APPENDIX E

WATER USAGE ASSESSMENT FOR THE PROPOSED GREGORY CANYON LANDFILL

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Revision 1

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Water Usage Assessment for the
Proposed Gregory Canyon Landfill

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WATER USAGE ASSESSMENT FOR
THE PROPOSED GREGORY CANYON LANDFILL

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LIST OF ACRONYMS

yd^3	cubic yard
EIR	Environmental Impact Report
gal/yd^2	gallons per square yard
gpd	gallons per day
gpm	gallons per minute
GCL	Gregory Canyon Ltd.
GCLF	Gregory Canyon Landfill
GLA	GeoLogic Associates
JTD	Joint Technical Document
MDAQMD	Mojave Desert Air Quality Management District
PCR	PCR Services Corporation
PM_{10}	Particulate matter with an aerodynamic diameter of 10 micrometers or less
tpd	tons per day

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1.0 EXECUTIVE SUMMARY

1.1 PROJECT INTRODUCTION

Gregory Canyon Ltd. (GCL) is proposing to build a municipal landfill on a 1,770 acre property in San Diego County located on State Route 76 approximately three miles east of Interstate 15. Construction, operation, and closure of the Gregory Canyon Landfill (GCLF) would include activities that would generate dust emissions; thus, water would be required as one of the methods for dust control. Water would also be required for ancillary uses, primarily consisting of landscape irrigation. This report will discuss the on-site sources of water proposed for use and the estimated water use that would be necessary under representative landfill operational scenarios.

1.2 GREGORY CANYON LANDFILL SOURCES OF WATER

Three on-site sources of water are proposed for use in the 2009 Addendum to the Final Environmental Impact Report (PCR 2009): an alluvial aquifer, percolating groundwater from the Gregory Canyon fractured bedrock, and percolating groundwater from fractured bedrock in other portions of the GCLF property (GLA 2007, GLA 2009). The alluvial aquifer would be a very large supply of water for use within riparian areas. Percolating groundwater from the Gregory Canyon Watershed wells have an estimated safe water yield of 21,576 gallons per day (gpd) (GLA 2009), and percolating groundwater from three other watersheds located on the GCLF property have an estimated safe water yield of 20,349 gpd (GLA 2009). This results in an estimated safe water yield of 41,925 gpd from percolating groundwater. Water from any of the percolating groundwater wells could be used anywhere on the GCLF project site (PCR 2007). In addition, GCL has entered into an agreement with the San Gabriel Valley Water Company for delivery of up to 80,000 gpd of recycled water. However, this report focuses exclusively on the adequacy of proposed on-site water sources.

1.3 GREGORY CANYON LANDFILL ESTIMATED WATER USE

The primary use of water at the GCLF would be to control fugitive dust emissions that would be generated from landfill construction, operation and closure activities. Such activities include excavation, cover soil application, and vehicle travel on unpaved roads. Based on the configuration of activities occurring throughout the life of the landfill, five operating scenarios were identified as representative for evaluating the range of water use needed for dust control and ancillary uses. The scenarios are as follows:

- Scenario 1 represents the maximum operations with simultaneous construction in areas with maximum soil excavation, as would be encountered in the lower areas of Gregory Canyon in the northern portion of the landfill footprint;
- Scenario 2 represents maximum operations with simultaneous construction in areas with less soil overburden, as would be encountered in the upper areas of Gregory Canyon in the southern portion of the landfill footprint;
- Scenario 3 represents maximum operations with no construction activities with cover soil taken from Stockpile B;
- Scenario 4 represents maximum operations with no construction activities with cover soil taken from Stockpile A, as would be encountered in the last year of operation; and
- Scenario 5 represents final closure activities.

Table 1-1 contains a summary of the average daily water usage for each scenario that was analyzed.

Table 1-1
Total Average Daily Water Use by Landfill Scenario

Landfill Scenario	Non-Riparian Area Water Use (gallons per day)	Riparian Area Water Use (gallons per day)	Total Water Use (gallons per day)
1	44	66,742	66,785
2	32,203	8,414	40,617
3	28,366	8,414	36,780
4	23,566	14,197	37,764
5	13,243	21,510	34,753

2.0 INTRODUCTION AND DESCRIPTION OF WATER SOURCES

GCL is proposing to build a municipal landfill on a 1,770 acre property in San Diego County located on State Route 76 approximately three miles east of Interstate 15. The GCLF would be expected to use approximately 308 acres of the total available property, including a 183 acre landfill cell area. The GCLF project would include construction, operation, and closure of the landfill. For purposes of this report, it was assumed that the GCLF would receive a maximum of 5,000 tons per day (tpd) of Class III municipal solid waste and operate six days per week, 307 days per year, even though the solid waste permit for the GCLF includes an annual waste receipt cap of 1,000,000 tons. Initial construction would occur over a two year period prior to landfill operation, and landfill closure would occur during a two year period after landfill operation.

The primary use of water at the GCLF would be to control fugitive dust emissions that would be generated from landfill construction, operation and closure activities. Such activities would include excavation, cover soil application, and vehicle travel on unpaved roads. Water from on-site sources is proposed for use at the GCLF for control of dust emissions. Water is also proposed to be used for ancillary purposes, primarily landscape irrigation. For purposes of this report, it was assumed that ancillary uses would utilize 10,000 gallons of water per day, 307 days per year, as provided in the project Environmental Impact Report (EIR) (PCR 2003). Based on the available on-site water sources, the GCLF project site has been separated into a riparian area and a non-riparian area, each containing components of the landfill.

2.1 ON-SITE WATER SOURCES

Three on-site sources of water are proposed for use: an alluvial aquifer, percolating groundwater from the Gregory Canyon fractured bedrock, and percolating groundwater from fractured bedrock in other portions of the GCLF property (GLA 2007, GLA 2009). The alluvial limits define the land parcels of the GCLF project site which would be considered riparian areas, where alluvial water could be utilized (Allen Matkins 2009, GLA 2009). Figure A-1 located in Appendix A shows the riparian and non-riparian parcels with an overlay of the landfill components. There would be a very large water supply from the alluvial aquifer as long as the water would be used for activities that occur within the riparian areas. However, water from the alluvial aquifer could not be used for landfill activities within the non-riparian areas.

Percolating groundwater from the Gregory Canyon Watershed wells have an estimated safe water yield of 27 gpm (38,880 gpd) (GLA 2007). However, the estimated safe water yield from these wells is anticipated to decrease as the GCLF development proceeds and reduces the acreage of the watershed. Particularly, the safe water yield is estimated to be reduced to 21,576 gpd once construction of the 183 acre landfill cell area would be complete (GLA 2009). Although construction of the landfill cell area would not be complete in all of the water scenarios analyzed in this report, the reduced safe water yield was used as a conservative value for water availability for this assessment. Although the water supply is limited from the Gregory Canyon Watershed, the water could be used anywhere on the GCLF project site.

The third on-site water supply would come from percolating groundwater located in three other watersheds on the GCLF property. The total safe water yield of these three locations is estimated at 20,349 gpd. Further, the estimated safe water yield limit in these three areas would not be decreased by GCLF activities; thus, the estimated safe water yield would remain constant over the lifetime of the landfill (GLA 2009). The estimated total water supply from percolating groundwater that would be available for use at the GCLF, including activities in non-riparian areas, would therefore be 41,925 gpd.

The water use analysis was conducted such that the riparian and non-riparian water usage totals could be identified separately to assess whether the available water supply would be adequate.

2.2 GREGORY CANYON LANDFILL COMPONENT LOCATION DESCRIPTION

The components of the GCLF that would require water for dust suppression consist of four elements: a main haul road, primarily for trash truck travel to and from the landfill cell area, the landfill cell area itself, two soil stockpile/borrow areas (Pile A and Pile B), and secondary haul roads for soil transport between the stockpiles and landfill cells. Figure A-1 in Appendix A shows the general landfill configuration and excavation Phase boundaries overlaid on a map of the riparian and non-riparian areas.

The landfill cell area would contain four areas of excavation and subsequent development, Phases 1 – 4 (BAS 2004). Phase 1 would cover the northern portion of the landfill area, Phase 2 would cover the south central portion of the landfill area, Phase 3 would cover the southern tip of the landfill area and Phase 4 would cover a small area on the north-western portion of the landfill area. In general, the Phase 1 area would be contained within the riparian area and would comprise approximately 40% of the entire 183 acre landfill area. The portion of Phase 1 within the riparian area would comprise approximately 33% of the entire 183 acre landfill footprint. Phase 2 would be contained within the non-riparian area and comprise approximately 44% of the 183 acre landfill footprint. Phase 3 would be contained within the non-riparian area and comprise approximately 11% of the 183 acre landfill footprint. Phase 4 would be divided equally between riparian and non-riparian areas, and would comprise approximately 5% of the 183 acre landfill footprint.

Stockpile A, approximately 22 acres, would be located in the riparian area, while all but a small portion of Stockpile B, approximately 65 acres, would be in the non-riparian area. For purposes of the water usage estimates, Stockpile B was assumed to lie entirely within non-riparian areas.

Most of the main unpaved haul road would be located in the riparian area; however, depending on the location of the working face of the landfill area, some of the main unpaved haul road may extend into the non-riparian area. The secondary haul road leading from the landfill cell to Stockpile A would be in the riparian area, while the secondary haul road leading from Stockpile B to the landfill cell would be mostly in the non-riparian area.

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3.0 WATER USAGE ESTIMATES

Based on the activities occurring throughout the life of the landfill, five scenarios were identified as representative combinations that address all potential activity configurations that might occur at the GCLF to determine the water that would be required. The scenarios are not tied to specific operational years, but rather based on general annual construction and operational scenarios where the estimated water demands would be the greatest. Thus, other construction and operational scenarios that could occur at the GCLF would not be expected to require water usage in excess of those scenarios that were analyzed. All scenarios were analyzed based on the assumption that a maximum of 5,000 tpd of trash would be accepted for all 307 operational days per year.

Two scenarios that were considered but not analyzed were the period of initial landfill cell construction and the period of Phase 4 landfill cell construction. The initial landfill cell construction period would be similar to Scenario 1 except that there would be no operations occurring and hauling of excavated soil would be to Stockpile Area A, which would be entirely within the riparian area. As a result, it would be expected that the demand for water would not exceed the estimates for Scenario 1. The period of Phase 4 landfill cell construction would be similar to Scenario 2 except that some construction excavation would be within the riparian area and landfill haul road distances for operations would be equivalent to or potentially less than assumed for Scenario 2. As a result, it would be expected that the demand for water would be less than estimated for Scenario 2.

Information used to prepare the water usage estimates, including excavation quantities, road lengths and estimated traffic, was obtained from Volume IV of the Air Quality Permit Application (PCR 2008). This document provided general guidance in evaluating both impacts and control requirements for the various scenarios. However, the scenarios are intended to represent activities that would occur in more than one operating year over the life of the landfill, and are not tied to specific operating years.

Scenario 1 was chosen because it assumes both landfill construction and operation activities would be occurring, and the amount of soil excavated for landfill construction would be at a maximum. It was assumed that 10,000 yd^3 of excavation would occur on every operating day, as the amount of excavation required for landfill cell construction would be greater at the bottom of the canyon. Based on information in the Joint Technical Document (JTD), excavated material would be approximately 60% soil and 40% rock (BAS 2004). Thus, of the assumed excavation of 3,070,000 yd^3 during the operating year, 1,842,000 yd^3 would be soil and 1,228,000 yd^3 would be rock. For purposes of this report, dust control was not considered for excavation of rock. All activities in Scenario 1 would occur in the riparian portion of the Phase 1 landfill cell area. Daily cover would come from soil excavated during the riparian portion of landfill cell construction.

Scenario 2 also assumes both landfill construction and operational activities would be occurring; however, it was chosen because the activities would be occurring in the Phase 2 and 3 portions of the landfill area; thus the road lengths would be greater than in Scenario 1. In Scenario 2, the amount of material required for landfill cell construction excavation was estimated at 853,333 yd^3, as less excavation would be required in the upper portions of the landfill. Of this amount, 512,000 yd^3 would be soil and 341,333 yd^3 would be rock. Daily cover would come from soil excavated during landfill cell construction.

Scenario 3 represents an operational scenario without construction in which the daily cover soil would come from the Stockpile B area and landfill operations would be occurring in the Phase 2 and 3 area of the landfill, where road lengths would be greater than if operations were to occur in the Phase 1 area.

Scenario 4 represents an annual operational period in which the daily cover soil would come from Stockpile A and landfill operations would be occurring in the Phase 2 and 3 areas of the landfill where road lengths would be greater. This would be expected to occur in the last year of landfill operation (BAS 2004).

Lastly, Scenario 5 was chosen because it represents placement of final cover soil once the landfill has ceased operational activities. During this period, it was assumed there would be excavation of 600,000 yd^3 of soil from Stockpile A during the operating year for use as final cover.

In addition to the estimate of water that would be needed for dust control, landscape and/or vegetation irrigation needs were taken into account by adding 10,000 gpd into the total water requirement estimate for each scenario assessed (PCR 2003). Landscape and/or vegetation irrigation would primarily occur around the landfill entrance and administrative facility, but would also occur upon initial re-vegetation of other areas that would consist of drought tolerant plants and, once established, would not require regular watering.

For each scenario, an average daily water use total and a maximum daily water use total was calculated. The average daily water use summed all the annual water needs of the particular scenario and divided the annual water amount by 307 operational days per year. However, some activities such as maximum construction excavation and chemical stabilization of unpaved roads would occur only on a limited number of days per year and would require more water on those days than the average amount. For those days, a maximum daily water total was calculated. The maximum daily water use takes into account the activities of the scenario being analyzed that would require the greatest amount of water and that could occur on the same day to obtain a maximum daily total. Section 3.1 explains in further detail the activities that would require more water than the average on certain days.

For purposes of assessing if the estimated water use is within the limits of the estimated available on-site water supply, only the average daily water use totals are considered. Average daily water usage would be lower because excavation of soil, road construction, or topical application of soil sealant would not occur on every operating day.

Water requirements on the maximum use days that would be in excess of the average estimated usage would be covered by water storage. Water storage in amounts up to 50,000 gallons would be available on-site with permanent tanks, and additional storage could be provided through temporary tanks. Thus, water could be pumped into the storage tanks and maximum water use activities would be scheduled when enough water would be available in storage. It is important to emphasize that the activities creating the greatest maximum water usage – excavation for cell construction, unpaved road construction and topical application of chemical road stabilizer – are all planned activities that would be scheduled in advance. This would provide the operator with the flexibly to plan ahead and store water as needed to meet maximum usage requirements.

3.1 WATER USE METHODOLOGY FOR LANDFILL ACTIVITIES

Two dust control methods involving water would be used at the landfill: direct water application and application of a chemical road stabilizer which is diluted in water. Direct water applications would be applied multiple times per day with the frequency of application depending on the desired level of dust control, or control efficiency. Weather conditions would play a part in the frequency of water application as well because rainy days would require less water and dry windy days would require more. However, the water application amounts were conservatively calculated in this report based on an average daily usage rate with no consideration of precipitation. Excavation for cell construction, excavation of stockpiles, cover soil application, and the portion of the main unpaved road closest to the working landfill cell would utilize direct water application.

Most of the unpaved main haul road and the unpaved secondary haul roads would utilize chemical stabilization products for dust control. The stabilizers would be diluted in water during the application process. The initial mix-in of the chemical stabilization product is assumed to occur once per year with topical sealants applied quarterly (a conservatively high application frequency). Thus, water use for the chemical stabilization process would not occur on a daily basis, but would require larger amounts of water over a period of a few days over the entire year. Typically, the initial mix-in process would occur over a period of several days, depending on the length of the road. After the initial mix-in process, a topical sealant would be applied, also over a period of one to three days depending on the length of the road. Further explanation on the water use during chemical stabilization is contained in Section 3.1.3.

3.1.1 Excavation

During construction, excavation would occur primarily in the landfill cell development area. The excavated soil would be used to contour the cell being constructed, as cover for an adjacent active cell, and/or moved to one of the stockpile areas for later use. Once construction is complete, excavation would occur primarily at one of the stockpile areas and the excavated soil moved to the landfill area and used for daily cover soil. During final closure, excavation would occur at Stockpile A and the excavated soil moved to the landfill cell to be used for final cover soil. Estimating the amount of water that would be needed for dust control during excavation depends on the amount of soil that would be excavated as well as the desired control efficiency. The amount of soil that would be excavated varies and depends on annual soil needs as well as the landfill construction schedule.

For all scenarios analyzed, the water usage was based on a 95% reduction in dust emissions from particles with an aerodynamic diameter of 10 micrometers or less (PM_{10}). The uncontrolled PM_{10} emissions are calculated by multiplying an emission factor for uncontrolled dust, in terms of pounds of PM_{10} emitted per ton of soil, by the amount of soil being excavated. Thus to achieve a 95% reduction in PM_{10} emissions, the emission factor must be reduced by 95%. The Mojave Desert Air Quality Management District (MDAQMD) has emission rate data for excavation activities at different moisture levels. Based on this data, a water application rate was estimated from the difference in moisture content that would be necessary to achieve emission rates that result in 95% lower emissions (MDAQMD 2000). Water use calculations for excavation activities are located in Appendix B, Table B-1.

The average amount of water needed per day during excavation for dust control was based on the annual amount of soil that would be excavated, for construction activities and/or operational needs, and then divided by 307 operational days per year. As discussed above, construction excavation amounts may not be equivalent on all days per year; thus, daily water use may vary. The maximum amount of soil that could be excavated on any given day during construction would be 10,000 yd^3. Thus, for the maximum daily water use, the amount of water needed for dust control during construction excavation was based on the maximum value. In either the average or maximum case, an annual limitation on the amount of soil excavated would not be exceeded; thus, the maximum daily excavation amount of 10,000 yd^3 of soil would only occur for a limited number of days throughout the year. Because 1,840,000 yd^3 of soil would be excavated in Scenario 1 and 512,000 yd^3 in Scenario 2, maximum excavation of soil could only occur for 184 days under Scenario 1 and 52 days under Scenario 2. At that point, all of the expected soil excavation for the operating year would be completed. If soil excavation were less than 10,000 yd^3 on a given operating day, water usage would be proportionally less. Excavation from stockpiles for operational cover soil use would only be based on a daily average amount because only the soil needed for daily activities would be excavated.

3.1.2 Cover Soil Application

During landfill operation and final closure, soil would be needed for landfill cover application. All cover soil application activities would occur in the landfill cell area. As with excavation, the amount of water that would be needed for dust control depends on the amount of soil being applied for cover as well as the desired control efficiency. For all cover soil activities, a 95% reduction in PM_{10} emissions was used as a basis. Cover soil would need to be excavated from the stockpiles during times where excavation for cell construction would not be occurring (Scenarios 3, 4 and 5), and dust control for this excavation was included in the water usage estimates. The use of soil for daily cover is assumed on each operating day, even though the GCLF has proposed the use of alternative daily cover (e.g. tarps, processed green waste) which would not require dust control (BAS 2004, 2009). For this reason, the water usage estimates are conservative.

The same methodology used to calculate the water use for dust control during excavation for cell construction was applied for cover soil excavation and application. Water use calculations for cover soil application, also based on the MDAQMD emission rate data, are located in Appendix B, Table B-2.

3.1.3 Main Haul Road

The main haul road of the landfill would be used by all vehicles entering the landfill. The initial portion of road from the landfill entrance off of State Route 76 to the scale house would be paved. The next portion of the main haul road from the scale house to within 500 feet of the working face would be a chemically stabilized unpaved road. Because the working face would be in different locations throughout the operational life of the landfill, the length of the stabilized portion of the unpaved road for each scenario analyzed is based on an estimation of the typical travel route. The last portion of the main haul road (approximately 500 feet) at the working face would not be chemically stabilized because continual configuration changes would need to occur for trucks to access the working landfill cell and it would not be viable to chemically stabilize this area. Therefore, this portion of the road would only use water as a means of dust control.

3.1.3.1 Unpaved Road Dust Control with Watering

The water use estimation for the 500 feet of unstabilized road is based on controlling the dust emissions by 90% from watering alone. The MDAQMD Emission Inventory Guidance provides a calculation method to estimate the amount of water necessary to achieve 90% control (MDAQMD 2000). This equation depends upon the Class A Pan Evaporation, average hourly traffic on the road, time between water applications, and watering intensity, which yields the desired control efficiency. The Class A Pan Evaporation value used was 60.5 inches and corresponds to the value for the San Diego Airport (CCDA n.d.), which is the closest identified available long term data source listed in the California Climate Data Archive. Water applications were assumed to occur every two hours with a watering intensity of 0.886 gallons per square yard (gal/yd^2), and the average hourly traffic was calculated assuming a maximum of 675 vehicles would travel on the road during an 11 hour operational shift. Additionally, the estimated amount of water use per day also depends upon the length and width of the road; for this road segment, the length would be 500 feet and the width would be 40 feet. Water use calculations for the water sprayed unpaved main haul road are located in Appendix B, Table B-3.

3.1.3.2 Unpaved Road Dust Control with Chemical Stabilization

There are several methods for chemically stabilizing an unpaved road which range from chemical surfactants that increase moisture retaining abilities of the road (magnesium chloride or similar products) to specific construction of the road with soil binders (chemical polymers). Due to the level of control efficiency desired, road use and traffic types, a program for road dust control using a chemical polymer was identified as the most effective control method. This program would require the road to be initially developed as a one time event followed by topical treatments to maintain the road. For the initial development, a liquid polymer diluted with water is mixed in with the soil and compacted to allow the soil to bind into a hard surface. The amount of water required for the mix-in product depends on the design criteria, the type of soils present and surface area of the road. This information was used to estimate the water that would be required to develop the main haul road in accordance with vendor data (Kinsey 2009).

The topical treatments to maintain the road is recommended to be conducted every 12 to 24 months according to a vendor that supplies the type of program identified for stabilizing the unpaved road (Soilworks n.d.). However, for the control level desired and to estimate a worst case water usage per year, the topical application was assumed to occur on a quarterly basis. Different chemical stabilizers can be used for topical treatments in which the solution can be directly applied without being diluted with water. However, as a conservative estimate, it is assumed the chemical stabilizer applied would be diluted with water based on vendor recommended dilution ratios to apply the chemical sealer effectively (Soilworks n.d). Over time, less chemical binders are needed. Therefore, the water use calculations are based on the first application after mix-in at full strength, while the next three quarterly applications were applied at 30% of the full application per vendor recommendations (Kinsey 2009). Again, this is a conservatively high application rate given the water estimates for this assessment are based on an assumed quarterly application rather than once a year. Additionally, each scenario was analyzed assuming the roads were being stabilized for the first time during that scenario. However, since initial mix-in and stabilization would have already occurred in earlier operation years, the latter scenarios are conservatively high estimates.

Because water would not be needed on a daily basis for the chemical stabilization application process, the water usage for the chemical stabilization application process was calculated as both an average daily amount and also a maximum daily amount. The average daily amount sums the annual water amount needed for all chemical stabilization processes that would occur during each landfill year, and then divides the total annual water requirement by the number of landfill operational days per year, or 307 days.

The maximum daily water amount takes into account that each chemical stabilization application process would only occur over a few days each year. Thus, larger amounts of water would be required for chemical stabilization on the days those events occur. Additionally, only one chemical stabilization process in each of the riparian and non-riparian areas would be occurring at a time. Thus, the total maximum daily water amount from chemical stabilization takes into account the chemical stabilization process that has the highest daily water demand from each of the riparian and non-riparian areas and sums those values with the other water use demands from other landfill activities. Water use calculations for the chemically stabilized main haul road are located in Appendix B, Table B-4.

3.1.4 Unpaved Secondary Haul Roads

Excavated soil would be moved between the stockpile areas and the landfill cell area during construction and operation. Depending on the location of the active landfill cell and the particular stockpile being utilized, the unpaved secondary roads would change location and length. The roads would, however, remain 20 feet wide and would primarily be used for scraper travel. All secondary unpaved haul roads would be chemically stabilized in the same manner as the unpaved stabilized portion of the main haul road. Water use calculations for the chemically stabilized secondary haul roads are located in Appendix B, Table B-4.

3.2 ESTIMATED WATER USE FOR SCENARIO 1

Dust generating activities in Scenario 1 would include both construction and operation activities. In Scenario 1, construction would require excavation of the Phase 1 landfill area for cell development. Excess soil not used for landfill cell construction would be moved to the working landfill cell for daily cover soil or to Stockpile B for storage. Excavation of soil for landfill cell construction would be at a maximum in Scenario 1. Operational activities include application of daily cover soil on the working landfill cell and trash truck traffic on the unpaved main haul road. In Scenario 1, the working landfill cell would be located in the riparian portion of the Phase 1 area of landfill cell development. The unpaved main haul road leading to the working landfill cell (both chemically stabilized and unstabilized portions) would also be located in the riparian area. Excess excavated soil would be moved to Stockpile B, located in the non-riparian area; the secondary road leading from the excavation area to Stockpile B would be located in both the riparian area and the non-riparian area. Figure A-2 located in Appendix A represents the locations of Scenario 1 activities relative to the boundaries of the riparian and non-riparian areas. All ancillary activities would be located in the riparian area as the landscaping would occur near the landfill entrance (including habitat restoration) and administration areas during Scenario 1. Ancillary water usage during this time would also include irrigation for revegetation of Stockpile Area A, located in the riparian area.

Table 3-1 and Table B-5 in Appendix B show average totals for daily water use by area and activity, and Table 3-2 and Table B-10 in Appendix B show the maximum daily water use totals. The only unpaved roads in the non-riparian area of this scenario are chemically stabilized and would not require daily watering; thus, the daily water use for routine watering of unpaved road surfaces is zero. The maximum daily water use in the riparian area would occur for chemical mix-in on the unpaved chemically stabilized road during Scenario 1, and the maximum daily water use in the non-riparian area would occur for chemical mix-in on the unpaved road to Stockpile B. In the average and maximum daily totals, the non-riparian water use is estimated to be below the estimated safe yield of 41,925 gpd of percolating groundwater.

Table 3-1
GCLF Scenario 1 Average Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	44
	Routine Watering Unpaved Road Surfaces	0
Non-Riparian Area Total		44
Riparian Area	Chemical Applications to Unpaved Road Surfaces	182
	Routine Watering Unpaved Road Surfaces	12,128
	Irrigation	10,000
	Landfill Cell Excavation Water Application	37,770
	Day Cover Water Application	6,661
Riparian Area Total		66,742
Total (Riparian & Non-Riparian)		**66,785**

Table 3-2
GCLF Scenario 1 Maximum Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	5,623
	Routine Watering Unpaved Road Surfaces	0
Non-Riparian Area Total		5,623
Riparian Area	Chemical Applications to Unpaved Road Surfaces	7,366
	Routine Watering Unpaved Road Surfaces	12,128
	Irrigation	10,000
	Landfill Cell Excavation Water Application	62,950
	Day Cover Water Application	6,661
Riparian Area Total		99,105
Total (Riparian & Non-Riparian)		**104,729**

3.3 ESTIMATED WATER USE FOR SCENARIO 2

Dust generating activities in Scenario 2 would include both construction and operation activities in the Phase 2 and 3 areas of landfill cell development; thus, the road lengths leading to the active landfill cell would be longer than in Scenario 1. In Scenario 2, construction would require excavation of the Phase 2 and 3 landfill areas for cell development, but less excavation would occur than in Scenario 1. Excess soil not used for landfill cell construction would be moved to the working landfill cell for daily cover soil or to Stockpile B for storage. Operation activities include application of daily cover soil on the working landfill cell and trash truck traffic on the unpaved main haul road. In Scenario 2, the working landfill cell would be located in the Phase 2 and 3 areas of the landfill cell development, and therefore in the non-riparian area. A portion of the unpaved main haul road leading to the working face would be located in the riparian area; however, the road would extend into the non-riparian area as well. The unstabilized main haul road would be entirely contained in the non-riparian area. The excess excavated soil would be moved to Stockpile B, located in the non-riparian area, so the secondary road leading from the excavation area to Stockpile B would be entirely located in the non-riparian area as well. Figure A-3 located in Appendix A represents the locations of Scenario 2 activities relative to the boundaries of the riparian and non-riparian areas. Most of the ancillary uses would be located in the riparian area. A small portion of the ancillary water requirement for irrigation would be needed in the non-riparian area during Scenario 2 in order to establish vegetation in the disturbed areas of Stockpile B.

Although most of the activities are located in the non-riparian areas in Scenario 2, the estimated water requirements for non-riparian areas would be below the estimated safe yield of 41,925 gpd of percolating groundwater for the average daily total as shown in Table 3-3 and Table B-6 in Appendix B. The only unpaved roads in the riparian area of this scenario are chemically stabilized and would not require daily watering; thus, the daily use of water for routine watering of unpaved road surfaces is zero. Maximum daily water use totals are shown in Table 3-4 and Table B-11 in Appendix B. The maximum daily water use in the riparian area would occur for chemical mix-in on the unpaved chemically stabilized road during Scenario 2, and the maximum daily water use in the non-riparian area would occur for topical sealant application on the unpaved chemically stabilized road. Because the maximum daily water usage estimate exceeds the estimated safe yield of percolating groundwater, water would be stored and used on scheduled days to assure that water supply would be adequate.

Table 3-3
GCLF Scenario 2 Average Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	265
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Landfill Cell Excavation Water Application	10,498
	Irrigation	2,000
Non-Riparian Area Total		32,203
Riparian Area	Chemical Applications to Unpaved Road Surfaces	414
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	8,000
Riparian Area Total		8,414
Total (Riparian & Non-Riparian)		**40,617**

Table 3-4
GCLF Scenario 2 Maximum Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	9,546
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Landfill Cell Excavation Water Application	62,950
	Irrigation	2,000
Non-Riparian Area Total		93,935
Riparian Area	Chemical Applications to Unpaved Road Surfaces	8,200
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	8,000
Riparian Area Total		16,200
Total (Riparian & Non-Riparian)		**110,135**

3.4 ESTIMATED WATER USE FOR SCENARIO 3

Only operational activities would occur in Scenario 3 including excavation of soil from Stockpile B, movement of the excavated soil to the working landfill cell for daily cover, daily cover soil application on the working landfill cell, and trash truck traffic on the unpaved main haul road. In Scenario 3, the working landfill cell would be located in the

Phase 2 and 3 portion of the landfill cell area, and therefore in the non-riparian area. Scenario 3 would contain a longer road length for trash trucks to get to the working landfill cell because it would be located in the southern portions of the landfill area. Figure A-4 located in Appendix A represents the locations of Scenario 3 activities relative to the boundaries of the riparian and non-riparian areas. Daily cover soil operations, soil excavation at Stockpile B, and the secondary unpaved road connecting the stockpile and the working landfill cell would be located in the non-riparian area. Further, because the working landfill cell would be in the non-riparian area, the entire 500 feet of the unpaved non-stabilized main haul road and a portion of the unpaved chemically stabilized main haul road would also be in the non-riparian area. Most of the ancillary usage and the remainder of the unpaved chemically stabilized main haul road would be located in the riparian area. A small portion of the water requirement for irrigation would be needed in the non-riparian area during Scenario 3 in order to establish vegetation in the disturbed areas of Stockpile B.

For Scenario 3, although most of the activities would be located in the non-riparian areas, both the estimated maximum and average water requirements for non-riparian areas would be below the estimated safe yield of 41,925 gpd of percolating groundwater as shown in Tables 3-5 (Table B-7 in Appendix B) and Table 3-6 (Table B-12 in Appendix B). The only unpaved roads in the riparian area of this scenario are chemically stabilized and would not require daily watering; thus, the daily water use for routine watering of unpaved road surfaces is zero. The maximum daily water use in the riparian area would occur for chemical mix-in on the unpaved chemically stabilized road during Scenario 3, and the maximum daily water use in the non-riparian area would occur for topical sealant application on the unpaved chemically stabilized road.

Table 3-5
GCLF Scenario 3 Average Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	265
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Excavation at Stockpile Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		28,366
Riparian Area	Chemical Applications to Unpaved Road Surfaces	414
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	8,000
Riparian Area Total		8,414
Total (Riparian & Non-Riparian)		**36,780**

Table 3-6
GCLF Scenario 3 Maximum Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	9,546
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Excavation at Stockpile Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		37,646
Riparian Area	Chemical Applications to Unpaved Road Surfaces	8,200
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	8,000
Riparian Area Total		16,200
Total (Riparian & Non-Riparian)		**53,847**

3.5 ESTIMATED WATER USE FOR SCENARIO 4

Dust generating operational activities in Scenario 4 would include excavation of soil for daily cover from Stockpile A, movement of the excavated soil to the working landfill cell for daily cover, daily cover soil application on the working landfill cell, and trash truck traffic on the unpaved main haul road. In Scenario 4, the working landfill cell would be located in the Phase 2 and 3 areas of the landfill, and therefore in the non-riparian area. Figure A-5 located in Appendix A represents the location of Scenario 4 activities relative to the boundaries of the riparian and non-riparian areas. Stockpile A, the secondary unpaved road connecting Stockpile A to the working landfill cell, and a portion of the stabilized main haul road would be in the riparian areas. A small amount of soil may be excavated from Stockpile B in Scenario 4. This soil would not necessarily be needed; however, to be conservative, water use for controlling dust emissions from travel on the secondary unpaved road leading from Stockpile B to the working landfill cell was included in the water use totals. Both Stockpile B and the unpaved secondary road connecting the stockpile to the working landfill cell would be located in the non-riparian areas. A small portion of the water requirement for ancillary uses be needed in the non-riparian area during Scenario 4 in order to establish vegetation in the disturbed areas of Stockpile B.

For Scenario 4, the estimated water requirements for non-riparian areas would be below the estimated safe yield of 41,925 gpd of percolating groundwater for both the average daily total and the maximum daily total as shown in Table 3-7 (Table B-8 in Appendix B) and Table 3-8 (Table B-13 in Appendix B). The only unpaved roads in the riparian area of this scenario are chemically stabilized and would not require daily watering; thus, the daily use of water for routine watering of unpaved road surfaces is zero. The maximum daily water use in the riparian area would occur for chemical mix-in on the unpaved chemically stabilized road during Scenario 4, and the maximum daily water use in the non-riparian area would occur for topical sealant application on the unpaved chemically stabilized road.

Table 3-7

GCLF Scenario 4 Average Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	265
	Routine Watering Unpaved Road Surfaces	13,615
	Excavation at Stockpile B Water Application	1,025
	Day Cover Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		23,566
Riparian Area	Chemical Applications to Unpaved Road Surfaces	561
	Routine Watering Unpaved Road Surfaces	0
	Excavation at Stockpile A Water Application	5,636
	Irrigation	8,000
Riparian Area Total		14,197
Total (Riparian & Non-Riparian)		**37,764**

Table 3-8

GCLF Scenario 4 Maximum Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	9,546
	Routine Watering Unpaved Road Surfaces	13,615
	Excavation at Stockpile B Water Application	6,661
	Day Cover Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		38,483
Riparian Area	Chemical Applications to Unpaved Road Surfaces	8,200
	Routine Watering Unpaved Road Surfaces	0
	Excavation at Stockpile A Water Application	6,661
	Irrigation	8,000
Riparian Area Total		22,862
Total (Riparian & Non-Riparian)		**61,345**

3.6 ESTIMATED WATER USE FOR SCENARIO 5

Scenario 5 would occur immediately after operations at the landfill have ceased and would consist of placing final cover soil on the entire landfill area. Dust generating activities in Scenario 5 would include excavation of soil for final cover from Stockpile A, movement of the excavated soil to the landfill area for final cover, and final cover soil application on the landfill area. Because the landfill would no longer be operational in Scenario 5, there would not be trash truck traffic on the unpaved main haul road. In Scenario 5, it is assumed that the entire landfill area would be receiving final cover soil applications necessary for closure. Thus, 33% of the final cover application would occur in the riparian and 67% in the non-riparian area, based on the percentage of the landfill cell that is contained in each of the two areas. Excavation of final cover soil at Stockpile A would be located in the riparian area, and the unpaved secondary road connecting Stockpile A and the landfill area would be located in the riparian area as well. Figure A-6 located in Appendix A represents the location of Scenario 5 activities relative to the boundaries of the riparian and non-riparian areas. Half of the ancillary water requirement for would be needed in the riparian area and half in the non-riparian area during Scenario 5 because most of the vegetation needs during final closure would be to stabilize previously excavated areas and the excavated areas would be located in both regions about equally.

For Scenario 5, the estimated water use requirements for non-riparian areas would be below the estimated safe yield of 41,925 gpd of percolating groundwater for both the average daily total and the maximum daily total as shown in Table 3-8 (Table B-9 in Appendix B) and Table 3-9 (Table B-14 in Appendix B). All unpaved roads this scenario are chemically stabilized and would not require daily watering; thus, the daily use of water for routine watering of unpaved road surfaces is zero. Further, for this scenario, all unpaved roads are located in the riparian area; thus, the water used for chemical applications on unpaved roads in the non-riparian areas is zero. The maximum daily water use in the riparian area would occur for chemical mix-in on the road from Stockpile A to the landfill cell area.

Table 3-9

GCLF Scenario 5 Average Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	0
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	5,000
	Final Cover Water Application	8,243
Non-Riparian Area Total		13,243
Riparian Area	Chemical Applications to Unpaved Road Surfaces	147
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	5,000
	Final Cover Water Application	4,060
	Excavation at Stockpile Water Application	12,303
Riparian Area Total		21,510
Total (Riparian & Non-Riparian)		**34,753**

Table 3-10
GCLF Scenario 5 Maximum Daily Water Use Summary

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces	0
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	2,000
	Final Cover Water Application	8,243
Non-Riparian Area Total		10,243
Riparian Area	Chemical Applications to Unpaved Road Surfaces	7,587
	Routine Watering Unpaved Road Surfaces	0
	Irrigation	8,000
	Final Cover Water Application	4,060
	Excavation at Stockpile Water Application	12,303
Riparian Area Total		31,950
Total (Riparian & Non-Riparian)		**42,193**

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4.0 SUMMARY

Water use requirements for different construction, operation, and closure configurations were assessed. Five scenarios were analyzed to represent the different combinations of activities requiring water for dust mitigation and ancillary uses over the life of the project. Dust control activities include excavation, cover soil application, and travel on unpaved roads. Additionally, water for ancillary uses, primarily consisting of landscape irrigation, was also accounted for. The analysis showed that, for the different construction, operation and closure configurations, the estimated average daily water use in non-riparian areas would be below the estimated safe yield of percolating groundwater. For all scenarios that were analyzed, except Scenario 2, the estimated maximum daily water use requirements for non-riparian areas would also be below the estimated safe yield of percolating groundwater. Stored water would be used for Scenario 2 maximum water use days to cover the excess water requirement. Scenario 1 had the highest estimated average daily water use, and Scenario 2 had the highest estimated maximum daily water use because both construction and landfill operational activities would occur during these scenarios.

5.0 LIMITATIONS

This report was prepared in general accordance with the accepted standard of care that existed in the region that the study was conducted at the time the report was written. The results contained in this report are based upon the information acquired at the time of the investigation. It is possible that not all conditions were identified during this project and factors may change over time, thus additional work may be required with the passage of time.

It should be recognized that identifying and assessing possible environmental, health and safety issues and regulatory requirements is difficult. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the facility. Kleinfelder should be notified for additional consultation if Gregory Canyon Ltd. wishes to reduce the uncertainties beyond the level associated with this report. It should be recognized that the scope of work described here is not intended to be inclusive, to identify all potential concerns, or to eliminate the possibility of problems. No warranty or guarantee, expressed or implied, is made.

This report may be used only by Gregory Canyon Ltd. and only for the purposes stated within a reasonable time from its issuance. Any party other than Gregory Canyon Ltd. who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

6.0 REFERENCES

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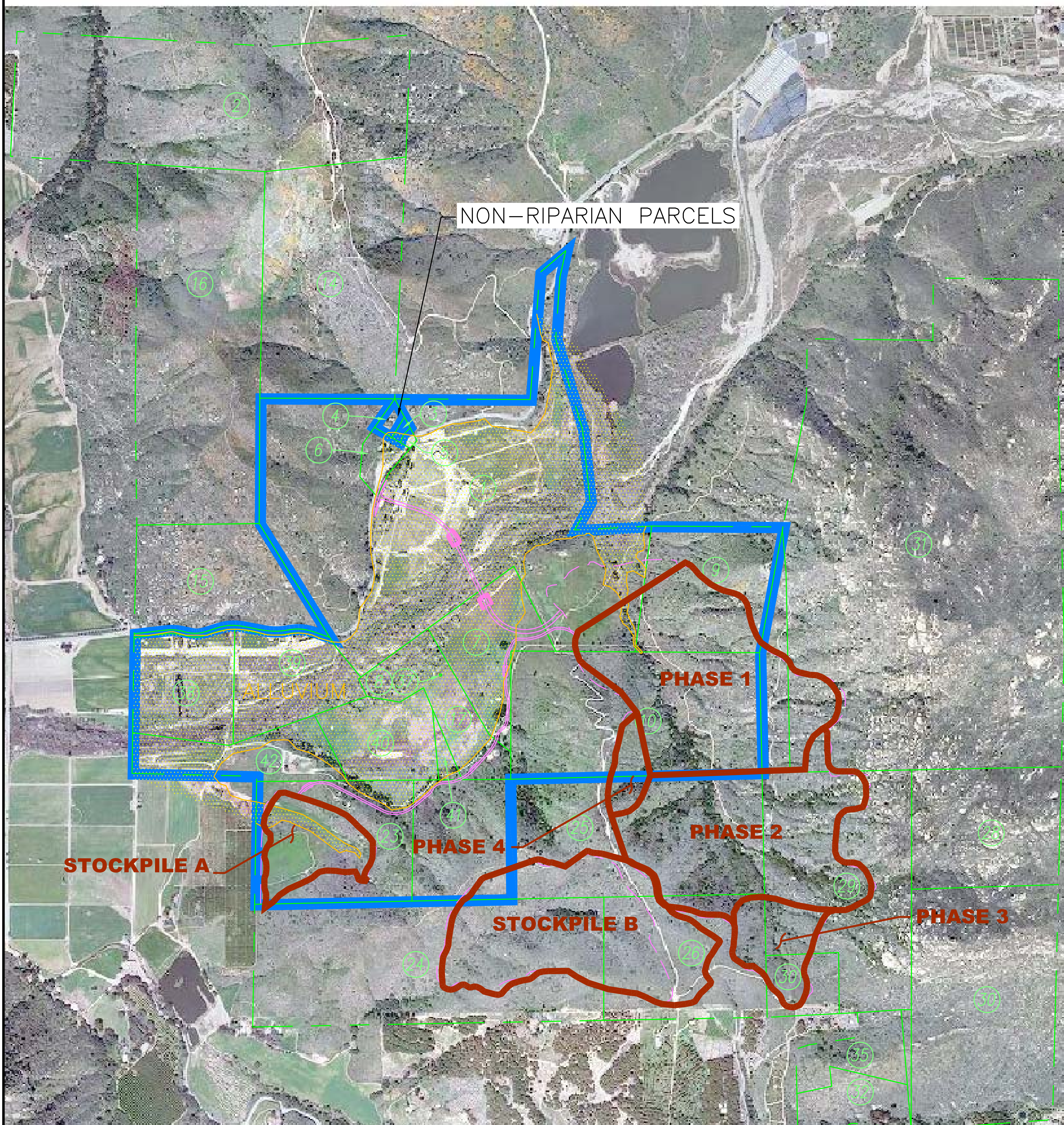
APPENDIX A

FIGURES



Base file source Geologic Associates, dated October 2009

LEGEND

- PROPERTY BOUNDARY
- PARCELS
- ALLUVIUM
- RIPARIAN PARCELS
- LANDFILL COMPONENTS
- LANDFILL COMPONENTS

N

0 500 1000 2000 3000

APPROXIMATE SCALE IN FEET

NOTES:

1. Phase boundaries are approximate.
2. The limits of Alluvium extend beyond the property boundary. However, its extent outside the property has not been defined.

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FILE NAME:	Figure A-1.dwg

LANDFILL PHASE AREAS

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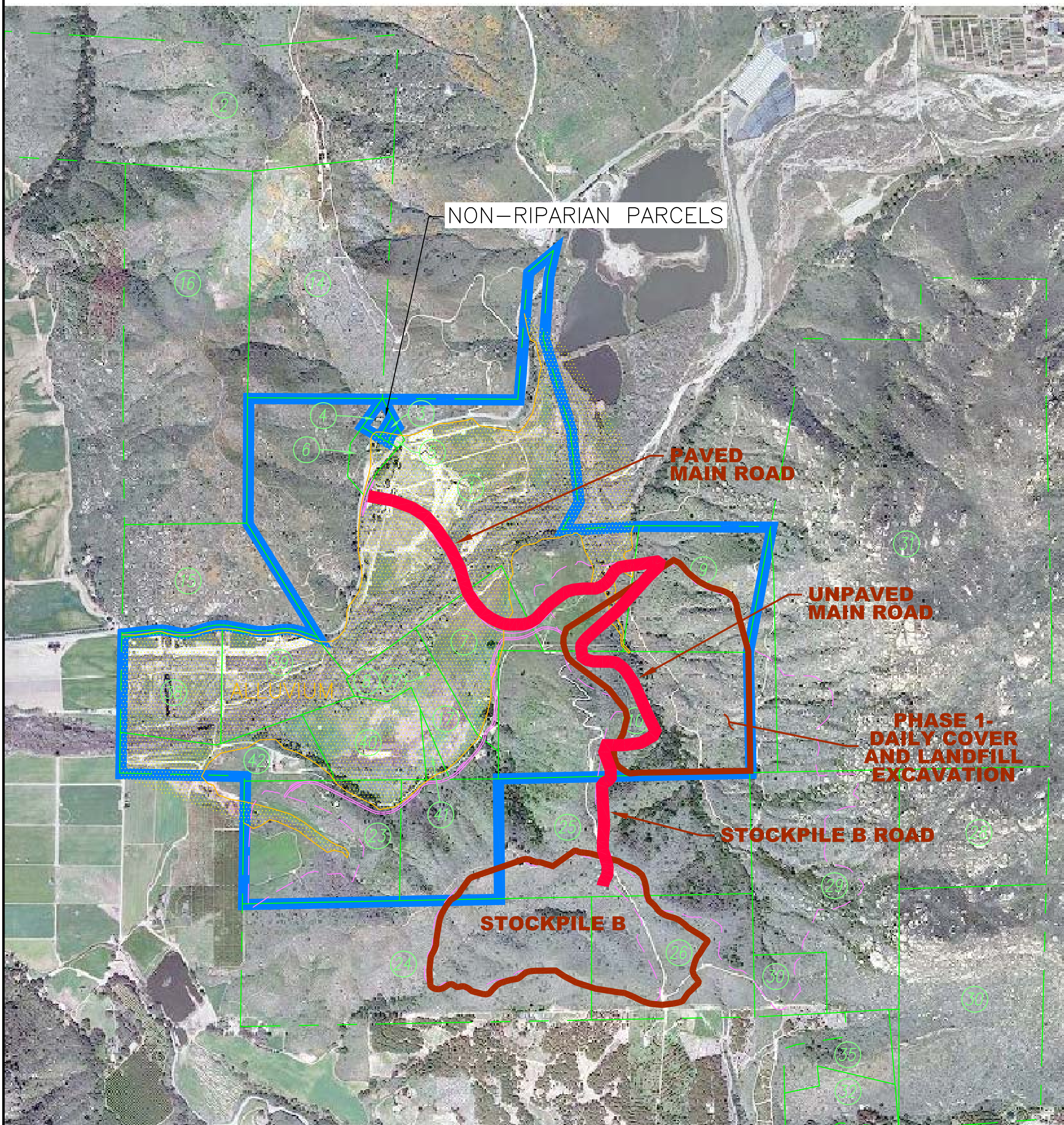
Tiburon, California

FIGURE

A-1



Base file source Geologic Associates, dated October 2009

LEGEND

- PROPERTY BOUNDARY
- PARCELS
- ALLUVIUM
- RIPARIAN PARCELS
- LANDFILL COMPONENTS
- LANDFILL COMPONENTS

0 500 1000 2000 3000
APPROXIMATE SCALE IN FEET

N

NOTES:

1. Phase boundaries are approximate.
2. The limits of Alluvium extend beyond the property boundary. However, its extent outside the property has not been defined.

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SCENARIO 1 CONFIGURATION

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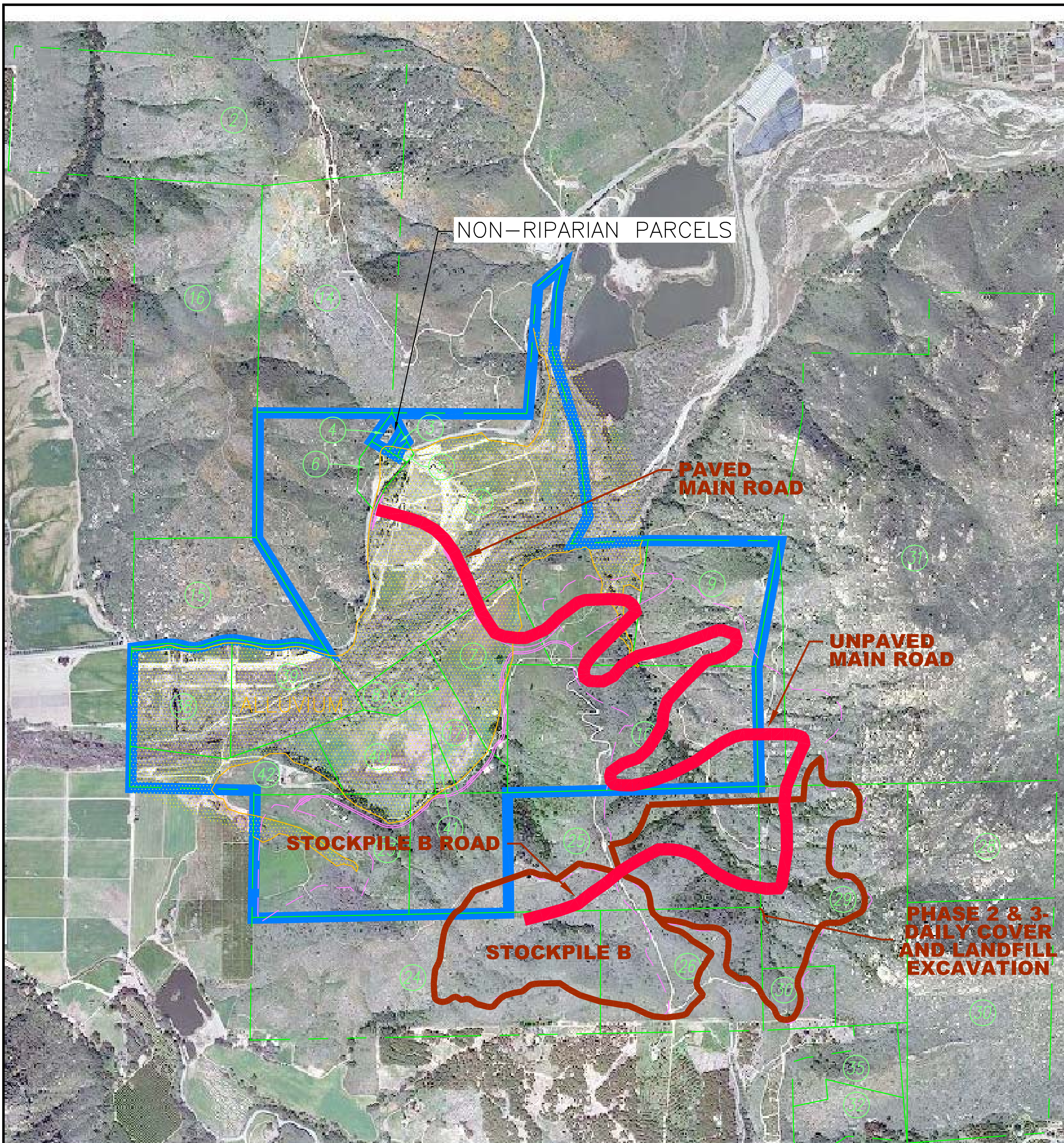
FIGURE
A-2



Base file source Geologic Associates, dated October 2009

LEGEND

- PROPERTY BOUNDARY
- PARCELS
- ALLUVIUM
- RIPARIAN PARCELS
- LANDFILL COMPONENTS (dashed)
- LANDFILL COMPONENTS (solid)

NOTES:

1. Phase boundaries are approximate.
2. The limits of Alluvium extend beyond the property boundary. However, its extent outside the property has not been defined.

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SCENARIO 2 CONFIGURATION

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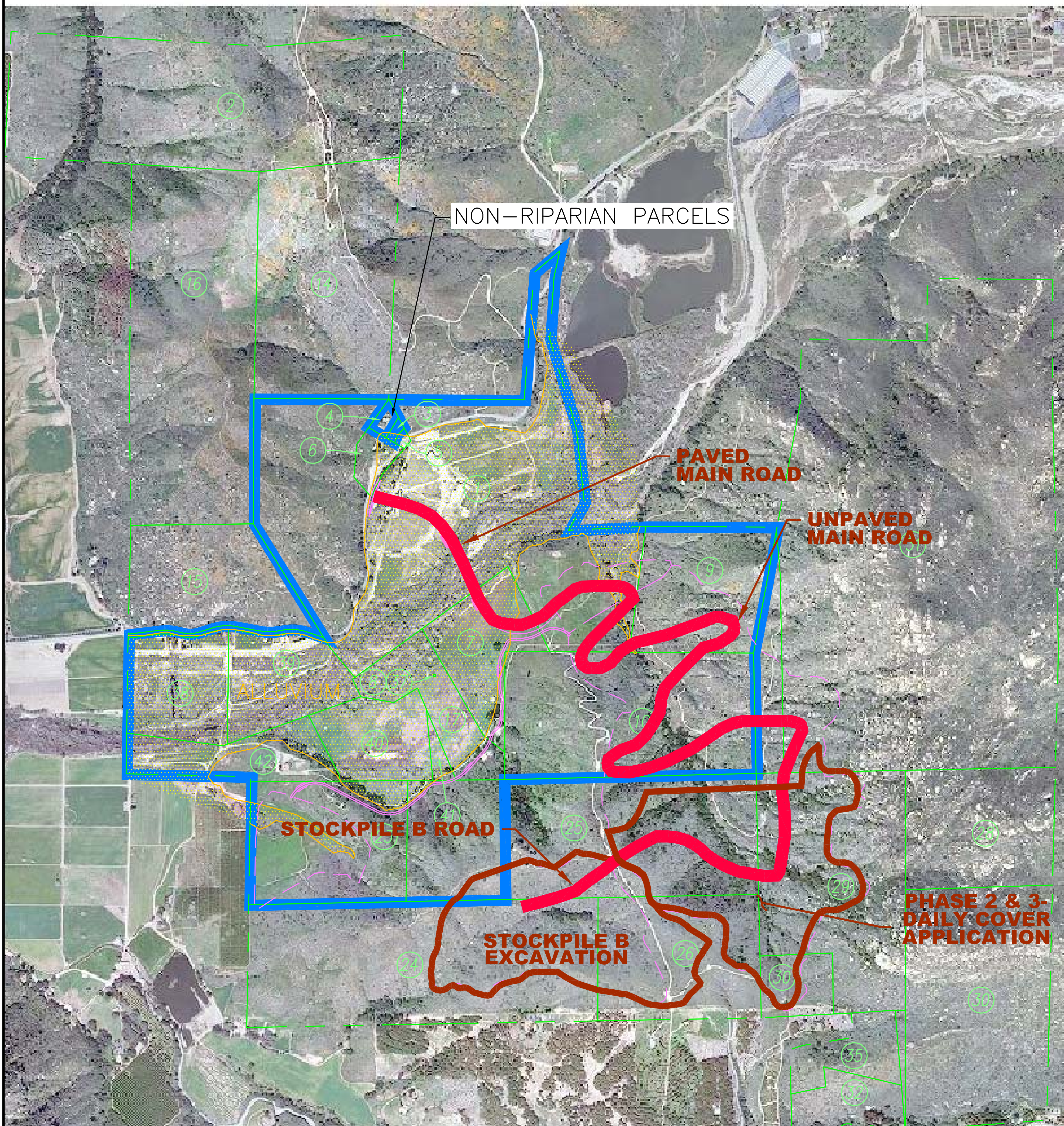
FIGURE
A-3



Base file source Geologic Associates, dated October 2009

LEGEND

- PROPERTY BOUNDARY
- PARCELS
- ALLUVIUM
- RIPARIAN PARCELS
- LANDFILL COMPONENTS
- LANDFILL COMPONENTS

N

0 500 1000 2000 3000

APPROXIMATE SCALE IN FEET

NOTES:

1. Phase boundaries are approximate.
2. The limits of Alluvium extend beyond the property boundary. However, its extent outside the property has not been defined.

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SCENARIO 3 CONFIGURATION

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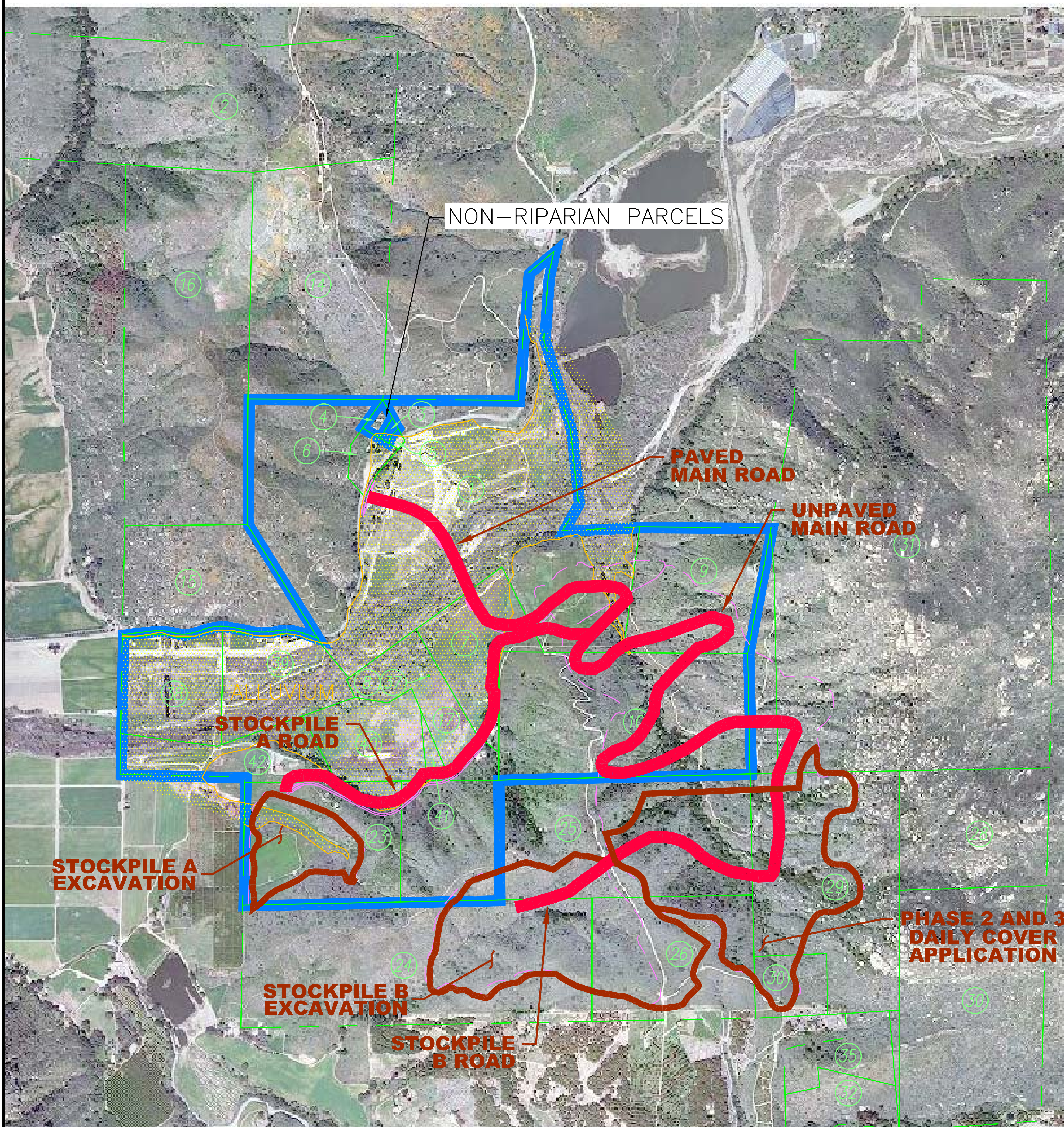
FIGURE
A-4



Base file source Geologic Associates, dated October 2009

LEGEND

- PROPERTY BOUNDARY
- PARCELS
- ALLUVIUM
- RIPARIAN PARCELS
- LANDFILL COMPONENTS
- LANDFILL COMPONENTS

N

0 500 1000 2000 3000

APPROXIMATE SCALE IN FEET

NOTES:

1. Phase boundaries are approximate.
2. The limits of Alluvium extend beyond the property boundary. However, its extent outside the property has not been defined.

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SCENARIO 4 CONFIGURATION

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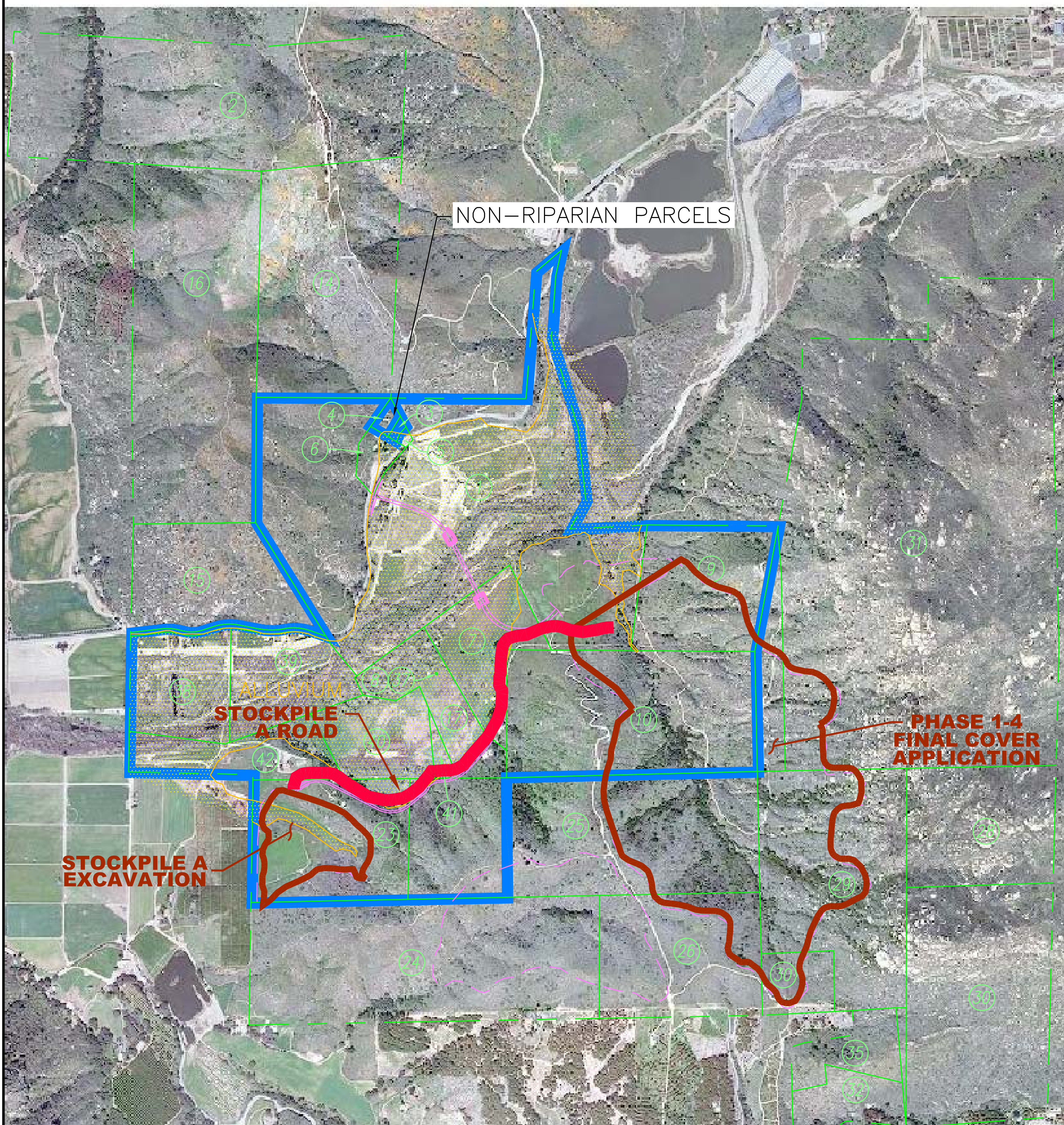
FIGURE

A-5



Base file source Geologic Associates, dated October 2009

LEGEND

- PROPERTY BOUNDARY
- PARCELS
- ALLUVIUM
- RIPARIAN PARCELS
- LANDFILL COMPONENTS
- LANDFILL COMPONENTS

N

0 500 1000 2000 3000

APPROXIMATE SCALE IN FEET

NOTES:

1. Phase boundaries are approximate.
2. The limits of Alluvium extend beyond the property boundary. However, its extent outside the property has not been defined.

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SCENARIO 5 CONFIGURATION

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FIGURE
A-6

APPENDIX B

ESTIMATED WATER USE CALCULATIONS

Table B-1

GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR EXCAVATION

Landfill Scenario 1		
During excavation, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Total volume excavated[2]	3,070,000	cy/yr, in Scenario 1
Soil volume excavated (60% alluvium soil)	1,842,000	cy soil/yr
Rock volume excavated (40% bedrock)	1,228,000	cy rock/yr
Soil volume excavated per day (Average)[3]	6,000	cy/day
Soil volume excavated some days (Maximum)[3]	10,000	cy/day
Density of Soil	3,000	lb/cu yd
Weight of average soil excavated	18,000,000	lb soil/day
Weight of maximum soil excavated	30,000,000	lb soil/day
Average Quantity of water required for 95% control	315,000.00	lb water
Maximum Quantity of water required for 95% control	525,000.00	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, average water needed in Scenario 1 [4]	**37,770**	gal water/day
Therefore, maximum water needed in Scenario 1	**62,950**	gal water/day

Landfill Scenario 2		
During excavation, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Total volume excavated[2]	853,333	cy/yr, in Scenario 2
Soil volume excavated (60% alluvium soil)	512,000	cy soil/yr
Rock volume excavated (40% bedrock)	341,333	cy rock/yr
Soil volume excavated per day (Average)[3]	1,668	cy/day
Soil volume excavated some days (Maximum)[3]	10,000	cy/day
Density of Soil	3,000	lb/cu yd
Weight of average soil excavated	5,003,255	lb soil/day
Weight of maximum soil excavated	30,000,000	lb soil/day
Average Quantity of water required for 95% control	87,556.97	lb water
Maximum Quantity of water required for 95% control	525,000.00	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, average water needed in Scenario 2	**10,498**	gal water/day
Therefore, maximum water needed in Scenario 2	**62,950**	gal water/day

Landfill Scenario 3		
During excavation, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Total volume excavated [5]	324,868	cy/yr, in Scenario 3
Soil volume excavated (100% alluvium soil)	324,868	cy soil/yr
Soil volume excavated per day (Average)	1,058	cy/day
Soil volume excavated per day (Maximum)	1,058	cy/day
Density of Soil	3,000	lb/cu yd
Weight of average soil excavated	3,174,606	lb soil/day
Weight of maximum soil excavated	3,174,606	lb soil/day
Average Quantity of water required for 95% control	55,555.60	lb water
Maximum Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, average water needed in Scenario 3	**6,661**	gal water/day
Therefore, maximum water needed in Scenario 3	**6,661**	gal water/day

Table B-1
GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR EXCAVATION

Landfill Scenario 4		
During excavation, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Stockpile A		
Total volume excavated - Stockpile A (SPA) [5]	274,868	cy/yr, in Scenario 4
Soil volume excavated (100% alluvium soil)	274,868	cy soil/yr
Soil volume excavated per day (Average)	895	cy/day
Soil volume excavated per day (Maximum)	1,058	cy/day
Density of Soil	3,000	lb/cu yd
Weight of average soil excavated	2,686,007	lb soil/day
Weight of maximum soil excavated	3,174,606	lb soil/day
Average Quantity of water required for 95% control	47,005.11	lb water
Maximum Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, average water needed in Scenario 4 - SPA	**5,636**	gal water/day
Therefore, maximum water needed in Scenario 4 - SPA	**6,661**	gal water/day
Stockpile B		
Total volume excavated - Stockpile B (SPB) [5]	50,000	cy/yr, in Scenario 4
Soil volume excavated (100% alluvium soil)	50,000	cy soil/yr
Soil volume excavated per day (Average)	163	cy/day
Soil volume excavated per day (Maximum)	1,058	cy/day
Density of Soil	3,000	lb/cu yd
Weight of average soil excavated	488,599	lb soil/day
Weight of maximum soil excavated	3,174,606	lb soil/day
Average Quantity of water required for 95% control	8,550.49	lb water
Maximum Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, average water needed in Scenario 4 - SPB	**1,025**	gal water/day
Therefore, maximum water needed in Scenario 4 - SPB	**6,661**	gal water/day

Landfill Scenario 5		
During excavation, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Total volume excavated [5]	600,000	cy/yr, in Scenario 5
Soil volume excavated (100% alluvium soil)	1,954	cy/day
Soil volume excavated per day (Maximum)	1,954	cy/day
Density of Soil	3,000	lb/cu yd
Weight of average soil excavated	5,863,192	lb soil/day
Weight of maximum soil excavated	5,863,192	lb soil/day
Average Quantity of water required for 95% control	102,605.86	lb water
Maximum Quantity of water required for 95% control	102,605.86	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, average water needed in Scenario 5	**12,303**	gal water/day
Therefore, maximum water needed in Scenario 5	**12,303**	gal water/day

Notes:

1. The correlation between moisture increase and emission control efficiency is obtained from Mojave Desert AQMD Emission Inventory Guidance, Page 10, Table 3.

2. The volume excavated in Scenarios 1 and 2 occurs in the landfill area for landfill cell construction. 60% of this material is alluvium soil, which will require water and 40% is bedrock, which will not require water. The excavated soil would be used for cell construction, daily cover, and/or moved to a stockpile area.

3. The average volume of excavated soil is the required annual soil quantity divided by 307 days per year. The maximum volume of excavated soil can be 10,000 cubic yards per day during construction activities in Scenario 1 and Scenario 2. However, the annual quanitity will not be exceeded for each scenario, so fewer than 307 days of excavation may be necessary during construction scenarios.

4. Estimate is validated, since operations estimates 2 water trucks passing 2 times per hour for approx. 30,000 cy/day soil excavation. Water truck capacity is 3,500 gal. Since the excavation of soil is 6,000 cy/day, operations would assume 6,000/30,000 x 3,500 gal x 2 trucks x 2 times per hr x 11 hr/day = 30,800 gal/day

5. Excavation occurs at the stockpiles in Scenarios 3, 4, and 5 to obtain daily or final cover soil. Material from the stockpiles is estimated to be 100% soil and will only be excavated as needed; thus, there is no maximum daily amount that would occur in these scenarios.

Table B-2
GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR COVER SOIL APPLICATION

Landfill Scenario 1		
For Day Cover Soil, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Day Cover Volume [2]	324,868	cy/yr, in Scenario 1
Day Cover Volume per day	1,058	cy/day
Density of Soil	3000	lb/cu yd
Weight of soil for Day Cover	3,174,606	lb soil/day
Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, water needed in Scenario 1	**6,661**	gal water/day

Landfill Scenario 2		
For Day Cover Soil, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Day Cover Volume [2]	324,868	cy/yr, in Scenario 2
Day Cover Volume per day	1,058	cy/day
Density of Soil	3000	lb/cu yd
Weight of soil for Day Cover	3,174,606	lb soil/day
Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, water needed in Scenario 2	**6,661**	gal water/day

Landfill Scenario 3		
For Day Cover Soil, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Day Cover Volume [3]	324,868	cy/yr, in Scenario 3
Day Cover Volume per day	1,058	cy/day
Density of Soil	3000	lb/cu yd
Weight of soil for Day Cover	3,174,606	lb soil/day
Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, water needed in Scenario 3	**6,661**	gal water/day

Landfill Scenario 4		
For Day Cover Soil, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Day Cover Volume [3]	324,868	cy/yr, in Scenario 4
Day Cover Volume per day	1,058	cy/day
Density of Soil	3000	lb/cu yd
Weight of soil for Day Cover	3,174,606	lb soil/day
Quantity of water required for 95% control	55,555.60	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, water needed in Scenario 4	**6,661**	gal water/day

Landfill Scenario 5 (Final Cover)		
For Final Cover Soil, target increase of 1.75% moisture resulting in 95% control efficiency[1]		
Final Cover Volume (33% riparian / 67% non riparian area) [3]	600,000	cy/yr, in Scenario 5
Final Cover Volume per day	1,954	cy/day
Density of Soil	3000	lb/cu yd
Weight of soil for Day Cover	5,863,192	lb soil/day
Quantity of water required for 95% control	102,605.86	lb water
Percent Increase in moisture content	1.75%	
Density of water	8.34	lb/gal
Therefore, water needed in Scenario 5	**12,303**	gal water/day

Notes:

1. The correlation between moisture increase and emission control efficiency is obtained from Mojave Desert AQMD Emission Inventory Guidance, Page 10, Table 3.

2. The day cover soil in Scenarios 1 and 2 would be obtained from soil excavated in the landfill area during landfill cell construction.

3. The day or final cover soil in Scenarios 3, 4, and 5 would be obtained from one of the two stockpile areas.

Table B-3
GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR CHEMICALLY STABILIZED UNPAVED ROADS

Product and Water Quantity for Mix-in on Non-Riparian Roads

Scenario and Road[1, 2]	Road Length[3]	Road Width	Road Area	Soiltac® Product	Water	Total Mix-In App	Estimated Days for Application[4]
	(ft)	(ft)	(ft^2)	(gal/yr)	(gal/yr)	(gal/yr)	(days)
Vendor Data[5]	10,560	55	580,800	38,700	230,000	268,700	
1 / Stockpile B Road	1,420	20	28,400	1,892	11,247	13,139	2
2 / Unpaved Main Road	3,140	40	125,600	8,369	49,738	58,107	6
2 / Stockpile B Road	2,340	20	46,800	3,118	18,533	21,651	3
3 / Unpaved Main Road	3,140	40	125,600	8,369	49,738	58,107	6
3 / Stockpile B Road	2,340	20	46,800	3,118	18,533	21,651	3
4 / Unpaved Main Road	3,140	40	125,600	8,369	49,738	58,107	6
4 / Stockpile B Road	2,340	20	46,800	3,118	18,533	21,651	3

Notes:
1. Initial Mix-in will occur as a one-time event.
2. Chemical application will be applied to the Unpaved Main Road and Stockpile B Road.
3. Estimated road length in the non-riparian area based on AERMOD air dispersion model files.
4. Estimated days for application is based on Soiltac® recommended guidelines for mix-in of 0.5 acres/day.
5. Vendor data used to ratio the road area to the amount of product and water needed for GCLF application.

Product and Water Quantity for Quarterly Topical Sealant on Non-Riparian Roads

Scenario and Road[1]	Road Length[2]	Road Width	Road Area	Soiltac® Product[3,4] (Initial Application)	Water[3,4] (Initial Application)	Soiltac® Product[4,5] (Annual)	Water[4,5] (Annual)	Total Sealer App (Annual)	Estimated Days for Application[6]
	(ft)	(ft)	(ft^2)	(gal/ event)	(gal/ event)	(gal/yr)	(gal/yr)	(gal)	(days)
1 / Stockpile B Road	1,420	20	28,400	284	1,136	540	2,158	2,698	1
2 / Unpaved Main Road	3,140	40	125,600	1,256	5,024	2,386	9,546	11,932	1
2 / Stockpile B Road	2,340	20	46,800	468	1,872	889	3,557	4,446	1
3 / Unpaved Main Road	3,140	40	125,600	1,256	5,024	2,386	9,546	11,932	1
3 / Stockpile B Road	2,340	20	46,800	468	1,872	889	3,557	4,446	1
4 / Unpaved Main Road	3,140	40	125,600	1,256	5,024	2,386	9,546	11,932	1
4 / Stockpile B Road	2,340	20	46,800	468	1,872	889	3,557	4,446	1

Notes:
1. Chemical application will be applied to the Unpaved Main Road and Stockpile B Road.
2. Estimated road length in the non-riparian area based on AERMOD air dispersion model files.
3. Standard application coverage rates for Soiltac® sealer, as provided by the manufacturer, are 0.01 gal product/ft^2 of road and 0.04 gal water/ft^2 of road.
4. Soiltac® manufacturer states that the topical sealer application should occur every 12 to 24 months. However, to estimate a worst case water year, it is assumed that the topical sealer application will occur quaterly (4 times per year).
5. Assume that 30% of the product and water used in the initial sealer quarterly application are needed for each quarter thereafter. So, one quarter will contain a full topical sealer application and the following three quarters will contain a 30% product applicaton. (This is conservative, since the manufacturer states 30% usage based on the previous year.)
6. Estimated days for application is based on Soiltac® manufacturer guidelines which recommends the sealer can be applied to approx 3 acres per day.

Table B-3
GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR CHEMICALLY STABILIZED UNPAVED ROADS

Product and Water Quantity for Mix-in on Riparian Roads

Scenario and Road[1,2]	Road Length[3]	Road Width	Road Area	Soiltac® Product	Water	Total Mix-In App	Estimated Days for Application[4]
	(ft)	(ft)	(ft2)	(gal/yr)	(gal/yr)	(gal/yr)	(days)
Vendor Data[5]	10,560	55	580,800	38,700	230,000	268,700	
1 / Stockpile B Road	820	20	16,400	1,093	6,494	7,587	1
1 / Unpaved Main Road	1,860	40	74,400	4,957	29,463	34,420	4
1 / Road to Daily Cover	1,380	20	27,600	1,839	10,930	12,769	2
2 / Unpaved Main Road	6,730	40	269,200	17,937	106,605	124,542	13
3 / Unpaved Main Road	6,730	40	269,200	17,937	106,605	124,542	13
4 / Unpaved Main Road	6,730	40	269,200	17,937	106,605	124,542	13
4 / Stockpile A Road	4,790	20	95,800	6,383	37,937	44,321	5
5 / Stockpile A Road	4,790	20	95,800	6,383	37,937	44,321	5

Notes:
1. Initial Mix-in will occur as a one time event.
2. Chemical application will be applied only to the Unpaved Main Road, Road to Daily Cover, Stockpile B Road, and Stockpile A Road.
3. Estimated road length in the riparian area based on AERMOD air dispersion model files.
4. Estimated days for application is based on Soiltac® recommended guidelines for mix-in of 0.5 acres/day.
5. Vendor data used to ratio the road area to the amount of product and water needed for GCLF application.

Product and Water Quantity for Quarterly Topical Sealant on Riparian Roads

Scenario and Road[1]	Road Length[2]	Road Width	Road Area	Soiltac® Product[3,4] (Initial Application)	Water[3,4] (Initial Application)	Soiltac® Product[4,5] (Annual)	Water[4,5] (Annual)	Total Sealer App (Annual)	Estimated Days for Application[6]
	(ft)	(ft)	(ft2)	(gal/ event)	(gal/ event)	(gal/yr)	(gal/yr)	(gal)	(days)
1 / Stockpile B Road	820	20	16,400	164	656	312	1,246	1,558	1
1 / Unpaved Main Road	1,860	40	74,400	744	2,976	1,414	5,654	7,068	1
1 / Road to Daily Cover	1,380	20	27,600	276	1,104	524	2,098	2,622	1
2 / Unpaved Main Road	6,730	40	269,200	2,692	10,768	5,115	20,459	25,574	3
3 / Unpaved Main Road	6,730	40	269,200	2,692	10,768	5,115	20,459	25,574	3
4 / Unpaved Main Road	6,730	40	269,200	2,692	10,768	5,115	20,459	25,574	3
4 / Stockpile A Road	4,790	20	95,800	958	3,832	1,820	7,281	9,101	1
5 / Stockpile A Road	4,790	20	95,800	958	3,832	1,820	7,281	9,101	1

Notes:
1. Chemical application will be applied only to the Unpaved Main Road, Road to Daily Cover, Stockpile B Road, and Stockpile A Road.
2. Estimated road length in the riparian area based on AERMOD air dispersion model files.
3. Standard application coverage rates for Soiltac® sealer, as provided by the manufacturer, are 0.01 gal product/ft^2 of road and 0.04 gal water/ft^2 of road.
4. Soiltac® manufacturer states that the topical sealer application should occur every 12 to 24 months. However, to estimate a worst case water year, it is assumed that the topical sealer application will occur quaterly (4 times per year).

5. Assume that 30% of the product and water used in the initial sealer quarterly application are needed for each quarter thereafter. So, one quarter will contain a full topical sealer application and the following three quarters will contain a 30% product applicaton. (This is conservative, since the manufacturer states 30% usage based on the previous year.)

6. Estimated days for application is based on Soiltac® manufacturer guidelines which recommends the sealer can be applied to approx 3 acres per day.

Table B-4

GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR WATER SPRAY ON UNPAVED ROADS

Unpaved Road Water Use Estimation Within the Non-Riparian Area - Non-stabilized Main Road

Equation:[1]
Cf=100-(0.0012 x ADT/I)

A	inches	Class A Pan Evaporation
D	vehicles/hour	Average Hourly Traffic
T	hour	Time Between Water Applications
Cf	%	Control Efficiency
I	gal/yd[2]	Water Application Intensity

Main UP Road Widths	
40	feet
13.3	yd

Non-Riparian Road Lengths for Main UP		
196.7	yd	Scenario 2
196.7	yd	Scenario 3
196.7	yd	Scenario 4

Main UP Road - Scenario 2		
A[2]	60.5	in
D[3]	61	V/Hr
T	2	Hr
Cf	90.00	%
I	0.886	gal/yd2
	2,323	gal/app
	12,778	gal/day

Main UP Road - Scenario 3		
A[2]	60.5	in
D[3]	61	V/Hr
T	2	Hr
Cf	90.00	%
I	0.886	gal/yd2
	2,323	gal/app
	12,778	gal/day

Main UP Road - Scenario 4		
A[2]	60.5	in
D[4]	65	V/Hr
T	2	Hr
Cf	90.00	%
I	0.944	gal/yd2
	2,475	gal/app
	13,615	gal/day

1. Watering Equation obtained from the Mojave Desert AQMD Emission Inventory Guidance, April 10, 2000, page 26.
2. Class A Pan Evaporation from the California Climate Data Archive, for San Diego airport.
3. Vehicles per hour based on a maximum of 675 trash trucks per day over an 11 hour operational day.
4. Vehicles per hour based on a maximum of 675 trash trucks per day and 43 scrapers per day over an 11 hour operational day.

Table B-4

GREGORY CANYON LANDFILL ESTIMATED WATER USE FOR WATER SPRAY ON UNPAVED ROADS

Unpaved Road Water Use Estimation Within the Riparian Area - Non-stabilized Main Road

Equation:[1]
Cf=100-(0.0012 x ADT/I)

A	inches	Class A Pan Evaporation
D	vehicles/hour	Average Hourly Traffic
T	hour	Time Between Water Applications
Cf	%	Control Efficiency
I	gal/yd^2	Water Application Intensity

Main UP Road Widths	
40	feet
13.3	Yd

Riparian Road Lengths for Main UP		
186.67	yd	Scenario 1

Main UP Road - Scenario 1		
A[2]	60.5	in
D[3]	61	V/Hr
T	2	Hr
Cf	90.00	%
I	0.886	gal/yd2
	2,205	gal/app
	12,128	gal/day

1. Watering Equation obtained from the Mojave Desert AQMD Emission Inventory Guidance, April 10, 2000, page 26.
2. Class A Pan Evaporation from the California Climate Data Archive, for San Diego airport.
3. Vehicles per hour based on a maximum of 675 trash trucks per day over an 11 hour operational day.

Table B-5

GREGORY CANYON LANDFILL SCENARIO 1 AVERAGE DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	44
	Routine Watering Unpaved Road Surfaces[3]	0
Non-Riparian Area Total		44
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	182
	Routine Watering Unpaved Road Surfaces	12,128
	Irrigation	10,000
	Landfill Cell Excavation Water Application	37,770
	Day Cover Water Application	6,661
Riparian Area Total		66,742
Total (Riparian & Non-Riparian)		**66,785**

Notes:

1. Based on a general modeled road configuration for scenario 1, which will include landfill cell construction and landfill operations occuring in the Phase I area of the landfill. Soil transfer is to stockpile B.

2. Water usage for unpaved road chemical mix-in is assumed to occur as a one-time event and road sealing on the unpaved roads is assumed to occur quarterly or less each year. Therefore, water usage for chemical applications on the unpaved roads is totaled on an annual basis and then averaged for each day of the year (307 days per year).

3. The only unpaved roads in the non-riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-6
GREGORY CANYON LANDFILL SCENARIO 2 AVERAGE DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	265
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Landfill Cell Excavation Water Application	10,498
	Irrigation	2,000
Non-Riparian Area Total		32,203
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	414
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	8,000
Riparian Area Total		8,414
Total (Riparian & Non-Riparian)		**40,617**

Notes:

1. Based on a general modeled road configuration for scenario 2, which will include landfill cell construction and landfill operations occuring in the Phase II and Phase III areas of the landfill. Soil transfer is to stockpile B.
2. Water usage for unpaved road chemical mix-in is assumed to occur as a one-time event and road sealing on the unpaved roads is assumed to occur quarterly or less each year. Therefore, water usage for chemical applications on the unpaved roads is totaled on an annual basis and then averaged for each day of the year (307 days per year).
3. The only unpaved roads in the riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-7
GREGORY CANYON LANDFILL SCENARIO 3 AVERAGE DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	265
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Excavation at Stockpile Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		28,366
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	414
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	8,000
Riparian Area Total		8,414
Total (Riparian & Non-Riparian)		**36,780**

Notes:

1. Based on a general modeled road configuration for scenario 3, which will include landfill operations occuring in the Phase III areas of the landfill. Soil transfer is from stockpile B.
2. Water usage for unpaved road chemical mix-in is assumed to occur as a one-time event and road sealing on the unpaved roads is assumed to occur quarterly or less each year. Therefore, water usage for chemical applications on the unpaved roads is totaled on an annual basis and then averaged for each day of the year (307 days per year).
3. The only unpaved roads in the riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-8
GREGORY CANYON LANDFILL SCENARIO 4 AVERAGE DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	265
	Routine Watering Unpaved Road Surfaces	13,615
	Excavation at Stockpile B Water Application	1,025
	Day Cover Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		23,566
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	561
	Routine Watering Unpaved Road Surfaces[3]	0
	Excavation at Stockpile A Water Application	5,636
	Irrigation	8,000
Riparian Area Total		14,197
Total (Riparian & Non-Riparian)		**37,764**

Notes:

1. Based on a general modeled road configuration for scenario 4, which will include landfill operations occuring in the Phase II and Phase III areas of the landfill. Soil transfer is mostly from stockpile A, with a smaller amount from stockpile B.

2. Water usage for unpaved road chemical mix-in is assumed to occur as a one-time event and road sealing on the unpaved roads is assumed to occur quarterly or less each year. Therefore, water usage for chemical applications on the unpaved roads is totaled on an annual basis and then averaged for each day of the year (307 days per year).

3. The only unpaved roads in the riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-9
GREGORY CANYON LANDFILL SCENARIO 5 AVERAGE DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	0
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	5,000
	Final Cover Water Application[4]	8,243
Non-Riparian Area Total		13,243
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	147
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	5,000
	Final Cover Water Application[4]	4,060
	Excavation at Stockpile Water Application[4]	12,303
Riparian Area Total		21,510
Total (Riparian & Non-Riparian)		**34,753**

Notes:

1. Based on a general modeled road configuration for scenario 5, which will include final cover application.
2. Water usage for unpaved road chemical mix-in is assumed to occur as a one-time event and road sealing on the unpaved roads is assumed to occur quarterly or less each year. Therefore, water usage for chemical applications on the unpaved roads is totaled on an annual basis and then averaged for each day of the year (307 days per year).
3. This scenario contains no operations, so the only unpaved roads used are chemically stabilized, which do not require daily watering.
4. It is assumed that approximately 33% of the final cover will be placed in the riparian area and 67% in the non riparian area. However, excavation will be performed in Stockpile A, which is within the riparian area.

Table B-10
GREGORY CANYON LANDFILL SCENARIO 1 MAXIMUM DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	5,623
	Routine Watering Unpaved Road Surfaces[3]	0
Non-Riparian Area Total		5,623
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	7,366
	Routine Watering Unpaved Road Surfaces	12,128
	Irrigation	10,000
	Landfill Cell Excavation Water Application	62,950
	Day Cover Water Application	6,661
Riparian Area Total		99,105
Total (Riparian & Non-Riparian)		**104,729**

Notes:

1. Based on a general modeled road configuration for scenario 1, which will include landfill cell construction and landfill operations occuring in the Phase I area of the landfill. Soil transfer is to stockpile B.

2. Maximum daily water use is based on the the highest daily water use for mix-in or topical sealer and will occur in each area (riparian/non-riparian) during scenario 2, but likely on different days. It is combined here as a worst case estimate.
3. The only unpaved roads in the non-riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-11
GREGORY CANYON LANDFILL SCENARIO 2 MAXIMUM DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	9,546
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Landfill Cell Excavation Water Application	62,950
	Irrigation	2,000
Non-Riparian Area Total		93,935
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	8,200
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	8,000
Riparian Area Total		16,200
Total (Riparian & Non-Riparian)		**110,135**

Notes:

1. Based on a general modeled road configuration for scenario 2, which will include landfill cell construction and landfill operations occuring in the Phase II and Phase III areas of the landfill. Soil transfer is to stockpile B.
2. Maximum daily water use is based on the the highest daily water use for mix-in or topical sealer and will occur in each area (riparian/non-riparian) during scenario 2, but likely on different days. It is combined here as a worst case estimate.
3. The only unpaved roads in the riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-12
GREGORY CANYON LANDFILL SCENARIO 3 MAXIMUM DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	9,546
	Routine Watering Unpaved Road Surfaces	12,778
	Day Cover Water Application	6,661
	Excavation at Stockpile Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		37,646
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	8,200
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	8,000
Riparian Area Total		16,200
Total (Riparian & Non-Riparian)		**53,847**

Notes:
1. Based on a general modeled road configuration for scenario 3, which will include landfill operations occuring in the Phase III areas of the landfill. Soil transfer is from stockpile B.
2. Maximum daily water use is based on the the highest daily water use for mix-in or topical sealer and will occur in each area (riparian/non-riparian) during scenario 3, but likely on different days. It is combined here as a worst case estimate.
3. The only unpaved roads in the riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-13

GREGORY CANYON LANDFILL SCENARIO 4 MAXIMUM DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	9,546
	Routine Watering Unpaved Road Surfaces	13,615
	Excavation at Stockpile B Water Application	6,661
	Day Cover Water Application	6,661
	Irrigation	2,000
Non-Riparian Area Total		38,483
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	8,200
	Routine Watering Unpaved Road Surfaces[3]	0
	Excavation at Stockpile A Water Application	6,661
	Irrigation	8,000
Riparian Area Total		22,862
Total (Riparian & Non-Riparian)		**61,345**

Notes:

1. Based on a general modeled road configuration for scenario 4, which will include landfill operations occuring in the Phase II and Phase III areas of the landfill. Soil transfer is mostly from stockpile A, with a smaller amount from stockpile B.

2. Maximum daily water use is based on the the highest daily water use for mix-in or topical sealer and will occur in each area (riparian/non-riparian) during scenario 4, but likely on different days. It is combined here as a worst case estimate.

3. The only unpaved roads in the riparian area of this scenario are chemically stabilized, which do not require daily watering.

Table B-14
GREGORY CANYON LANDFILL SCENARIO 5 MAXIMUM DAILY WATER USE SUMMARY[1]

Location	Activity	Daily Water Use (gallons)
Non-Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	0
	Routine Watering Unpaved Road Surfaces[3]	0
	Irrigation	2,000
	Final Cover Water Application[4]	8,243
Non-Riparian Area Total		10,243
Riparian Area	Chemical Applications to Unpaved Road Surfaces[2]	7,587
	Routine Watering Unpaved Road Surfaces[2]	0
	Irrigation	8,000
	Final Cover Water Application[4]	4,060
	Excavation at Stockpile Water Application[4]	12,303
Riparian Area Total		31,950
Total (Riparian & Non-Riparian)		**42,193**

Notes:

1. Based on a general modeled road configuration for scenario 5, which will include final cover application.
2. Maximum daily water use is based on the the highest daily water use for mix-in or topical sealer and will occur in each area (riparian/non-riparian) during scenario 5, but likely on different days. It is combined here as a worst case estimate.
3. This scenario contains no operations, so the only unpaved roads used are chemically stabilized, which do not require daily watering.
4. It is assumed that approximately 33% of the final cover will be placed in the riparian area and 67% in the non riparian area. However, excavation will be performed in Stockpile A, which is within the riparian area.

APPENDIX C

SOILTAC® PRODUCT INFORMATION

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Specializing in Soil Stabilization and Dust Control

Global Manufacturer & Distributor of
Soiltac® / Powdered Soiltac®
Durasoil® AND Gorilla-Snot®

SOILTAC®

Letter of Introduction

Soilworks®, LLC is the innovator and manufacturer of Soiltac® soil stabilizer and dust control agent. Soiltac® is an eco-safe, biodegradable, liquid copolymer used to stabilize and solidify any soil or aggregate as well as erosion control and dust suppression.

Soilworks'® recent advances in simulation, chemistry, processing techniques, and analytical instrumentation have allowed a whole host of new types of polymer particles and polymer nanotechnology applications to be realized. These advances led to the revolutionary development of nanotechnology into Soiltac's® superior performance.

Once applied to the soil or aggregate, the copolymer molecules coalesce forming bonds between the soil or aggregate particles. The key advantage of Soiltac® originates with its long, nanoparticle molecular structure that link and cross-link together. As the water dissipates from the soil or aggregate, a durable and water resistant matrix of flexible solid-mass is created. Once cured, Soiltac® becomes completely transparent, leaving the natural landscape to appear untouched.

Soiltac® results are based on the application rate used. Modest application rates are useful for dust suppression and erosion control by creating a three-dimensional cap or surface crust. Heavier rates can generate qualities similar to cement; useful for soil solidification and stabilization found in road building. By adjusting the application rate, Soiltac® can remain effective from weeks to several years. Most importantly, Soiltac® is a truly biodegradable product that is completely environmentally safe to use.

Soiltac® has been rigorously evaluated and its performance verified by the U.S. Army Engineering Research and Development Center (ERDC) against the industry's traditional top performing soil stabilizers and dust control agents. As a result, the Department of Defense continues to award Soilworks® with contracts to supply Operation Iraqi Freedom, Enduring Freedom and the on-going Iraq rebuilding efforts with Soiltac®. Its success with the U.S Military and Allied Forces has led to Soilworks® GSA contract (# GS-07F-5364P) and a complete listing of National Stock Numbers for the U.S. Department of Defense warehouses.

Soiltac's® advanced nanotechnology is modernizing the way we stabilize soils and aggregates in addition to controlling dust and erosion for a whole new generation. Soiltac® applications are extensive ranging from simple backyard trails and construction sites to heavy-lift military cargo runways and global transportation infrastructure.

Soilworks® is dedicated to economically solving soil stabilization challenges throughout the world's residential, commercial, industrial and military markets. For more information about Soiltac®, please visit us online at www.soilworks.com or call 1-800-545-5420.

Respectfully,

Chad Falkenberg
President

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Specializing in Soil Stabilization and Dust Control

SOILTAC®

Applications & Uses Examples


Unpaved Dirt Roads
Road *Dust Control*
Erosion Control
Road Stabilization


Construction Sites
Fugitive *Dust Control*
Erosion Control
Road Stabilization


Heavy Haul Roads
Road *Dust Control*
Erosion Control
Road Stabilization


Land Development
Fugitive *Dust Control*
Erosion Control
Silt Loading Control


Road Base & Sub-Base
Road Base Stabilization
Sub-Base Stabilization
Mud Suppression


Unpaved Driveways
Driveway *Dust Control*
Erosion Control
Soil Stabilization


Aircraft Runways
Runway *Dust Control*
FOD Control
Runway Stabilization


Helipads & FARPs
Helipad Dust Control
LZ FOD Control
Pad Stabilization


Airport Taxiways
Airfield Dust Control
Airport FOD Control
Soil Stabilization


Recycled Asphalt
Road Dust Control
Road Reclamation
Milling Stabilization


Forestry Roads
Road *Dust Control*
Erosion Control
Road Stabilization


Agricultural Roads
Road *Dust Control*
Erosion Control
Road Stabilization


Mine Tailings
Tailings Dust Control
Tailings Erosion Control
Tailings Reclamation


Storage & Stock Piles
Stock Pile Dust Control
Stock Pile Capping
Stock Pile Stabilization


Power Plants
Facility Dust Control
Stock Pile Capping
Road Dust Control


Border Patrol Roads
Road *Dust Control*
Erosion Control
Road Stabilization


Hydroseeding
Hydroseed Tackifier
Hydromulch Tackifier
Erosion Control


Construction Parking
Parking Lot Dust Control
Haul Road Dust Control
Parking Lot Solidification


Event Parking Lots
Parking Lot Dust Control
Event Dust Control
Parking Lot Stabilization


Road Shoulders
Shoulder Dust Control
Shoulder Erosion Control
Shoulder Stabilization


Slopes & Berms
Slope Erosion Control
Slope Stabilization
Silt Containment


Military Operations
Dust Suppression
Soil Solidification
Road Stabilization


Defense Compounds
Suppress Fugitive Dust
Soil Stabilization
Dust Prevention


Military Training Sites
FARP Dust Control
Road Dust Suppression
Land Target Coloration


Airport Infields
Infield Dust Retardant
Shoulder FOD Control
Infield Dust Stabilization

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SOILTAC®

Standard Application Coverage Rates

(Topical Only)	Undiluted Concentrate											Dilution		
	Standard					Metric								
	ft²/gal.	gal./ft²	yd²/gal.	gal./yd²	gal./acre	m²/gal	gal./m²	m²/L	L/m²	Parts Water	Traffic Area	gal./Acre	gal./SY	Life (months)
Water Retention Basin & Pond Lining	20	0.0500	2.2	0.450	2,178	1.9	0.538	0.5	2.04	2	No	6,534	1.35	12-24
Aircraft Runways (Heavy use)	35	0.0286	3.9	0.257	1,245	3.3	0.308	0.9	1.16	4	Yes	6,223	1.29	12-24
Aircraft Runways (single engine)	50	0.0200	5.6	0.180	871	4.6	0.215	1.2	0.81	6	Yes	6,098	1.26	12-24
Helicopter Landing Pads (Heavy Craft)	45	0.0222	5.0	0.200	968	4.2	0.239	1.1	0.91	5	Yes	5,808	1.20	12-24
Helicopter Landing Pads (Light Craft)	70	0.0143	7.8	0.129	622	6.5	0.154	1.7	0.58	8	Yes	5,601	1.16	12-24
Heavy Haul Roads & Mining Roads	60	0.0167	6.7	0.150	726	5.6	0.179	1.5	0.68	6	Yes	5,082	1.05	12-24
Military Convoy & Supply Roads	65	0.0154	7.2	0.138	670	6.0	0.166	1.6	0.63	6	Yes	4,691	0.97	12-24
Roads (High Traffic)	65	0.0154	7.2	0.138	670	6.0	0.166	1.6	0.63	6	Yes	4,691	0.97	12-24
Residential Driveways	65	0.0154	7.2	0.138	670	6.0	0.166	1.6	0.63	6	Yes	4,691	0.97	12-24
Parking Lots	65	0.0154	7.2	0.138	670	6.0	0.166	1.6	0.63	6	Yes	4,691	0.97	12-24
Roads (Light Traffic)	70	0.0143	7.8	0.129	622	6.5	0.154	1.7	0.58	7	Yes	4,978	1.03	12-24
Golf Course Bunker Liner	50	0.0200	5.6	0.180	871	4.6	0.215	1.2	0.81	5	Yes	5,227	1.08	12-24
Golf Course Cart Paths	80	0.0125	8.9	0.113	545	7.4	0.135	2.0	0.51	8	Yes	4,901	1.01	12-24
Walking Trails and Paths	100	0.0100	11.1	0.090	436	9.3	0.108	2.5	0.41	10	Yes	4,792	0.99	12-24
Road Sealer over Soiltac Stabilized Base	100	0.0100	11.1	0.090	436	9.3	0.108	2.5	0.41	4	Yes	2,178	0.45	12-24
BMX Tracks	120	0.0083	13.3	0.075	363	11.1	0.090	2.9	0.34	10	Yes	3,993	0.83	9-16
Temporary Parking Lots	120	0.0083	13.3	0.075	363	11.1	0.090	2.9	0.34	10	Yes	3,993	0.83	1-3
Temporary Roads & Detours	150	0.0067	16.7	0.060	290	13.9	0.072	3.7	0.27	13	Yes	4,066	0.84	1-3
Road Shoulders	160	0.0063	17.8	0.056	272	14.9	0.067	3.9	0.25	14	Yes	4,084	0.84	12-24
Slope Erosion Control (Steep Slope)	100	0.0100	11	0.090	436	9	0.108	2	0.41	5	No	2,614	0.54	12-24
Slope Erosion Control (Average Slope)	180	0.0056	20	0.050	242	17	0.060	4	0.23	10	No	2,662	0.55	12-24
Slope Erosion Control (Light Slope)	220	0.0045	24	0.041	198	20	0.049	5	0.19	12	No	2,574	0.53	12-24
Stock Pile Dust Capping (Steep Slope)	220	0.0045	24	0.041	198	20	0.049	5	0.19	9	No	1,980	0.41	12-24
Stock Pile Dust Capping (Average Slope)	270	0.0037	30	0.033	161	25	0.040	7	0.15	12	No	2,097	0.43	12-24
Stock Pile Dust Capping (Light Slope)	320	0.0031	36	0.028	136	30	0.034	8	0.13	14	No	2,042	0.42	12-24
Hazardous Material Capping & Sealing	160	0.0063	18	0.056	272	15	0.067	4	0.25	8	No	2,450	0.51	12-24
Landfill Capping & Reclamation	360	0.0028	40	0.025	121	33	0.030	9	0.11	10	No	1,331	0.28	12-24
Odor & Vapor Suppression	360	0.0028	40	0.025	121	33	0.030	9	0.11	20	No	2,541	0.53	12-24
Mine Tailings Capping & Reclamation	450	0.0022	50	0.020	97	42	0.024	11	0.09	12	No	1,258	0.26	12-24
Coal Rail Car Capping	1,000	0.0010	111	0.009	44	93	0.011	25	0.04	29	No	1,307	0.27	1+
Dust Control (30 Days)	1,250	0.0008	139	0.007	35	116	0.009	31	0.03	34	No	1,220	0.25	1+
Dust Control (90 days)	795	0.0013	88	0.011	55	74	0.014	20	0.05	21	No	1,205	0.25	3+
Dust Control (6 Months)	580	0.0017	64	0.016	75	54	0.019	14	0.07	15	No	1,202	0.25	6+
Dust Control (12 Months)	415	0.0024	46	0.022	105	39	0.026	10	0.10	11	No	1,260	0.26	12+
Dust Control (12-24 Months)	320	0.0031	36	0.028	136	30	0.034	8	0.13	8	No	1,225	0.25	12-24
Hydroseed & Hydromulch Tackifier	1,740	0.0006	193	0.005	25	162	0.006	43	0.02	40	No	1,026	0.21	3-6
(Mixed-in / Processed)														
Base Stabilization Light (4"-10cm deep)	45	0.0222	5.0	0.200	968	4.2	0.239	1.1	0.91	**				
Base Stabilization Average (4"-10cm deep)	35	0.0286	3.9	0.257	1,245	3.3	0.308	0.9	1.16					
Base Stabilization Heavy (4"-10cm deep)	25	0.0400	2.8	0.360	1,742	2.3	0.431	0.6	1.63					
Road Pot Hole Repair (4"-10cm deep)	25	0.0400	2.8	0.360	1,742	2.3	0.431	0.6	1.63					
Adobe Blocks & Earth Blocks (6"-15cm Tall)	35	0.0286	3.9	0.257	1,245	3.3	0.308	0.9	1.16					
Base Stabilization Light (6"-15cm deep)	35	0.0286	3.9	0.257	1,245	3.3	0.308	0.9	1.16					
Base Stabilization Average (6"-15cm deep)	25	0.0400	2.8	0.360	1,742	2.3	0.431	0.6	1.63					
Base Stabilization Heavy (6"-15cm deep)	15	0.0667	1.7	0.600	2,904	1.4	0.718	0.4	2.72					

**Dilution rates for mix-in/processed applications are based on the difference between optimum moisture and in-situ moisture levels. Please consult with your local Soiltac® representative to calculate recommended dilution rates for all mix-in applications.

Application coverage and dilution rates may vary depending on traffic volume, load bearing capacity, soil type, weather conditions, soil moisture levels and compaction. All Mixed-in/Processed applications require laboratory and on-site testing to determine optimal application and dilution rates.

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Unique Product Advantages

	Dries Flexible
	Biodegradable
	Simple and Easy to Apply
	Dries Transparent / Clear
	Dries Completely Odorless
	Non-Flammable & Non-Volatile
	Non-Hazardous
	Non-Corrosive & Safe for All Equipment
	Non-Slippery & Safe to Walk and Drive on
	Non-Regulated for Transportation (land/Ocean/Air)
	Ecologically & Environmentally Safe
	Cumulative Effect with Maintenance
	Dyes & Pigments can be Added for Color
	Human, Animal, Marine Life and Vegetation Safe
	Water Resistant (will not break down with water)
	Non-Tracking & Non-Transferable (will not be picked up onto vehicles)
	Non-Leaching (will not continue to seep into the soil)
	Ultraviolet Ray Resistant (will not break down in sunlight)
	Non-Dissipating (will not wash away with water once cured)
	Alkaline Soil Resistant (will not break down in alkaline soils)
	Self Mixes with Water for Diluting (prior to applying to the soil)
	PM_{10} & $PM_{2.5}$ Compliant (stops hazardous dust particles of 2.5+ microns in size)

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SOILTAC®

Frequently Asked Questions

Prices	Current Soiltac® pricing is based on volume and is available upon request.
GSA Schedule	Soiltac® is available for wholesale through our Federal GSA contract (#GS07F5364P).
Payment Terms	Prepaid or Net 30 Days upon approved credit.
Payment Method	Cash, Check, Visa, MSTC, AMEX, Letter of Credit, Govt. Cards & Wire Transfer.
Bids / Proposals	Formal bids and proposals are available upon request.
Minimum Order	5 gallons square poly pail (one liter test samples are available).
Availability	40,000+ gallons (150,000 liters) are stocked and available on an immediate basis.
Turn-Around	Same day or next day shipments (< 24 hrs) upon order.
Large Volumes	3-14 day turn-around for single order shipments of 100,000+ gallons (400,000+ liters).
Production Limits	None. Soiltac® can be manufactured rapidly in unlimited volumes worldwide.
Prime Material	Unlike traditional stabilizers, Soiltac® is a “Prime” material, not blended or recycled.
By-Products	Unlike traditional stabilizers, Soiltac® is not an ultra-filtrate, by-product or off-grade.
Curing	Unlike cement, Soiltac® does not cure chemically, it cures as the water evaporates.
Cure Time	Topically, 24 hours (@70°F/21°C) is normal. Temperature is the primary factor.
Penetration Depth	1/8th”to 2” deep for topical applications. Soil type & compaction are the primary factors.
Cold Weather	Will significantly increase cure time. The lower the temperature the longer the cure time.
Freezing	Do not freeze uncured Soiltac®. Cured Soiltac is unaffected by freezing temperatures
Shipping	National & International. Non-Hazardous and Non-Regulated. Worldwide production.
Guarantee	Soilworks® guarantees that each batch of Soiltac® meets the stated specifications
Normal Life Span	Indefinitely with maintenance. Topically, 12-24 months prior to first maintenance coat.
Shelf Life	12 Months. If stored for longer than 12 months, agitation may be required.
Maintenance	Approximately 30% the original volume used after the first 12-24 months. Cumulative.
Soil Type	Any. Best with non-plastic materials with a well graded grain size distribution and fines.
Rain / Precipitation	Once cured, Soiltac® is no longer water soluble and will not dissipate or wash away.
Uncured Cleaning	Rinse equipment immediately. Simply use water to rinse out any uncured Soiltac®.
Cured Cleaning	Difficult to remove. Use hot water pressure washer with scrub brush and solvents.
Gray Water Dilution	Soiltac® can be diluted with almost any water including grey water.
Sea Water Dilution	Soiltac® can be diluted with sea salt water. Do not store sea salt water dilution over 8hrs.
Performance Factors	Application rate, soil type, dilution, compaction, traffic, penetration, climate & others
Harmonized Code	The International Tariff Code for Soiltac® is 3905.21.00.00.

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SOILTAC®

Standard Container & Shipping Options

Image	Description	Maximum Volume	Dimensions (LxWxH)	Weight (gross)
	Sample Bottle	¼ gallon 1 liter	4”x4”x12” 10x10x31cm	3 lbs 1.3 kg
	Square Poly Pail	5 gallons 19 liters	11”x11”x14” 28x28x36cm	50 lbs 22.7 kg
	Poly Drum **NSN: 6850-01-519-4706**	55 gallons 208 liters	24”x24”x36” 61x61x91cm	540 lbs 245 kg
	**Standard** IBC Tote (Steel Cage & Poly) **NSN: 6850-01-519-4708**	275 gallons 1,041 liters	40”x48”x46” 101x121x117cm	2,600 lbs 1,180 kg
	Bulk Tanker *(U.S. Only)*	5,000 gallons 18,927 liters	Variable	45,000 lbs 20,412 kg
	53’ Box Van with 80 **Poly Drums**	4,400 gallons 16,656 liters	Variable	44,400 lbs 20,140 kg
	53’ Box Van with 17 **Standard IBC Totes**	4,675 gallons 17,697 liters	Variable	44,200 lbs 20,049 kg
	48’ Flatbed with 84 **Poly Drums** 21 **Pallets**	4,620 gallons 17,488 liters	Variable	46,620 lbs 21,146 kg
	48’ Flatbed with 18 **Standard IBC Totes**	4,950 gallons 18,737 liters	Variable	46,800 lbs 21,228 kg
	20’ Ocean Container with 40 **Poly Drums**	2,200 gallons 8,328 liters	Variable	22,200 lbs 10,070 kg
	20’ Ocean Container with 14 **Standard IBC Totes**	3,850 gallons 14,573 liters	Variable	35,000 lbs 15,875 kg

SOILTAC®

Product Selection Guide Chart

Project Requirements					Soilworks® Complete Product Line Recommendations: Soiltac®	Powdered Soiltac®	Gorilla-Snot®	Durasoil®
Dust Control	Non-Traffic	Non-Water Resistant / Solidification			YES	YES	YES	NO
		Water Resistant / Solidification	Short Term		YES	YES	**Best**	NO
			Short & Long Term		**Best**	**Best**	NO	NO
	Vehicle / Aircraft / Foot Traffic Areas	Tracked Vehicles, Skid Steers or Forklifts (**No Solidification**)			**NO**	NO	NO	**Best**
		Equestrian / Livestock / Animals (**No Solidification**)			**NO**	NO	NO	**Best**
		Rubber Tire / Foot Traffic Only	Uncompacted or Loose Soil / Aggregate / Gravel (**No Solidification**)		**NO**	NO	NO	**Best**
			95% Compacted & No Loose Gravel / Aggregate (Solidification)	Non-Water Resistant	YES	YES	YES	NO
				Water Resistant – Short Term	YES	YES	**Best**	NO
				Water Resistant – Short & Long Term	**Best**	**Best**	NO	NO
Soil Stabilization	Water Resistant				**Best**	**Best**	NO	NO
	Non-Water Resistant				YES	YES	YES	NO
Erosion Control	Water Resistant	Short Term			YES	YES	**Best**	NO
		Short & Long Term			**Best**	**Best**	NO	NO
	Non-Water Resistant				YES	YES	YES	NO

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Application Equipment Examples

Highway Accessible
Water Trucks

All Wheel Drive
Water Trucks

Water Wagons
"Water Pulls"

Mining Water Trucks
"Mining Pigs"

Heavy Expanded Mobility
Tactical Truck Tankers

Flat Bed Trucks with
Tanks & Pumps

In-situ road reclaimers
In-situ soil stabilizers

Computerized Rate
Control Distributor Trucks

Truck Mounted
Hydroseeders

Trailer Mounted
Hydroseeders

Agricultural Tractors with
Towable Spray Bars

Agricultural Tractors with
Towable Spray Booms

Water Trucks with
Gravity Feed Spray Bars

Single Axle
Water Trucks

Military “DAV”
(Dust Abatement Vehicle)

Pick-up Trucks with
IBC Tote & Pumps

Towable Spray Tanks
"Water Buffalo"

Truckbed Water Tanks
"Skid Sprayers"

Standard Hose & Pump
Hand Spraying

Airplane Sprayers
"Crop Duster"

Helicopters
"Water Drop"

ATV Towable Tank
Sprayers

ATV Mounted
Tank Sprayers

Watering Cans

Anything capable of spraying water can be used to apply Soiltac®.

SOILTAC®
Price Schedule

 **Pail**	 **Drum**	 **IBC Tote**	 **Tanker / Bulk*** U.S. Only
5 gallons 19 liters	**55 gallons 208 liters**	**275 gallons 1,041 liters**	Up to **5,000 gallons 18,927 liters**

Please contact us or your local distributor today
for our current price schedule.

1-800-545-5420 U.S. Toll Free
001-480-545-5454 International
info@soilworks.com

SOILTAC®

Topical Traffic & Non-Traffic Application Overview
(for 1-Liter Sample Bottle Test Plot)

1.) Prepare the Site:

Dry Soil: The test plot should be completely dry and free from water.
Weather: The test plot must be free from rain for a minimum of 72 hours after the application. Temperature must be at least 40°F (4°C).
Compaction: Compact the test plot to a minimum of 95%. *(Optional for No-Traffic test plot)*
Drainage: Contour and crown the test plot to provide for proper drainage.
Loose Aggregate: Remove any loose aggregate, soil or debris from the test plot. *(Optional for No-Traffic)*
Pre-Wetting *(Optional)*: Optimally, pre-wet the test plot with water (only) at a rate of 100 ft²/gal. (2 m²/L) to break the surface tension and increase penetration depth.

Non-Traffic Test Plot Specifications – Based on "Dust Control (12-24 month)" rate of 320 ft²/gal. (8 m²/L)
Test Plot Size = 85 ft² (8 m²) = 110"x110" (280cm x 280cm)
Optional Water Only Pre-Wet = 0.85 gallons or 14 cups (4 liters)
Water to Soiltac® Ratio = 14 Parts Water = 3.7 gallons or 60 cups (14 liters)
Total Soiltac® Dilution = 4 gallons or 64 cups (15 liters)
Traffic Area Test Plot Specifications – Based on "Roads (high traffic)" rate of 65 ft²/gal. (1.6 m²/L)
Test Plot Size = 17 ft² (1.6 m²) = 50"x50" (130cm x 130cm)
Optional Water Only Pre-Wet = 0.17 gallons or 3 cups (0.65 liters)
Water to Soiltac® Ratio = 6 Parts Water = 1.6 gallons or 26 cups (6 liters)
Total Soiltac® Dilution = 1.85 gallons or 30 cups (7 liters)

2.) Prepare the Soiltac® Dilution:

Water: Fill the application equipment with the recommended volume of water (see above).
Soiltac®: Fill the application equipment with the recommended volume of Soiltac® concentrate (see above).

3.) Apply the Soiltac® Dilution

Multiple Coats: Apply the Soiltac® dilution in (1-2 coats for non-traffic) or (4-5 coats for traffic) onto the test plot.
Drying: Each successive coat of Soiltac® dilution should be applied in a timely manner to ensure that the surface always stays wet with the Soiltac® dilution. DO NOT allow the Soiltac® dilution to dry between the application coats. Failure to do so will result in an underperforming "skin" layer rather than a penetrating layer.

4.) Clean the Application Equipment

Rinse: Rinse off the application equipment thoroughly with water until clean.

5.) Finish - Allow Site to Dry/Cure

Curing: Allow the test plot to dry and cure for a minimum of 24 hours (@70°F/21°C).
Non-Traffic Test Area: Prevent any human activity over the test plot .
Traffic Test Area: Prevent any human activity over the test plot until it has completely cured.

(1 Liter = 0.26 gallons = 4.2 cups)

SOILTAC®

Topical Traffic Area Application Overview

1.) Prepare the Site:

Dry Soil: The site should be completely dry and free from water.
Weather: The site must be free from rain for a minimum of 72 hours after the application.
Temperature must be at least 40°F (4°C).
Compaction: Compact the site to a minimum of 95%.
(per ASTM D 698 D 1557 modified Proctor Density).
Drainage: Contour and crown the site to provide for proper drainage.
Loose Aggregate: Remove any loose aggregate, soil or debris from the treatment area.

2.) Prepare Application Equipment

Spray Nozzles: Set spray nozzles to the desired width, height and output rate.
Test equipment (off-site) if necessary.
Coverage: The spray nozzles should provide an even coat over the treatment area with each pass.
Spray Rate: Set the spray rate high enough to allow even coverage with multiple coats and low enough to prevent material from draining away from the treatment area.
Pre-Wetting (Optional): Optimally, pre-wet the treatment area with water (only) to break the surface tension and increase penetration depth. Pre-wet at a rate of 100 SF/gallon (2.5m²/liter) of water.
Release Agent (Optional): Optionally, a form release agent (like Durasoil®) can be sprayed onto the equipment to prevent Soiltac® overspray from adhering onto the outside of the equipment

3.) Prepare the Soiltac® Dilution:

Water: Fill the application equipment with the recommended volume of water.
Reference the "application coverage rates" chart.

Example: Roads (Light Traffic) = 70 ft²/gallons (1.7m²/liter) +7 parts water.
Equipment: 4,000 gallon (15,142 liters) water truck
Calculation: 7+1 = 8 parts dilution total.
4,000 gallons / 8 parts = 500 gallons (1,893 liters) per part
Volume of Water: 500 gallons X 7 parts = 3,500 gallons (13,249 liters) of water
Volume of Soiltac®: 500 gallons X 1 part = 500 gallons (1,893 liters) of Soiltac® concentrate
Volume of Dilution: 500 gallons X 8 parts = 4,000 gallons (15,142 liters) of Soiltac® dilution

Soiltac®: Fill the application equipment with the recommended volume of Soiltac® concentrate.
Foaming: To prevent foaming, add the Soiltac® concentrate last, directly into the water.

4.) Apply the Soiltac® Dilution

Multiple Coats: Apply the Soiltac® dilution in coats over the treatment area.

Example: (See Above) Roads (Light Traffic) typically require a minimum of 4 even coats.
500 gallons / 4 coats = 125 gallons (473 liters) (Soiltac® concentrate) per coat.
4,000 gallons / 4 coats = 1,000 gallons (3,785 liters) (Soiltac® dilution) per coat.
500 gallons (Soiltac® concentrate) X 70 ft²/gal. = 35,000 ft² (3,252 m²) treatment per water truck

Drying: Each successive coat of Soiltac® dilution should be applied in a timely manner to ensure that the surface always stays wet with the Soiltac® dilution. DO NOT allow the Soiltac® dilution to dry between the application coats. Failure to do so will result in an underperforming "skin" layer rather than a penetrating layer.

5.) Clean the Application Equipment

Rinse: Rinse off all application equipment thoroughly with water until clean. If Soiltac® is allowed to dry and cure use a hot pressure washer or steam cleaner and brush to remove residue.
Traffic: Prevent any human activity over the treated area until the site has completely cured.
Curing: Allow the treated area to dry and cure for approximately 24 hours (@70°F/21°C).

SOILTAC®

Topical Non-Traffic & Slope Area Application Overview

1.) Prepare the Site:

Dry Soil: The site should be completely dry free from water.

Weather: The site must be free from rain for a minimum of 72 hours after the application. Temperature must be at least 40°F (4°C).

Compaction (Optional): Compaction is not required but is recommended for optimal longevity. A minimum of 95% density is recommended (per ASTM D 698 D 1557 modified Proctor Density).

Drainage: Optimally, contour the site to provide for proper drainage to prevent channeled water flow.

2.) Prepare Application Equipment

Spray Nozzles: Set spray nozzles to the desired width, height and output rate.
Test equipment (off-site) if necessary.

Coverage: The spray nozzles should provide an even coat over the treatment area with each pass.

Spray Rate: Set the spray rate high enough to allow even coverage with multiple coats and low enough to prevent material from draining away from the treatment area.

Pre-Wetting (Optional): Optimally, pre-wet the treatment area with water (only) to break the surface tension and increase penetration depth. Pre-wet at a rate of 100 SF/gallon (2.5m²/liter) of water.

Release Agent (Optional): Optionally, a form release agent (like Durasoil®) can be sprayed onto the equipment to prevent Soiltac® overspray from adhering onto the outside of the equipment

3.) Prepare the Soiltac® Dilution:

Water: Fill the application equipment with the recommended volume of water.
Reference the "application coverage rates" chart.

Example: 6 Month Dust Control (no traffic)=75 gal./acre=580 ft²/gal.)(2.5m²/liter) + 15 parts water
Equipment: 4,000 gallon (15,142 liters) water truck
Calculation: 15+1 = 16 parts dilution total.
4,000 gallons / 16 parts = 250 gallons (946 liters) per part
Volume of Water: 250 gallons X 15 parts = 3,750 gallons (14,195 liters) of water
Volume of Soiltac®: 250 gallons X 1 part = 250 gallons (946 liters) of Soiltac® concentrate
Volume of Dilution: 250 gallons X 16 parts = 4,000 gallons (15,142 liters) of Soiltac® dilution

Soiltac: Fill the application equipment with the recommended volume of Soiltac® concentrate.

Foaming: To prevent foaming, add the Soiltac® concentrate last, directly into the water.

4.) Apply the Soiltac® Dilution

Multiple Coats: Apply the Soiltac® dilution in coats over the treatment area. On slopes, the steeper the slope, the need for more coats (to prevent run-off and increase penetration depth).

Example: (See Above) 6 Month Dust Control Rate (no traffic) typically requires 1-2 Coats
250 gallons / 2 coats = 125 gallons (473 liters) (Soiltac® concentrate) per coat.
4,000 gallons / 2 coats = 2,000 gallons (7,571 liters) (Soiltac® dilution) per coat.
250 gallons (Soiltac® concentrate) / 75 gal./acre = 3⅓ acre (13,489 m²) treatment per water truck

Drying: On slopes, each successive coat of Soiltac® dilution should be applied in a timely manor to ensure that the surface always stays wet with the Soiltac® dilution. On slopes, DO NOT allow the Soiltac® dilution to dry in between the application coats. Failure to do so will result in an underperforming "skin" layer rather than a penetrating layer.

5.) Clean the Application Equipment

Rinse: Rinse off all application equipment thoroughly with water until clean. If Soiltac® is allowed to dry and cure, use a pressure washer or steam cleaner and a brush to remove residue.

Traffic: Prevent any human activity over the treated area.

Curing: Allow the treated area to dry and cure for approximately 24 hours (@70°F/21°C).

SOILTAC®

Mixed-In (2-6"↔5-15cm Deep) Soil Stabilization Application Overview

1.) Prepare the Site:

Dry Soil: The site and must be below the optimum moisture level (minimally low enough to reach optimum with the addition of Soiltac® at a 1:1 water ratio).
Weather: The site must be free from rain for a minimum of 72 hours after the application. Temperature must be at least 40°F (4°C).

1.) Scarification:

Scarification: Scarify or till the soil completely (without clods) to the recommended depth.
Large Aggregate: Remove any large aggregate (4"+/10cm+) that could effect the final compaction.

2.) Prepare Application Equipment

Spray Nozzles: Set spray nozzles to the desired width, height and output rate. Test equipment (off-site) if necessary.
Coverage: The spray nozzles should provide an even coat over the treatment area with each pass.
Spray Rate: Set the spray rate high enough to allow even coverage with multiple coats and low enough to prevent material from draining away from the treatment area.
Release Agent (Optional): Optionally, a form release agent (like Durasoil®) can be sprayed onto the equipment to prevent Soiltac® overspray from adhering onto the outside of the equipment

3.) Prepare the Soiltac® Dilution:

Water: Fill the application equipment with the recommended volume of water.
Dilution Calculation: The amount of water required to achieve optimum moisture must be field determined by comparing the in place moisture content to the optimum moisture content (determined by a laboratory proctor test ASTM D2216-92). The in place moisture content can be determined by the average of four in place readings with a nuclear density gauge. Testing the native soil for optimum moisture levels **is required** to determine the exact parts of water to use for diluting Soiltac® properly. *Not enough water will generate dry spots / too much water will create mud or "pumping. Optimum moisture is critical when compacting for maximum compressive strength.*

> **Example**: Base Stabilization Average (6"/15cm deep) rate (25 ft²/gal.)(1.63L/m²),
> 4,000 gallon (15,142 liter) water truck, 4 parts water (laboratory & field calculated) dilution rate
> **Calculation**: 3+1 = 4 parts dilution total.
> 4,000 gallons / 4 parts = 1,000 gallons (3,785 liters) per part
> Volume of Water: 1,000 gal. X 3 parts = 3,000 gallons (11,356 liters) of water
> Volume of Soiltac: 1,000 gal. X 1 part = 1,000 gallons (3,785 liters) of Soiltac® concentrate
> Volume of Dilution: 1,000 gal. X 4 parts = 4,000 gallons (15,142 liters) of Soiltac® dilution

Soiltac: Fill the application equipment with the recommended volume of Soiltac® concentrate.
Foaming: To prevent foaming, add the Soiltac® concentrate last, directly into the water.

4.) Apply and Process the Soiltac® Dilution

Application: Apply the Soiltac® dilution evenly over the scarified treatment area.

> **Example**: (See Above) Base Stabilization Average (6"/15cm deep) rate (25 ft²/gal.) (1.63L/m²),
> 1,000 gallons (Soiltac® concentrate) X 25 ft²/gal.= 25,000 ft² (2,323 m²) treatment per water truck

Processing: Till, disc or manipulate the treated soil until the dilution is uniformly distributed into the soil.
Grading: Contour, shape and crown the site to provide for proper drainage.
Compaction: Compact the site to a minimum of 95% (per ASTM D 698 D 1557 modified Proctor Density). Optimally, use a pneumatic compactor for initial compaction to prevent soil adhering to the drum and finishing with a vibratory smooth steel drum compactor.

5.) Clean the Application Equipment

Rinse: Rinse off all application equipment thoroughly with water until clean. If Soiltac® is allowed to dry and cure use a hot pressure washer or steam cleaner and brush to remove residue.
Traffic: Prevent any human activity over the treated area until the site has completely cured.
Curing: Allow the treated area to dry and cure for approximately 24 hours (@70°F/21°C).
Topical Wear Coarse: If the mix-in/processed area is not going be covered with an alternate topical wear coarse (example: asphalt, concrete, chip-seal, etc.), then a topical application of Soiltac® must be applied as a topical road sealer and surface wear coarse (see our "Standard Application Coverage Rates" for details).

SOILTAC®

Topical Water Retention Basin & Pond Lining Application Overview

1.) Prepare the Site:

Dry Soil: The site should be completely dry and free from water.
Weather: The site must be free from rain for a minimum of 72 hours after the application.
Temperature must be at least 40°F (4°C).
Compaction: Compact the site to a minimum of 95%.
(per ASTM D 698 D 1557 modified Proctor Density).
Loose Aggregate: Remove any loose aggregate, soil or debris from the treatment area.

2.) Prepare Application Equipment

Spray Nozzles: Set spray nozzles to the desired width, height and output rate.
Test equipment (off-site) if necessary.
Coverage: The spray nozzles should provide an even coat over the treatment area with each pass.
Spray Rate: Set the spray rate high enough to allow even coverage with multiple coats and low enough to prevent material from draining away from the treatment area.
Release Agent (Optional): Optionally, a form release agent (like Durasoil®) can be sprayed onto the equipment to prevent Soiltac® overspray from adhering onto the outside of the equipment

3.) Prepare the Soiltac® Dilution:

Water: Fill the application equipment with the recommended volume of water.
Reference the "application coverage rates" chart.

Example: Water Retention Basin & Pond Lining = 20 ft²/gallons (0.5m²/liter) +2 parts water.
Equipment: 4,000 gallon (15,142 liters) water truck
Calculation: 2+1 = 3 parts dilution total.
4,000 gallons / 3 parts = 1,333 gallons (5,050 liters) per part
Volume of Water: 1,333 gallons X 2 parts = 2,670 gallons (10,100 liters) of water
Volume of Soiltac®: 1,333 gallons X 1 part = 1,333 gallons (5,050 liters) of Soiltac® concentrate
Volume of Dilution: 1,333 gallons X 3 parts = 4,000 gallons (15,142 liters) of Soiltac® dilution

Soiltac®: Fill the application equipment with the recommended volume of Soiltac® concentrate.
Foaming: To prevent foaming, add the Soiltac® concentrate last, directly into the water.

4.) Apply the Soiltac® Dilution

Multiple Coats: Apply the Soiltac® dilution in coats over the treatment area.

Example: (See Above) Water Retention & Pond Lining typically require a minimum of 6 coats.
1,333 gallons / 6 coats = 222 gallons (840 liters) (Soiltac® concentrate) per coat.
4,000 gallons / 6 coats = 667 gallons (2,520 liters) (Soiltac® dilution) per coat.
1,333 gallons (Soiltac® concentrate) X 20 ft²/gal. = 26,667 ft² (2,480 m²) treatment per water truck

Drying: Each successive coat of Soiltac® dilution should be applied in a timely manner to ensure that the surface always stays wet with the Soiltac® dilution. DO NOT allow the Soiltac® dilution to dry between the application coats. Failure to do so will result in an underperforming "skin" layer rather than a penetrating layer.

5.) Clean the Application Equipment

Rinse: Rinse off all application equipment thoroughly with water until clean. If Soiltac® is allowed to dry and cure use a hot pressure washer or steam cleaner and brush to remove residue.
Traffic: Prevent any human activity over the treated area.
Curing: Allow the treated area to dry and cure for approximately 24 hours (@70°F/21°C).

SOILTAC®

Topical Golf Course Bunker Stabilization Application Overview

1.) Prepare the Site:

Dry Soil: The site should be completely dry and free from water.
Weather: The site must be free from rain for a minimum of 72 hours after the application.
Temperature must be at least 40°F (4°C).
Compaction: Compact the site to a minimum of 95%.
(per ASTM D 698 D 1557 modified Proctor Density).
Drainage: Contour the site and drainage channels to provide for proper drainage. For optimal results, steep slopes must be aerated (with a pitchfork or similar) to maximize penetration depth and serve as stabilization anchor points.
Loose Aggregate: Remove any loose aggregate, soil or debris from the treatment area.

2.) Prepare Application Equipment

Spray Nozzles: Set spray nozzles to the desired width, height and output rate.
Test equipment (off-site) if necessary.
Coverage: The spray nozzles should provide an even coat over the treatment area with each pass.
Spray Rate: Set the spray rate high enough to allow even coverage with multiple coats and low enough to prevent material from draining away from the treatment area.
Pre-Wetting (Optional): Optimally, pre-wet the treatment area with water (only) to break the surface tension and increase penetration depth. Pre-wet at a rate of 100 SF/gallon (2.5m²/liter) of water.
Release Agent (Optional): Optionally, a form release agent (like Durasoil®) can be sprayed onto the equipment to prevent Soiltac® overspray from adhering onto the outside of the equipment

3.) Prepare the Soiltac® Dilution:

Water: Fill the application equipment with the recommended volume of water.
Reference the "application coverage rates" chart.

> **Example**: Golf Course Bunker Liner = 50 ft²/gallons (1.2m²/liter) +5 parts water.
> **Equipment:** 4,000 gallon (15,142 liters) water truck
> **Calculation**: 5+1 = 6 parts dilution total.
> 4,000 gallons / 6 parts = 667 gallons (2,520 liters) per part
> Volume of Water: 667 gallons X 5 parts = 3,333 gallons (12,620 liters) of water
> Volume of Soiltac®: 667 gallons X 1 part = 667 gallons (2,520 liters) of Soiltac® concentrate
> Volume of Dilution: 667 gallons X 6 parts = 4,000 gallons (15,142 liters) of Soiltac® dilution

Soiltac®: Fill the application equipment with the recommended volume of Soiltac® concentrate.
Foaming: To prevent foaming, add the Soiltac® concentrate last, directly into the water.

4.) Apply the Soiltac® Dilution

Multiple Coats: Apply the Soiltac® dilution in coats over the treatment area.

> **Example**: (See Above) Golf Corse Bunker typically require a minimum of 3 even coats.
> 667 gallons / 3 coats = 222 gallons (840 liters) (Soiltac® concentrate) per coat.
> 4,000 gallons / 4 coats = 1,000 gallons (3,785 liters) (Soiltac® dilution) per coat.
> 667 gallons (Soiltac® concentrate) X 50 ft²/gal. = 33,333 ft² (3,100 m²) treatment per water truck

Drying: Each successive coat of Soiltac® dilution should be applied in a timely manner to ensure that the surface always stays wet with the Soiltac® dilution. DO NOT allow the Soiltac® dilution to dry between the application coats. Failure to do so will result in an underperforming "skin" layer rather than a penetrating layer.
Drainage Systems: For optimal results, Soiltac® must be applied prior to installing a drainage system to completely seal the bunker (and seal the drainage channels). If the bunker has an existing drainage system, DO NOT apply Soiltac® over the existing drainage areas or allow any Soiltac® to run-off into the drainage areas.

5.) Clean the Application Equipment

Rinse: Rinse off all application equipment thoroughly with water until clean. If Soiltac® is allowed to dry and cure use a hot pressure washer or steam cleaner and brush to remove residue.
Traffic: Prevent any human activity over the treated area until backfilled and covered with sand.
Curing: Allow the treated area to dry and cure for approximately 24 hours (@70°F/21°C).

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www.Soilworks.com Info@Soilworks.com
Specializing in Soil Stabilization and Dust Control

MATERIAL SAFETY DATA SHEET

SECTION 1 - MATERIAL IDENTIFICATION

PRODUCT NAME	**SOILTAC*** *SOILTAC is a registered trademark of Soilworks, LLC.
MANUFACTURER	Soilworks, LLC. 681 North Monterey Street Gilbert, Arizona 85233-8318 USA www.soilworks.com
TELEPHONE NUMBER	800-545-5420
ONLINE INFORMATION	www.Soiltac.com
EMERGENCY TELEPHONE NUMBERS	800-545-5420 (National & International)
REVISION DATE	November 2006 *(supersedes March 2006)*
PHYSICAL FORM	Mobile liquid
COLOR	Milky White (transparent once cured)
ODOR	Mild / Slight (no odor once cured)
C.A.S. CHEMICAL NAME	Mixture
SYNONYMS	Soil stabilizer, soil stabilization agent, soil solidifier, soil amendment, soil additive, soil crusting agent, dust control agent, dust inhibitor, dust palliative, dust suppressant, dust retardant
CHEMICAL FAMILY	Vinyl Copolymer Emulsion
EMPIRICAL FORMULA	Mixture
INTENDED USE	Soil stabilization, soil solidification, fugitive dust control, dust suppression, dust abatement, tackifier, dust abatement, PM_{10} and $PM_{2.5}$ air quality control and erosion control

SECTION 2 - INGREDIENTS

	%	CAS Number	Chemical Name
1.	50-60	Proprietary	Vinyl Copolymer
2.	40-60	7732-18-5	Water

SECTION 3 - HEALTH HAZARDS

ROUTES OF ENTRY

Eye Contact, Skin Contact, Ingestion and Inhalation

SIGNS AND SYMPTOMS OF ACUTE EXPOSURE

Eyes: Direct contact with this material may cause eye irritation including lachrymation (tearing).
Inhalation: Inhalation of vapor or aerosol may cause irritation to the respiratory tract (nose, throat, and lungs).
Skin: Contact may cause skin irritation.
Ingestion: No hazard in normal industrial use.

SIGNS AND SYMPTOMS OF CHRONIC EXPOSURE

Prolonged or repeated contact with skin may cause irritation and dermatitis (inflammation).

CARCINOGENICITY

This material **does not** contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 4 - FIRST AID

EYE CONTACT

Flush eyes with clean water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT

Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if irritation develops or persists.

INHALATION

Move patient to fresh air. If breathing has stopped or is labored give assisted respiration (e.g. mouth-to-mouth). Supplemental oxygen may be indicated. Seek medical advice.

INGESTION

Give the victim one or two glasses of water or milk to drink. Get immediate medical attention. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE AND EXPLOSION DATA

FLASH POINT (closed cup)	Not applicable
UPPER EXPLOSION LIMIT (UEL)	Not applicable
LOWER EXPLOSION LIMIT (LEL)	Not applicable
AUTOIGNITION TEMPERATURE	Not applicable
FIRE HAZARD CLASSIFICATION (OSHA/NFPA)	Non-Combustible

EXTINGUISHING MEDIA

Product does not burn. The product will only burn after the water it contains is driven off. For dry polymer use carbon dioxide, foam, dry chemical or water fog to extinguish fire. Aqueous solution **is not flammable**.

FIRE FIGHTING EQUIPMENT

Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective clothing. Thoroughly decontaminate all protective equipment after use.

FIRE FIGHTING INSTRUCTIONS

Containers of this material may build up pressure if exposed to heat (fire). Use water spray to cool fire-exposed containers.

FIRE AND EXPLOSION HAZARDS

This material **will not burn** unless it is evaporated to dryness. Closed containers may rupture when exposed to extreme heat.

HAZARDOUS COMBUSTION PRODUCTS

When dried polymer burns, water (H_2O), carbon dioxide (CO_2), carbon monoxide (CO) and smoke are produced.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

CONTAINMENT TECHNIQUES (Removal of ignition sources, diking etc)

Stop the leak, if possible. Ventilate the space involved.

CLEAN-UP PROCEDURES

Wear suitable protective equipment. If recovery is not feasible, admix with dry soil, sand or non-reactive absorbent and place in an appropriate chemical waste container. Prevent spilled material from entering sanitary sewers, storm sewers, drainage systems and from entering bodies of water or ditches that lead to waterways. Transfer to containers by suction, preparatory for later disposal. Place in metal containers for recovery or disposal. Flush area with water spray. Wash contaminated property (e.g., automobiles) quickly before the material dries. For large spills, recover spilled material with a vacuum truck.

OTHER EMERGENCY ADVICE

Spilled polymer emulsion is very slippery. Use care to avoid falls. A film will form on drying. Remove saturated clothing and wash contacted skin area with soap and water. Product imparts a milky white color to contaminated waters. Foaming may result. Sewage treatment plants may not be able to remove the white color imparted to the water.

SECTION 7 - HANDLING AND STORAGE

STORAGE

Keep from freezing. Store in a dry area. Keep containers closed when not in use to minimize contact with atmospheric air and prevent inoculation with microorganisms.

HANDLING

Use only in well-ventilated areas. Avoid contact with eyes. Avoid breathing vapors. Avoid prolonged or repeated contact with skin. Wash hands thoroughly after handling and before eating or drinking.

SECTION 8 - PERSONAL PROTECTION / EXPOSURE CONTROLS

EXPOSURE GUIDELINES

There are no Occupational Safety and Health (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) or Short Term Exposure Limits (STEL) established for the component(s) of this product.

EYE PROTECTION

Chemical safety glasses.

HAND PROTECTION

Rubber Gloves. The breakthrough time of the selected glove(s) must be greater than the intended use period.

RESPIRATORY PROTECTION

Not required under normal use.

PROTECTIVE CLOTHING

No specific recommendation.

ENGINEERING CONTROLS

Good general ventilation should be sufficient to control airborne levels of irritating vapors.

SECTION 9 - TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM	liquid
COLOR	Milky White (transparent once cured)
ODOR	Mild / Slight (no odor once cured)
pH	4.5-6.0
EVAPORATION RATE	< 1 (BuAc=1)
VAPOR DENSITY	> 1 (Air = 1)
BOILING POINT	>100.00°C (>212.00°F)
FREEZING POINT	<0°C (<32°F)
SOLUBILITY IN WATER	Completely (100%) (until cured)
SPECIFIC GRAVITY (Water = 1)	1.05-1.10

SECTION 10 - STABILITY AND REACTIVITY

STABILITY

Stable at ambient temperatures. Coagulation may occur following freezing, thawing or boiling.

INCOMPATIBILITY (Materials to Avoid)

No incompatibilities have been identified.

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition may form: Acetic acid and Acrolein. Thermal decomposition may produce various hydrocarbons and irritating, acrid vapors.

HAZARDOUS POLYMERIZATION

Will not occur

CONDITIONS TO AVOID

Freezing temperatures (until cured).

SECTION 11 - TOXICOLOGICAL PROPERTIES

ACUTE EYE TOXICITY

No Information is available.

ACUTE ORAL TOXICITY

No Information is available.

ACUTE SKIN TOXICITY

No Information is available.

ACUTE INHALATION TOXICITY

No Information is available.

CHRONIC/CARCINOGENICY

This material **does not** contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 12 - ECOLOGICAL INFORMATION

ECOTOXICITY

Common Name	Species	Test	Result	Concentration
Green Algae	Raphidocelus Subcapitata	96-hr chronic LC50	>1,000	Undiluted
Fathead Minnow	Pimephales Promelas	96-hr acute LC50	>1,208	Undiluted
Rainbow Trout	Oncorhynchus Mykiss	96-hr acute LC50	>1,000	Undiluted

ENVIRONMENTAL FATE

No data is available.

SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

This material **is not** a RCRA hazardous waste. Disposal of this material is not regulated under RCRA. Consult federal, state and local regulations to ensure that this material and its containers, if discarded, is disposed of in compliance with all regulatory requirements. NOTE: As supplied or diluted, product material (foam included), when splashed on automobiles or other personal property, is difficult to remove if allowed to dry.

RCRA HAZARD CLASS

This material **is not** a RCRA hazardous waste. When discarded in its purchased form, this material would not be regulated as a RCRA Hazardous waste under 40 CFR 261.

SECTION 14 - TRANSPORT INFORMATION

DOT NON-BULK SHIPPING NAME	Refer to Bill of Lading - Not DOT Regulated // Keep From Freezing // Not dangerous goods
DOT BULK SHIPPING NAME	Refer to Bill of Lading.
IMO SHIPPING DATA	Refer to Bill of Lading.
ICAO/IATA SHIPPING DATA	Refer to Bill of Lading - Not IATA Regulated // Keep From Freezing // Not dangerous goods
CFR	Not Regulated // Keep From Freezing // Not dangerous goods
IMDG	Not Regulated // Keep From Freezing // Not dangerous goods
CTC	Not Regulated // Keep From Freezing // Not dangerous goods

SECTION 15 - REGULATORY INFORMATION

TSCA SECTION 8(b) INVENTORY STATUS

All components are included in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

TSCA SECTION 12(b) EXPORT NOTIFICATION

This material **does not** contain any components that are subject to the U.S. Toxic Substances Control Act (TSCA) Section 12 (b) Export Notification requirements.

OSHA Hazard Communication Standard (29CFR1910.1200) hazard class(es)

This material **is not** classified as hazardous under the criteria of the U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR 1910.1200

EPA SARA Title III Section 304 CERCLA

Reportable quantities have not been established for any of this material's components.

EPA SARA Title III Section 311/312 HAZARD COMMUNICATION STANDARD (HCS)

This material **is not** a hazardous chemical.

EPA SARA Title III Section 313 TOXIC CHEMICAL LIST (TCL)

This product **does not** contain Section 313 Reportable Ingredients.

CANADIAN INVENTORY STATUS

All components of this material are listed on the Canadian Domestic Substances List (DSL)

CANADIAN WHMIS

This material **is not** classified as a controlled product under the Canadian Workplace Hazardous Material Information System.

ADDITIONAL CANADIAN REGULATORY INFORMATION

This product **does not** contain a substance present on the WHMIS Ingredient Disclosure List (IDL) which is at or above the specified concentration limit.

EUROPEAN INVENTORY STATUS (EINECS)

The polymer portion of this product is manufactured from reactants which are listed on EINECS and meets the EINECS definition of an exempt polymer.

AICS (Australia)

Included on inventory

ENCS (Japan)

Included on inventory

ECL (South Korea)

Included on inventory

SEPA (China)

Included on inventory

SECTION 16 – OTHER INFORMATION

HMIS and NFPA Classification

Health	: 1
Flammability	: 0
Reactivity	: 0
Special Hazard	: 0