4.4 HYDROLOGY AND WATER QUALITY

4.4.1 EXISTING CONDITIONS

SURFACE WATER

The Potrero Hills form a horseshoe-shaped ridge, enclosing a 900-acre valley that drains westward into Hill Slough and First Mallard Branch in the upper reaches of the western Suisun Marsh area. The valley is characterized by rolling hills with some moderate to steep slopes that generally drain from east to west. The elevations on the site range from 250 to 300 feet in the hills to 40 feet at the southwestern end of the site (Wetlands Research Associates 1991). The average annual rainfall for the area is 21 inches, based on climatological data summarized by the National Oceanic and Atmospheric Administration in 1990 (Wetlands Research Associates 1991).

The project site is located 2 to 3 miles upstream of the brackish Suisun Marsh. Natural terrain surrounding the site is comprised of a range of hills on both the north and south. An ephemeral surface water runoff channel, Spring Branch Creek, exists along the southern edge of the valley. Spring Branch Creek is formed from two smaller waterways to the east and south, which drain from the hills into swales that continue to the headwaters of the creek. Spring Branch Creek flows west into First Mallard Branch, a tributary of Cutoff and Suisun Sloughs. This channel has been relocated as approved by the Use Permit/Marsh Development Permit, the RWQCB Waste Discharge Requirements, and the U.S. Army Corps of Engineers (USACE) permits. In 1995, a second permit was issued by the USACE to establish the conditions for the stream channel relocation in the upper reach of the valley within the 320-acre Phase I landfill parcel. The channel was designed to accommodate the 1,000-year flood.

An unnamed watercourse drains westward from Siltation Control Basin No. 1 (Exhibit 3-3) toward Hill Slough. Drainage also exits a small area of the site northward, downslope from the entrance pond that is adjacent to the main access road near the northern property boundary. A portion of the Northside Stormwater Control Facility and Power Plant Area (Exhibit 3-4) sheet flows to the north toward Hill Slough.

Surface Water Quality

The RWQCB's Basin Plan contains narrative and numerical water quality objectives to protect and maintain beneficial uses of surface water and groundwater. Beneficial uses and water quality objectives have been established for waters in the project area and Suisun Marsh. These include providing for stock watering, domestic water supply, wildlife and fish habitat, estuarine habitat, and recreation.

Surface Water Quality Monitoring

For the Phase I area, a surface water quality monitoring program for Spring Branch Creek and the unnamed drainage leading west to Hill Slough was developed and approved by the

RWQCB and the SCDEM. The monitoring program requirements included collection of background water quality data, location of monitoring stations, constituents to be monitored, sampling procedures, and the manner of reporting results. Exhibit 3-3 indicates the location of the surface water monitoring stations. Key storm water monitoring and control protocols are summarized below.

Prior to each rainy season, the project applicant is required to inspect the site to ensure that drainage channels are in place and that necessary erosion control measures have been taken (e.g., placement of any needed hay bale check dams, siltation control fabric fences, and spreading of mulch and reseeding of bare areas).

Inspections by the project applicant during the wet-weather season may identify portions of the surface drainage channels that have been eroded or that contain silt deposits that may interfere with the functioning of the channel if not maintained. These areas are required to be maintained by the project applicant, as appropriate.

Inspections by the project applicant may identify areas where the vegetative cover shows signs of poor vegetation growth. Those areas may be tilled to a shallow depth, and soil amendments may be added before they are subsequently reseeded. Other areas may require only reseeding. These areas are required to be maintained by the project applicant, as appropriate.

Runoff from the composting, wood, and metal recycling area flows into the water retention pond located in Recycling Area No. 2. The collected water is used for compost windrow irrigation or dust control. At times of excessive runoff during large storms, this retention pond flows into the diked pond in Stormwater Control Basin No. 1 (Exhibit 3-3). This basin pond is required to be regularly monitored by the project applicant to develop background information on water quality.

The monitoring program schedule has been established in coordination with the Local Enforcement Agency and the RWQCB, as specified in the Waste Discharge Requirements. The surface water monitoring is conducted monthly by the project applicant between November and May, when water is flowing in the channels and from the siltation control basins.

Surface water quality is tested at four locations throughout the existing landfill site: Siltation Control Basin Nos. 1, 2, and 3, and downstream. High levels of bromomethane, chloroethane, chloromethane, dichlorodifluoromethane, trichlorofluoromethane, and vinyl chloride have been detected at all four locations in the past. Readings for all constituents tested were consistently high on December 13, 1994; January 20, 1995; and March 28, 1995. Basin Nos. 1 and 2 were out of range for 2 chloroethyl vinyl ether from March 28, 1991 to March 28, 1995 and March 23, 1987 to January 20, 1995, respectively. However, through implementation of the site's Water Quality Contingency Plan (included as Appendix Q in the Joint Technical Document) these contaminants have been reduced to below applicable water quality standards. The Water Quality Contingency Plan contains performance standards and measures to be taken to correct and eliminate surface water or groundwater degradation found during the

water quality monitoring program. This plan specifies the project applicant's responsibilities and the allotted time period for undertaking corrective measures. Based on surface water monitoring completed on January 9, 2002 for the 2001-2002 wet season, no contaminants were found to be present in the creek water or the onsite siltation control basins (Potrero Hills Landfill Environmental Management Division, July 2002).

Surface Water-Groundwater Interactions

Surface water-groundwater interactions for the landfill site involve drainage from the southern rim of the Potrero Hills seeping into alluvial soils below Spring Branch Creek, as described above. This causes saturation of alluvial soils under Spring Branch Creek. The 1995 Combined EIR noted that some additional interaction could occur as a result of seepage from drainage along the north and east walls at the edge of the landfill, if these areas are underlain by the moderately permeable sandstone formation.

GROUNDWATER

The project site lies in the Suisun-Fairfield Valley Groundwater Basin along the western margin of the Sacramento Valley and is underlain by a thick sequence of low-permeability marine sedimentary rocks. Marine sedimentary units in the Fairfield-Suisun area are classified as non-water-bearing (USGS 1960). Groundwater in the Suisun-Fairfield Basin occurs in upland and lowland areas. The project site lies in the upland area, which is underlain predominantly by claystone and shale sediments with low permeability, as well as alluvium and residual soils. Groundwater in the upland areas is influenced by the nature and structure of the bedrock, as well as by the depth and consistency of the alluvium in each valley and swale. Groundwater resources in bedrock units near the site are extremely limited and are characterized by low well yields and poor water quality.

Groundwater occurs beneath the site in bedrock units and locally within the surficial soil units. Groundwater in the bedrock units generally flows toward the valley from the north and south ridges, and west and southwest along the axis of the valley. The groundwater generally occurs under confined conditions, typically fractures, in the Capay shale; unconfined to semi-confined conditions in the Domengine sandstone; confined conditions, generally sandstone interbeds, in the Nortonville shale; and unconfined to semi-confined conditions within perched zones in the surficial soils. The surficial soil is stripped away before base liner construction begins.

For the Phase I area, groundwater occurrence was characterized on the site by EMCON Associates and was summarized in the Report of Disposal Site Information (RDSI) prepared by the project applicant (1993). Only limited quantities of poor quality, shallow groundwater were found at the site. This shallow groundwater aquifer appeared to be isolated from usable groundwater in agricultural areas around the Potrero Hills (RWQCB 1985). Groundwater elevations reflect surface topography, with direction of flow generally to the west and southwest. For Phase I, groundwater flow velocities were estimated at 0.4 to 12.4 feet per year.

According to the 1993 RDSI, the source of groundwater is generally seepage migrating downward from the sandstone formations and rainwater trapped in cracks in the clay soils during summer. The greatest seepage occurs along the southern boundary of the existing landfill. A subsurface drain and cutoff wall were installed in this area to collect the seepage, as well as water percolating through the stream channel and silt control basins. The subsurface drainage is periodically pumped from the drain. Construction was completed in 1993 before placing wastes against the southern edge of the landfill excavation (PHLF 1993). The remaining seepage was on the north and east walls of the landfill excavation cells, where drainage flows down to channels at the edge of the landfill.

Groundwater at the existing landfill is monitored by eleven wells surrounding the landfill area. A substantial body of data has been developed for the landfill site and has been used to hydrogeologically and chemically characterize the area. The groundwater monitoring was conducted quarterly until 1995, when the RWQCB approved the semiannual monitoring frequency.

Well locations are shown in Exhibit 4.4-1. The background Wells GW-5, GW-6, and GW-10 are located upgradient and provide the water quality information from upgradient perimeter sources.

Groundwater Seepage

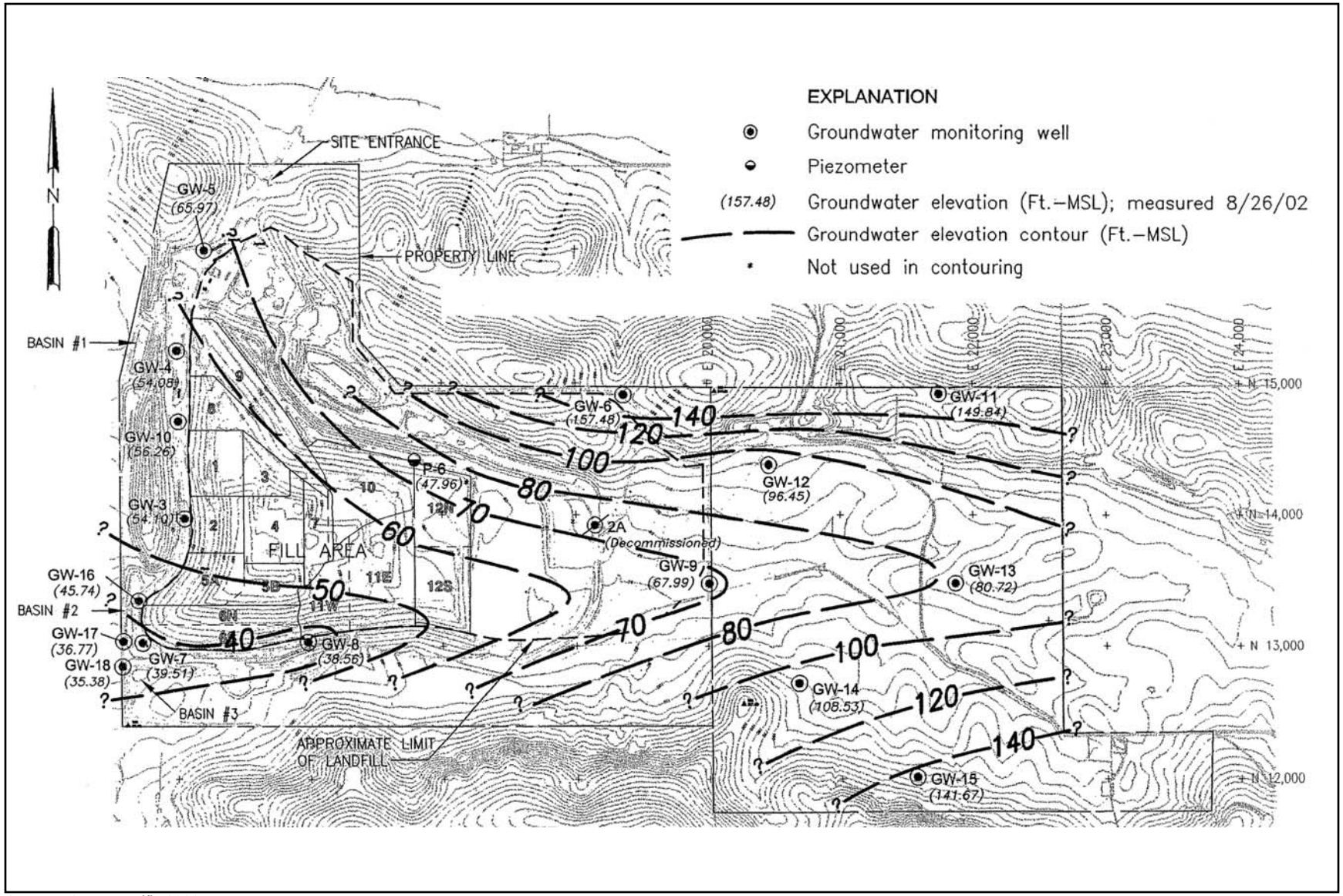
The elevation of the landfill base varies from several feet above the measured groundwater potentiometric surface to approximately 40 feet below the potentiometric surface (the level to which the water in an artesian aquifer would rise if unaffected by friction with the surrounding rocks and sediments). Most of the groundwater beneath the permitted and proposed expansion areas occurs under confined conditions and may not rise to its potentiometric surface during or after construction of the base liner. This condition has been observed during the construction of Cells 1 through 12S. Nevertheless, groundwater seepage is anticipated, particularly along the northern margin of the Phase I excavation, where sandstone may be exposed on the excavated base and side slopes.

Because of the anticipated groundwater seepage, a groundwater subdrain system is included in the Phase I landfill design. A groundwater discharge (seepage) evaluation was performed to estimate seepage rates for design of the groundwater subdrain system (EMCON Associates, Volume 2 of 3, May 1999).

Groundwater Quality

Studies conducted for Phase I by the project applicant revealed that the groundwater in the area around the landfill was little used and appeared to be effectively isolated from usable groundwater in agricultural areas outside the Potrero Hills (PHLF 1993).

Investigation conducted by EMCON Associates on behalf of the project applicant encountered only limited quantities of groundwater onsite, which was of poor quality (EMCON, May 1999).



Source: Conor Pacific 2002

Groundwater Contours
Second Semiannual 2002 Monitoring Report

EXHIBIT 4.4-1

NORTH EDAW

The source is generally seepage into the sandstone formation that migrates downward along the dip of the formation. Rain water also is trapped in the cracks that form in the clay soils during summer. Hence, as the cells in Phase I are periodically excavated to base grade, limited seepage of groundwater is encountered along the walls. Such seepage is evaluated by the engineering geologist prior to landfilling wastes in the cell. For the initial months of exposure, this seepage water either drains into the leachate collection subdrain or it evaporates at the base of the other exposed walls.

The predominant direction of regional groundwater flow is east to west. The adjacent groundwater aquifers are located approximately 0.5 to 1 mile to the north and south, respectively.

The groundwater monitoring well system installed at the site monitors the effectiveness of the site containment features and the Leachate Collection and Removal System (LCRS). The locations of the wells are shown on Exhibit 4.4-1. The location and design of the wells have been approved by the RWQCB and the Local Enforcement Agency. The Water Quality Monitoring Program includes the constituents to be monitored, the sampling procedures, the laboratory to be used, and the manner of reporting results. The plan includes the semi-annual monitoring of the wells, collection of the samples via a set protocol, and analysis of the samples for an extensive group of organic and inorganic constituents. It has been established with the concurrence of the RWQCB and the Local Enforcement Agency.

The groundwater monitoring network for the existing landfill consists of 11 monitoring wells designed to monitor the uppermost aquifer at the site. Initial groundwater monitoring indicated that, because of changing subsurface conditions, the water quality of individual wells varied substantially. Based on this information, the project applicant recommended that the initial well concentrations be used as a baseline against which to evaluate potential changes in water quality. Initial concentrations, known as water quality protection standards, were developed and recommended to the RWQCB as alternates to the standard list proposed in the WDRs. These water quality protection standards were incorporated into the existing WDRs for the currently permitted landfill.

Based on groundwater monitoring data collected from the monitoring wells located throughout the landfill site, groundwater quality is generally good. However, volatile organic compounds (VOCs) have been detected in groundwater monitoring well number 7 (GW-7) in the site's southwest corner (Exhibit 4.4-1). In addition, residents located directly north of the site have raised concerns with the Regional Water Quality Control Board regarding contamination of their groundwater supplies. In response to the detection of VOCs in GW-7 and the concerns raised by adjacent residents, the Regional Water Quality Control Board required implementation of a Correction Action Program.

As part of the Corrective Action Monitoring Program, groundwater monitoring wells GW-16, GW-17 and GW-18, and alluvial piezometer P-2 were installed in 1999. The groundwater monitoring wells and piezometer were installed to determine the extent of groundwater impacts downgradient from well GW-7. The source of the VOCs was determined through the

Corrective Action Monitoring Program to be landfill gas. As part of the corrective action to mitigate the release, additional landfill gas extraction wells were installed and hooked to the site's landfill gas extraction system. Based on monitoring conducted in 2002, no VOCs, other than laboratory contaminants, were reported in the samples from well GW-7. Also, during the first and second semiannual monitoring events in 2002, no VOCs were reported in the detection or evaluation monitoring well samples with the exception of the alluvial piezometer P-2. This indicates that enhancement of the landfill gas extraction system has been effective in mitigating the source of VOCs that had affected groundwater near well GW-7 (Potrero Hills Landfill Environmental Management Division, July 2002).

DRAINAGE AND FLOODING

The finished fill patterns of the Phase I area dictate the direction of surface runoff from the filled slopes within the interior of the site. The interior area of the site has been graded to handle all runoff from the adjacent slopes and to minimize erosion. These disturbed areas drain to siltation control basins. On final exterior slopes, lateral benches are being constructed at approximately the bench channel elevations, which will direct runoff flow down constructed downdrains or the slopes of the Phase I landfill. Covered landfill slopes are mulched or seeded to promote the growth of natural grasses. The grassy slopes promote erosion control of the landfill cover. Final discharge of the Phase I surface area runoff is to Spring Branch Creek and an unnamed drainage to the northwest of the site. Spring Branch Creek downstream of the site flows into the stockwater pond constructed offsite by the project applicant in 1995. No residential or commercial structures are currently located within the project drainage area.

The vegetation that has developed on the intermediate covered slopes of the landfill has proven to be very suitable for control of erosion, even without any special care such as providing soil amendments or fertilization. To the extent practicable, the initial vegetation planting is done near the beginning of the rainy season (October-November) to aid in germination of the seed and establishment of plant growth.

Covered landfill slopes will be allowed to grow natural grasses. To promote grass growth, these slopes initially will be mulched or seeded to control erosion of the landfill cover. After several years of grass growth, these areas will be plowed or back-bladed with a dozer to smooth minor erosion rills and promote more vigorous grass growth.

Estimates of the 1,000-year, 24-hour precipitation and the probable maximum 24-hour precipitation at the site are derived from the precipitation frequency, intensity, and duration study conducted by EMCON in 2001. The maximum precipitation depth for a 24-hour, 1,000-year frequency storm is about 7.64 inches. The maximum annual rainfall on record is about 33 inches in 1958, as measured at Mare Island. Calculation of the peak flow of rainfall runoff from the landfill was performed using the rational method. The "design storm" selected to estimate the maximum anticipated runoff is a 1,000-year storm of 24-hour duration.

Some drainage water not associated with landfill activities flows north to the entrance pond adjacent to the main access road. A stock pond originally located in approximately the southcentral portion of the site was relocated under a Corps wetland permit in 1995. With sufficient precipitation, the pond overflows the spillway leading to the lower reach of Spring Branch Creek.

The PHLF site is not located in the 1,000-year floodplain. The site has limited flooding potential because of its natural drainage characteristics and the engineering features associated with landfill operations.

Drainage and Erosion Control Programs

One of the primary purposes of the surface water drainage controls in use at the existing landfill is to keep drainage separated from landfill operations, including the public disposal and recycling areas. Another purpose is to control surface runoff and reduce erosion during the active life of the landfill. Drainage from vegetated slopes is directed to perimeter drainage ditches and other conveyance structures on the site. Most of this drainage flows ultimately to Spring Branch Creek, but a portion flows northwest to the unnamed channel. All drainage channels have been designed to accommodate runoff from a 1,000-year, 24-hour storm. On final exterior slopes, lateral benches are designed at appropriate elevations to drain down the slopes of the landfill.

Surface water drainage systems are designed and maintained to ensure the integrity of roads, structures, and gas monitoring and control systems; prevent safety hazards; and prevent exposure of waste. If erosion occurs, it is to be promptly repaired, with steps taken to prevent further occurrence.

The local topography of the Potrero Hills creates a well-defined drainage area. Adherence to the site development and operations plans keeps drainage separated from the landfill operations. Drainage controls also are provided at the Public Unloading Area and the various recycling areas to prevent runoff from entering the composting, wood, recyclable materials, asphalt, and concrete storage piles.

For the currently permitted landfill, areas of disturbed soil are sloped to drain to one of five siltation control basins (Exhibit 3-3). Flow from Basin No. 1 exits the landfill property to the northwest through the unnamed channel. Flow from Basin No. 2 moves generally south to Spring Branch Creek. Basin No. 3 receives runoff from the soil stockpile area south of the active landfill area and also discharges to Spring Branch Creek. Flow from Basin No. 4 moves southwest to the stock pond, which overflows when full into Spring Branch Creek. Other siltation control basins are located in the southwestern portion of the recycling area to control runoff flows from these operations. Temporary drainage ditches and berms are placed in appropriate locations to intercept and divert surface runoff away from active working areas. In steeply sloped ditches, check dams are provided to reduce flow velocity and allow some of the sediment load to settle. The upper surfaces of the landfill are graded at a minimum slope

of 5% to facilitate surface runoff after settlement of the fill. During site operations, interim cover surfaces are constructed with sufficient slopes to prevent ponding on covered fill areas.

During site operations, the interim surfaces of the landfill are being constructed with sufficient slopes to prevent standing water on covered fill areas.

Landfill grades and lengths of slopes are designed to minimize soil loss from the landfill. The soil loss potential on landfill slopes was evaluated using the Universal Soil Loss Equation developed by the U.S. Department of Agriculture. The evaluation conducted by the project applicant indicates that the existing sediment basins have sufficient capacity to hold sediments from unvegetated landfill and soil stockpile areas. The evaluation also indicated that basin areas for the final development of the Phase I landfill will be sufficient.

Drainage Control Program

The landfill is being constructed as an area-type fill that will create a raised mound. In general, sheet flow of runoff occurs down vegetated slopes. Drainage from the vegetated slopes of the landfill is directed to the perimeter of the site. This runoff is collected in drainage ditches and other conveyance structures designed to meet Class II site standards. As the Phase I landfilling proceeds eastward up the valley, most of the drainage from the landfill will be channeled into the south drainage channel. A portion will drain directly westward. Drainage from the active landfill area flows to retention basins that convey the water offsite to downstream stockwater ponds.

Erosion and Sedimentation Control Plan

The Erosion and Sedimentation Control Plan identifies ongoing and proposed drainage and erosion and sedimentation control programs for the site. As a part of that plan, the following facilities, conditions, or procedures are provided:

- The erosion control features and facilities are inspected weekly during those times of the year when weather conditions could lead to damage of the facilities (e.g., erosion of vegetation silt barriers or sedimentation control basins caused by runoff of high amounts of rainfall).

- Sedimentation control basins are maintained annually to remove accumulated silt in order to restore the sediment storage capacity and clear the discharge control weirs.

- An energy dissipation feature will be installed in the south drainage channel downstream from the landfill at the appropriate stage of landfill development.

- The completed landfill areas will be covered, vegetated, and returned to cattle grazing in modules to minimize the active disturbed areas.

- Interim erosion control (possibly including silt control barriers and hydromulching) will be provided where quarry excavation precedes landfilling by more than 1 year.

- Soil disturbance outside the actual landfill boundaries is restricted to the minimum practicable.
- Soil amendments will be added to surface soils on completed landfill areas to support revegetation and reduce cracking from soil desiccation.
- Grazing on completed landfill areas will be controlled so that grass provides adequate erosion protection; grazing will be especially restricted in the first 2 years after revegetation to ensure that adequate vegetation growth is established.

The Erosion and Sedimentation Control Plan covers the entire site, including the landfill portion, the equipment maintenance and fueling area, the wood waste recycling area, the composting area, the Public Unloading Area, and the asphalt and concrete recycling areas.

Storm Water Pollution Prevention Plan

In accordance with the provisions of General Permit No. CAS000001 for Water Quality Order No. 91-13-DWQ National Pollutant Discharge Elimination System (NPDES), the project applicant has prepared and implemented a Storm Water Pollution Prevention Plan (SWPPP). Current landfill operations are in compliance with the requirements of NPDES Order No. 91-13-DWQ. The project applicant has certified annually that all non-storm water discharges to storm water conveyance systems have been eliminated.

The site has been evaluated for non-storm water discharges. The areas of potential concern include the material loading and unloading areas at the equipment maintenance building, landfill gas flare station, metals recycling area, and the two leachate storage tank locations.

The outside material storage/work areas at the existing landfill consist of the following activities:

- Storage of maintenance and/or construction equipment, non-chemical in nature.
- Household hazardous waste storage area.
- Refrigerator drop-off area for chlorofluorocarbon removal.
- Oil tanks located at the equipment maintenance building.
- Diesel fuel oil tanks located south of the equipment maintenance building and at the landfill gas flare station.
- Equipment washing facility at the equipment maintenance building.
- LNG truck fueling station.
- Public unloading facility.
- Future truck washing facility near the equipment maintenance building.

Other potential sources of non-storm water discharges include the unhoused vehicle storage area and unhoused trash containers.

A preventive maintenance program has been instituted. Landfill personnel perform semi-annual inspections to ensure that all storm water management devices are clean and properly functioning. Spill cleanup supplies and equipment also are inspected semi-annually. Upon identification of other vulnerable areas, a regular inspection and maintenance program is implemented to prevent contaminated storm water runoff in these areas. The primary diesel storage tank and gasoline tank are double-walled metal tanks (installed in 1998). Bollards installed along the tanks protect them from being struck and ruptured by equipment.

An accumulation of debris and trash can lead to the discharge of pollutants to the storm water system or directly to the waters of the state; therefore, a Pollution Prevention Committee has established programs to keep the facility in a clean and orderly manner at all times. The committee assigns individuals to periodically inspect the facility for overall cleanliness.

The landfill operator conducts an annual program to inspect and maintain the drainage system, as designed, to prevent run-on and runoff from adversely affecting the intermediate and final covered areas.

As of November 2001, nine siltation control basins were installed at the site. These basins are sized to protect the downstream areas from silt discharged from disturbed soil areas in the site.

Equipment and Truck Wash Drainage

The equipment wash facility is located directly adjacent to the equipment building near the site entrance (Exhibit 3-3). The equipment wash facility is used by the equipment maintenance staff and mechanics to clean equipment of soil and trash prior to performing maintenance tasks. The equipment wash pad is designed to collect wash water in a basin. From the basin, the wash water is treated through several steps, including oil/water separation, sediment filtration, and carbon filtration. Treated water from the washdown pad is either stored as recycled water for reuse in equipment washing or discharged to the recycling area silt control basin, where it ultimately flows to Silt Basin No. 1 (Exhibit 3-3).

Public Unloading Area Drainage

The unloading areas for self-haul vehicles and collection trucks are designed to collect drainage water and route it in a controlled fashion. During wet-weather operations, the runoff water is sampled to determine whether any degradation of downstream water quality might occur. The design allows for an oil/water separator unit to be installed in the channel prior to where it ultimately flows to Siltation Control Basin No. 1, if such is found to be necessary.

LEACHATE

Leachate is the liquid that has come into contact with or percolated through waste materials and has extracted or dissolved substances originating from the waste materials. Leachate

generation at the site is caused by residual groundwater discharge from the side slopes of the cell excavations, the liquid content in the waste deposited in the landfill, and from rainwater infiltration. The groundwater sources are of relatively low volume and tend to evaporate shortly after the cell is constructed. Some precipitation infiltration has occurred along the site perimeter. The site operator uses compacted clay soil to seal off these entry points.

The landfill is equipped with a Landfill Collection and Removal System (LCRS) around the entire downgradient perimeter of the site. The main purpose of the LCRS is to ensure that leachate does not come into contact with surface waters or groundwater, enter existing surface water drainages, or increase in volume through groundwater seepage. The primary concern is protection of water quality. The design of this system is founded on the concept that the leachate will flow downgradient on top of the low-permeability barrier that is the base of the landfill and will be collected in the collection system. The base of the landfill modules is sloped so that seepage will drain to specific locations where it can be collected and removed in pipes.

The LCRS for the 50-acre footprint constructed before the October 1993 implementation of Subtitle D regulations comprises an extensive network of subsurface French drains that are connected to central sumps and pumps. Collector drains are installed on a dendritic (branching) grid pattern to direct seepage toward collection points that are downgradient along the western and southern edges of the 50-acre footprint. All leachate drains to a central collection sump and pump (main sump Station No. 1) at the southwest corner of the 50-acre footprint.

As each pre-Subtitle D cell was constructed, the base was inspected to confirm the site geology and ensure that the base met the 1 x 10-6 centimeters/second State permeability standard. In the pre-Subtitle D area, native soil areas were removed where the claystone shale was fractured; where sandstone seams were encountered and were removed, the clayey soil was recompacted to a depth of from 2 to 5 feet as necessary.

Subtitle D regulations required in part that landfill cells constructed after October 1993 be equipped with a composite lining system, consisting of a compacted clay liner, geosynthetics, and a blanket drainage layer. This drainage layer must be hydraulically separate from the LCRS contained in cells developed before October 1993. Accordingly, landfill disposal cells developed after October 1993 at PHLF have been constructed with a composite layer and blanket drainage layer that drains away from the 50-acre footprint to a central collection sump and pump located at Station No. 3, at the northwestern corner of the composite-lined cells developed to date. The remainder of the landfill footprint is a Subtitle D landfill constructed with a composite liner.

Leachate Control Programs

The RWQCB requires that the leachate levels in the base of the landfill be monitored for excessive buildup. Landfill management staff measure leachate levels monthly.

Collection of leachate generated from within the site is accomplished by draining leachate through an extensive network of subsurface French drains that are connected to pump sumps. The project applicant provides an annual report to the RWQCB that summarizes leachate level measurements, extracted quantities, disposal procedures, and the effectiveness of the LCRS.

Leachate Facilities Contingency Plan

Provision No. 8 of the WDRs (Order No. 93-072) adopted by the RWQCB on July 21, 1993, requires the preparation of a contingency plan to be instituted in the event of a surface leak or spill from the leachate facilities. In the event of a major surface leak or spill from the leachate facilities that threatens to cause migration of pollutants to receiving waters, the project applicant is required to give immediate notification (within 24 hours) to the RWQCB and Local Enforcement Agency (and the DTSC if hazardous wastes or toxic substances are involved).

The leachate control system is monitored as required by Title 27 CCRs Section 20790 (Leachate Control) to prevent contact with the public. Monitoring of the leachate levels is accomplished through periodic measuring of water levels in the leachate monitoring wells. Correlation of these data allows determination of trends in the leachate elevations within the landfill, to prevent leachate buildup within the site. Minimal leachate accumulation is expected at this site. Limited water has accumulated in the southern and western perimeter drain (Cell 6 sump). Leachate has also been collected in the Cell 10 sump. Water contained in the PHLF leachate control drain is sampled annually.

Leachate analytical data were collected from February 1990 to January 2001. Results consistently show the presence of high levels of cobalt, antimony, thallium, vanadium, EC, TDS, chloride, benzene, toluene, ethylbenzene, 1, 4-dichlorobenzene, and 1, 2-dichloroethane in the leachate. The presence of these contaminants in the leachate is not unusual based on the waste received at the site and is not considered a hazard to humans based on the site's current leachate management practices.

BIOSOLIDS

Treatment of municipal wastewater typically generates two waste streams: a liquid component and a solid or semisolid component. The liquid component, commonly referred to as effluent, usually is discharged to surface waters or percolation ponds or is used as irrigation water on some types of land. The solid or semisolid component, commonly referred to as sewage sludge, is treated to varying degrees and is typically incinerated, stored in drying beds or ponds, disposed of in landfills, or reused as a soil amendment on some types of land (JSA, June 1999).

Non-pathogenic contaminants are included in biosolids that could contribute to degradation of water quality if not properly managed in accordance with existing regulations governing the disposal of biosolids and the use of best management practices. A wide range of contaminants were evaluated during the development of the Part 503 regulations (Title 40 Code of Federal Regulations [CFR] Part 503) governing biosolids disposal and beneficial reuse (JSA, June

1999). Among those constituents of particular concern are those that might contaminate sources of drinking water and result in impairment of beneficial uses, including uses for potable supplies, which would result in direct impacts on public health. Any such impairments in quality could indirectly affect irrigation and livestock watering and, hence, crop and animal health. Included among these contaminants are nitrates, certain trace metals, selenium, salts, trace SOCs, and a large number of other compounds (200 were initially addressed in the EPA 503 rule development).

4.4.2 Impacts and Mitigation Measures

Thresholds of Significance

The following criteria were used to evaluate the significance of hydrology and water quality impacts resulting from the proposed project. Impacts on hydrology and water quality were considered significant if implementation of the proposed project would:

- Substantially alter existing drainage patterns, including streamflow, in a manner that would result in flooding onsite or offsite.
- Substantially alter existing drainage patterns, including streamflow, in a manner that would result in erosion or siltation onsite or offsite.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff.
- Violate any Waste Discharge Requirements or water quality standards.
- Otherwise substantially degrade water quality.

Impact **4.4-1**

Increased Erosion Potential. *The construction activities associated with the proposed expansion could result in increased soil erosion by modifying the sites drainage patterns and removing site vegetation. Increased erosion could adversely affect the water quality of local drainages. This would be considered a* ***significant*** *project impact.*

The additional grading necessary to excavate the expansion area would increase the potential for soil erosion by removing site vegetation and modifying site drainage patterns. During landfill operations, soils are typically stockpiled on the site prior to their use. The exposure of graded areas, stockpiled soils and existing and proposed composting operations to wind and water erosion during storm events would increase the volume of sediments transported off of the site and into adjacent waters and the Suisun Marsh area. If runoff were exposed to wastes, leachate, contaminated green wastes, or compost, surface water quality could be degraded. Surface water contaminated with nutrients, heavy metals, and organic chemicals could introduce these pollutants into adjacent surface waters and Suisun Marsh.

The surface water drainage system is intended to collect and direct rainfall runoff over the surface of the landfill without causing erosion and damage to the cover. The project is not located in a floodplain and increased flood risks would not be anticipated with project implementation. The system would be designed for a 1,000-year storm intensity, as required by the site's Waste Discharge Requirements. This would be accomplished by directing sheet flow runoff from the sloped areas of the cover to the nearest downslope bench drains. Downdrains would direct the water down the outer slopes of the landfill and discharge it into the Spring Branch Creek channel. Slope protection would be managed by selecting soil cover with low erosion potential and maintaining slopes and slope lengths that keep erosion from becoming excessive.

The southern drainage channel (Spring Branch Creek) is proposed to be constructed as a lined channel to protect the base of the landfill slope and prevent infiltration into the channel bottom and into the adjacent landfill. An energy dissipation device would be installed at the western end of the channel if necessary. A drainage channel and pipeline have been designed for relocating Spring Branch Creek to the southern edge of the landfill. The realignment of this creek has already occurred within the Phase I area of the site. The drainage channel/pipeline has been designed to carry the estimated 1,000-year storm peak flow rate. Hydrologic analysis showed the design peak flow for the south drainage channel to be about 312 cubic feet per second (cfs). An updated 2001 analysis, considering the Phase II landfill area, resulted in a peak flow of about 350 cfs at the southwest corner of the landfill. Based on the drainage analysis conducted for the site, the proposed drainage system would be designed with adequate capacity to accommodate projected storm water flows and capture peak discharge (EMCON, May 1999).

To provide long-term site capacity, a buttress fill—also referred to as a "shingle fill"—has been designed along the southern edge of the landfill. The buttressing of the southern edge of the landfill would involve two forms of water flow in Spring Branch Creek. The main creek flow would be routed into a pipeline that would be placed at the bottom of the buttress. The buttress fill would be constructed of on-site soil material and would be phased in during cell development. As each buttress layer is constructed, a surface channel would be created to carry runoff from the south hillsides and from the landfill. This channel would merge with the flow discharging from the pipeline near the western outlet of the pipe. The realignment would not reduce the surface water-carrying capacity in site channels or retention basins.

A sedimentation/storm water detention basin is planned for the north side of the Phase II area. This facility would serve as the sediment control structure for the northern area of the landfill. It would also function as a detention structure for storm water to reduce the peak outflow prior to release downstream.

As the northeastern portion of the Phase II cells are filled, drainage from a portion of the Phase II landfill mound would be directed to the northern flank of hills comprising the Potrero Hills Valley. The drainage waters are planned to flow down two drainageways that would be constructed on the northern slope of the Potrero Hills. These two drainageways

would direct the runoff water into a water storage and sedimentation control basin. The stored water would be used for on-site uses, such as dust control and fire control. The location of this basin is shown on Exhibit 3-3.

Although the surface water drainage system is designed intended to collect and direct rainfall runoff over the surface of the landfill without causing erosion and damage to the cover, the extensive nature of the grading activities associated with facility expansion over the life of the landfill and the continual changes in the site's drainage characteristics would increase the potential for substantial erosion to occur both on and off of the site. This would be considered a significant impact.

Mitigation Measure 4.4-1 Increased Erosion Potential

Consistent with the requirements of CCR Title 27, Section 20365, the design of the site's surface water drainage system shall include the diversion and drainage controls necessary to intercept run-on and direct run-off, and to minimize erosion during construction and operation activities over the life of the project. This would include the implementation of Best Management Practices (BMPs) during cell construction to minimize soil erosion. These BMPs may include diversion of storm water runoff using temporary swales or interceptor ditches, retention of existing vegetation wherever possible, stabilization of barren soils with jute netting or geotextile fabric, application of straw or mulch after seeding, installation of silt fencing and berms or hay bales to direct runoff away from construction areas, and the provision of visqueen (plastic) sheets or tarps to cover stockpiled soils.

Level of Significance after Mitigation

With implementation of the identified mitigation measure, potential erosion impacts would be considered less than significant.

Impact **4.4-2**

Surface Water Quality. *Surface water quality could be degraded by the increase in the area disturbed by the landfill operation and contact with refuse, leachate or biosolids. This would be considered a* ***significant*** *impact.*

The operation of landfills involves construction of new cells, the stockpiling of large volumes of soil, the placement of interim/final soil cover, and the processing of a wide variety of waste materials. These operations would be expected to cause significant water quality impacts. The management of water quality at the site, as described below, is intended to ensure water quality is not adversely degraded. However, based on the lifespan of the proposed project and the continual nature and intensive use of the site for solid waste disposal activities, potential surface water quality impacts would be considered significant.

Management of Site Water Quality

The area of disturbed soil is controlled by building increments of landfill cells, limiting the size of soil stockpiles, and maintaining a vegetative growth over interim closed areas of the landfill,

final closed areas and stockpiles. Vegetation is highly effective in stabilizing soil surfaces and minimizing soil loss.

Contact water usually occurs in the active landfill cell and most often at the active face. Once contact with refuse or leachate occurs, the surface water is handled as leachate meaning that the contact water would be discharged to lined surface impoundments. Discharge from leachate surface impoundments to surface water is not permitted.

During the active life of the landfill, areas of disturbed soil would be sloped to drain into siltation control basins. Temporary drainage ditches and berms would be placed where needed to intercept and divert surface runoff away from the active working areas. In steeper sloped ditches, layers of carpets would be placed as a channel liner, and hay bale check dams would be provided to slow the water flow and settle out some of the sediment load. The uppermost surfaces of the completed landfill would be graded to maintain a minimum slope of 5% to facilitate surface runoff after anticipated settlement of the fill. All surfaces (including critical interim exposed areas) would be seeded to control erosion.

The proposed truck wash facility would generate contaminants that could pollute downstream drainages and the Suisun Marsh. The truck wash facility is planned to be constructed near the existing equipment wash pad so that it can use the same utilities and discharge line into the compost area silt control basin. The truck wash would be used by commercial fleet vehicles leaving the landfill as a means of removing dirt and dust from the truck body and tires. Treated water from the truck wash facility would be collected in a basin. From the basin, the wash water would be treated through several steps including oil/water separation, sediment filtration and carbon filtration. Treated water would be discharged either as recycled water for reuse in truck washing or to the compost area silt control basin where it ultimately flows to Basin No 1.

A public unloading area is proposed to be located near the site entrance (Exhibit 3-3). The unloading facility would be used by self haul customers to unload trash and recyclables. The public unloading area is designed to collect drainage water and route it in a controlled fashion. During wet weather operations, the runoff water would be sampled to determine if contamination of downstream water quality could occur. The design allows for an oil/water separator unit to be installed in the channel prior to the drainage flowing into silt control Basin No 1, if required as a NPDES permit requirement.

Management of wastes in the recycling area (including wood, concrete, and asphalt) and in the compost area must conform with the Use Permit/Marsh Development Permit, CIWMB requirements, and Chapter 15 regulations to prevent water quality degradation. Composting activities are regulated by the CIWMB pursuant to CCR Title 14, Section 18220; this regulation specifies that green wastes for compost must be tested before use for hazardous constituents or other pollutants that could be released in surface runoff. In addition, the siltation control basin in this area traps pollutants before discharge to Siltation Control Basin No. 1. Catchment basins are proposed to address the Phase II composting components which include the addition of biosolids and a larger composting operation.

Mitigation Measure 4.4-2 Surface Water Quality

The project applicant shall prepare a revised Surface Water Monitoring Program and a revised Erosion and Sedimentation Control Plan for the proposed expansion. In addition, the project applicant shall acquire an NPDES permit, to include a revised Storm Water Pollution Prevention Plan; a Waste Discharge Permit; and a revised Use Permit/Marsh Development Permit prior to initiating landfill expansion activities.

Level of Significance after Mitigation

With implementation of the identified mitigation measure, potential surface water quality impacts would be considered less than significant.

Impact **4.4-3**

Groundwater Quality. *Increased leachate and landfill gas generation would be anticipated with expansion of the landfill, increasing the potential for groundwater contamination. Groundwater contamination could result because of a failure of the liner, leachate collection system, or landfill gas management system. However, liner design in accordance with CCR Title 27 requirements, quality assurance and quality control during construction of the landfill containment system, the ongoing groundwater monitoring program, the addition of new monitoring wells for the expansion areas, and expansion of the landfill gas system to the expansion areas would limit the potential to adversely affect groundwater quality. Therefore, this impact would be considered* ***less than significant****.*

Increased leachate and landfill gas generation would occur with expansion of the landfill. However, potential impacts to groundwater associated with leachate and landfill gas would be less than significant assuming design, construction, operation, and closure in accordance with minimum state and federal standards. For example:

- The bottom liner for the landfill would be designed to be a flexible, multilayer containment system that at a minimum would include a composite base lining system consisting of a compacted clay liner, a geosynthetic layer, and a blanket drainage layer, consistent with Subtitle D requirements.

- At the time of liner construction, and in accordance with state and federal requirements, extensive quality assurance and quality control measures would be implemented to ensure the containment system is constructed in accordance with the approved plans and specifications for the project and that there are no punctures, tears, or other defects in the bottom liner system. Should the HDPE liner become compromised during or after the landfill's operational life, the underlying compacted clay (or other approved material) serves as secondary containment.

- Groundwater quality would be protected through the continued implementation of site's landfill gas control system. This system would remove potential volatile organic contaminants that could migrate to the groundwater. The perimeter monitoring system would provide early detection of possible landfill gas migration and allow

modifications to the system to be implemented to limit landfill gas migration and groundwater impacts.

- Groundwater quality would be protected through expansion of the existing leachate collection network. In the Phase II area, the leachate collection network would include the continuation of the two east-west collection lines established in the Phase I area. North-south trending laterals would be installed in each cell, in a pattern that is similar to the Phase I area configuration. Because of the low rainfall encountered and the high clay content of the landfill cover material, little leachate production is expected. The overall leachate management concept is to drain any leachate from the landfill and dispose of it within the landfill property. The program is envisioned to include extracting the leachate via pumps in sumps and injecting it into the Subtitle D landfill cells or maximizing on-site leachate disposal during summer, using the surfaces of the Subtitle D landfill cells. This disposal is consistent with RWQCB requirements. The landfill operator began injecting leachate into Cells 10 and 11 during 1998, and the leachate disposal has continued since that time.

- Groundwater quality would be protected by regular upgradient and downgradient monitoring and testing of the underlying water bearing zones. In the event that monitoring identifies indications of a release, the landfill operator would be required to immediately conduct an evaluation monitoring program to assess the nature and extent of the release. Following completion of the evaluation monitoring program, the landfill would be required to implement an appropriate corrective action plan under the guidance of the RWQCB to remediate any groundwater contamination and meet the water quality protection standards for the facility.

Therefore, implementation of regulatory design standards, continued operation of a leachate collection system, continued operation of the landfill gas control system, regular monitoring of the site groundwater, surface water, vadose zone, leachate, and landfill gas, and implementation of an appropriate corrective action plan (if necessary) would reduce the potential for significant groundwater contamination to less-than-significant levels.

Mitigation Measure 4.4-3 Groundwater Quality

No mitigation measures would be necessary.

Level of Significance after Mitigation

Potential groundwater impacts would be considered less than significant.