CHAPTER 6.0

Surface Water Drainage

6.1 Introduction

This chapter evaluates surface water drainage, including surface water runoff and sediment control, related to the Chiquita Canyon Landfill (CCL) Master Plan Revision (Proposed Project).

6.2 Methodology

This evaluation is based on data collected as part of the Stormwater Monitoring Program (SWMP) under the CCL Stormwater Pollution Prevention Plan (SWPPP), the plans for the Proposed Project, compliance with the applicable regulations summarized below, and other applicable information.

6.3 Regulatory Setting

6.3.1 Federal Regulations and Standards

6.3.1.1 Clean Water Act

The Clean Water Act (CWA), enacted by the federal government in 1972 and subsequently amended, was designed to restore and maintain the chemical, physical, and biological integrity of the waters of the nation. The CWA requires that point source discharges of pollutants to Waters of the United States be performed in conformance with a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits establish effluent limitations that incorporate various requirements of the CWA designed to protect water quality. The CWA authorizes the United States Environmental Protection Agency (EPA) or states with an approved NPDES program to issue permits. California became a "delegated state" for issuing NPDES permits in 1974. The state issues NPDES permits as waste discharge requirements (WDR) in accordance with a Memorandum of Agreement (MOA) between EPA and the state board, and as codified in the California Water Code.

In response to the CWA promulgated in 1972 as subsequently amended and codified as final regulations in 1990 in Title 40 of the *Code of Federal Regulations* (CFR), Part 122 (40 CFR 122), the State Water Resources Control Board (SWRCB) elected to issue a statewide General Permit that would apply to all discharges covered under the new regulations, except municipal storm drain systems and stormwater discharges from construction activities covered under separate statewide permits. The General Permit was initially issued in November 1991 under Water Quality Order No. 91-13-DWQ.

SWRCB issued a revised General Permit under Order No. 97-03-DWQ in April 1997 to replace the existing General Permit (Order No. 91-13-DWQ). This General Permit was issued to revise some of the provisions of the expired permit in accordance with federal regulations. The revised General Permit (Order No. 97-03-DWQ) requires discharges covered under the former and revised permits to comply with the following requirements:

- Submission of an abbreviated Notice of Intent (NOI)
- Preparation of a revised SWPPP to comply with the appropriate requirements of the new General Permit
- Development and implementation of a SWMP
- Annual reporting of stormwater testing results and a comprehensive site compliance evaluation

The SWPPP has two major objectives: (1) to describe site conditions and activities to help identify sources of pollution that may affect stormwater discharge quality; and (2) to identify and implement site-specific best management practices (BMP) that mitigate pollution in stormwater discharges. Stormwater management controls include both structural and nonstructural BMPs. Structural BMPs generally consist of structural devices and improvements that are installed to complement nonstructural BMPs to control potential pollution

of stormwater discharges. Nonstructural BMPs generally consist of procedures and policies that are implemented to mitigate the potential for pollution of stormwater due to site activities.

The SWMP has four objectives: (1) to monitor the quality of stormwater discharges to ensure compliance with the General Permit; (2) to evaluate changing conditions and practices at the site to control pollutants in stormwater discharges; (3) to aid in the implementation of the SWPPP; and (4) to measure the effectiveness of the BMPs in mitigating pollutants in stormwater discharges. The General Permit requires annual sampling and testing of stormwater runoff discharge events and the subsequent reporting of results. Two annual stormwater discharge events are required to be sampled and tested.

Annual reports are required to be submitted by July 1st of each year to the Regional Water Quality Control Board (RWQCB).

6.3.2 State Regulations and Standards

6.3.2.1 Title 27, California Code of Regulations

Title 27, *California Code of Regulations* (CCR), contains the current regulations of the California Department of Resources Recycling and Recovery (CalRecycle, previously California Integrated Waste Management Board) and SWRCB pertaining to waste disposal on land. The following sections from Title 27 are relevant to surface water drainage and erosion control.

Section 20260, Class III: Landfills for Nonhazardous Solid Waste: New Class III landfills shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return period (Subsection [c]).

Section 20365, Precipitation and Drainage Controls: Disposal Units and their respective containment structures shall be designed and constructed to limit, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under a 100-year, 24-hour design storm for Class III landfills (Subsection [a]).

Section 20820, Drainage and Erosion Control: The drainage system shall be designed and maintained to: (1) ensure integrity of roads, structures, and gas monitoring and control systems, (2) prevent safety hazards, and (3) prevent exposure to waste.

Section 21150, Drainage and Erosion Control: The drainage and erosion control system shall be designed and maintained to ensure integrity of post-closure land uses, roads, and structures; to prevent public contact with waste and leachate; to ensure integrity of gas monitoring and control systems; to prevent safety hazards; and to prevent exposure to waste (Subsection [a]). Slopes not underlain by waste shall be stabilized to prevent soil erosion. Methods used to protect slopes and erosion control shall include, but shall not be limited to, terracing, contour furrows, and trenches (Subsection [c]).

6.3.2.2 RWQCB Order No. R4-2011-0052

In 2011, RWQCB Order No. R4-2011-0052 required landfill operators to file a revised SWPPP that:

- Meets the requirements of the General Permit
- Incorporates facility-specific BMPs that limit constituents (other than water) in contaminated soils or related wastes and foreseeable breakdown byproducts from stormwater runoff
- Discusses the specific sediment and erosion control BMPs selected and implemented to address the requirements of this Order

The facility-specific BMPs include procedures for limiting the use of contaminated soils or related wastes during periods of wet weather so that the contribution of waste constituents and foreseeable breakdown byproducts to surface water runoff is limited. Erosion and sediment control BMPs shall be implemented to prevent erosion, soil loss, or mobilized waste constituents that exceed stormwater benchmark values contained in the Order.

In addition, this Order required dischargers to:

- Submit an updated list of contaminants of concern for the landfill surface water monitoring program that includes all waste constituents appropriate to the contaminated soils or related wastes.
- Implement stormwater monitoring procedures to sample all storm events (not just two as required by the General Permit) and submit samples for analysis if the storms are qualifying storm events that result in runoff at established stormwater monitoring points.

The Order defines qualifying storm events differently than the General Permit. A qualifying storm event is one that: (1) has produced a minimum of 1/4-inch of rainfall as measured by an onsite rainfall measurement device, and (2) was preceded by 2 consecutive days of dry weather. Dry weather is defined as two consecutive days of combined rainfall of less than 1/8-inch as measured by an onsite rainfall measurement device. The Order establishes stormwater benchmark values to be controlled by BMPs, or requires submittal of a plan (within 60 days of test results) to assess whether contaminated soils or related wastes are the source of stormwater pollutants. Results of this stormwater monitoring are provided to RWQCB in the semi-annual groundwater reports.

6.3.2.3 Los Angeles County Department of Public Works

In a memorandum dated March 31, 1986, the Los Angeles County Department of Public Works (LACDPW) established the policy on levels of flood protection. The policy describes what degree of flooding, and therefore which design storms, to use for certain conditions and structures. The various levels of flood protection are described below.

6.3.2.3.1 Capital Flood Protection

The Capital Flood is the runoff produced by a 50-year frequency design storm falling on a saturated watershed (soil moisture at field capacity). A 50-year frequency design storm has a 1 in 50 (1/50) probability of being equaled or exceeded in any year. Capital Flood protection also requires adding the effects of fires and erosion under certain conditions.

Facilities and structures required to meet the Capital Flood level of protection include the following.

- **Natural Watercourses –** The Capital Flood level of protection applies to facilities that are not under State of California jurisdiction, including open channels, closed conduits, bridges, dams, and debris basins. These facilities also must be constructed in, or intercept flood waters from, natural watercourses.

  A natural watercourse is a path along which water flows due to natural topographic features. For definition purposes, a natural watercourse drains a watershed greater than 100 acres. Natural watercourses have not been subject to major engineering works such as channel realignment or bank protection. The watercourse must also meet one or more of the following conditions during a Capital Flood:

  - Flow velocities greater than 5 feet per second
  - Flow depths greater than 1.5 feet

  Replacement of the natural watercourse with flood control facilities that do not provide the Capital Flood level of protection requires water surface elevation analysis. The water surface elevation must be at least 1 foot below the base of existing dwellings adjacent to the channel. The construction also must meet the requirements of the National Flood Insurance Program (NFIP).

- **Floodways –** The Capital Flood level of protection applies to all areas mapped as floodways.
- **Natural Depressions or Sumps –** The Capital Flood level of protection applies to all facilities constructed to drain natural depressions or sumps. These facilities include channels, closed conduits, retention basins, detention basins, pump stations, and highway underpasses. A depression or sump is an area from which there is no surface flow outlet. A depression or sump must meet one or more of the following conditions during a Capital Flood:

  - It has a ponded depth of 3 feet or more.

- It has a ponded water surface elevation within 1 foot below the base of adjacent dwellings resulting from construction of facilities with less than the Capital Flood capacity. This condition does not apply if ponded water can escape as surface flow before reaching the base of adjacent dwellings during the Capital Flood.

Sumps with drainage from roadways require special care. If flows reach the sump by following the roadway from upstream, the Capital Flood must be used on all areas upstream of the sump that drain to the roadway. The roadway must carry the Capital Flood capacity with a water surface elevation below the private property line. Otherwise, drainage facilities must be added beneath the roadway.

- **Culverts –** The Capital Flood level of protection applies to all culverts under major and secondary highways.
- **Tributary Areas Subject to Burning –** Canyons and mountainous areas within the County of Los Angeles are subject to burning. The Capital Flood applies to all areas likely to remain in a natural state, regardless of size. Burned canyons and mountainous areas also add debris to the runoff. Therefore, flow from "burned" areas must be “bulked.” Bulking reflects increases in runoff volumes and peak flows related to inclusion and transport of sediment and debris.

6.3.2.3.2 Urban Flood Protection

All drainage facilities in developed areas not covered under the Capital Flood protection conditions must meet the Urban Flood level of protection. The Urban Flood is runoff from a 25-year frequency design storm falling on a saturated watershed. A 25-year frequency design storm has a 1 in 25 (1/25) probability of being equaled or exceeded in any year. Street flow due to the urban flood may not exceed the private property line elevation. However, runoff can be conveyed in drains under the street and on the street surface. Urban Flood runoff is allowed to flow in the street to the point where the flow reaches the street capacity at the property line. Depth analysis is to be started at the upstream end of the watershed. The flow should be split to allow conveyance in the street and in a drain below the street when flows exceed street capacity. Drains at least must carry flow from the 10-year frequency design storm. Refer to the *Los Angeles County Highway Design Manual* and Chapter 44 of the *Land Development Division Guidelines* for road design requirements.

The street or highway must carry the balance of the 25-year frequency design storm below the property line. The drain may carry more flow to lower the water surface on the street to below the private property line or meet other requirements for vehicular or pedestrian traffic.

6.3.2.3.3 Probable Maximum Flood Protection

The Probable Maximum Flood (PMF) results from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The Probable Maximum Precipitation (PMP) represents the greatest depth of rainfall theoretically possible for a given duration over a given drainage basin. The PMF occurs when the PMP falls over watersheds that have reached field capacity (saturated) conditions.

The California Division of Safety of Dams (DSOD) requires a PMF analysis for dams and debris basins that hold at least 1,000 acre-feet, are 50 feet or higher, would require at least 1,000 people to be evacuated, and have a damage potential of $25 million or more. Most dams and debris basins (earth embankment, concrete, or other materials) in the County of Los Angeles must safely pass the PMF.

National Flood Insurance Program

The NFIP set the 100-year flood as the standard for flood insurance protection. The 100-year flood relies on historical runoff records for definition. The standard makes no allowance for future urbanization or the possible inclusion of debris in the flow. In flood hazard areas, the federal standard requires the finished floor elevation of proposed dwellings to be at least 1 foot above the water surface elevation of the 100-year flood. The Base Flood Elevation (BFE) refers to the water surface elevation of the 100-year flood on the predeveloped condition. LACDPW uses the Capital Flood peak-flow rate for Los Angeles County floodway mapping standards.

The floodway is determined using the 1-foot rise criterion. Floodplain management regulations dictate that any rise in the BFE, as a result of a floodway encroachment, is unacceptable without a Conditional Letter of

Map Revision. The Federal Emergency Management Agency (FEMA) provides guidelines and standards for flood hazard mapping and requirements to meet the NFIP level of protection.

Compatibility with Existing Systems
The level of protection standards may require modification if the receiving system has limited capacity at the outlet of the proposed drain. If the receiving drain will be replaced or relieved in the future, the proposed drain must be sized for the appropriate level of protection. The proposed drain capacity is restricted to match the capacity available in the downstream drain when no future relief is planned. Solutions to situations with restricted capacities require project-specific decisions.

Existing Level of Flood Protection
Subsurface drainage often replaces surface drainage when land is developed. Replacing or modifying surface drainage systems requires maintaining or increasing the original level of flood protection. The total capacity, subsurface and surface, must equal or exceed the original surface capacity. Adequate surface drainage capacity must be retained if the proposed subsurface drain provides a lower level of protection than the original surface drainage system.

Multiple Levels of Flood Protection
There are numerous instances where a drainage system must provide more than a single level of flood protection. Drainage systems must meet the criteria described in the LACDPW Hydrology Manual.

Engineering Studies
Engineering studies to determine runoff volumes are undertaken for projects in Los Angeles County in accordance with the current methods, standards, and policies of LACDPW. In circumstances for landfill design where 100-year flood protection is required by state or federal standards, the studies include a supplemental review utilizing nationally accepted hydrology methods and meteorologic data from the National Oceanic and Atmospheric Administration. The landfill designer shall use the larger of the two results found from both studies to prove 100-year flood protection for the site.

6.4 Regional Setting

CCL is located in the Santa Clara River East Watershed as shown in Figure 6-1. The Santa Clara River headwaters originate in the San Gabriel Mountains in northern Los Angeles County and traverse Ventura County to discharge in the Pacific Ocean. The Santa Clara River receives drainage from a 1,600-square-mile area. The Santa Clara River is mostly unaltered, with 90 percent of the watershed in rugged mountains and the remaining watershed in the valley and coastal plain.

The quality of the regional surface water is variable and depends on the discharge volume (EMCON, 1990a). The surface water quality of the tributaries of the Santa Clara River is generally good, except for that west of Newhall. Those tributaries tend to degrade both groundwater and the Santa Clara River (EMCON, 1990a).

6.5 Local Setting

The Santa Clara River passes south of CCL, just south of State Route 126 (SR-126) (Figure 6-1). CCL is above the 100-year floodplain of the Santa Clara River, as identified by the FEMA Flood Map. Therefore, the potential for onsite flooding associated with the Santa Clara River is low.

6.6 Stormwater Management at CCL

Stormwater is managed at CCL in accordance with appropriate federal, state, and county regulations, including NPDES, the Los Angeles County Low Impact Development Ordinance, and Title 27 requirements. Stormwater is managed under a SWPPP prepared in accordance with the requirements of Order No. 97-03-DWQ (WDRs for Discharge of Stormwater Associated with Industrial Activities Excluding Construction Activities) issued by SWRCB under NPDES General Permit No. CAS000001 (General Permit).

CCL has an extensive surface water drainage system that consists of channels, surface/subsurface pipes, energy dissipating structures, and sedimentation basins. This system effectively protects slopes, diverts water away from the landfill, and discharges runoff into either the Santa Clara River or Castaic Creek, a tributary of the Santa Clara River. Stormwater from the Primary Canyon and the west half of the Main Canyon enters the Santa Clara River through a culvert that crosses beneath SR-126 near the landfill entrance. Stormwater from the east half of the Main Canyon, Canyon B and the proposed East Canyon expansion area drains to the east of CCL and discharges into Castaic Creek, approximately 3,000 feet from the site boundary. The discharge from this area flows through a debris basin and a reinforced concrete stormwater pipeline. All surface drainage from the landfill property flows through one or more sedimentation ponds before discharging from the site.

There are no surface water bodies within the landfill property boundaries. The surface drainage at CCL is controlled by diversion berms, drainage channels, overside drains, and sedimentation basins. Exposed soil and interim and final covers are vegetated to control erosion.

For landfill areas that have not been closed, surface water runoff is controlled by temporary berms and "V" ditches near active refuse fill areas and temporary overside drains to carry surface water from fill areas to drainage courses. Each refuse lift is sloped to promote drainage toward interim drainage-control facilities. All berms and ditches direct runoff around refuse and prevent ponding of surface water against refuse.

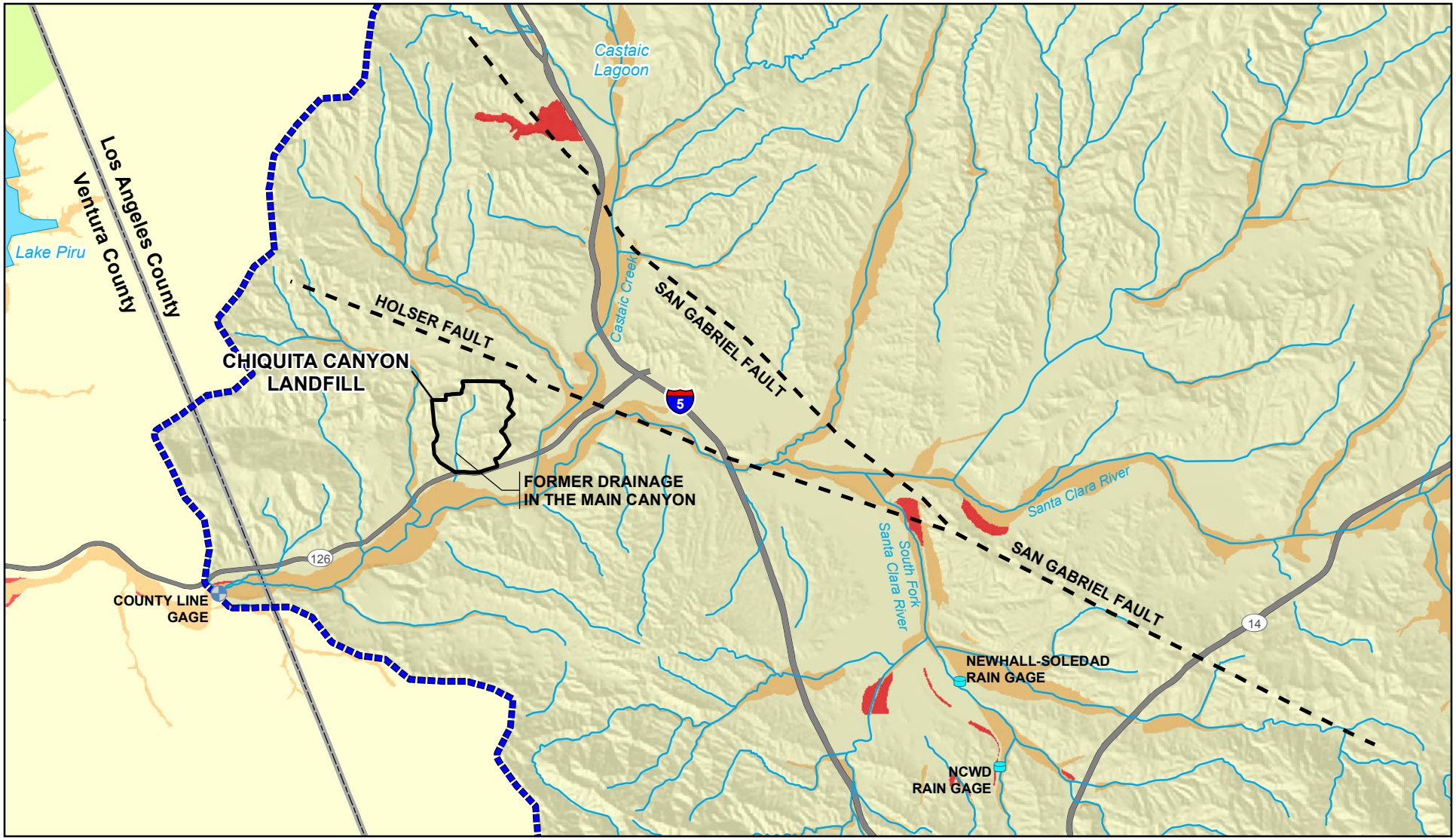
The designed landfill grades are to help minimize the diversion of runoff from one watershed to another. Runoff from watersheds surrounding the site is redirected around the landfill site perimeter to avoid run-on to the landfill.

A diversion berm designed to handle runoff from a 24-hour, 25-year storm will be installed on the up-gradient side of the composting area to divert storm water around the area. Storm runoff and excess liquid from the composting process from this area will flow to the site drainage system. The composting facility may be relocated periodically to accommodate landfill operations; the diversion berm will be relocated along with the composting operation.

The mean annual precipitation is approximately 14.45 inches (1970 to 2014), with a majority of the precipitation falling between November and March (Table 5-2). Figure 5-14 shows the annual precipitation and cumulative departure from the average for CCL.

Much of the precipitation received at CCL does not infiltrate because of the steep terrain. Surface water tends to be directed to the south and east of the site due to the steep ridgelines at the site. The northeastern portion of the site, which includes the proposed East Canyon expansion area, drains to the east into Castaic Creek located approximately 3,000 feet from the site boundary. Castaic Creek is seasonally dry and flows to the south to the Santa Clara River.

Due to topographic and engineering considerations, the current landfill grading and drainage plan diverts surface water runoff from approximately 93 acres of land in the western to the eastern watershed, and from approximately 12 acres of land in the eastern to the western watershed. This results in surface water runoff from a net 81 acres being diverted from the western to the eastern watershed. The diverted surface water runoff would flow through the existing debris basin and stormwater pipeline to Castaic Creek. Previous drainage evaluations (EMCON, 1990b and 1993) determined that the downstream drainage facilities were capable of handling the increased flows resulting from the diversion.



Source: FEMA Flood Insurance Rate Maps

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Figure 6-1
100-year Flood Plain
Chiquita Canyon Landfill
Master Plan Revision

CH2MHILL

6.6.1 Stormwater Monitoring

Stormwater monitoring is performed as described in the SWMP prepared by CCL, revised in April 2011 (CCL, 2011b).

Surface Water Monitoring Program. Surface water is monitored at the eastern (near the United States Postal Facility, Monitoring Point East) and the southern (at SR-126 and the landfill entrance, Monitoring Point South) discharge points from the CCL site. The following are performed, as required by the SWMP:

- Conduct quarterly visual observations at all drainage areas and utilities, and at all facility structures.
- Conduct quarterly visual observations of nonstormwater).
- Conduct visual observations of stormwater discharge during the wet season (October 1st to May 30th) to monitor for the presence of pollutants in stormwater at all facility stormwater discharge locations. Minimum of one storm event per month during the wet season that produces significant stormwater discharge.
- Collect stormwater samples of all stormwater discharges that represent the quality and quantity of the stormwater discharge from the facility during the first hour of discharge from the first storm event of the wet season and from at least one other storm event during the remainder of the wet season (samples are collected at the southern and eastern discharge points) as required by the General Permit.
- Collect stormwater samples of all stormwater discharges for qualifying storm events as required by RWQCB Order No. R4-2011-0052.
- Analyze stormwater samples for the following parameters:
  - Ammonia
  - Biological oxygen demand
  - Chemical oxygen demand
  - Cyanide, total
  - Specific conductance
  - Nitrate + nitrite nitrogen
  - Oil and grease (in lieu of total organic carbon)
  - Hydrogen (ion) concentration (pH)
  - Phosphorous, total
  - Sulfate
  - Total dissolved solids
  - Total suspended solids
  - Metals, total
  - Volatile organic compounds

The effectiveness of the program is evaluated annually during the required annual reports. Effectiveness is determined by observing trends in analytical data from stormwater sampling events and results of annual inspections. Significant increasing trends in pollutant concentrations at a sample point may indicate a need for review or a modification of existing stormwater management practices. Order No. R4-2011-0052 establishes benchmark values for many of the monitoring parameters. If stormwater test results exceed benchmark values, then the effectiveness of the BMPs are further evaluated.

Surface Water Quality Monitoring Results. The surface water quality monitoring results for the General Permit are presented in the Annual Surface Water Quality Monitoring Reports. These are prepared by CCL and submitted annually to RWQCB. The surface water quality monitoring results for Order No. R4-2011-0052 sampling events are prepared by RTF&A and submitted to RWQCB in the semi-annual groundwater reports.

Proposed Surface Water Monitoring System. The Proposed Project includes a new landfill entrance on Wolcott Way and developing new entrance facilities in this area, as described in Chapter 2.0, Project Description. Currently, the site area adjacent to Wolcott Way is undeveloped. Accordingly, a third surface water sampling point will be added to monitor the surface water quality of the discharge from the new entrance area. The two existing sampling points will continue to be monitored as part of the Proposed Project.

6.7 Potential Impacts

6.7.1 Standards of Significance

Potential impacts on surface water quality could occur as a result of solid waste placement activities. If not properly controlled, the amount of silt and debris carried in drainage paths during a storm could increase. This increase in silt could result from the removal of vegetation, exposure of cut slopes prior to filling or vegetating, and exposure of the solid waste area, which consists predominantly of soil cover.

During periods of heavy precipitation, both excavated and filled areas would be subject to erosion if vegetation is not established. Erosion of these areas could increase the amount of suspended soil particles carried by surface water runoff into drainage channels both onsite and offsite.

If surface water management and/or drainage systems are not properly designed, constructed, and maintained, potential impacts could result from stormwater runoff flooding both onsite and offsite, as well as erosion and discharge of silt.

The *California Environmental Quality Act (CEQA) Guidelines* define a significant surface water impact as one that:

- Substantially alters existing drainage patterns
- Substantially increases erosion of surface runoff and causes flooding
- Creates or contributes to runoff that exceeds drainage system capacity
- Places housing within a 100-year flood area
- Impedes or redirects flood flows within a 100-year flood hazard area
- Exposes people or structures to significant risk of loss, injury, or death from flooding, or contributes to inundation by seiche, tsunami, or mudflow

6.7.2 Proposed Project

Potential impacts of the Proposed Project related to surface water drainage are described below with respect to the above standards of significance.

6.7.2.1 Drainage Patterns, Erosion, Flooding, and Drainage System Capacity

There is a potential for the Proposed Project to result in the following surface water impacts:

- Substantially alter existing drainage patterns
- Substantially increase erosion of surface runoff and cause flooding
- Create or contribute to runoff that exceeds drainage system capacity

The existing drainage patterns will be altered within CCL during implementation of the Proposed Project. This will include constructing, operating, and maintaining a precipitation drainage and control system in accordance with the following regulatory criteria:

- NPDES General Permit requirements issued under SWRCB Order No. 97-03-DWQ and the associated site-specific SWPPP and SWMP
- CCR Title 27 requirements, including Sections 20365, 20820, and 21150
- LACDPW requirements, including Policy on Levels of Flood Protection

As required, this system will be designed and constructed to carry the peak discharge resulting from the 100-year, 24-hour storm event, as required by Title 27, and the stormwater runoff volume resulting from the Capital Flood event (50-year, 24-hour storm), as required by LACDPW. In addition, the system will limit, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under the required design storms (100-year, 24-hour) for Class III landfills, as required by Title 27, and the Capital Flood event (50-year, 24-hour storm), as required by LACDPW.

This drainage and control system will prevent substantial erosion of surface runoff and will not cause flooding. Drainage patterns will not be altered downstream of the two discharge points from the CCL site. Therefore, no mitigation measures would be required, because all onsite drainage patterns will be altered in accordance with applicable regulatory requirements, and offsite drainages will not be altered.

6.7.2.2 100-Year Flood Area

There is no potential for the Proposed Project to result in the following surface water impacts:

- Place housing within a 100-year flood area
- Impede or redirect flood flows within a 100-year flood hazard area

As shown in Figure 6-1, the landfill site is above the 100-year floodplain of the Santa Clara River, as identified by FEMA. No elements of the Proposed Project will be located within the 100-year flood area. Stormwater at the landfill site is controlled by diversion berms, drainage channels, oversize drains, and sedimentation basins. Exposed soil and interim and final covers are vegetated to control erosion. All surface drainage from the landfill property flows through one or more sedimentation ponds before discharging from the site.

These controls, together with the landfill site being located above the 100-year floodplain, ensure that the Proposed Project will not impede or redirect flood flows within a 100-year flood hazard area. Therefore, no mitigation measures would be required.

6.7.2.3 Exposure from Flooding

As described above, there is a potential for the Proposed Project to result in flooding, which could expose people or structures to risk of loss, injury, or death. However, because the drainage and control system will be constructed, operated, and maintained in accordance with regulatory criteria (NPDES, Title 27, and LACDPW) as described above, the potential for flooding would not be significant. Therefore, no mitigation measures would be required.

6.7.2.4 Contribution to Inundation by Seiche, Tsunami, or Mudflow

There is no potential for the Proposed Project to contribute to inundation by tsunami or seiche, as described below:

- **Tsunami** is a series of waves when a body of water, such as an ocean, is rapidly displaced on a massive scale as a result of earthquakes, volcanic eruptions, and other mass movements above or below water. The effects of a tsunami can range from unnoticeable to devastating. Most damage is caused by the huge mass of water behind the initial wave front, as the height of the sea continues rising fast and floods powerfully into a coastal area. CCL is too far inland (approximately 30 to 40 miles) and high in elevation (greater than 900 feet above mean sea level) to be significantly threatened by tsunami. Therefore, no mitigation measures would be required.
- **Seiche** is a standing wave in an enclosed or partially enclosed body of water that can be caused on lakes, reservoirs, bays, and seas by resonances by one or more of a number of factors, most often meteorological effects (wind and atmospheric pressure variations), seismic activity, or by tsunamis. There are no enclosed water bodies at or in the vicinity of CCL. Therefore, no mitigation measures would be required.

There is a potential for the Proposed Project to contribute to inundation by mudflow as described below:

- **Mudflow** is a rapid and fluid type of downhill mass wasting, consisting of heterogeneous debris lubricated with a large amount of water caused by heavy rainfall or high levels of groundwater. Similar terms are debris flow (on steep slopes) and mudslide (not very liquid). As described in Section 5.7.2, there is a potential for debris flow during repeated heavy rains, within the natural drainages above the proposed natural slopes. This debris flow has the potential to expose people to risk of injury or death. As described in Mitigation Measure GH-1, the proposed design should allow for the cleanup or control of any debris flows that may encroach into the landfill cell and perimeter maintenance road from the natural drainages and slopes that are not included in the proposed grading and construction of drainage/debris basins. The potential to expose people to risk of injury or death from this debris flow would be mitigated by requiring operations staff to avoid the potential debris flow areas after an appropriate amount of waiting time following heavy and sustained precipitation events (Mitigation Measure SW-1).

6.8 Mitigation Measures

Potential impacts of the Proposed Project related to surface water drainage considerations will be addressed by implementing the following mitigation measures.

SW-1 There is a potential for mudflow (i.e., debris flow) during repeated heavy rains within existing drainage areas at the subject site. The proposed design should evaluate and specify an appropriate amount of waiting time following heavy and sustained precipitation events before CCL staff occupy the area, to avoid the potential to expose people to the risk of injury or death from this debris. This would supplement Mitigation Measure GH-1, which specifies that the proposed design should allow for the cleanup or control of any debris flows that may encroach into the landfill cell and perimeter maintenance road from the natural drainages and slopes that are not included in the proposed grading and construction of drainage/debris basins.

6.9 Significance After Mitigation

Potential impacts of the Proposed Project related to surface water drainage will be less than significant after implementation of the mitigation measure described above.

6.10 Cumulative Impacts

Increased runoff from development of previously undisturbed land has the potential to add incrementally to flooding impacts. However, the proponents of other developments within the immediate watershed would be required to provide engineered drainage facilities and coordinate with appropriate permitting agencies, including LACDPW. These requirements would mitigate these potential impacts to below a level of significance. Each project must demonstrate to the County that floodwaters will be accommodated by onsite drainage facilities so that there is no negative impact off-site; therefore, no significant cumulative surface water runoff/ flooding impacts are expected from the Proposed Project.