying Clean Fill Through Existing Tunnel after Barge Delivery

This alternative includes utilizing an existing subsurface tunnel that underlies Beach Channel Drive to transfer clean fill from the Bulkhead Area to the Site. The clean fill will be barged from the approved backfill source location to the Bulkhead Area. The material would be offloaded from the barges and transported through the existing tunnel utilizing a conveyor belt system. Under this alternative, an offloading dock facility would need to be constructed adjacent to the Bulkhead Area in Beach Channel in order for clean fill to be barged from the approved backfill source. Clean fill would be offloaded from the barge using a backhoe and placed into a hopper before being depositing onto the conveyor belt system. The clean fill would be conveyed through the subsurface tunnel and onto the Site. Within the Site, the conveyor belt system would be elevated to a surge bin from which dump trucks would then be loaded for backfilling.

3.4.1 Constructability

This alternative is considered to be conditionally constructible. The constructability of this alternative is dependent on the following:

- The viability of utilizing the existing subsurface tunnel that underlies Beach Channel Drive;
- The construction of barge loading/unloading dock facility off of the Bulkhead Area; and
- The existence of backfill source that has barge access and barge loading equipment.

Under this alternative, the tunnel access points would need to be re-opened and the existing fill material and groundwater within the tunnel would require removal to facilitate the installation of a conveyor belt system. Continuous groundwater removal may be required to facilitate the conveyor belt system. In addition, the existing pipes and the pipe rack would require removal under this alternative. This alternative assumes that the structural integrity of the tunnel is sound. The ramp on the Site may require minor upgrades. The ramp within the Bulkhead Area will likely require extensive upgrades to facilitate the utilization of the conveyor belt system.

In order to barge clean fill from the approved backfill source to the Bulkhead Area, a barge offloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. The City of New York owns the existing bulkhead and prohibits utilizing the existing bulkhead to moor dock or transport barges. In addition, upgrades to the Bulkhead Area to facilitate a loading/unloading operation would be prohibited due to potential adverse impacts on the existing bulkhead. The offloading dock facility will consist of a stationary dock barge anchored into the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for the offloading of the barges.

Finally, in order for this alternative to be constructible, the approved backfill source facility must have barge accessibility, barge loading equipment, and clean fill that meets the geotechnical and environmental requirements of the remedial design.

3.4.2 Impact to the Project Schedule

The requirement for obtaining federal permit authorization for the dock barge construction may prolong the scheduled mobilization date for the planned remedial construction activities. It is estimated that the required federal permit authorizations will take approximately 6 months to obtain. In addition to the construction of the offloading dock facility and the time required for permitting, the dimensions of the existing tunnel will limit the volume of clean fill that can be conveyed during a given period of time thus delaying production and the project schedule.

3.4.3 Community Impact

Under this alternative, adverse impacts to the surrounding communities are not anticipated. By using the existing subsurface tunnel, traffic flow on Beach Channel Drive will not be hindered during the transportation of clean fill from the Bulkhead Area to the Site Area. However, there may be impacts to the existing traffic on the waterways between the Bulkhead Area and the approved backfill dock facility due to the influx of barges as well as to the communities located between the dock facility and the backfill source due to the need to transport the material via truck.

3.4.4 Estimated Cost

The estimated cost for conveying barged clean fill from the Bulkhead Area to the Site utilizing a conveyor belt system through the existing subsurface tunnel is approximately $5.4 million, not including costs associated with handling or compaction. This cost assumes that approximately 126,000 tons (90,000 cubic yards) of clean fill is required to backfill the excavation areas during the remedial

construction and that the unit cost for transportation will be approximately $42.86 per ton.

3.4.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area is limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of the dock barge facility will also likely require authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste, issued by the United States Army Corp of Engineers (USACOE).

Under this alternative, coordination with the United States Coast Guard (USCG) would be required regarding the dock barge unloading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the marking/lighting of the barges moored against the dock barge unloading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the NYSDEC. The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in clean fill entering the water thus potentially impacting marine environment and sediments within the waterways.

3.4.6 Conclusion

The evaluation of this alternative has determined that this alternative is conditionally constructible and will not result in adverse impacts to the residential communities surrounding the Site. However, the implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $5.4 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval likely is not readily obtainable due to structural stability concerns associated with the existing bulkhead. Finally, the constructability of this alternative is contingent upon the structural integrity and viability of the subsurface tunnel which makes the success of this alternative uncertain. In conclusion, given these uncertainties, this alternative is not advanced for further consideration.

3.5 Alternative 2A2 – Conveying Clean Fill Through the Existing Tunnel Pneumatically

This alternative consists of utilizing the existing subsurface tunnel that underlies Beach Channel Drive to transfer clean fill from the Bulkhead Area to the Site via a pneumatic conveyance system. The pneumatic conveyance system would consist of a compressor with two pressure vessels mounted at the Bulkhead Area of the tunnel and a cyclone separator mounted on two 40 cubic yard silos on the Site side of the tunnel. Under this alternative, an offloading dock facility would need to be constructed adjacent to the existing bulkhead within Beach Channel and clean fill would be barged to this offloading dock facility from the approved backfill source location. The clean fill would be pneumatically removed from the barges and conveyed to the Site utilizing the proposed pneumatic pipeline. The clean fill would be transferred to the cyclone separator located atop the 40 cubic yard silos. The silos would be stationed at an elevated position on Site such that the dedicated dump trucks can be loaded. The loaded dump trucks would then transport the clean fill to the excavation areas as needed.

3.5.1 Constructability

This alternative is considered to be conditionally constructible. The constructability of this alternative is dependent on the following:

- The viability of utilizing the existing subsurface tunnel that underlies Beach Channel Drive;
- The moisture content of the clean fill being less than 15%;
- The construction of the barge loading/offloading dock facility adjacent to the Bulkhead Area; and
- The existence of backfill source that has barge access and barge loading equipment.

Under this alternative, the tunnel access points need to be re-opened and the fill material and groundwater within the interior of the tunnel will require removal to facilitate the installation of a pneumatic conveyance system. Continuous groundwater removal may be required to facilitate the conveyance of the containers. In addition, the existing pipes and pipe rack would require removal under this alternative. It may be possible to hydraulically jack the pneumatic pipeline through the tunnel thus eliminating the need to remove all of the tunnel's contents. This alternative also assumes that the structural integrity of the tunnel is sound.

The pneumatic conveyance system performs best when the moisture content of the clean fill is less than 15%. The system will not operate efficiently should the clean fill be moderately to extremely wet. Should the moisture content of the clean fill be substantially higher than 15%, the need for drying equipment staged

on the dock barge may be required to evaporate the moisture of the clean fill prior to it being pneumatically conveyed through the tunnel. The drying time required to reduce the moisture content below 15% may cause delays to the project schedule.

In order to barge clean fill from the backfill source to the Bulkhead Area, a barge unloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. The City of New York owns the existing bulkhead and prohibits utilizing the existing bulkhead to moor dock or transport barges. In addition, upgrades to the Bulkhead Area (i.e., backfilling to a new grade) to facilitate a loading/unloading operation may be prohibited due to potential adverse impacts on the existing bulkhead. The unloading dock facility will consist of stationary dock barge anchored to the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for offloading of barges.

Finally, in order for this alternative to be constructible, the approved backfill source facility must have barge accessibility, barge loading equipment, and clean fill that meets the geotechnical and environmental requirements of the remedial design.

3.5.2 Impact to the Project Schedule

The requirement to obtain federal permit authorization may prolong the scheduled mobilization date for the remedial construction activities. It is estimated that the permit authorization will take approximately 6 months to obtain. In addition, the construction of the unloading dock facility may cause delays to the project schedule. Lastly, drying of the clean fill may be required to reduce the moisture content below 15%, resulting in possible adverse impacts to the project schedule.

3.5.3 Community Impact

Under this alternative, adverse impacts to the surrounding communities are not anticipated. By using the existing subsurface tunnel, traffic flow on Beach Channel Drive will not be hindered during the transportation of clean fill from the Bulkhead Area to the Site Area. However, there may be impacts to the existing traffic on the waterways between the Site and the backfill dock facility due to the influx of barges as well as to the communities located between the dock facility and backfill source location due to the need to transport the material via truck.

3.5.4 Estimated Cost

The estimated cost for conveying barged clean fill from the Bulkhead Area to the Site Area utilizing a pneumatic conveyance system through the existing subsurface tunnel is approximately $4.1 million, not including costs associated

with subsequent handling or compaction. This cost assumes that approximately 126,000 tons (90,000 cubic yards) of clean fill is required to backfill the excavation areas during remedial construction and a unit cost for transportation of approximately $32.54 per ton.

3.5.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area is limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of the dock facility within Beach Channel immediately adjacent to the existing bulkhead will also likely require obtaining authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste, issued by the United States Army Corp of Engineers (USACOE).

Under this alternative, coordination with the USCG would be required regarding the dock barge unloading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the marking/lighting of the barges moored against the dock barge unloading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the New York State Department of Environmental (NYSDEC). The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in clean fill entering the water thus potentially impacting marine environment and sediments within the waterways.

3.5.6 Conclusion

The evaluation of this alternative has determined that this alternative is conditionally constructible and will not result in adverse impacts to the residential communities surrounding the Site. However, the implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $4.1 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval is likely not readily obtainable due to structural stability concerns associated with the existing bulkhead. Finally, the constructability of this alternative is contingent upon the structural integrity and

viability of the subsurface tunnel which, at this time, is uncertain. In conclusion, given these uncertainties, this alternative is not advanced for further consideration.

3.6 Alternative 2A4 – Conveying Clean fill Through the Existing Tunnel Using Containers

This alternative includes utilizing the existing subsurface tunnel that underlies Beach Channel Drive to transfer containers from the Bulkhead Area to the Site Area. The estimated number of containers required is approximately 700. Under this alternative, an unloading dock facility would need to be constructed within Beach Channel adjacent to the existing bulkhead and clean fill would be barged to this facility from the approved backfill source. A forklift would be used to carry containers filled with clean fill through the subsurface tunnel and onto the Site Area. The containers would be barged from the backfill source location to the dock barge facility stationed within Beach Channel. The containers will then be lifted by a truck crane positioned on the dock barge and placed within the Bulkhead Area. A forklift would be used to transport containers filled with clean fill through the subsurface tunnel and onto the Site Area.

3.6.1 Constructability

This alternative is considered to be conditionally constructible. The constructability of this alternative is dependent on the following:

- The viability of utilizing the existing subsurface tunnel that underlies Beach Channel Drive;
- The construction of barge loading/unloading dock facility off of the Bulkhead Area; and
- The existence of backfill source that has barge access and barge loading equipment.

Under this alternative, the tunnel access points would need to be re-opened and the fill material and groundwater within the interior of the tunnel will require removal to facilitate transporting containers through the tunnel. Continuous groundwater removal may be required to facilitate the conveyance of the containers. In addition, the existing pipes and pipe rack would require removal under this alternative. This alternative assumes that the structural integrity of the tunnel is sound. The ramp in the Site Area may not require extensive upgrades but the condition of the ramp within the Bulkhead Area may require extensive upgrades to facilitate the operation of forklifts from the Bulkhead Area to Site.

In order to barge clean fill from the approved backfill source to the Bulkhead Area, a barge unloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. The City of New York owns the existing bulkhead and prohibits utilizing the existing bulkhead to moor dock or transport

barges. In addition, upgrades to the Bulkhead Area (i.e., backfilling to a new grade) to facilitate a loading/unloading operation may be prohibited due to potential adverse impacts on the existing bulkhead. The unloading dock facility will consist of stationary dock barge anchored to the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for unloading of barges.

Finally, in order for this alternative to be constructible, the approved backfill source facility must have barge accessibility, barge loading equipment, and clean fill that meets the geotechnical and environmental requirements of the remedial design.

3.6.2 Impact to the Project Schedule

The requirement to obtain federal permit authorization may prolong the scheduled mobilization date for the remedial construction. It is estimated that the permit authorization will take approximately 6 months to obtain. Due to size limitations imposed by the dimensions of the tunnel and the allowable container sizes, this alternative would have an adverse impact to the project schedule. Under this alternative, it is estimated that it will take approximately 2.5 years to transport 90,000 cubic yards of clean fill from the Bulkhead Area to the Site Area via the existing subsurface tunnel (not including the duration required to obtain the necessary permits and approvals).

3.6.3 Community Impact

Under this alternative, significant adverse impacts to the surrounding communities are not anticipated. However, because the transport vehicles will be utilizing Beach 108th Street, Beach Channel Drive, and Rockaway Freeway during the material transportation between the Bulkhead Area and the Site Area, potential impacts to the existing traffic patterns may result. Because of this influx of the transport trucks into the local roadways, a detailed traffic analysis of local traffic flow patterns is recommended and traffic mitigation measures (i.e. flag men, police detail, modification of existing traffic signals/signage, etc.) may be required. In addition, there may be impacts to the existing traffic on the waterways between the backfill source location and the Site and also to the communities located between the dock facility and the approved backfill source location due to the need to transport the material via truck.

3.6.4 Estimated Cost

The estimated cost for transporting the clean fill to the Site Area using containers loaded onto barges is approximately $7.6 million not including costs associated with subsequent handling or compaction. This cost assuming that approximately 126,000 tons (90,000 cubic yards) of clean fill is required to backfill the

excavation areas during the remedial construction activities and a unit cost for transportation of approximately $60.32 per ton.

3.6.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area is limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of a dock barge facility within Beach Channel immediately adjacent to the existing bulkhead will also likely require authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste, issued by the United States Army Corp of Engineers (USACOE).

Under this alternative, coordination with the United States Coast Guard (USCG) would be required regarding the dock barge unloading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the marking/lighting of the barges moored against the dock barge unloading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the New York State Department of Environmental (NYSDEC). The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in clean fill entering the water thus potentially impacting marine environment and sediments within the waterways.

3.6.6 Conclusion

The evaluation of this alternative has determined that this alternative is conditionally constructible and will not result in adverse impacts to the residential communities surrounding the Site. However, the implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $7.6 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval is likely not readily obtainable due to structural stability concerns associated with the existing bulkhead. Finally, the constructability of this alternative is contingent upon the structural integrity and viability of the subsurface tunnel which, at this time, is uncertain. In conclusion,

given these uncertainties, this alternative is not advanced for further consideration.

3.7 Alternative 2B1 – Truck Backfill to Site Area Using Roll-offs, Dump Trailers, or Open Containers

This alternative includes transporting clean fill from the Bulkhead Area in roll-offs, dump trailers, or other open containers to the Site Area. Clean fill would be barged to the Bulkhead Area in roll-offs, dump trailers, or other open containers. Under this alternative, an unloading dock facility would need to be constructed within Beach Channel adjacent to the existing bulkhead and clean fill would be barged to this dock facility from the approved backfill source location. The roll-offs/containers will then be lifted by a truck crane positioned on a dock barge and loaded onto transport trucks that will transport the material over to the Site Area. The material will then be unloaded at the Site Area into excavation areas or onto stockpiles to support the remedial construction activities.

3.7.1 Constructability

This alternative is conditionally constructible, in the event that approval from the City of New York is granted. Under this alternative, transport vehicles will transfer roll-offs/containers from the Bulkhead Area to the Site Area. The route taken by the transport vehicles would need further evaluation and may require a detailed traffic analysis. One potential route would be for the loaded transport vehicles to exit the Bulkhead Area at the intersection of Beach Channel Drive and Beach 108th Street, travel south along Beach 108th Street before making a right turn into the Site. Empty transport trucks would exit the Site through the eastern entrance gate, travel south along Beach 108th Street, proceed west and then north along Rockaway Freeway, then drive east along Beach Channel Drive before making a left turn at the intersection of Beach Channel drive and Beach 108th Street to gain entrance to the eastern end of the Bulkhead Area.

An additional option to advance this alternative would be to obtain approval for constructing a temporary cutout in the concrete center island along Beach 108th Street. Empty transport vehicles could then exit the Site Area via the gate at Beach 108th Street. The trucks would travel east through the new cutout and travel north along Beach 108th Street. The trucks could then proceed through the traffic light at the intersection of Beach 108th Street and Beach Channel Drive and make a left turn onto Beach Channel Drive before making a quick right turn into the Bulkhead Area. Loaded transport trucks would exit the Bulkhead Area along its western extent, travel west along Beach Channel Drive, make a left turn to travel south and then east along Rockaway Freeway, and then turn left to proceed north along Beach 108th Street. The trucks would then make a left turn through the new cutout and into the Site Area. Because of this influx of the transport trucks onto the local roadways, a detailed traffic analysis of the impacts to the local roadways may be required.

Under this alternative, the Bulkhead Area would need improvements (i.e. entrance gates, haul road, stabilization of side slopes, etc.) in order to facilitate transport trucks ingress and egress. The design for the Bulkhead Area improvements would need to consider the turning radii for transport trucks, anticipated truck traffic, and sizing for the entrance/exit gates along Beach Channel Drive.

In order to barge clean fill from the backfill source to the Bulkhead Area, a barge unloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. However, the City of New York owns the existing bulkhead and prohibits vessels tie-ups to the existing bulkhead (refer to Appendix C). In addition, upgrades to the Bulkhead Area (i.e. backfilling to a new grade) to facilitate a loading/unloading operation would be prohibited due to potential adverse impacts on the existing bulkhead. The unloading dock facility would consist of a stationary dock barge anchored to the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for the unloading of containers.

Finally, in order for this alternative to be constructible, the approved backfill source facility must have barge accessibility, barge loading equipment, and clean fill that meets the geotechnical and environmental requirements of the remedial design.

3.7.2 Impact to the Project Schedule

The requirement to obtain federal permit authorization may prolong the scheduled mobilization date for the remedial construction. It is estimated that the permit authorization may take approximately 6 months to obtain. Under this alternative, it is estimated that it will take approximately 6 months to transport 90,000 cubic yards of clean fill to the Site.

3.7.3 Community Impact

Under this alternative, significant adverse impacts to the surrounding communities are not anticipated. However, because the transport vehicles will be utilizing Beach 108th Street, Beach Channel Drive, and Rockaway Freeway during the material transportation between the Bulkhead Area and the Site, potential impacts to the existing traffic patterns in the immediate vicinity of the Site may result. Because of this influx of the transport trucks onto the local roadways, a detailed traffic analysis of local traffic flow patterns is recommended and traffic mitigation measures (i.e., flag men, police detail, modification of existing traffic signals/signage, etc.) may be required.

Barging the material to the dock facility in vicinity to the selected disposal facility will not impact the community surrounding the Site. However, there will be an impact to the communities located between the dock facility and the approved backfill facility due to the necessity of transporting the material by truck from the dock facility to the disposal facility.

3.7.4 Estimated Cost

The estimated cost for trucking the clean fill to the Site using roll-offs or other containers is approximately $6.8 million, not including costs associated with subsequent handling or compaction. This cost assumes that approximately 126,000 tons (90,000 cubic yards) of clean fill is required to backfill the excavation areas during the remedial construction and a unit cost for transportation of approximately $53.97 per ton.

3.7.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area is limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of a dock barge facility within the Beach Channel adjacent to the existing bulkhead will also likely require authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste issued by the United States Army Corp of Engineers (USACOE).

Under this alternative, coordination with the USCG would be required regarding the dock barge unloading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the marking/lighting of the barges moored against the dock barge unloading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the NYSDEC. The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in clean fill entering the water thus potentially impacting marine environment and sediments within the waterways.

3.7.6 Conclusion

The evaluation of this alternative has determined that this alternative is conditionally constructible and will not result in adverse impacts to the residential communities surrounding the Site. Direct impacts to the community will be limited to the immediate Site area. To address this limited impact, a detailed Site-specific traffic analysis and Traffic Mitigation Plan may be required. However, implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $6.8 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval is likely not readily obtainable due to structural stability concerns associated with the existing bulkhead. In conclusion, given both the schedule impacts and the uncertainty of use of the Bulkhead Area, this alternative is not advanced for further consideration.

3.8 Alternative 2B2 – Trucking Clean Fill from the Bulkhead Area Using Bulk Delivery

This alternative includes transporting clean fill from the Bulkhead Area in bulk via loaded transport trucks. Clean fill would be barged to the Bulkhead Area in bulk volumes. Under this alternative, an unloading dock barge facility would need to be constructed within Beach Channel adjacent to the existing bulkhead and clean fill would be barged to this dock barge facility from the dock facility in the vicinity of the approved backfill source location. Clean fill would be unloaded from the barge using a backhoe and trucked to the Site Area.

3.8.1 Constructability

This alternative is conditionally constructible, in the event that approval from the City of New York is granted. Under this alternative, transport vehicles will truck backfill in bulk from the Bulkhead Area to the Site Area. The route to be taken by the transport vehicles would need further evaluation and may require a detailed traffic analysis of the impacts to the local roadways. One option would be for the bulk loaded transport vehicles to exit the Bulkhead Area at the intersection of Beach Channel Drive and Beach 108th Street, travel south along Beach 108th Street before making a right turn to gain entrance into the Site Area. Empty transport trucks would exit the Site Area through the eastern entrance gate, travel south along Beach 108th Street, make a right turn and proceed west and then north along Rockaway Freeway, then make a right turn and travel east along Beach Channel Drive before making a left turn to gain entrance into the Bulkhead Area.

An additional option that may be necessary to advance this alternative would be to obtain approval for constructing a temporary cutout in the concrete center island along Beach 108th Street. Empty transport vehicles could then exit the Site via the eastern gate at Beach 108th Street. The trucks would continue east through the proposed cutout and turn left and travel north along Beach 108th Street. The trucks would then proceed through the traffic light at the intersection of Beach 108th Street and Beach Channel Drive and make a left turn onto Beach Channel Drive and travel west before making a quick right turn to gain entrance into the Bulkhead Area. Bulk loaded transport trucks would exit the Bulkhead Area along its western extent, travel west along Beach Channel Drive, turn left to travel south and then east along Rockaway Freeway, and make a left turn and then proceed north along Beach 108th Street. The trucks could then make a left turn through the new cutout to gain entrance into the Site Area.

Under this alternative, the Bulkhead Area would need improvements (i.e., entrance gates, haul road, stabilization of side slopes, etc.) in order to facilitate transport trucks ingress and egress. The design for the Bulkhead Area improvements would need to consider turning radii for transport trucks, anticipated truck traffic, and sizing for entrance/exit gates along Beach Channel Drive.

In order to barge clean fill from the backfill source to the Bulkhead Area, a barge unloading dock facility will need to be constructed within Beach Channel off of the existing bulkhead. However, the City of New York owns the existing bulkhead and prohibits vessel tie-ups to the existing bulkhead (refer to Appendix C). In addition, upgrades to the Bulkhead Area (i.e., backfilling to a new grade) to facilitate a loading/unloading operation may be prohibited due to potential adverse impacts on the existing bulkhead. The unloading dock facility would consist of a stationary dock barge anchored to the bottom of the Channel. The dock barge will allow cargo barges to moor immediately adjacent to it for the unloading of the barges.

Finally, in order for this alternative to be constructible, the approved backfill source facility must have barge accessibility, barge loading equipment, and clean fill that meets the geotechnical and environmental requirements of the remedial design.

3.8.2 Impact to the Project Schedule

The requirement to obtain federal permit authorization may prolong the scheduled mobilization date for the remedial construction activities. It is estimated that the permit authorization may take approximately 6 months to obtain. Under this alternative, it is estimated that it will take approximately 6 months to transport 90,000 cubic yards of clean fill to the Site.

3.8.3 Community Impact

Under this alternative, significant adverse impacts to the surrounding communities are not anticipated. However, because the transport vehicles will be utilizing Beach 108th Street, Beach Channel Drive, and Rockaway Freeway during the material transportation between the Bulkhead Area and the Site, potential impacts to the existing traffic patterns may result. Because of this influx of transport trucks onto the local roadways, a detailed traffic analysis of local traffic flow patterns is recommended and traffic mitigation measures (i.e., flag men, police detail, modification of existing traffic signals/signage, etc.) may be required. In addition, there may be impacts to the existing traffic on the waterways between the source location and the Bulkhead Area due to the influx of the barges.

Barging the material to the dock facility in vicinity to the selected disposal facility will not impact the community surrounding the Site. However, there will be an impact to the communities located between the dock facility and the backfill facility due to the necessity of transporting the material by truck from the dock facility to the backfill facility.

3.8.4 Estimated Cost

The estimated cost for trucking the clean fill to the Site in bulk is approximately $5.1 million, not including costs associated with subsequent handling or compaction. This cost assumes that approximately 126,000 tons (90,000 cubic yards) of clean fill is required to backfill the excavation areas during remedial construction and a unit cost for transportation of approximately $40.48 per ton.

3.8.5 Regulatory Acceptance

Approval from the City of New York will be required for access to and use of the Bulkhead Area. In correspondence dated May 5, 2004, Structural Consulting Services, P.C. has advised the NYSDEC that use of the Bulkhead Area is limited to plantings and public access only due to concerns related to the structural integrity of the existing steel bulkhead (refer to Appendix C). This approval presents a significant obstacle to implementing this alternative.

The construction of a dock barge facility will likely require authorization under Nationwide Permit Number 38 – Cleanup of Hazardous and Toxic Waste, issued by the USACOE.

Under this alternative, coordination with the USCG would be required regarding the dock barge unloading facility and the transport routes. This coordination is necessary because the USCG may have specific requirements concerning the

marking/lighting of the barges moored against the dock barge unloading facility in order to avoid creating a potential hazard to navigation.

On the State level, remedial activities at the Site are being performed under Consent Order Number D2-002-98-11 signed by KeySpan and the NYSDEC. The remedial construction activities will be performed in accordance with the NYSDEC approved remedial design. Both the USACOE and the NYSDEC will be concerned that the loading of containers onto barges and the subsequent barge transport operations do not result in clean fill entering the water thus potentially impacting marine environment and sediments within the waterways.

3.8.6 Conclusion

The evaluation of this alternative has determined that this alternative is conditionally constructible and will not result in adverse impacts to the residential communities surrounding the Site. Direct impacts to the community will be limited to the immediate Site area. To address this limited impact, a detailed Site-specific traffic analysis and Traffic Mitigation Plan may be required. However, implementation of this alternative would result in delays to the project schedule and would result in an additional cost of approximately $5.1 million to the project. In addition, approval for improvements to the Bulkhead Area would have to be obtained from the City of New York. Such approval is likely not readily obtainable due to structural stability concerns associated with the existing bulkhead. In conclusion, given both the schedule impacts and the uncertainty of use of the Bulkhead Area, this alternative is not advanced for further consideration.

3.9 Alternative 3A1 – On-Site Mobile Thermal Desorption Unit

As detailed in Section 2.6 of this Report, Low-Temperature Thermal Desorption (LTTD) is an ex-situ (i.e., out of the ground) remedial technology that uses heat to physically separate petroleum hydrocarbons from excavated soils. Thermal desorbers are designed to heat soils to temperatures sufficient to cause contamination to volatilize and desorb (physically separate) from the soil, but will typically not oxidize them (i.e., incineration). LTTD has generally been accepted as a treatment technology for soils impacted with MGP-related contaminants.

Should the treated soil meet the parameters of the remedial design, it can be used as clean fill under this alternative. Therefore the need for transporting clean fill from off-site source(s) will be significantly reduced resulting in substantially decreased impacts caused by transport trucks.

3.9.1 Constructability

Mobile LTTD units are typically modular and are delivered to a site and are assembled on the site. Special permits may be required to transport the modular units, depending on the delivery route selected. Depending on the size of the unit, at least 0.5 acre is required for the treatment unit and treated soil stockpiles. LTTD units are typically fired by natural gas, LPG or fuel oil. In addition, both a water source (40-60 gallons of water per ton of soil fed is typically needed to quench/humidify the soil) and electricity (operation of the monitoring equipment and related system components) are required.

The Site meets the minimum footprint requirement and has ready access to the required utilities (natural gas, water and electricity).

3.9.2 Impact to the Project Schedule

Although LTTD is generally recognized as an acceptable technology for the treatment of MGP-impacted soils, the NYSDEC and/or NYSDOH may require pilot testing of the system in which a quantity of soil from the Site is processed through the LTTD system (i.e., a "test burn"). Depending on the availability of the system and regulatory requirements (number of soil samples, residence times and testing of feed soil and treated soil), the pilot test may add 2 to 6 months to the schedule.

The removal of saturated soils containing source material is anticipated. These soils would have to be dewatered or amended to achieve a moisture content of less than 20%. The time require to dewater site soils is not included in the current remedial schedule.

The most significant schedule impact, however, will come from the need to establish air discharge requirements. Although a formal permit is not required for this Site, all of substantive requirements for obtaining a permit would have to be met. These substantive requirements include establishing contaminant-specific limits, discharge monitoring requirements and operational limitations. Although it is difficult to estimate the schedule impact associated with setting site-specific air discharge requirements, the best case scenario is probably on the order of 6 months.

3.9.3 Community Impact

Use of a LTTD at the Site would significantly reduce, but not eliminate, the number of transport trucks that carry impacted materials.

As discussed, an LTTD is typically operated 24-hours per day, 7 days per week to maximize cost efficiency. This operational schedule is unlikely to be accepted by the community due to potential noise and other impacts associated with round-the-clock operations.

Finally, there may be the perception in the community that LTTD is equivalent to incineration. Incineration is typically regarded as an undesirable technology due to negative impressions associated with air emissions and treatment residual disposal. Although the two technologies are different, it may be difficult to convey the technical differences of the two technologies to the community residents.

3.9.4 Estimated Cost

There are no transportation costs under this alternative since the impacted soil will be treated on-site which would result in decreased remediation costs for the project. The estimated cost for this alternative would not include costs associated with obtaining permits, excavation, screening of debris, or management of treated soil. The estimated cost for this alternative would depend on whether the treated soil would meet the geotechnical and environmental parameters of the remedial design. Therefore, the estimated costs for this alternative cannot be determined at this point in time.

3.9.5 Regulatory Acceptance

Given a sufficient allowance in the project schedule, the regulatory issues are likely readily resolvable. As referenced above, air discharge limits will have to be negotiated with the NYSDEC and NYSDOH and air discharge approvals would most likely need to be obtained. It is also possible that the NYCDEP may take an active role in the regulatory review process. Confirmation from the NYSDEC would also have to be obtained to ensure that impacted soil treated the Site with LTTD technology are granted an exclusion from the New York State hazardous waste regulations.

3.9.6 Conclusion

The evaluation of this alternative has determined that this alternative is constructible, is regulatory compliant and will significantly reduce the potential adverse impacts to the surrounding residential communities caused by the influx of transport trucks. In addition, this alternative would likely not result in increased remedial construction costs. However, this alternative may cause significant delays to the project schedule due to the need for a pilot test demonstration, NYSDEC review and approval, revisions to existing regulatory documents, and due to the limited capacity of the LTTD system. Since it is not known whether or not the treated soil will meet the parameters of the remedial design until a pilot

test is conducted, the success of this alternative is uncertain. Because of this potential project delays and due to the negative public perception, this alternative has been eliminated from further consideration.

4.0 EVALUATION SUMMARY

The summary tables contained in Appendix B present an overview of the results of the alternative evaluations for both the transportation of impacted soil from the Site to the disposal facility and the transportation of clean fill from the source locations to the Site.

5.0 RECOMMENDATIONS

5.1 Impacted Soil

It is recommended that "Alternative 1A1 – Time Restrictions for Transport Vehicles" be selected for the management of impacted soils that will be generated during the planned remedial construction activities. Based on the results of this alternatives analysis, this alternative is readily constructible; would not result in adverse impacts to the project schedule; is cost effective; is regulatory compliant; and reduces the potential adverse impacts to the surrounding residential communities. Alternative 1A1 was the only alternative among those evaluated which met each the identified criteria.

Under this alternative, transport vehicles would only travel through the surrounding communities along the preferred route of Beach Channel Drive during limited hours of the day. These hours would be restricted to off-peak hours for existing traffic and during time periods in which residents are most likely to be away from their homes. The time period proposed is between the hours of 9:00 AM and 2:00 PM. Further discussions with community members would be required to obtain concurrence with this alternative.

5.2 Clean Fill

It is also recommended that "Alternative 1A2 – Time Restrictions for Transport Vehicles" be selected for the transportation of clean fill to the Site Area. Based on the results of this analysis, this alternative is readily constructible; would result in adverse impacts to the project schedule; is cost effective; is regulatory compliant; and reduces the potential adverse impacts to the surrounding residential communities. Alternative 1A2 was the only alternative among those evaluated which met each the identified criteria.

Under this alternative, transport vehicles would only travel through the surrounding communities during limited hours of the day. These hours would be restricted to off-peak hours for existing traffic and during time periods in which residents are most likely to be away from their homes. The time period proposed is between the hours of 9:00 AM and 2:00 PM. Further discussions with community members would be required to obtain concurrence with this alternative.

APPENDIX A

INITIAL SCREENING MATRIX

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (IMPACTED SOIL)

Impacted Soils Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Truck Transportation	*Alternative 1A* Direct to Disposal Facility	1A1. Identify alternative truck routes through community	• Single material handling • Expedited project schedule • Cost effectiveness • Decreased public impacts	• Alternative truck routes may not exist • Adverse impacts to other communities may exist	Yes
		1A2. Identify time of day restrictions for truck movement through community	• Single material handling • Expedited project schedule • Cost effectiveness • Decreased public impacts	• Does not decrease truck traffic though local areas • Transportation and disposal coordination will be more difficult	Yes
	Alternative 1B To Intermediate Facility	1B1. Truck to adjacent facility with improved bulkhead for barge shipment (NYC POTW)	• Eliminates costs associated with improving the Bulkhead Area	• Potential interference with adjacent facility's operations • May not decrease truck traffic through local areas • Multiple handling of material	Yes
		1B2. Truck to rail yard for barge transport	• Eliminates costs associated with improving the Bulkhead Area	• May not decrease truck traffic through local areas • Multiple handling of material • A rail yard has not been identified	No

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (IMPACTED SOIL)

Impacted Soils Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging	*Alternative 2A* Use existing tunnel to convey soil to Bulkhead Area	2A1. Use conveyor belt system	• Decreases truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Control of fugitive odors • Multiple handling of material • Negative public perception with regard to barging through waterways • Spill prevention measures are required • Increased project costs • Requires bulkhead improvements • Requires opening of tunnel • Structural integrity of tunnel uncertain • Permits are required • Prolonged project schedule	No
		2A2. Use pneumatic conveyance system	• Decreases truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Control of fugitive odors • Multiple handling of material • Negative public perception with regard to barging through waterways • Spill prevention measures are required • Increased project costs • Requires bulkhead improvements • Requires opening of tunnel • Structural integrity of tunnel uncertain • Requires that material have a 3% to 5% moisture content • Prolonged project duration • Permits are required • Max. size restrictions in material	No

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (IMPACTED SOIL)

Impacted Soils Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2A* Use existing tunnel to convey soil to Bulkhead Area (cont.)	2A3. Convey containers through tunnel	• Decrease in truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Negative public perception with regard to barging through waterways • Increased project costs • Requires bulkhead improvements • Requires opening of tunnel • Multiple handling of material • Structural integrity of tunnel uncertain • Tunnel will limit size of containers • Permits are required • Prolonged project duration	Yes
	Alternative 2B Trucking soil to Bulkhead Area	2B1. Use roll-offs, dump trailers, or sealed containers	• Decrease in truck traffic through local areas • Does not require opening of tunnel • Barges can transport greater volume of material • Minimizes potential odor generation	• Negative public perception with regard to barging through waterways • Increased project costs • Multiple handling of material • Requires traffic mitigation • Requires bulkhead improvements • Permits are required • Prolonged project duration	Yes

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (IMPACTED SOIL)

Impacted Soils Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2B* Trucking soil to Bulkhead Area (cont.)	2B2. Bulk delivery	• Decreases truck traffic through local areas • Does not require opening of tunnel • Barges can transport greater volume of material	• Negative public perception with regard to barging through waterways • Increased project costs • Multiple handling of material • Requires traffic mitigation • Requires bulkhead improvements • Potential odor generation both on-site and off-site • Contamination of bilge water in barge • Permits are required • Prolonged project duration • Spill prevention measures are required	No
		2B3. Load transport vehicles on barges	• Decreases truck traffic through local areas • Does not require opening of tunnel • Single material handling • Minimizes potential odor generation	• Negative public perception with regard to barging through waterways • Increased project costs • Multiple handling of material • Requires traffic mitigation • Requires bulkhead improvements • Permits are required • Prolonged project duration • Transport and disposal contractors may resist this option	No

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (IMPACTED SOIL)

Impacted Soils Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2C* Use overhead conveyance to Bulkhead Area	2C1. Utilization of bucket elevator or screw conveyor system with conveyor belts	• Decreases truck traffic through local areas • Does not require opening of tunnel • No disruption to Beach Channel Drive traffic	• Existence of overhead utilities • Negative public perception with regard to barging through waterways • Increased project costs • Requires bulkhead improvements • Potential generation of odors • Permits are required • Prolonged project duration • Road clearance may be a concern • A bucket elevator system has not been identified • Screw conveyor system may generate residual MGP tar within screw system	No
		2C2. Utilization of container conveyor on bridge structure	• Decreases truck traffic through local areas • Does not require opening of tunnel • No disruption to Beach Channel Drive traffic	• Existence of overhead utilities • Negative public perception with regard to barging through waterways • Potential generation of odors • Increased project costs • Requires bulkhead improvements • Permits are required • Prolonged project duration • Road clearance may be a concern • An automated carting system has not been identified	No

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR
MATERIAL TRANSPORTATION ANALYSIS
(IMPACTED SOIL)

Impacted Soils Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2C* Use overhead conveyance to Bulkhead Area (cont.)	2C3. Use pneumatic conveyance system	• Decrease in truck traffic through local areas • Does not require opening of tunnel • No disruption to Beach Channel Drive traffic	• Existence of overhead utilities • Negative public perception with regard to barging through waterways • Potential generation of odors • Requires a 3% to 5% moisture content • Increased project costs • Requires bulkhead improvements • Permits are required • Prolonged project duration • Road clearance may be a concern	No
On-site Treatment	*Alternative 3A* Low Temperature Thermal Desorption	3A1. On site mobile unit	• Decrease in truck traffic through local areas • Does not require opening of tunnel • Does not require bulkhead improvements • Decreased project costs	• Potential generation of odors and noise • Requires permits • Requires on-site operation of thermal desorption unit • Negative public perception	Yes
Change Remedial Approach (Re-open ROD)	*Alternative 4A* In-Situ Stabilization		• Decrease in truck traffic through local areas • Does not require opening of tunnel • Does not require bulkhead improvements • Decreased project costs	• The NYSDEC will most likely not approve of this remedial approach • If allowed, requires revision of ROD • May complicate site reuse	No

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (CLEAN BACKFILL)

Clean Backfill Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Truck Transportation	*Alternative 1A* Direct from Backfill Source	1A1. Identify alternative truck routes through community	• Single material handling • Expedited project schedule • Cost effective • Decreased community impact	• Alternative truck routes may not exist • Adverse impacts to other communities may exist	Yes
		1A2. Identify time of day restrictions for truck movement through community	• Single material handling • Expedited project schedule • Cost effective • Decreased community impact	• Does not significantly decrease truck traffic though local areas • T&D coordination may be more difficult	Yes
	Alternative 1B Delivery from Intermediate Facility	1B1. Truck from intermediate facility with improved bulkhead as delivery point	• Eliminates costs associated with improving the Bulkhead Area	• Intermediate facility has not been identified • May not decrease truck traffic through local areas • Multiple handling of material	Yes
		1B2. Truck from rail yard as delivery point	• Eliminates costs associated with improving the Bulkhead Area	• May not decrease truck traffic through local areas • Multiple handling of material • A rail yard has not been identified	No
Barging	*Alternative 2A* Use existing tunnel to convey soil from Bulkhead Area	2A1. Use conveyor belt system	• Decreases truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Multiple handling of material • Increased project cost • Requires bulkhead improvements • Requires opening of tunnel • Structural integrity of tunnel is uncertain • Permits are required • Prolonged project schedule	Yes

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (CLEAN BACKFILL)

Clean Backfill Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2A* Use existing tunnel to convey soil from Bulkhead Area (cont.)	2A2. Use pneumatic conveyance system	• Decrease in truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Multiple handling of material • Increased project cost • Requires bulkhead improvements • Requires opening of tunnel • Structural integrity of tunnel in question • Material to have 3%-5% moisture content • Prolonged project schedule • Permits are required	Yes
		2A3. Use hydraulic conveyance system	• Decreases truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Multiple handling of material • Increased project cost • Requires bulkhead improvements • Requires opening of tunnel • Structural integrity of tunnel in question • Management of generated water • Prolonged project schedule • Permits are required	No
		2A4. Use containers through tunnel	• Decreases truck traffic through local areas • Barges can transport greater volume of material • No disruption to Beach Channel Drive traffic	• Increased project cost • Requires bulkhead improvements • Requires opening of tunnel • Structural integrity of tunnel in question • Multiple handling of material • Tunnel will limit size of containers • Permits are required • Prolonged project schedule	Yes

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (CLEAN BACKFILL)

Clean Backfill Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2B* Trucking fill from Bulkhead Area	2B1. Use roll-offs, dump trailers, or open containers	• Decrease in truck traffic through local areas • Does not require opening of tunnel • Barges can transport greater volumes of material • Minimizes potential odor generation	• Increased project cost • Multiple handling of material • Requires traffic mitigation • Requires bulkhead improvements • Permits are required • Prolonged project schedule	Yes
	Alternative 2B Trucking fill from Bulkhead Area (cont.)	2B2. Bulk delivery	• Decrease in truck traffic through local areas • Does not require opening of tunnel • Barges can transport greater volume of material	• Increased project cost • Multiple handling of material • Requires traffic mitigation • Requires bulkhead improvements • Permits are required • Prolonged project schedule	Yes
	Alternative 2C Use overhead conveyance to Bulkhead Area	2C1. Utilization of bucket elevator or screw conveyor system with conveyor belts	• Decrease in truck traffic through local areas • Does not require opening of tunnel • No disruption to Beach Channel Drive traffic	• Increased project cost • Requires bulkhead improvements • Permits are required • Prolonged project duration • Road clearance may be a concern • An elevator system has not been identified	No

KEYSPAN

Rockaway Park Former MGP Site

INITIAL SCREENING MATRIX FOR MATERIAL TRANSPORTATION ANALYSIS (CLEAN BACKFILL)

Clean Backfill Management Activities	Potential Alternatives	Options	Advantages	Disadvantages	Advance to Further Evaluation?
Barging (cont.)	*Alternative 2C* Use overhead conveyance to Bulkhead Area (cont.)	2C2. Utilization of container conveyor on bridge structure	• Decrease in truck traffic through local areas • Does not require opening of tunnel • No disruption to Beach Channel Drive traffic	• Increased project cost • Requires bulkhead improvements • Permits are required • Prolonged project schedule • Road clearance may be a concern • An automated carting system has not been identified	No
		2C3. Use pneumatic conveyance system	• Decrease in truck traffic through local areas • Does not require opening of tunnel • No disruption to Beach Channel Drive traffic	• Requires 3% to 5% moisture content • Increased project cost • Requires bulkhead improvements • Permits are required • Prolonged project schedule • Road clearance may be a concern	No
Re-used Treated Soil	*Alternative 3A* Low Temperature Thermal Desorption	3A1. On site mobile unit	• Decrease in truck traffic through local areas • Does not require opening of tunnel • Does not require bulkhead improvements • Decreased project cost	• Requires permits • Potential generation of odors and noise • Requires on-site operation of thermal desorption unit • Need NYSDEC approval to re-use treated soils as backfill	Yes
Change Remedial Approach (Re-open ROD)	*Alternative 4A* In-Situ Stabilization		• Decreases truck traffic through local areas • Does not require opening of tunnel • Does not require bulkhead improvements • Decreased project costs	• The NYSDEC will most likely not approve of this remedial approach • If allowed, requires revision of ROD • May complicate site reuse	No

APPENDIX B

SUMMARY EVALUATION TABLES

Table 4.1 – Summary of Alternative Evaluation for Impacted Soil

Evaluation Criteria	Alternative 1A1	Alternative 1A2	Alternative 1B1	Alternative 2A3	Alternative 2B1	Alternative 3A1
	Alternate Truck Routes	Time Restrictions for Transport Vehicles	Trucking to Adjacent Facility	Use of Containers Through Existing Tunnel to Bulkhead Area	Trucking Impacted Soil to the Bulkhead Area	On-site Mobile Thermal Desorption Unit
Constructability	Not readily constructible due to lack of viable alternate routes	Readily constructible	Not readily constructible due to uncertainty with POTW access	Conditionally constructible. Alternative is dependent on viability of tunnel, approval for use of Bulkhead Area by NYC, construction of dock barge facility, and the existence of an unloading dock facility in vicinity to the disposal facility.	Conditionally constructible. Alternative is dependent on construction of dock barge facility, approval for use of Bulkhead Area by NYC, and the existence of an unloading dock facility in vicinity to the disposal facility.	Readily constructible
Project Schedule	No schedule impact	No schedule impact	Unknown due to the uncertainty with POTW access	Potential delay of 6 months due to need to obtain permits; and an estimated additional 2.5 years to convey all impacted soil off-site due to tunnel limitations	Potential delay of 6 months due to need to obtain permits	Significant potential impact due to air permitting requirements, pilot testing and need to modify decision documents
Community Impact	Due to lack of viable potential alternate routes, community impacts are identical to the existing transportation approach	Reduction in potential impacts due to restricted transportation hours	Unknown due to the uncertainty with POTW access	Potential adverse impacts are limited to the immediate vicinity of the Site	Potential adverse impacts are limited to the immediate vicinity of the Site	Reduced community impacts due to a significant reduction in traffic, however, these may be off-set by impacts from 24-hr Site operations
Estimated Costs	$3.8 million or $30 per ton	$3.8 million or $30 per ton	Unknown due to the uncertainty with POTW access	$7.6 million or $60.32 per ton	$7.7 million or $61.11 per ton	$3.8 to $7.6 million or $30 to $60 per ton
Regulatory Acceptance	Readily acceptable	Readily acceptable	Unknown due to the uncertainty with POTW access	USACOE NP38 likely required; Bulkhead use approval from NYC required	USACOE NP38 likely required; Bulkhead Use approval from NYC required	Acceptance is likely if stringent performance objectives can be met
Conclusion	Not recommended due to lack of viable alternative routes and, therefore, no net reduction in community impacts	Recommended based on ability to meet each evaluation criterion	Not recommended based on uncertainty associated with POTW access	Not recommended due to uncertainty regarding use of Bulkhead Area, viability of the tunnel, schedule delays and cost	Not recommended due to uncertainty regarding use of Bulkhead Area, schedule delays and cost	Not recommended due to potential significant project delays associated with regulatory approvals

Table 4.2 – Summary of Alternative Evaluation for Clean Fill

Evaluation Criteria	Alternative 1A1	Alternative 1A2	Alternative 1B1	Alternative 2A1	Alternative 2A2	Alternative 2A4	Alternative 2B1	Alternative 2B2	Alternative 3A1
	Alternate Truck Routes	Time Restrictions for Transport Vehicles	Trucking to Adjacent Facility	Conveying Clean Fill Through Tunnel from Bulkhead Area	Pneumatically Convey Clean Fill Through Existing Tunnel from Bulkhead Area	Convey Backfill Through Existing Tunnel Using Containers from Bulkhead Area	Trucking Clean Fill to the Site Area Using Roll-offs or Containers from Bulkhead Area	Trucking Clean Fill to the Site Area in Bulk from Bulkhead Area	Treated Soil from On-Site Mobile Thermal Desorption Unit
Constructability	Not readily constructible due to lack of viable alternative routes	Readily constructible	Not readily constructible due to uncertainty with POTW access	Conditionally constructible. Alternative is dependent on viability of tunnel, access to Bulkhead Area, construction of dock barge facility, and the existence of backfill source with barge access/loading capabilities.	Conditionally constructible. Alternative is dependent on viability of tunnel, access to Bulkhead Area, moisture content of fill less than 15%, construction of dock barge facility, and the existence of backfill source with barge access/loading capabilities.	Conditionally constructible. Alternative is dependent on viability of tunnel, access to Bulkhead Area, construction of dock barge facility, and existence of backfill source with barge access/loading capabilities.	Conditionally constructible. Alternative is dependent on construction of dock barge facility, access to Bulkhead Area and existence of backfill source with barge access/loading capabilities.	Conditionally constructible. Alternative is dependent the construction of dock barge facility, access to Bulkhead Area and existence of backfill source with barge access/loading capabilities.	Readily constructible
Project Schedule	No schedule impact	No schedule impact	Unknown due to the uncertainty with POTW access	Potential delay of 6 months due to need to obtain permits	Potential delay of 6 months due to need to obtain permits	Potential delay of 6 months due to need to obtain permits	Potential delay of 6 months due to need to obtain permits	Potential delay of 6 months due to need to obtain permits	Significant potential impact due to air permitting requirements, pilot testing and need to modify decision documents
Community Impact	Due to lack of viable potential alternate routes, community impacts are identical to planned transportation approach	Reduction in potential impacts due to restricted transportation hours	Unknown due to the uncertainty with POTW access	Potential adverse impacts are limited to the immediate vicinity of the Site	Potential adverse impacts are limited to the immediate vicinity of the Site	Potential adverse impacts are limited to the immediate vicinity of the Site	Potential adverse impacts are limited to the immediate vicinity of the Site	Potential adverse impacts are limited to the immediate vicinity of the Site	Reduced community impacts due to a significant reduction in traffic, however, these may be off-set by impacts from 24-hr Site operations
Estimated Costs	$2.27 million or $18.02 per ton	$2.27 million or $18.02 per ton	Unknown due to the uncertainty with POTW access	$5.4 million or $42.86 per ton	$4.1 million or $32.54 per ton	$7.6 million or $60.32 per ton	$6.8 million or $53.97 per ton	$5.1 million or $40.48 per ton	Dependent on whether treated soil meets environmental/ geotechnical parameters

Evaluation Criteria	Alternative 1A1	Alternative 1A2	Alternative 1B1	Alternative 2A1	Alternative 2A2	Alternative 2A4	Alternative 2B1	Alternative 2B2	Alternative 3A1
	Alternate Truck Routes	Time Restrictions for Transport Vehicles	Trucking to Adjacent Facility	Conveying Clean Fill Through Tunnel	Pneumatically Convey Clean Fill Through Existing Tunnel	Convey Backfill Through Existing Tunnel Using Containers	Trucking Clean Fill to the Site Area Using Roll-offs or Containers	Trucking Clean Fill to the Site Area in Bulk	Treated Soil from On-Site Mobile Thermal Desorption Unit
Regulatory Acceptance	Readily acceptable	Readily acceptable	Unknown due to the uncertainty with POTW access	USACOE NP38 likely required; Bulkhead use approval from NYC required	USACOE NP38 likely required; Bulkhead use approval from NYC required	USACOE NP38 likely required; Bulkhead use approval from NYC required	USACOE NP38 likely required; Bulkhead use approval from NYC required	USACOE NP38 likely required; Bulkhead use approval from NYC required	Acceptance is likely if stringent performance objectives can be met
Conclusion	Not recommended due to lack of viable alternate routes and, therefore, no net reduction in community impacts	Recommended based on ability to meet each evaluation criterion	Not recommended based on uncertainty associated with POTW access	Not recommended due to uncertainty regarding use of Bulkhead Area, viability of the tunnel and schedule delays	Not recommended due to uncertainty regarding use of Bulkhead Area, viability of the tunnel and schedule delays	Not recommended due to uncertainty regarding use of Bulkhead Area, viability of the tunnel, schedule delays and cost	Not recommended due to uncertainty regarding use of Bulkhead Area, schedule delays and cost	Not recommended due to uncertainty regarding use of Bulkhead Area and schedule delays	Not recommended due to potential significant project delays associated with regulatory approvals

APPENDIX C

STRUCTURAL CONSULTING SERVICES PC LETTER

S C S STRUCTURAL CONSULTING SERVICES, P.C.

May 5, 2004

Regional Permit Administrator
Region 2 Office
New York State Department of Environmental Conservation
47-40 21st Street
Long Island City, NY 11101

RE: Replacement of Deteriorated Timber Bulkhead
Beach Channel Drive at Beach 108th Street
Jamaica Bay
Queens, NY
NYSDEC Application Number 2-6309-00090/00001

Please be advised that a tie-back system is not required to support the new steel bulkhead at the referenced location. This is conditioned upon there being no vessel tie-ups at this location and that the area landward of the new bulkhead shall be used for planting and public access only.

Sincerely,

Alan M. Rosa, P.E.
Principal

AMR/amr

RECEIVED
N.Y.S.D.E.C. - REGION 2
MAY 18 2004
DIVISION OF
ENVIRONMENTAL PERMITS

67 Federal Road, Suite A8, Brookfield, CT 06804
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14 Spring Street
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E-mail: edward@emweinsteinpc.com

May 17, 2004

Harold Dickey, Deputy Regional Permit Administrator
NYSDEC – Region 2 Headquarters
47-40 21st Street
Long Island City, NY 11101-5407

Re: Application No. 2-6309-00090/00001
Beach Channel Drive at Beach 108th Street

Dear Mr. Dickey:

As a follow up to your letter to NYCDCAS dated August 26, 2003, and in accordance with item Number 21 in that letter, transmitted herewith is a signed, sealed and dated report from a professional engineer regarding the bulkhead.

As to the modified Special Conditions 16 and 17, these improvements any further work on the site must be delayed until the applicant is informed by DEC that the contamination on the site has been remediated. Please let me know if there are any questions or if there is anything else that you require.

Sincerely,

Edward M. Weinstein, AIA, AICP

cc: George Stadnick, NYSDEC
Barry Gendelman, Assistant Commissioner
Harry Abrams, Director of Technical Services
Charles Kriss, Waterfront Engineer, NYC DCAS
Pile Foundation Construction, Inc.
M. Weinstein, EMWPC