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resources & energy

ZERO WASTE ENERGY – NINE PAR LANDFILL SITE

Analysis of Hazardous Materials and Petroleum Contaminated Soils

Nine Par Landfill – Preliminary Site Investigation
Zero Waste Energy
San Jose, California

May 24, 2010

Environment & Water Resources

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1. INTRODUCTION

Zero Waste Energy Development Company is proposing a 150,000-ton per year dry fermentation Anaerobic Digestion (AD) facility to process and recover energy from the organic portion of the municipal solid waste stream generated by the City of San Jose (City) and surrounding communities. The project is part of an integrated waste management system and compliments the existing and currently proposed waste processing facilities on Los Esteros Road in San Jose, CA. The proposed project will be developed in three phases, with each phase capable of processing approximately 50,000 tons per year of organic materials.

The preferred site is the former Nine Par Landfill (Nine Par Site) in San Jose, California, due to its available and usable land, proximity to Zanker Road Resource Recovery Operation and Landfill (ZRRROL) and the Zanker Material Processing Facility (ZMPF) and its readiness to proceed and feasibility to promptly obtain the necessary permits and approvals to develop the site and construct and operate the AD Facility. The Nine Par Site is owned by the City of San Jose, and the site location is shown on Figure 1. The City property is identified as APN 015-38-005 in the Santa Clara County Assessor's Parcel Map. The Nine Par Site is part of the buffer lands of the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The property is bounded by tidal marshlands and the active Zanker Road Class III Landfill to the north, WPCP sludge drying beds to the east/northeast, Los Esteros Road and the WPCP facility to the south, and Artesian Slough to the west. A Site Plan is shown in Figure 2.

The Nine Par Facility was used for solid waste disposal during the period from approximately 1938 until 1977. Waste quantity and type are poorly documented, however, disposal reported consisted of a mix of municipal solid waste (MSW), inert debris (including Naturally Occurring Asbestos), and possibly asbestos-containing building materials (ACBM) and septic pumpings.

On-site burning of waste materials occurred at Nine Par Landfill until about 1953 and feeding raw garbage to agricultural animals occurred until about 1957. After that time land disposal was via trench cut and fill methods. Trenches likely extended to the depth of underlying groundwater, near sea level, as evidenced by aerial photos (SCS Engineers, March 2007). At the time that the Nine Par Landfill stopped accepting wastes (in 1977), California Title 27 regulations were not in place. As a result, the facility was never formally closed in accordance with these regulations and there is no engineered cap in place. Random till soils were placed as cover material, in the early 1980s and additional fill/cover has been placed since that time. The cover soils were placed and compacted without uniform quality

control. Based on the most recent topographic map (2004), the elevations of wastes and cover soils at the Nine Par Site range from approximately sea level to elevation 24 feet MSL.

This document was prepared to evaluate existing conditions, potential impacts, and proposed mitigation measures with regards the presence of hazardous materials (including non-hazardous solid waste) and petroleum contaminated soils and fill at the Nine Par Site.

2. EXISTING SETTING

The area around the Nine Par Site was a pear orchard until the 1920's or 1930's. The orchards reportedly declined due to salt water intrusion. Dikes were built at the margins of San Francisco Bay, and subsidence resulted due to water pumping. This formed the area marshlands. Prior to landfill operations, the Nine Par Site was comprised of tidal marshes and sloughs.

The Nine Par Company conducted waste disposal activities on what was originally a 166-acre area north of Los Esteros Road and east of Artesian Slough. This 166-acre area now entails two properties: the City-owned 96 acres (the Nine Par Site and other areas within APN 015-38-005); and an adjacent 70-acre property owned by Zanker Road Resource Management, Ltd. (Zanker) (refer to Figure 2). Zanker purchased the 70-acre parcel from the Nine Par Company in 1982, and began fully-permitted disposal operations in 1985 at the Zanker Road Class III Landfill.

The Zanker Road Landfill is still active. Regulatory agency files and historical records do not clearly differentiate the Nine Par Company's historic filling operations between what are now the City's Nine Par Site and the Zanker Road Landfill property.

From the late 1970's until the late 1980's and after municipal landfilling activities had ceased, the Nine Par Site was used for disposal of grit from aerator tanks and inert biosolids mixed with soil that were generated at the adjacent WPCP. Filling took place in low spots and slopes on and around the then-inactive landfill. Records or surveys of these disposal activities were not kept by the WPCP. The placement of naturally occurring asbestos (NOA) in the stockpile area located in the western portion of the Nine Par Landfill was carefully managed, with EPA oversight in 2003.

Since 2005, approximately 250,000 cubic yards of clean soils have been stockpiled on the top deck area of the Nine Par Site. These soils are excavation spoils from City Civic Center and San Jose Airport improvement projects and consist of non-engineered fill that is primarily low to moderately expansive clays (CL) with some areas covered by clayey or sandy gravels. Stockpile locations have been mapped by the City. Materials delivered to the Nine Par Site from these projects were reportedly part of a City Environmental Services Department Soil Management Program. The soils were screened for contaminants per San Francisco Regional Water Quality Control Board (RWQCB) risk-based guidelines.

2.1 Current On-site Environmental Conditions

A detailed hydrogeologic investigation specific to the Nine Par Site has not been performed; however, hydrogeologic conditions for the adjacent Zanker Material Processing Facility, Zanker Road Landfill and WPCP facilities are well documented. The following information was obtained from documents specific to those properties.

The Nine Par Site lies within the northern part of the Santa Clara Valley groundwater basin, which contains over 1,000 feet of unconsolidated to semi-consolidated clays, silts, sands, and gravel. Regional groundwater studies indicate that the primary freshwater aquifers of the northern Santa Clara Valley are restricted to buried channel deposits within the Pleistocene alluvium. The buried channel deposits are regionally grouped into upper and lower aquifers. Near the bay, these aquifers are separated from each other by the Pleistocene Bay Mud, which forms an extensive clay aquitard. Regional groundwater flow within the aquifer system is toward the San Francisco Bay and is recharged by runoff from the Santa Cruz Mountains and the Diablo Range (Helley et al., 1979).

Investigations completed at the Zanker Material Processing Facility (EMCON, 1974 and 1989), the Zanker Road Landfill (Cooper-Clark and Associates, 1975; EMCON 1992), and on a regional scale (Iwamura, 1980; Poland and Ireland, 1985), indicate that sediments beneath the Nine Par Site contain an “upper” and a “lower” aquifer. Near the Nine Par Site, the upper aquifer is encountered at approximately -45 feet relative to mean sea level (MSL) and is overlain by the Holocene Bay Mud and Holocene fine-grained alluvium. The Bay Mud was deposited in an estuarine environment and the fine-grained alluvium was deposited in inter-fluvial basins and fresh-water marshes. The upper aquifer is underlain by a laterally extensive clay aquitard that extends to -200 feet MSL. The lower aquifer occurs below this aquitard and forms an extensive drinking water aquifer in the Santa Clara Valley (Helley et al., 1979). Flowing artesian conditions from this aquifer have been reported in the area.

In addition to the upper and lower regional aquifers, shallow water-bearing sand zones have been identified within the Holocene Bay Mud and Holocene fine-grained alluvium, which interfinger beneath the site. These shallow water-bearing sand zones are separated from the upper aquifer by a regionally extensive Bay Mud aquitard. The quality of groundwater in the shallow water-bearing sands is generally poor because of extensive saltwater intrusion (Iwamura, 1980). Groundwater is recharged mainly from local runoff and percolation. The sands within the shallow water-bearing zone have been characterized in detail beneath the Zanker Material Processing Facility and the Zanker Road Landfill

because although groundwater occurs in both the sands and surrounding clays, most groundwater movement occurs in the sands and potential impacts to groundwater therefore, would initially be detected in these sands.

Where encountered in exploratory borings beneath the Nine Par Site (Cooper-Clark and Associates, 1975; SCS Engineers, 2007 and ENGEO 2010), the shallow water-bearing sand zone occurs within the -5 to -20 feet MSL interval and is separated from the upper aquifer by approximately 20 to 30 feet of low-permeability clay (generally classified as CL in the Unified Soil Classification System). These sands are described as silty sand and clayey sand (classified as SM and SC in the Unified Soil Classification System).

The City-owned Nine Par Landfill property overlies parts of a larger municipal waste disposal site that was operated by the Nine Par Company. The City property is currently vacant and consists of a portion of the former Nine Par Landfill, a tidal marsh area, and the inactive WPCP recycle water filling station. The adjacent Zanker Road Class III Landfill property also occupies a portion of the former Nine Par Company disposal area.

The non-engineered fill cover at Nine Par Landfill is underlain by mixed municipal waste fill including a mixture of highly decomposed organic materials, glass, wood, metal, plastic, and construction and miscellaneous debris. Field screening for petroleum contaminated soils shall be performed prior to site grading and construction. Screening shall include the analysis of grab soil samples using a Flame Ionization Detector (FID) and a Photoionization Detector (PID).

The mixed waste layer varies in thickness from 5 to 20 feet (SCS Engineers, 2007, ENGEO, 2010). The whereabouts of biosolids that were mixed with soils and disposed of in low spots at the landfill is unknown. As previously mentioned, records or surveys of these disposal activities were not kept by the WPCP. In November 2003, approximately 1,200 cubic yards of asbestos-containing soil were placed on the Nine Par Site in what is known as the NOA stockpile area (refer to Figure 2).

The waste is underlain by stiff clays that exhibit hydraulic conductivity on the order of 3x10-8 cm/sec and good shear strength and some lenses of sand (SCS Engineers, 2007). The low-plasticity clayey materials extend to at least depths 31.5 feet below the waste mass (where discontinuous sand to clayey sand and silt lenses have been identified). Moisture content of the deep soils underlying the

waste are reported to range from 22.8 to 25.1 percent; dry densities reportedly range from 102.4 to 107.4 pounds per cubic foot (SCS Engineers, 2007). Consolidation tests suggest that surface settlements can be expected from any planned additional soil placement or surcharging (SCS Engineers, 2007).

2.2 Current Off-site Environmental Conditions

In 1987 the City constructed a recycled water pumping facility in the southwestern corner of APN-015-38-005. Reclaimed, treated wastewater was pumped from Artesian Slough into recycle water pipelines or tanker trucks for off-site use. This facility is no longer operating. During 1987-1989, WPCP-generated wastes as described above were placed around Nine Par Site western fill slopes adjacent to the pumping facility, reportedly to depths of 6- to 8 feet.

3. IMPACT ANALYSIS

The challenges to be addressed in order to proceed with construction, design, and operation of the proposed anaerobic digester facility at Nine Par Landfill are generally common to improvement projects at old landfills. They include: settlement affecting roadways, pavement, utilities and foundations; subsurface combustible gas migration control (into site buildings or off-site locations); odor/air quality mitigation during onsite excavations; water quality protection; and construction worker safety, among other things.

4. MITIGATION MEASURES

WorleyParsons is in the process of developing a Plan for the preliminary characterization of environmental conditions at the Nine Par Landfill Site. This Plan is being developed with input from the City of San Jose, the Regional Water Quality Control Board and CalRecycles. The scope of work proposed in the Plan is designed to address the following requirements:

- Evaluation of the potential for vapor intrusion into new buildings and work areas so that planned construction may be designed to mitigate health and safety hazards.
- Evaluation of the possibility of encountering/disturbing disposed asbestos containing materials to prevent exposure of harmful air-borne particles to workers during construction activities; based on the findings of this evaluation, an Asbestos Dust Mitigation Plan may need to be prepared to comply with local air quality management board regulations.
- Identification of the vertical and lateral extent of waste materials at Nine Par Landfill for foundation, pavement and structural design purposes.
- Field screening for petroleum contaminated soils shall be performed prior to site grading and construction. Screening shall include the analysis of grab soil samples using a Flame Ionization Detector (FID) and a Photoionization Detector (PID).
- General characterization of the physical and chemical nature of waste (fill) materials, soil and groundwater that will be disturbed/encountered during the planned foundation and earth work to ensure that contractors are informed and appropriate safety and management practices are implemented, as required.

In the event that petroleum contaminated soils are encountered during field screening, a mitigation plan may need to be prepared to define the extent of contamination and to present mitigation alternatives. Clean-up alternatives may include in-situ treatment and soil excavation and disposal at an approved facility.

A Health and Safety Plan should be prepared prior to initiation of site grading work in accordance with landfill industry guidelines and known site conditions. It should include an assessment of potential hazards, provisions for air quality, combustible gas and dust monitoring, procedures for identifying and handling special wastes or liquids, requirements for protective clothing and equipment, emergency response steps and recordkeeping procedure. Preparation of an Asbestos Mitigation and Avoidance Plan may be required to ensure worker safety during planned construction activities.

Normal refuse decomposition processes will result in both differential and uniform landfill settlements. Settlements of the underlying Bay Muds may also be expected. Ongoing maintenance may be required for site grade and drainage patterns, and special provisions may be required for the construction of buildings over refuse. Underground utilities and connections to buildings may become damaged or compromised due to settlement. This can be mitigated via use of supports and/or flexible utility connections at building entry points and at refuse/native soil transition points or other comparable methods or techniques.

5. CONCLUSIONS

In addition to the performance of additional site characterization and an assessment of whether hazardous materials (including petroleum contaminated soils) are present at Nine Par Landfill, the following items should be addressed in preparation for site development:

- A Health and Safety Plan should be developed prior to site grading to protect workers from possible exposure to odors, combustible gas and trace LFG constituents, and contact with refuse, hazardous waste, leachate and contaminated water.
- Preparation of an Asbestos Mitigation and Avoidance Plan may be required to ensure worker safety during planned construction activities.
- In the event that petroleum contaminated soils are encountered during field screening, and are determined to require mitigation, a plan should be prepared to define the lateral and vertical extent of contamination and to present mitigation alternatives – which may include in-situ treatment or soil excavation and disposal at an approved facility.
- Upgrades to the landfill cover and drainage systems may be required to meet current regulatory standards. If this occurs, a landfill post-closure monitoring and maintenance plan may need to be developed. This Plan would include monitoring programs for groundwater, surface water, leachate and landfill gas.
- A landfill construction management plan should be developed prior to initiation of facility design, with provisions for odor, particulate and LFG emission controls.
- Ongoing maintenance may be required in response to waste settlement in order to ensure consistent site grade and drainage patterns.
- Special provisions may be required for the construction of buildings over refuse in order to ensure structural stability without damage from waste settlement.
- Damage to underground utilities and connections to buildings as a result of waste settlement may be mitigated via use of supports and/or flexible utility connections at building entry points and at refuse/native soil transition points or other comparable methods or techniques.

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Gas Migration Assessment

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topographic map (2004), the elevations of wastes and cover soils at the Nine Par Site range from approximately sea level to elevation 24 feet MSL.

This document was prepared to assess the potential migration of subsurface landfill gas at the Nine Par Site.

2. EXISTING SETTING

The area around the Nine Par Site was a pear orchard until the 1920's or 1930's. The orchards reportedly declined due to salt water intrusion. Dikes were built at the margins of San Francisco Bay, and subsidence resulted due to water pumping. This formed the area marshlands. Prior to landfill operations, the Nine Par Site was comprised of tidal marshes and sloughs.

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In addition to the upper and lower regional aquifers, shallow water-bearing sand zones have been identified within the Holocene Bay Mud and Holocene fine-grained alluvium, which interfinger beneath the site. These shallow water-bearing sand zones are separated from the upper aquifer by a regionally extensive Bay Mud aquitard. The quality of groundwater in the shallow water-bearing sands is generally poor because of extensive saltwater intrusion (Iwamura, 1980). Groundwater is recharged mainly from local runoff and percolation. The sands within the shallow water-bearing zone have been characterized in detail beneath the Zanker Material Processing Facility and the Zanker Road Landfill

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The non-engineered fill cover at Nine Par Landfill is underlain by mixed municipal waste fill including a mixture of highly decomposed organic materials, glass, wood, metal, plastic, and construction and miscellaneous debris. Field screening for petroleum contaminated soils shall be performed prior to site grading and construction. Screening shall include the analysis of grab soil samples using a Flame Ionization Detector (FID) and a Photoionization Detector (PID).

The mixed waste layer varies in thickness from 5 to 20 feet (SCS Engineers, 2007, ENGEO, 2010). The whereabouts of biosolids that were mixed with soils and disposed of in low spots at the landfill is unknown. As previously mentioned, records or surveys of these disposal activities were not kept by the WPCP. In November 2003, approximately 1,200 cubic yards of asbestos-containing soil were placed on the Nine Par Site in what is known as the NOA stockpile area (refer to Figure 2).

The waste is underlain by stiff clays that exhibit hydraulic conductivity on the order of 3x10-8 cm/sec and good shear strength and some lenses of sand (SCS Engineers, 2007). The low-plasticity clayey materials extend to at least depths 31.5 feet below the waste mass (where discontinuous sand to clayey sand and silt lenses have been identified). Moisture content of the deep soils underlying the

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2.2 Current Off-site Environmental Conditions

In 1987 the City constructed a recycled water pumping facility in the southwestern corner of APN-015-38-005. Reclaimed, treated wastewater was pumped from Artesian Slough into recycle water pipelines or tanker trucks for off-site use. This facility is no longer operating. During 1987-1989, WPCP-generated wastes as described above were placed around Nine Par Site western fill slopes adjacent to the pumping facility, reportedly to depths of 6- to 8 feet.

3. IMPACT ANALYSIS

The challenges to be addressed in order to proceed with construction, design, and operation of the proposed anaerobic digester facility at Nine Par Landfill are generally common to improvement projects at old landfills. They include: settlement affecting roadways, pavement, utilities and foundations; subsurface combustible gas migration control (into site buildings or off-site locations); odor/air quality mitigation during onsite excavations; water quality protection; and construction worker safety, among other things.

Combustible Gas Migration Control

Methane is a component of refuse decomposition gases and can be explosive or flammable in a confined space environment under certain conditions. Municipal wastes were last placed at the Nine Par Site over 35 years ago and the rate of decomposition and methane generation is long past its peak. Nonetheless, methane and other landfill gas constituents are most likely still present (albeit, at low concentrations and pressures) in the subsurface fill environment. This is normal at old landfill sites and the presence of methane in the refuse mass does not typically pose a safety hazard. Improvements to the landfill surface (low-permeability cap, hardscaping or buildings) could promote lateral subsurface gas migration to off-site locations, but the low permeability soils underlying the site combined with the high water table should minimize this concern. This may be of concern along the southern Nine Par Site boundary in the direction of the San Jose/Santa Clara WPCP. The rest of the Site is bounded by other landfill areas, sloughs or unoccupied wetlands and potential subsurface gas migration to the north, west, and east is not a safety concern.

4. MITIGATION MEASURES

WorleyParsons is in the process of developing a Plan for the preliminary characterization of environmental conditions at the Nine Par Landfill Site. This Plan is being developed with input from the City of San Jose, the Regional Water Quality Control Board, and CalRecycle. The scope of work proposed in the Plan is designed to address the following requirements:

- Evaluation of the potential for vapor intrusion into new buildings and work areas so that planned construction may be designed to mitigate health and safety hazards.
- Evaluation of the possibility of encountering/disturbing disposed asbestos containing materials to prevent exposure of harmful air-borne particles to workers during construction activities; based on the findings of this evaluation, an Asbestos Dust Mitigation Plan may need to be prepared to comply with local air quality management board regulations.
- Identification of the vertical and lateral extent of waste materials at Nine Par Landfill for foundation, pavement and structural design purposes.
- Field screening for petroleum contaminated soils shall be performed prior to site grading and construction. Screening shall include the analysis of grab soil samples using a Flame Ionization Detector (FID) and a Photoionization Detector (PID).
- General characterization of the physical and chemical nature of waste (fill) materials, soil and groundwater that will be disturbed/encountered during the planned foundation and earth work to ensure that contractors are informed and appropriate safety and management practices are implemented, as required.

A Health and Safety Plan should be prepared prior to initiation of site grading work in accordance with landfill industry guidelines and known site conditions. It should include an assessment of potential hazards, provisions for air quality, combustible gas and dust monitoring, procedures for identifying and handling special wastes or liquids, requirements for protective clothing and equipment, emergency response steps and recordkeeping procedure. Preparation of an Asbestos Mitigation and Avoidance Plan may be required to ensure worker safety during planned construction activities.

There is no perimeter subsurface gas monitoring network currently in place at the Nine Par Site and the extent of off-site landfill gas migration, if any, toward the WPCP is unknown. Enclosed structures that will be built on the landfill will require combustible gas infiltration protection and monitoring features. Protection measures can include a combination of below-slab membrane and venting systems, and gas cut-offs for utility trenches or conduit penetrations. Specific protection measures

would be a function of building and utility design, occupancy, and foundation requirements. CCR Title 27 regulations also require that automatic methane gas level sensor systems be installed in building interiors. These monitoring systems can be equipped with communication devices to notify response personnel in the event elevated combustible gas concentrations are present in the building interior.

Normal refuse decomposition processes will result in both differential and uniform landfill settlements. Settlements of the underlying Bay Muds may also be expected. Ongoing maintenance may be required for site grade and drainage patterns, and special provisions may be required for the construction of buildings over refuse. Underground utilities and connections to buildings may become damaged or compromised due to settlement. This can be mitigated via use of supports and/or flexible utility connections at building entry points and at refuse/native soil transition points or other comparable methods or techniques.

5. CONCLUSIONS

In addition to the performance of additional site characterization and an assessment of whether hazardous materials (including petroleum contaminated soils) are present at Nine Par Landfill, the following items should be addressed in preparation for site development:

- A Health and Safety Plan should be developed prior to site grading to protect workers from possible exposure to odors, combustible gas and trace LFG constituents, and contact with refuse, hazardous waste, leachate and contaminated water.
- Preparation of an Asbestos Mitigation and Avoidance Plan may be required to ensure worker safety during planned construction activities.
- In the event that petroleum contaminated soils are encountered during field screening, and are determined to require mitigation, a plan should be prepared to define the lateral and vertical extent of contamination and to present mitigation alternatives – which may include in-situ treatment or soil excavation and disposal at an approved facility.
- Upgrades to the landfill cover and drainage systems may be required to meet current regulatory standards. If this occurs, a landfill post-closure monitoring and maintenance plan may need to be developed. This Plan would include monitoring programs for groundwater, surface water, leachate and landfill gas.
- A landfill construction management plan should be developed prior to initiation of facility design, with provisions for odor, particulate and LFG emission controls.
- Ongoing maintenance may be required in response to waste settlement in order to ensure consistent site grade and drainage patterns.
- Special provisions may be required for the construction of buildings over refuse in order to ensure structural stability without damage from waste settlement.
- Damage to underground utilities and connections to buildings as a result of waste settlement may be mitigated via use of supports and/or flexible utility connections at building entry points and at refuse/native soil transition points or other comparable methods or techniques.
- Enclosed structures that will be built on the landfill surface will require combustible gas infiltration protection (e.g., combination of below-slab membrane and venting systems, gas cut-offs for utility trenches or conduit penetrations) and monitoring features.
- Automatic methane gas level sensor systems may need to be installed in building interiors if CCR Title 27 regulations are to be addressed.

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resources & energy

ZERO WASTE ENERGY – NINE PAR LANDFILL SITE

Naturally Occurring Asbestos (NOA) Stockpiles Hazard Assessment

Nine Par Landfill – Preliminary Site Investigation
Zero Waste Energy
San Jose, California

May 24, 2010

Environment & Water Resources

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FIGURE 1 SITE LOCATION MAP

FIGURE 2 SITE PLAN

1. INTRODUCTION

Zero Waste Energy Development Company is proposing a 150,000-ton per year dry fermentation Anaerobic Digestion (AD) facility to process and recover energy from the organic portion of the municipal solid waste stream generated by the City of San Jose (City) and surrounding communities. The project is part of an integrated waste management system and compliments the existing and currently proposed waste processing facilities on Los Esteros Road in San Jose, CA. The proposed project will be developed in three phases, with each phase capable of processing approximately 50,000 tons per year of organic materials.

The preferred site is the former Nine Par Landfill (Nine Par Site) in San Jose, California, due to its available and usable land, proximity to Zanker Road Resource Recovery Operation and Landfill (ZRRROL) and the Zanker Material Processing Facility (ZMPF) and its readiness to proceed and feasibility to promptly obtain the necessary permits and approvals to develop the site and construct and operate the AD Facility. The Nine Par Site is owned by the City of San Jose, and the site location is shown on Figure 1. The City property is identified as APN 015-38-005 in the Santa Clara County Assessor's Parcel Map. The Nine Par Site is part of the buffer lands of the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The property is bounded by tidal marshlands and the active Zanker Road Class III Landfill to the north, WPCP sludge drying beds to the east/northeast, Los Esteros Road and the WPCP facility to the south, and Artesian Slough to the west. A Site Plan is shown in Figure 2.

The Nine Par Facility was used for solid waste disposal during the period from approximately 1938 until 1977. Waste quantity and type are poorly documented, however, disposal reported consisted of a mix of municipal solid waste (MSW), inert debris (including Naturally Occurring Asbestos), and possibly asbestos-containing building materials (ACBM) and septic pumpings.

On-site burning of waste materials occurred at Nine Par Landfill until about 1953 and feeding raw garbage to agricultural animals occurred until about 1957. After that time land disposal was via trench cut and fill methods. Trenches likely extended to the depth of underlying groundwater, near sea level, as evidenced by aerial photos (SCS Engineers, March 2007). The facility was never formally closed in accordance with Title 27 regulations and there is no engineered cap in place. Random till soils were placed as cover material, in the early 1980s and additional fill/cover has been placed since that time. The cover soils were placed and compacted without uniform quality control. Based on the most recent

topographic map (2004), the elevations of wastes and cover soils at the Nine Par Site range from approximately sea level to elevation 24 feet MSL.

In November 2003, approximately 1,200 cubic yards of asbestos-containing soil were placed near the western boundary of the Nine Par Site, in what is known as the NOA stockpile area (refer to Figure 2). These wastes were placed, covered and surveyed under U.S. EPA oversight. The construction design plan for the facilities and associated areas (e.g., roadways, parking lots, etc.) completely avoids areas where naturally occurring asbestos (NOA) was disposed of in November 2003. This document was prepared to evaluate potential impacts on site development and proposed mitigation measures with regards the NOA stockpiles and possibly asbestos-containing building materials at the Nine Par Site.

2. EXISTING SETTING

The area around the Nine Par Site was a pear orchard until the 1920's or 1930's. The orchards reportedly declined due to salt water intrusion. Dikes were built at the margins of San Francisco Bay, and subsidence resulted due to water pumping. This formed the area marshlands. Prior to landfill operations, the Nine Par Site was comprised of tidal marshes and sloughs.

The Nine Par Company conducted waste disposal activities on what was originally a 166-acre area north of Los Esteros Road and east of Artesian Slough. This 166-acre area now entails two properties: the City-owned 96 acres (the Nine Par Site and other areas within APN 015-38-005); and an adjacent 70-acre property owned by Zanker Road Resource Management, Ltd. (Zanker) (refer to Figure 2). Zanker purchased the 70-acre parcel from the Nine Par Company in 1982, and began fully-permitted disposal operations in 1985 at the Zanker Road Class III Landfill.

The Zanker Road Landfill is still active. Regulatory agency files and historical records do not clearly differentiate the Nine Par Company's historic filling operations between what are now the City's Nine Par Site and the Zanker Road Landfill property.

From the late 1970's until the late 1980's and after municipal landfilling activities had ceased, the Nine Par Site was used for disposal of grit from aerator tanks and inert biosolids mixed with soil that were generated at the adjacent WPCP. Filling took place in low spots and slopes on and around the then-inactive landfill. Records or surveys of these disposal activities were not kept by the WPCP. The placement of naturally occurring asbestos (NOA) in the stockpile area located in the western portion of the Nine Par Landfill was carefully managed, with EPA oversight in 2003.

Since 2005, approximately 250,000 cubic yards of clean soils have been stockpiled on the top deck area of the Nine Par Site. These soils are excavation spoils from City Civic Center and San Jose Airport improvement projects and consist of non-engineered fill that is primarily low to moderately expansive clays (CL) with some areas covered by clayey or sandy gravels. Stockpile locations have been mapped by the City. Materials delivered to the Nine Par Site from these projects were reportedly part of a City Environmental Services Department Soil Management Program. The soils were screened for contaminants per San Francisco Regional Water Quality Control Board (RWQCB) risk-based guidelines.

2.1 Current On-site Environmental Conditions

A detailed hydrogeologic investigation specific to the Nine Par Site has not been performed; however, hydrogeologic conditions for the adjacent Zanker Material Processing Facility, Zanker Road Landfill and WPCP facilities are well documented. The following information was obtained from documents specific to those properties.

The Nine Par Site lies within the northern part of the Santa Clara Valley groundwater basin, which contains over 1,000 feet of unconsolidated to semi-consolidated clays, silts, sands, and gravel. Regional groundwater studies indicate that the primary freshwater aquifers of the northern Santa Clara Valley are restricted to buried channel deposits within the Pleistocene alluvium. The buried channel deposits are regionally grouped into upper and lower aquifers. Near the bay, these aquifers are separated from each other by the Pleistocene Bay Mud, which forms an extensive clay aquitard. Regional groundwater flow within the aquifer system is toward the San Francisco Bay and is recharged by runoff from the Santa Cruz Mountains and the Diablo Range (Helley et al., 1979).

Investigations completed at the Zanker Material Processing Facility (EMCON, 1974 and 1989), the Zanker Road Landfill (Cooper-Clark and Associates, 1975; EMCON 1992), and on a regional scale (Iwamura, 1980; Poland and Ireland, 1985), indicate that sediments beneath the Nine Par Site contain an “upper” and a “lower” aquifer. Near the Nine Par Site, the upper aquifer is encountered at approximately -45 feet relative to mean sea level (MSL) and is overlain by the Holocene Bay Mud and Holocene fine-grained alluvium. The Bay Mud was deposited in an estuarine environment and the fine-grained alluvium was deposited in inter-fluvial basins and fresh-water marshes. The upper aquifer is underlain by a laterally extensive clay aquitard that extends to -200 feet MSL. The lower aquifer occurs below this aquitard and forms an extensive drinking water aquifer in the Santa Clara Valley (Helley et al., 1979). Flowing artesian conditions from this aquifer have been reported in the area.

In addition to the upper and lower regional aquifers, shallow water-bearing sand zones have been identified within the Holocene Bay Mud and Holocene fine-grained alluvium, which interfinger beneath the site. These shallow water-bearing sand zones are separated from the upper aquifer by a regionally extensive Bay Mud aquitard. The quality of groundwater in the shallow water-bearing sands is generally poor because of extensive saltwater intrusion (Iwamura, 1980). Groundwater is recharged mainly from local runoff and percolation. The sands within the shallow water-bearing zone have been characterized in detail beneath the Zanker Material Processing Facility and the Zanker Road Landfill

because although groundwater occurs in both the sands and surrounding clays, most groundwater movement occurs in the sands and potential impacts to groundwater therefore, would initially be detected in these sands.

Where encountered in exploratory borings beneath the Nine Par Site (Cooper-Clark and Associates, 1975; SCS Engineers, 2007 and ENGEO 2010), the shallow water-bearing sand zone occurs within the -5 to -20 feet MSL interval and is separated from the upper aquifer by approximately 20 to 30 feet of low-permeability clay (generally classified as CL in the Unified Soil Classification System). These sands are described as silty sand and clayey sand (classified as SM and SC in the Unified Soil Classification System).

The City-owned Nine Par Landfill property overlies parts of a larger municipal waste disposal site that was operated by the Nine Par Company. The City property is currently vacant and consists of a portion of the former Nine Par Landfill, a tidal marsh area, and the inactive WPCP recycle water filling station. The adjacent Zanker Road Class III Landfill property also occupies a portion of the former Nine Par Company disposal area.

The non-engineered fill cover at Nine Par Landfill is underlain by mixed municipal waste fill including a mixture of highly decomposed organic materials, glass, wood, metal, plastic, and construction and miscellaneous debris. The mixed waste layer varies in thickness from 5 to 20 feet (SCS Engineers, 2007, ENGEO, 2010). The whereabouts of biosolids that were mixed with soils and disposed of in low spots at the landfill is unknown. As previously mentioned, records or surveys of these disposal activities were not kept by the WPCP. The location of the NOA Stockpiles was carefully surveyed and recorded when it was emplaced in November 2003.

The waste is underlain by stiff clays that exhibit hydraulic conductivity on the order of 3x10-8 cm/sec and good shear strength and some lenses of sand (SCS Engineers, 2007). The low-plasticity clayey materials extend to at least depths 31.5 feet below the waste mass (where discontinuous sand to clayey sand and silt lenses have been identified). Moisture content of the deep soils underlying the waste are reported to range from 22.8 to 25.1 percent; dry densities reportedly range from 102.4 to 107.4 pounds per cubic foot (SCS Engineers, 2007). Consolidation tests suggest that surface settlements can be expected from any planned additional soil placement or surcharging (SCS Engineers, 2007).

2.2 Current Off-site Environmental Conditions

In 1987 the City constructed a recycled water pumping facility in the southwestern corner of APN-015-38-005. Reclaimed, treated wastewater was pumped from Artesian Slough into recycle water pipelines or tanker trucks for off-site use. This facility is no longer operating. During 1987-1989, WPCP-generated wastes as described above were placed around Nine Par Site western fill slopes adjacent to the pumping facility, reportedly to depths of 6- to 8 feet.

3. IMPACT ANALYSIS

The challenges to be addressed in order to proceed with construction, design, and operation of the proposed anaerobic digester facility at Nine Par Landfill are generally common to improvement projects at old landfills. They include: settlement affecting roadways, pavement, utilities and foundations; subsurface combustible gas migration control (into site buildings or off-site locations); odor/air quality mitigation during onsite excavations; water quality protection; and construction worker safety, among other things.

NOA Stockpiles

Naturally Occurring Asbestos (NOA) is considered hazardous and is commonly found in ultramafic or serpentine rock. Activity in areas with asbestos containing rock or soil may create dust emissions containing asbestos fibers that can penetrate body tissues and remain in lung or abdominal cavity tissue for a long time. Such fibers are believed to be the cause of asbestos-related diseases. The most common of these are Asbestosis -- causing scarring of the lungs and breathing difficulties, Lung Cancer, and, Mesothelioma -- a cancer of the membranes lining the lungs, chest, and abdominal cavity.

Accordingly, the disturbance of soils and rock that may contain asbestos should be avoided whenever possible, and the good dust control practices are not only required by regulations but are obvious precautions that will minimize potential health impacts.

Areas having a greater likelihood for the presence of Naturally Occurring Asbestos require special dust control when the earth is disturbed. The Air Resources Board (ARB) has adopted two Airborne Toxic Control Measures for naturally-occurring asbestos. The first is the Asbestos ATCM for Surfacing Applications and the second is the Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. Also, the U.S. EPA is responsible for enforcing regulations relating to asbestos renovations and demolitions. However, the U.S. EPA can delegate this authority to state and local agencies. The ARB and local air districts have received delegated authority to enforce the federal National Emission Standards for Hazardous Air Pollutants (NESHAPS) regulations for asbestos.

As previously mentioned, the location of the NOA Stockpiles was carefully surveyed and recorded when it was emplaced at Nine Par Landfill in November 2003. The construction design plan for the facilities and associated areas (e.g., roadways, parking lots, etc.) completely avoids these areas.

4. MITIGATION MEASURES

WorleyParsons is in the process of developing a Plan for the preliminary characterization of environmental conditions at the Nine Par Landfill Site. The NOA stockpile area will be avoided during the field investigation and during subsequent site development. Landfill cover materials will be sampled at three locations and the samples will be submitted to an analytical laboratory for chemical analyses (including asbestos). Soil samples will be analyzed for asbestos using ARB 435.

This Plan is being developed with input from the City of San Jose, the Regional Water Quality Control Board, and CalRecycle. The scope of work proposed in the Plan is designed to address the following requirements:

- Evaluation of the potential for vapor intrusion into new buildings and work areas so that planned construction may be designed to mitigate health and safety hazards.
- Evaluation of the possibility of encountering/disturbing disposed asbestos containing materials to prevent exposure of harmful air-borne particles to workers during construction activities; based on the findings of this evaluation, an Asbestos Dust Mitigation Plan may need to be prepared to comply with local air quality management board regulations.
- Identification of lateral extent of waste materials at Nine Par Landfill.
- Field screening for petroleum contaminated soils shall be performed prior to site grading and construction. Screening shall include the analysis of grab soil samples using a Flame Ionization Detector (FID) and a Photoionization Detector (PID).
- General characterization of the physical and chemical nature of waste (fill) materials, soil, groundwater, and leachate that will be disturbed/encountered during the planned foundation and earth work to ensure that contractors are informed and appropriate safety and management practices are implemented, as required.

A Health and Safety Plan will be prepared prior to initiation of site grading work in accordance with landfill industry guidelines and known site conditions. It should include an assessment of potential hazards, provisions for air quality, combustible gas and dust monitoring, procedures for identifying and handling special wastes or liquids, requirements for protective clothing and equipment, emergency response steps and recordkeeping procedure. Preparation of an Asbestos Mitigation and Avoidance Plan may be required to ensure worker safety during planned construction activities.

There is no perimeter subsurface gas monitoring network currently in place at the Nine Par Site and the extent of off-site landfill gas migration, if any, toward the WPCP is unknown. Enclosed structures that will be built on the landfill will require combustible gas infiltration protection and monitoring features. Protection measures can include a combination of below-slab membrane and venting systems, and gas cut-offs for utility trenches or conduit penetrations. Specific protection measures would be a function of building and utility design, occupancy, and foundation requirements. CCR Title 27 regulations also require that automatic methane gas level sensor systems be installed in building interiors. These monitoring systems can be equipped with communication devices to notify response personnel in the event elevated combustible gas concentrations are present in the building interior.

Normal refuse decomposition processes will result in both differential and uniform landfill settlements. Settlements of the underlying Bay Muds may also be expected. Ongoing maintenance may be required for site grade and drainage patterns, and special provisions may be required for the construction of buildings over refuse. Underground utilities and connections to buildings may become damaged or compromised due to settlement. This can be mitigated via use of supports and/or flexible utility connections at building entry points and at refuse/native soil transition points or other comparable methods or techniques.

5. CONCLUSIONS

In addition to the performance of additional site characterization at Nine Par Landfill, the following items should be addressed in preparation for site development:

- A Health and Safety Plan should be developed prior to site grading to protect workers from possible exposure to odors, combustible gas and trace LFG constituents, and contact with refuse, hazardous waste, leachate and contaminated water.
- Preparation of an Asbestos Mitigation and Avoidance Plan may be required to ensure worker safety during planned construction activities; the disturbance of soils and rock that may contain asbestos should be avoided whenever possible, and the good dust control practices are not only required by regulations but are obvious precautions that will minimize potential health impacts.
- In the event that petroleum contaminated soils are encountered during field screening, and are determined to require mitigation, a plan should be prepared to define the lateral and vertical extent of contamination and to present mitigation alternatives – which may include in-situ treatment or soil excavation and disposal at an approved facility.
- Upgrades to the landfill cover and drainage systems may be required to meet current regulatory standards. If this occurs, a landfill post-closure monitoring and maintenance plan may need to be developed. This Plan would include monitoring programs for groundwater, surface water, leachate, and landfill gas.
- A landfill construction management plan should be developed prior to initiation of facility design, with provisions for odor, particulate and LFG emission controls.
- Ongoing maintenance may be required in response to waste settlement in order to ensure consistent site grade and drainage patterns.
- Special provisions may be required for the construction of buildings over refuse in order to ensure structural stability without damage from waste settlement.
- Damage to underground utilities and connections to buildings as a result of waste settlement may be mitigated via use of supports and/or flexible utility connections at building entry points and at refuse/native soil transition points or other comparable methods or techniques.
- Enclosed structures that will be built on the landfill surface will require combustible gas infiltration protection (e.g., combination of below-slab membrane and venting systems, gas cut-offs for utility trenches or conduit penetrations) and monitoring features.
- Automatic methane gas level sensor systems may need to be installed in building interiors if CCR Title 27 regulations are to be addressed.

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