APPENDIX O

HYDROGEOLOGIC AND WATER SUPPLY IMPACT ANALYSIS REPORT

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Tajiguas Resource Recovery Project

HYDROGEOLOGIC AND WATER SUPPLY IMPACT ANALYSIS REPORT

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California

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TAJIGUAS RESOURCE RECOVERY PROJECT HYDROGEOLOGIC AND WATER SUPPLY IMPACT ANALYSIS REPORT

SANTA BARBARA COUNTY, CALIFORNIA

Prepared on behalf of the:

County of Santa Barbara

October 4, 2013

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1.0 INTRODUCTION

Geosyntec Consultants (Geosyntec) is providing Santa Barbara County Public Works Department, Resource Recovery and Waste Management Division (RRWMD) with this report that presents an assessment of hydrogeologic and water supply impacts associated with the proposed Tajiguas Resource Recovery Project (Project). The report has been prepared to support the analysis of project impacts to water resources as required under the California Environmental Quality Act (CEQA). The proposed Project includes the construction and operation of a Material Recovery Facility (MRF), Anaerobic Digestion Facility (ADF), and Composting Area that would process municipal solid waste that is currently disposed of at the county-owned and operated Tajiguas Landfill to recover additional recyclable material and generate green energy. The proposed location of the Project is at the Tajiguas Landfill, as shown on **Figure 1.**

The hydrogeologic impact analysis for the Project includes a summary of the baseline hydrogeologic and water supply conditions along with analysis of the potential impacts to groundwater resources from the Project and project alternatives. For the purposes of this evaluation we have assumed that the baseline hydrogeologic conditions are those that exist at the time of preparation of this report and include the existing landfill operations. These conditions differ from what was analyzed in prior EIRs for the Project because several major landfill construction projects have been completed and phased closure (Phase 1) of a portion of the landfill has occurred which has reduced the overall landfill water demand. The current permitted Tajiguas Landfill Expansion Project was analyzed in an Environmental Impact Report (01-EIR-05) dated July 2002 and approved in 2002. A reconfiguration of the approved landfill footprint was analyzed in a Subsequent EIR (08EIR-00000-00007) dated March 2009 and approved in May 2009. Potential impacts for the Project are evaluated similarly to those previously identified in 01-EIR-05 and 08EIR-00000-00007, where, an environmental impact is defined as a project-induced change in the status of physical conditions. In accordance with the 01-EIR-05 and 08EIR-00000-00007, the significance of the hydrogeologic impact for this evaluation was based on State and County CEQA guidelines, requirements of CCR Title 27, and County of Santa Barbara Environmental Thresholds and Guidelines Manual.

In addition to the proposed project, to meet CEQA requirements several Project alternatives have been identified through the CEQA public scoping process and are evaluated in this report. The Project alternatives that were analyzed include:

1. No Project – Assumes similar waste management practices with the Tajiguas Landfill reaching capacity in the year 2026,
2. Two alternative urban sites for the MRF with the ADF and Composting Area located at the Tajiguas Landfill,
3. MRF located at Tajiguas Landfill and an Aerobic Composting Facility located at Engel and Gray in Santa Maria,
4. Tajiguas Landfill expansion to meet demand up to the year 2036, and
5. Waste exportation after the year 2026 including exportation to the Simi Valley Landfill and the proposed Santa Maria Integrated Waste Management Facility.

2.0 SUMMARY OF PROJECT DESCRIPTION

The County of Santa Barbara RRWMD proposes to develop a Resource Recovery Project that would process municipal solid waste from the communities currently served by the Tajiguas Landfill. The Project will be designed and constructed to process various waste streams delivered to the Tajiguas Landfill from unincorporated areas of the South Coast of Santa Barbara, the Cities of Santa Barbara, Goleta, Buellton, and Solvang as well as the unincorporated Santa Ynez and Cuyama Valley. The Project will be built and operated by Mustang Power Ventures of San Luis Obispo, California.

The waste stream, anticipated to be delivered to the Project site for processing, is municipal solid waste. As an optional project element, co-mingled source separated recyclables (CSSR) could also be brought to the Project for consolidated processing. The Project would be located at the Tajiguas Landfill (**Figure 2**) and would include a MRF to recover recyclable materials, an ADF to process organic waste into biogas and digestate, and an Energy Facility that would use the biogas from the ADF to produce electricity. The digestate would be further cured in outdoor windrows (Composting Area) at the landfill to create compost and soil amendments. Residual waste (residue) from the processing would be disposed of in the landfill. No change in the landfill's permitted capacity is proposed.

As detailed in *Tajiguas Resource Recovery Project – Preliminary Water Supply, Storage, Transmission and Distribution, Revision 1,* John Kular Consulting, May 24, 2013 (**Appendix A**), the total estimated water demand for the Project including the MRF, ADF, and compost area is 11.5 Acre Feet per Year (AFY). Further breakdown of the project's water budget summary is included in a spreadsheet (**Appendix A**) provided by Mustang Energy. The Project proposes to use water primarily pumped from a well (Well #6) to be completed in the Sespe-Alegria Formation (**Figure 3**) as a part of the project. Well #6 is considered a replacement well for Well #4 which was historically used for landfill operations and was properly destroyed in 2012 as part of the recent landfill reconfiguration project. Well #6 will supply water to the MRF and ADF (wash down and domestic use). It is estimated that water use at the MRF and ADF will be approximately 10.9 AFY (Kular, 2013). In addition, up to 0.60 AFY of water is proposed to be pumped from Well #5 and applied to the Composting Area located on the upper deck of the landfill. Well #5 is completed in the Vaqueros Formation and is currently used by the landfill as a water source. Well #5 replaced Well #2, which was located on the operations deck and was also completed in the Vaqueros Formation.

3.0 HYDROGEOLOGIC AND WATER SUPPLY BASELINE CONDTIONS

3.1 Hydrogeology

The regional setting and existing hydrogeologic conditions for the Tajiguas Landfill were analyzed in detail in 01-EIR-05 including information regarding the landfill water demand and supply for the Landfill Expansion Project. Water demand and supply was re-evaluated in the 08EIR-00000-00007 for the Tajiguas Landfill Reconfiguration Project due to the proposed removal of Well #4, removal of two in-channel sedimentation basins, concrete lining of upper Pila Creek, and additional modification of the waste footprint.

The Tajiguas Landfill and proposed Project are located on the southern slope of the Santa Ynez Mountains. The project area is underlain by moderately to steeply south-dipping sections of consolidated sedimentary units including from oldest to youngest: Gaviota Formation, Sespe-Alegria Formation, Vaqueros Formation, Rincon Formation, and Monterey Formation (**Figures 3 and 4**). The Gaviota and Vaqueros Formation are consolidated sandstone units, the Sespe-Alegria is an interbedded sandstone and siltstone/claystone unit, and the Rincon and Monterey Formations generally consist of mudstones and shales. A thorough description of these formations is provided in the 01-EIR-05. The water supply well for the project, Well #6, is proposed to be constructed in the Sespe-Alegria Formation.

Most of the groundwater in these formations is believed to occur in fractures but some intergranular groundwater is also likely to occur in the sandstone units. Groundwater flow direction is generally to the southwest in the landfill area, although local flow deviations likely occur due to the fractured nature of the aquifer units and the fact that the finer-grained formations, such as the Rincon and Monterey, act as hydraulic boundaries.

Locally, the Vaqueros and Gaviota Formations are generally considered to be important groundwater sources. The groundwater yield and quality (dissolved general minerals) is generally higher in these sandstone units compared to the finer-grained Sespe-Alegria, Rincon, and Monterey units. However, the Sespe-Alegria Formation has previously been an important water source at the Landfill (former Well #4) and some of the water wells at the adjacent Baron Ranch are also completed in the Sespe-Alegria Formation. The Monterey Formation is also a water source for the landfill (Well #3) and the community of Arroyo Quemada located south of the landfill along the coastline. The water quality in the Monterey Formation is generally considered poor. The Total

Dissolved Solids (TDS) in Well #3 was measured at 2,500 milligrams per liter (mg/L) in May 2012.

3.2 Tajiguas Landfill Water Supply

The landfill currently uses a mixture of pumped groundwater, groundwater extracted from a groundwater leachate collection recovery system (GLCRS) Interceptor Trench, and water from the leachate collection systems for its water supply (**Table 1**). Groundwater supplies currently consist of a Vaqueros Formation well (Aera Well) located in Cañada de la Huerta (canyon directly west of the landfill), Well #3 completed in the Monterey Formation southwest of the landfill, and Well #5 completed in the Vaqueros Formation on the east side of the Landfill. Well #5 is currently the only Vaqueros Formation well located in the Landfill watershed area. Landfill collection systems that currently provide a water supply to the landfill include the GLCRS Interceptor Trench, the Groundwater Collection System North of the Landfill (Pila Creek in-channel sump pump [ICSP], and leachate collection systems which include the Horizontal Well Dewatering System (HWDS), the Leachate Collection Recovery System #5, and various dewatering wells. These landfill collection systems are not suitable for domestic water uses due to elevated levels of total dissolved solids (TDS), volatile organic compounds (VOCs), metals and minerals.

As noted above, two prior Landfill water supply wells (Wells #2 and #4) were properly destroyed. Well #2 was completed in the Vaqueros Formation and Well #4 was completed in the Sespe-Alegria Formation. These wells were destroyed as a result of stockpiling activity or Landfill reconfiguration activities in the vicinity of the former wells.

The current baseline water use and supply of the Landfill is summarized below and in **Table 1**. The water demand has been updated from the 01-EIR-05 and 08EIR-00000-00007 based on actual recorded use during 2012. Based on information obtained from 2012 Landfill operations data, an estimated 31 AF of water was required for construction (i.e., liner construction), landfill operation (i.e., dust control), and domestic use in 2012, while a total water supply of 36.5 AF was available for use. Of the available water supply, approximately 29.5 AF are available for landfill operations and construction projects while 7 AF are available for domestic water supply. The available domestic supplies include the Aera Well and Well #5. It should be noted that water supply from the Aera Well is not always reliable. The difference in overall water supply and water use results in an estimated surplus of 5.5 AFY available for usage at the landfill (baseline).

Based on conversations with Santa Barbara County RRWMD personnel, the annual water use for year 2012 represents the expected worst case water demand through closure of the Landfill. In future years some reduction in Landfill demand may occur since remaining construction projects are smaller and are anticipated to generate a reduced demand and as the phased closure of the Landfill occurs, less water will be required for dust control.

4.0 PROJECT IMPACT ANALYSIS

The proposed Project is located on the Gaviota Coast of Santa Barbara County, California. Previous assessments of the aquifers located beneath the proposed Project are included in Environmental Impact Reports 01-EIR-05 and 08EIR-00000-00007. The aquifers located beneath the proposed Project are composed of consolidated bedrock. The County's Environmental Thresholds and Guidelines Manual (Groundwater Thresholds Manual) states the threshold of significance for consolidated rock aquifers is considered the amount of new pumpage by a proposed project which would place the aquifer in a state of overdraft. In addition, environmental concerns associated with these aquifers include degradation of water quality, long-term loss of well yield, well interference and effects on biological resources, i.e. spring and base flow. In general accordance with CEQA, CCR Title 27, and the Groundwater Thresholds Manual, the water demands of the Project were evaluated to determine the potential impacts on the following:

- Landfill water supply
- Groundwater overdraft (safe yield[1]) in the pumping aquifer,
- Groundwater quality,
- Well interference from utilization of groundwater in the proposed new supply well on water levels in existing site wells,
- Well pumping impacts on springs, and
- Landfill gas migration.

4.1 Landfill Water Supply

The water supply of the landfill has been described in Section 3.2. An analysis of available water supply information along with projected landfill usage is provided in **Table 1**. The water supply for the landfill includes several groundwater wells, water from ground water collection systems, and leachate collection systems (**Table 1**).

[1] The County of Santa Barbara Groundwater Thresholds Manual defines safe yield as potential average annual recharge.

The total water demand for the Project is estimated to be 11.5 AFY and includes 3.08 AFY for use at the MRF/ADF[2], 7.80 AFY for biofilter usage at the MRF/ADF, and 0.60 AFY for use at the compost finishing area (Kular, 2013). Accordingly, the estimated water demand for the MRF/ADF facility (not including the composting facility) is estimated at 10.9 AFY. The water demand for the MRF/ADF is planned to be mostly derived from a new supply well (Well #6) installed in the Sespe-Alegria Formation, located approximately 800 feet north of the MRF/ADF site (**Figures 2** and **3**). The proposed Well #6 replaces former Well #4 which was destroyed during the landfill reconfiguration project and is not included in the baseline landfill water supply estimate (**Table 1**). Water demand for the composting operations would primarily be provided from the reuse of runoff collected within the Composting Area (Kular, 2013). This water would be collected and stored in a proposed 325,000 gallon Composting Area runoff collection tank. During the summer months some supplemental water may be required and the estimated additional water demand for the Composting Area (0.6 AFY) is proposed to be derived from Well #5 which is located in close proximity to the area and is a current water source for the Landfill.

The estimated total Project water demand (11.5 AFY) is more than the baseline water supply surplus for the landfill (5.5 AFY) as presented in **Table 1.** With the additional volume of water to be provided from proposed Well #6 (presented in **Table 2** as a range between 6.3 - 20 AFY), the estimated water demand for the Project and the landfill is less than the estimated water supply.

4.2 Groundwater Overdraft

Water demand of 10.9 AFY for use at the MRF/ADF (Kular, 2013) is to be mostly derived from a new supply well (Well #6). The new well is proposed to be installed in the Sespe-Alegria Formation, located approximately 800 feet north of the MRF/ADF site (**Figure 2**) and replaces former Well #4. Former Well #4 was installed in the Sespe-Alegria Formation near the location of the proposed new supply well. Well yield for the Sespe-Alegria Formation Well #4 was estimated by the RRWMD to be 20 AFY (**Table 2**). Well #4 was in operation for approximately 6 years and available pumping and water level data (i.e., water level data collected during pumping) indicate that between 2006 and 2011 the well was pumped at an average annual rate of 6.3 AFY with

[2]The water usage estimate for the MRF/ADF includes 20 CSSR employees working at the MRF/ADF. The estimated demand for these employees is 0.34 AFY [(20 employees x 18 gpd/employee x 311 days/year]/325,851 gal/AF) .

no significant changes in groundwater pumping levels. Consequently, it is assumed that proposed Well #6, as a replacement well for Well #4, will have a similar yield (20 AFY as previously estimated by the RRWMD of which 6.3 AFY was actually pumped between 2006 and 2011). It is estimated that the groundwater level response from pumping will be similar, i.e., no significant change in groundwater pumping level.

The Sespe-Alegria Formation is generally not considered an important water-bearing source in the area. Because Well #6 is a replacement well and the Project has a relatively short duration (20-year life), and because the well is not currently installed (consequently the depth of the well and number of permeable sandstone layers it will intersect in the formation is unknown), a quantitative evaluation of the safe yield was not considered. Rather, the environmental impacts associated with pumping were analyzed separately (Sections 4.3 to 4.6). Once the well is installed, a safe-yield analysis for the well using methods outlined in the Groundwater Thresholds Manual could be completed or, as a more appropriate alternative, long-term pumping and water level data could be collected and used with other scientifically accepted methods such as the "Pumpage versus Change in Storage" method[3] to calculate a long-term safe pumping rate (i.e., safe-yield). At this time, based on the water demand of 10.9 AFY at the MRF/ADF and the estimated range in yield of the former Sespe-Alegria Well #4, it is assumed that a single well completed in the Sespe-Alegria aquifer will be capable of meeting the project's water demand. However, for planning purposes a recommendation for siting a second Sespe-Alegria well and for monitoring of water levels and pumping volumes is presented in Section 5.0. It should be noted that the possible addition of a second well in the Sespe-Alegria would not change conclusions reached in the following environmental impact analyses (Sections 4.2 through 4.6).

It is estimated that 0.6 AFY of additional water will be required at the Composting Area (John Kular Consulting, 2013). The water is planned to be pumped from the existing Well #5 completed in the Vaqueros Formation. The Vaqueros is considered an important water source in the area. As estimated in Geosyntec's *Hydrogeologic Report on the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project*, dated October 23, 2008, a safe yield value of 4 AFY was calculated for the Vaqueros

[3] Changes and trends in storage are estimated by comparing the changing water levels in the aquifer to the total volume of water extracted from the aquifer over a long period of pumping. This method requires collecting long-term water level data from the aquifer as well as maintaining long-term pumping records.

Formation[4] located within the landfill watershed. This safe yield value was calculated based on the Groundwater Thresholds Manual methodology in TRC's *Tajiguas Expansion Water Use Versus Supply Memorandum*, dated September 26, 2001 (TRC, 2001). Since the water demand of 0.6 AFY is far less than the 4 AFY safe yield for the Vaqueros Formation and the landfill will have a water supply surplus, no potential significant impacts are expected associated with the groundwater pumping from Well #5.

It should be noted that Well #5 is located on the eastern ridge of the Landfill. The Groundwater Thresholds Manual states that a well located within 800 feet of a watershed boundary will access the yield attributable to the adjacent watershed (Baron Ranch). The exposed Vaqueros Formation within Baron Ranch is approximately 2 times larger in area than the exposed Tajiguas Landfill Vaqueros Formation, and the Baron Ranch watershed is more than 5 times larger in area than the Tajiguas Landfill watershed. Based on the area of the Vaqueros Formation exposed within Baron Ranch (approximately 50 acres), the safe yield for the Vaqueros Formation could be on the order of an additional 10 AFY, assuming that the Vaqueros Formation is not used for water supply at the neighboring Baron Ranch. No Vaqueros wells are known to be active on the Baron Ranch property (EMCON, 1994; and Rick Hoffman, personal communication, 2013).

4.3 Groundwater Quality

Groundwater pumping can potentially degrade groundwater quality if wells are over pumped or if safe yields are exceeded. Over pumping an aquifer can potentially produce groundwater level declines (head loss in the aquifer) that cause deeper saline waters to intrude into fresher portions of the aquifer and, in the case of the Gaviota Coast, sea water intrusion. Due to the relatively low amount of water projected to be pumped from Wells #5 and #6 to meet the water supply demands for the Project, it is not expected that over pumping will occur.

[4] Assumed that recharge in the Vaqueros Formation occurred as direct recharge. 01-EIR-05 estimated that 11.5% of average rainfall recharged the Vaqueros aquifer over approximately 33 acres. A revised safe yield used EIR methodology and calculated recharge over 22 acres based on landfill reconfiguration and low permeability material placement.

Available water quality data, although limited, for Well #4 (previous Sespe-Alegria well) and Well #5 indicate that the salinity or TDS concentrations did not increase significantly during initial pumping of these wells. Available water quality data for Well #4 indicate that TDS in the well rose slightly (80 mg/L) after pumping started in the well: TDS was measured at 628 mg/L in September 2005 when the well was installed and then at 708 mg/L in January 2007 after a year of pumping in the well. Available water quality data for Well #5 indicate TDS did not rise in the groundwater after pumping began in early 2011: TDS was measured at 640 mg/L in March 2011 when the well was installed and at 630 mg/L in May 2012 after approximately ½ year of pumping. Furthermore, sea water intrusion into the bedrock aquifers is highly unlikely because the Vaqueros and Sespe-Alegria Formations are not hydraulically connected to the ocean as the formations lie stratigraphically below the Rincon and Monterey Formations which are shale formations and act as hydraulic boundaries to ocean water intrusion. Consequently, the potential for pumping to significantly impact groundwater quality is considered low and impacts would not be significant.

4.4 Well Interference

Groundwater pumping in a well has the potential to drawdown groundwater levels in neighboring wells. If the drawdown is large then there is potential to significantly increase pumping costs (i.e, electrical consumption) or even dry up a well. For this analysis the potential well interference was evaluated for proposed pumping in Well #5 and proposed Well #6. Hydraulic connection between the bedrock aquifers beneath the Project area is generally considered low because of the interlayered shale, mudstone, and claystone layers in the bedrock formations. These interbedded shale and claystone/mudstone layers act as hydraulic boundaries. Wells completed in one bedrock formation or bedrock aquifer should not significantly impact groundwater levels in other adjacent formations or aquifers. That is, pumping in the new Well #6, completed in the Sespe-Alegria Formation, should not significantly impact groundwater levels in the adjacent Vaqueros Formation (Well #5) and Monterey Formation (Well #3) and vice versa. A geologic cross-section schematically showing the well locations is presented on **Figure 4**.

The highest potential for well interference in the Project area is for pumping in any one well to impact groundwater levels in a well installed in the same bedrock aquifer. The bedrock formations/aquifers beneath the Project area are all steeply dipping to the south with east-west strikes (**Figure 4**). The potential for pumping in Well #5 and Well #6 to impact wells located along strike, or to the east and west is discussed below.

Well Interference within the Vaqueros Formation

Additional pumping in Well #5 to meet Project demand is estimated at 0.6 AFY. This equates to an additional 0.4 gallons per minute (gpm) of pumping to achieve the additional volume. The nearest neighboring wells to the east of Well #5 are wells located on Baron Ranch. No known active Vaqueros wells are located on the Baron Ranch (EMCON, 1994; Rick Hoffman, personal communication, 2013). The nearest Vaqueros well to the west is the Aera Well located in Cañada de la Huerta canyon. The Aera Well is located approximately 2,500 feet west of Well #5 (**Figure 3**). The Groundwater Thresholds Manual indicates that a reasonable radius of influence for a Vaqueros Formation well is 800 feet. Based on the low estimated demand for the project (additional 0.6 AFY or 0.4 gpm) and the fact that the closest neighboring well is located at least 2,000 feet away from Well #5 and beyond the reasonable radius of influence, well interference from proposed additional pumping in Well #5 is not considered significant.

Well Interference within the Sespe-Alegria Formation

Proposed pumping in new Well #6 completed in the Sespe-Alegria Formation is estimated at 10.9 AFY. This equates to a long-term pumping rate of approximately 6.75 gpm. The nearest neighboring Sespe-Alegria wells to the east of Well #6 are located within Baron Ranch and are approximately 3,500 feet away. Based on EMCON (1994) and a file review of neighboring properties on June 3, 2013, at the Santa Barbara County Department of Environmental Health Services, no active Sespe-Alegria wells are known to be located west of Well #6 within a mile of the proposed location of Well #6 (EMCON, 1994).

The Groundwater Thresholds Manual does not indicate a reasonable radius of influence for the Sespe-Alegria Formation. To estimate the potential well interference of the planned Well #6 on the Baron Ranch wells, drawdown was estimated using the Theis Equation. No specific transmissivity and hydraulic conductivity values derived from aquifer testing on Tajiguas Landfill water supply wells installed in the Sespe-Alegria are available. However, Hoffman (2002) completed aquifer tests on two wells completed in the Sespe-Alegria Formation on the adjacent Baron Ranch. Transmissivity was reported at 4.5 ft^2/day and 23.9 ft^2/day. Assuming that the screen interval of the wells (450 feet) is equivalent to aquifer thickness and averaging the two transmissivity values, a hydraulic conductivity of 0.032 ft/day is derived.[5] Using the

[5] Hydraulic conductivity of a formation is derived by dividing the transmissivity by the aquifer thickness.

Theis Equation, and based on the average hydraulic conductivity (0.032 ft/day), a long term pumping rate of 6.75 gpm, and a screen interval or aquifer thickness of 450 feet at the planned Well #6 location, it is estimated that after 20 years of pumping, groundwater level drawdown (well interference) would be approximately 6 ½ feet at the Baron Ranch well locations. Wells A and C are 585 and 561 feet deep, respectively and have 411 and 226 feet of water column above the reported pump depths, respectively (Hoffman, 2002). Therefore, the estimated drawdown from the pumping of proposed Well #6 would not significantly impact the water column in the Baron Ranch Sespe-Alegria wells. Consequently, the estimated drawdown of 6 ½ feet indicates that potential for significant well interference is low. Well interference from the planned pumping in the proposed well #6 is not considered significant.

4.5 Well Pumping Impacts on Springs and Streamflow

Former seeps located within Pila Creek were covered with low permeability material and a subdrain was installed to collect this water during the Landfill Reconfiguration Project. The low permeability material was placed over the entire Vaqueros Formation within Pila Creek and portions of the Sespe-Alegria Formation. No additional seeps or springs are known to exist in Pila Creek within the Vaqueros or Sespe-Alegria Formations. Therefore, groundwater pumping in these formations will not significantly impact spring flow or stream baseflow in the watershed area.

Pumpage from Well #6 is also not expected to significantly impact springs or stream baseflow on the Baron Ranch because: 1) there are no reported springs in the Sespe Alegria Formation on the Baron Ranch (Anikouchine, 1991), 2) the bedded nature of the Sespe Alegria Formation will impede the vertical communication of groundwater and surface water, and 3) a low amount of drawdown is predicted (i.e., potentiometric head reduction) in the area of Baron Ranch, as discussed in Section 4.4.

4.6 Landfill Gas Migration

The potential for construction and operation of the new Well #6 to enable landfill gas migration to the groundwater table was evaluated. Landfill gas migration can potentially degrade the groundwater quality of an aquifer via two possible routes: (1) landfill gas diffusing through the vadose zone could interact with the groundwater at the capillary fringe (top of groundwater), causing gas constituents to dissolve, and (2) landfill gas migration from the landfilled waste could occur within the casing of a groundwater well in the event that the top of the well screen is above the water table or within the well borehole annulus where sand filter pack occurs (i.e., the well provides a conduit for landfill gas migration to the groundwater). The potential for the construction and operation of Well #6 to enable landfill gas migration and degrade groundwater quality is considered low based on the following rationale:

- The proposed location of Well #6, **Figure 3**, is situated approximately 115 feet to the west of a lined portion of the landfill and approximately 800 feet north of an unlined portion of the landfill. The landfill liner, where applicable, and landfill gas collection system will reduce the potential for landfill gas to migrate westward to the proposed well location.

- Groundwater pumping in the well will decrease groundwater levels, thus increasing the distance from the bottom of the landfill to the top of the groundwater table. Regulation requires a minimum of five feet distance between a landfill liner system and the highest predicted groundwater levels. The increased distance between the groundwater table and the bottom of the landfill will reduce the potential for landfill gas to interact with groundwater.

In order to further reduce the potential for proposed Well #6 to act as a conduit for landfill gas migration to the groundwater, the screened portion of the well must be installed below the top of the groundwater table, as is common construction practice for a water supply well, and below the base of the landfill liner system adjacent to the well. In addition, the well sanitary seal that is required per California Well Standards (CDWR, 1991), shall be installed through the unsaturated portion of the formation (vadose zone) and below the top of groundwater (see Section 5.0). With implementation of these well construction measures along with the low potential for Well #6 to provide a landfill gas conduit, the potential impacts of the project on downward landfill gas migration is considered less than significant.

5.0 RECOMMENDATIONS / MITIGATION MEASURES

The following standard well construction/design measures would reduce the potential for proposed Well #6 to act as a conduit for landfill gas migration to the groundwater:

- Proposed Well #6 shall be constructed so the well screen is sufficiently below the top of the groundwater table so that the well screen is not exposed due to declining water levels from pumping. The anticipated pumping levels should be taken into account so that the groundwater level does not drop below the top of the well screen. This is common water well construction practice. Additionally, the sanitary seal of Well #6 shall be constructed so it extends to at least the top of the static groundwater table.

The following measures are not required for mitigation purposes but are recommended for planning purposes to better manage groundwater resources:

- In order to better define the groundwater yield of the Sespe-Alegria aquifer, it is recommended that a groundwater monitoring program be established in order to monitor static and pumping groundwater levels along with pumping rates and volumes after installation of proposed Well #6. Standard hydrogeologic methods should be used to analyze the data and manage the groundwater resources.

- Groundwater levels and pumping volumes should continue to be monitored in the Vaqueros Formation Well #5 to manage the groundwater resources.

An additional Sespe-Alegria well could be preliminarily sited for planning purposes. The well would only be installed if Well #6 does not meet the Project’s water demand.

6.0 CUMULATIVE IMPACT ANALYSIS

Groundwater in the Sespe-Alegria Formation is generally considered to be localized and, subsequently, the Sespe-Alegria is not considered to be an important groundwater bearing source. There are no cumulative projects listed (**Appendix B**) that are located in the Pila Creek watershed where the project's proposed well #6 is proposed to be located. In addition, based on the location and project descriptions, no cumulative projects listed within a three mile radius of proposed Well #6 will likely derive water from the Sespe-Alegria bedrock source. Consequently, cumulative groundwater supply impacts and other associated groundwater pumping impacts are considered to be less than significant.

7.0 PROJECT ALTERNATIVE ANALYSIS

To meet the requirements of the California Environnmental Quality Act (CEQA), seven potential alternatives have been identified. These seven alternatives include the following:

1. No Project – Assumes existing waste management practices with the Tajiguas Landfill reaching capacity in the year 2026;
2. Urban area MRF Alternative 1 – MRF at property owned by MarBorg Industries in the City of Santa Barbara and the ADF, Composting Area, and residual waste disposal would remain at the Tajiguas Landfill;
3. Urban area MRF Alternative 2 – MRF at the South Coast Recycling and Transfer Station (SCRTS) and the ADF, Composting Area and residual waste disposal would remain at the Tajiguas Landfill;
4. MRF located at Tajiguas Landfill and an Aerobic Composting of organics at the existing Engel and Gray Composting Facility in Santa Maria;
5. Tajiguas Landfill expansion to provide an equivalent disposal capacity to meet demand up to approximately the year 2036;
6. Waste exportation after the closure of the Tajiguas Landfill in approximately year 2026 to the proposed Simi Valley Landfill and Recycling Center Expansion Project (Simi Valley Landfill RCEP); and
7. Waste exportation after the closure of the Tajiguas Landfill in approximately year 2026 to the proposed Santa Maria Integrated Waste Management Facility (Santa Maria IWMF).

7.1 No Project

Under the 'No Project' alternative waste disposal activities would continue at the Tajiguas Landfill as currently conducted and no additional recovery of recyclables or organics from the municipal solid wastes (MSW) would occur. Overall landfill capacity would be reached in approximately the year 2026. No increase in water demand (or groundwater demand) is expected through 2026 at the landfill for the 'No Project' alternative (water supply and demand for the current landfill operations are provided in **Table 1**). Thus, no additional water supply impacts and associated groundwater impacts at the landfill through 2026 are expected under the 'No Project' alternative. Under the 'No Project' Alternative, to meet the continued need for waste disposal services, the Tajiguas landfill would either need to be expanded or waste would need to be exported to and disposed of at another landfill after 2026. These alternatives are described in sections 7.4 and 7.5.

7.2 Alternative MRF Locations

Two urban sites are proposed as alternative locations for the MRF while the ADF, Composting Area and residual waste disposal would remain at the Tajiguas Landfill. With the reduction of facilities located at the Tajiguas Landfill, the water demand (2.8 AFY for the ADF and Composting Area) will be reduced and less than the baseline water supply identified in section 4.1. The alternative MRF locations are:

1. Within the City of Santa Barbara at the MarBorg property located at 620 Quinientos Street, and
2. The South Coast Recycling and Transfer Station (SCRTS) located on the south coast of Santa Barbara County.

7.2.1 MarBorg MRF Alternative

If the MRF was constructed at the MarBorg property, an estimated 2,600 gallons per day (gpd) would be used domestically and an additional 200 gpd would be used for misting operations (MarBorg Industries, 2013). The total amount of water usage, for the MarBorg Alternative MRF is estimated to be 2.68 AFY. The City of Santa Barbara's water supply comes primarily from the following sources, with the actual share of each determined by availability and level of customer demand: Lake Cachuma and Tecolote Tunnel; Gibraltar Reservoir, Devils Canyon and Mission Tunnel; groundwater; State Water Project Table A allotment; desalination; and recycled water. Conservation and efficiency improvements are projected to contribute to the supply by offsetting demand that would otherwise have to be supplied by additional sources. On June 14, 2011, based on the comprehensive review of the City's water supply, the City Council approved the Long Term Water Supply Program (LTWSP) for the planning period 2011-2030. The LTWSP outlines a strategy to use the above sources to meet the City's estimated system demand (potable plus recycled water) of 14,000 AFY, plus a 10% safety margin equal to 1,400 AFY, for a total water supply target of 15,400 AFY. The LTWSP concludes that the City's water supply is adequate to serve the anticipated demand plus safety margin during the planning period. Additionally, based on personal communications with City of Santa Barbara Water Resources Manager Rebecca Bjork (January 18, 2013), the water requirements of the MRF located at the MarBorg property would not have a significant impact on the City of Santa Barbara's water supply. It was noted by the water resources manager that recycled water would be the preferred source where applicable.

7.2.2 SCRTS MRF Alternative

If the MRF was constructed at the SCRTS property, an estimated 10 AFY of water would be required for domestic and operational purposes[6]. The SCRTS site is served by the Goleta Water District (GWD). The GWD receives supplies from Lake Cachuma, groundwater, the State Water Project and some limited supplies of reclaimed water. Based on personal communications with Carrie Bennet, a Goleta Water District Associate Water Resources Analyst, on June 17, 2013, the water requirements of the MRF at the SCRTS property (9.97 AFY) are within the Goleta Water District's annual water allotment for new projects. Therefore, the MRF project would not have a significant impact on the Goleta Water District's water supply.

7.3 Aerobic Composting at Off-Site Location

This alternative entails constructing the MRF and disposing of residual materials at the Tajiguas Landfill and transporting and processing the recovered organic material through aerobic composting at the existing Engel and Gray Compositing Facility (Engel and Gray) in Santa Maria, California. Up to an additional 240 tons/day or 73,600 tons/year of organic waste would be transported from the MRF at Tajiguas to Engel and Gray for composting. Based on the estimated rate of 240 tons/day or 370 cubic yards/day[7] coming from Tajiguas, the Engel and Gray facility would receive an additional 113,230 cubic yards/year. The composting facility water supply is an agricultural well which is completed in the Santa Maria Groundwater Basin. Engel and Gray estimates that approximately 90 gallons of water is required per cubic yard of compost at their facility (Engel and Gray, September 2009). Using this estimate, the proposed additional volume of composting material (113,230 cubic yards) will require approximately 31 AFY of additional water use. It is assumed that the additional material would be processed within the existing permitted capacity [400,000 cubic yards (Solid Waste Facility Permit 42-AA-0053)] of the Engel and Gray facility which was analyzed in prior environmental documents (Conditional Negative Declaration SP-94 28 & E94-56 and CEQA Section 15164 (Addendum) to SP-94-28 (City of Santa

[6] Note that the significant difference is estimated demand between construction of the MRF at the MarBorg Alternative site as compared to the SCRTS Alternative site is associated with the proposed air quality treatment systems. The MarBorg MRF Alternative includes use of an activated carbon filtration system along with misting whereas the SCRTS MRF Alternative includes the use of biofilters.

[7] Based on an estimated density for compost of 0.65 tons per cubic yard provided by Mustang Energy.

Maria, June 1995 and July 2008). These documents did not identify significant water supply/groundwater impacts associated with operation of the composting facility.

As noted above, under this alternative the MRF would be constructed at the Tajiguas Landfill. With the elimination of the ADF and the Composting Area the revised water demand for the MRF would be 8.7 AFY. With the reduction of facilities located at the Tajiguas Landfill and the additional volume of water to be provided from proposed Well #6, the water demand is less than the estimated water supply identified in section 4.1.

7.4 <u>Landfill Expansion</u>

Under the Landfill Expansion Alternative, the Tajiguas Landfill would be expanded horizontally and vertically to provide additional disposal capacity to meet the community's disposal needs to approximately the year 2036 with no further recovery of recyclable materials or organics from the MSW. Implementation of this alternative would require water for additional landfill cell and groundwater protection system construction, operations, and dust control. The water demand would be similar to existing landfill operations and the water balance of the landfill would remain roughly the same as outlined in **Table 1**. Consequently, this alternative would not significantly affect the landfill water supply or groundwater conditions.

7.5 <u>Waste Exportation</u>

Under the Waste Exportation Alternatives, after closure of the Tajiguas Landfill in approximately 2026, the community's waste disposal needs would be met by exporting waste to either the proposed Simi Valley Landfill Expansion or the proposed Santa Maria Integrated Waste Management Facility (Santa Maria IWMF) with no further recovery of recyclable materials or organics from the MSW.

7.5.1 Export to the Proposed Simi Valley Landfill

The source of water for operations at the Simi Valley Landfill is the Calleguas Municipal Water District (CMWD) which receives its main source of water from the State Water Project. According to The *Simi Valley Landfill and Recycling Center Expansion Project Final EIR (Ventura County*, December 2010), estimated water demand for overall construction and operation of the Simi Landfill is 174 AFY. The EIR identifies that because the project would be served by the CMWD, water supply impacts would be less than significant.

7.5.2 Export to the Proposed Santa Maria IWMF

The source of water for the proposed Santa Maria IWMF is the Santa Maria Groundwater Basin. Based on the *Santa Maria Integrated Waste Management Facility Project – Final Environmental Impact Report (City of Santa Maria* April 2010), the projected water demand for construction and operation of the Santa Maria IWMF is estimated at 35.2 AFY to be extracted from the Santa Maria Groundwater Basin through an existing on-site well. The EIR identified impacts due to water demand and groundwater recharge to be less than significant.

8.0 REFERENCES

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Rick Hoffman & Associates, September 3, 2002. Water Well Production Update Letter – Baron Ranch Well "A" and Well "C".

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TRC, September 26, 2001. Tajiguas Expansion Water Use Versus Supply Memorandum.

TABLES

TABLE 1

YEAR 2012 BASELINE AVERAGE ANNUAL WATER USE AND SUPPLY ESTIMATES

TAJIGUAS LANDFILL OPERATIONS AND CONSTRUCTION

Category	Estimated Quantity (AF/Y)
Projected Water Use	
Landfill Domestic[1]	3
Landfill Operation[1]	18
Landfill Construction[2]	10
Total Estimated Water Use	**31**
Projected Water Supply	
GLCRS Interceptor Trench[3]	11*
Canada de la Huerta (Aera Well)[1]	3
Groundwater Collection System North of LF (ICSP)[1]	1*
Well No. 3 in Monterey formation[4]	16*
Well #5[5]	4
HWDS,LCRS#5,DW-Wells[6]	1.5*
Total Estimated Water Supply	**36.5**
Estimated Water Balance (Water Supply minus Water Use)	**5.5**

[1]Based on 2012 landfill operations water use per Tajiguas Landfill Operations Data.
[2]From estimate provided by SWT Civil Engineering and County of Santa Barbara, June 2012
[3]Based on annual totals from RWQCB Reports relative to median rainfall totals generated by Santa Barbara Flood Control District Rainfall Records.
[4]Reported by Moore and Taber, February 17, 1998, indicates a potential 20-25 gpm long-term sustainable pumping rate based on a short-term aquifer test. Conservatively reduced to 10 gpm for this analysis (i.e.,16 AF/Y)
[5]Hydrogeologic Report on the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project. Geosyntec Consultants. October 23, 2008.
[6]Based on annual totals from RWQCB Reports. This supply to be used on landfill footprint only per RWQCB.
*Water supply available for operation and construction, not suitable for domestic supply.

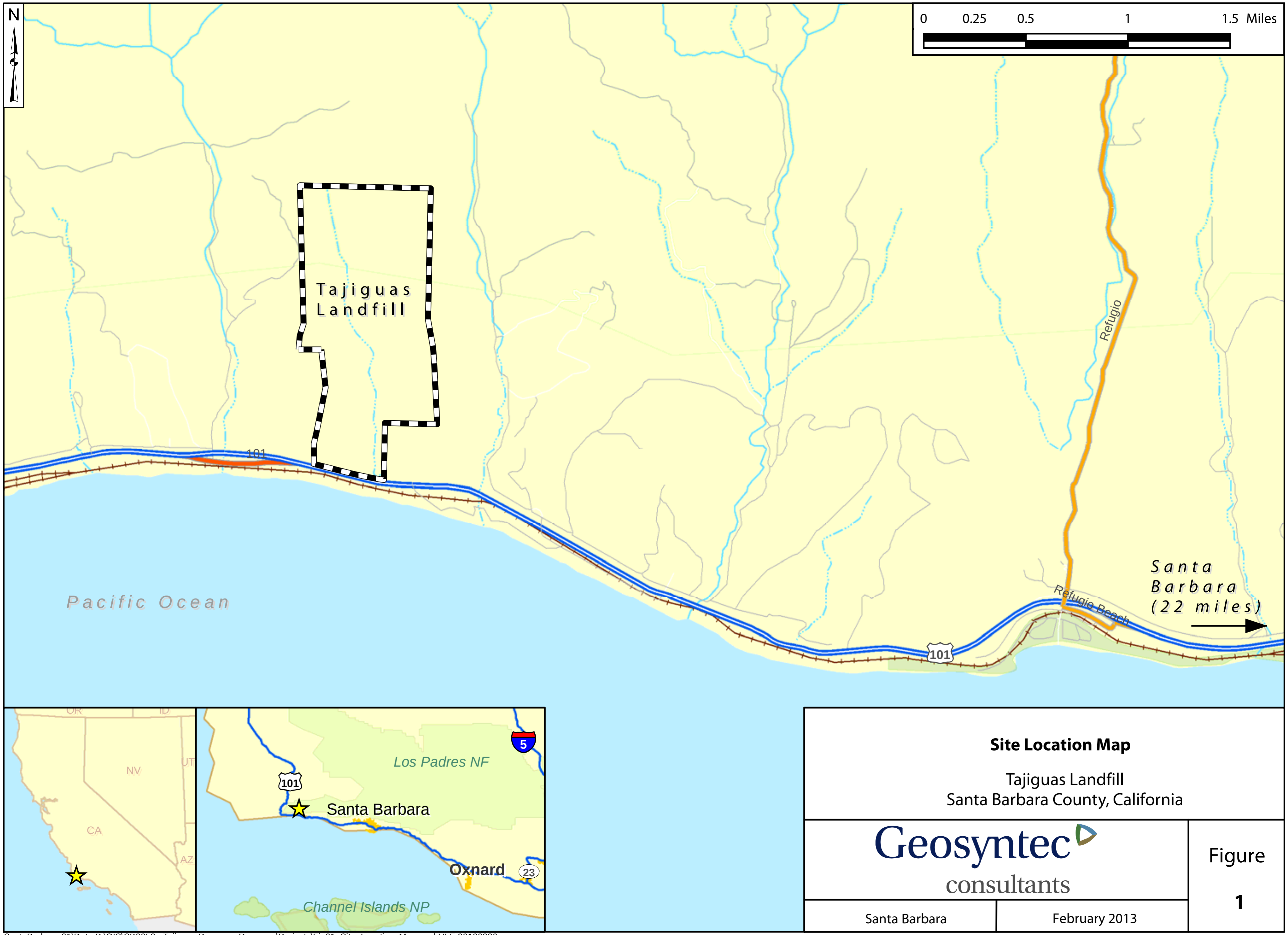
TABLE 2
YEAR 2012 BASELINE + PROJECT AVERAGE ANNUAL WATER USE AND SUPPLY ESTIMATES
TAJIGUAS LANDFILL OPERATIONS AND CONSTRUCTION

Category	Estimated Quantity (AF/Y)
Projected Water Use	
Landfill Domestic[1]	3
Landfill Operation[1]	18
Landfill Construction[2]	10
Resource and Recovery Project	11.5
Total Estimated Water Use	**42.5**
Projected Water Supply	
GLCRS Interceptor Trench[3]	11*
Canada de la Huerta (Aera Well)[1]	3
Groundwater Collection System North of LF (ICSP)[1]	1*
Well No. 3 in Monterey formation[4]	16*
Well #5[5]	4
HWDS,LCRS#5,DW-Wells[6]	1.5*
Replacement well for Well No. 4 in Sespe-Alegria Formation (Well #6)[7]	6.3-20
Total Estimated Water Supply	**42.8 - 56.5**
Estimated Water Balance (Water Supply minus Water Use)	**0.3 - 14**

[1]Based on 2012 landfill operations water use per Tajiguas Landfill Operations Data.
[2]From estimate provided by SWT Civil Engineering and County of Santa Barbara, June 2012
[3]Based on annual totals from RWQCB Reports relative to median rainfall totals generated by Santa Barbara Flood Control District Rainfall Records.
[4]Reported by Moore and Taber, February 17, 1998, indicates a potential 20-25 gpm long-term sustainable pumping rate based on a short-term aquifer test. Conservatively reduced to 10 gpm for this analysis (i.e.,16 AF/Y)
[5]Hydrogeologic Report on the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project. Geosyntec Consultants. October 23, 2008.
[6]Based on annual totals from RWQCB Reports. This supply to be used on landfill footprint only per RWQCB.
[7]Well No.6 may be completed in the Sespe-Alegria formation and will replace destroyed Well No.4. County of Santa Barbara reports that Well No.4 was completed in the Sespe-Alegria formation and had been pumping at a rate of approximately 25 gpm over long periods of time. The reported long term-term sustainable supply estimate of 20 AF/Y for Well No.4 is based on half of this pumping rate (12½ gpm). The lower range value of 6.3 AF/Y is an average of the actual pumping data for years 2006 through 2011. It is assumed that Well No.6 will have a yield within this range.
*Water supply available for operation and construction, not suitable for domestic supply.

Geosyntec consultants

FIGURES



Site Location Map

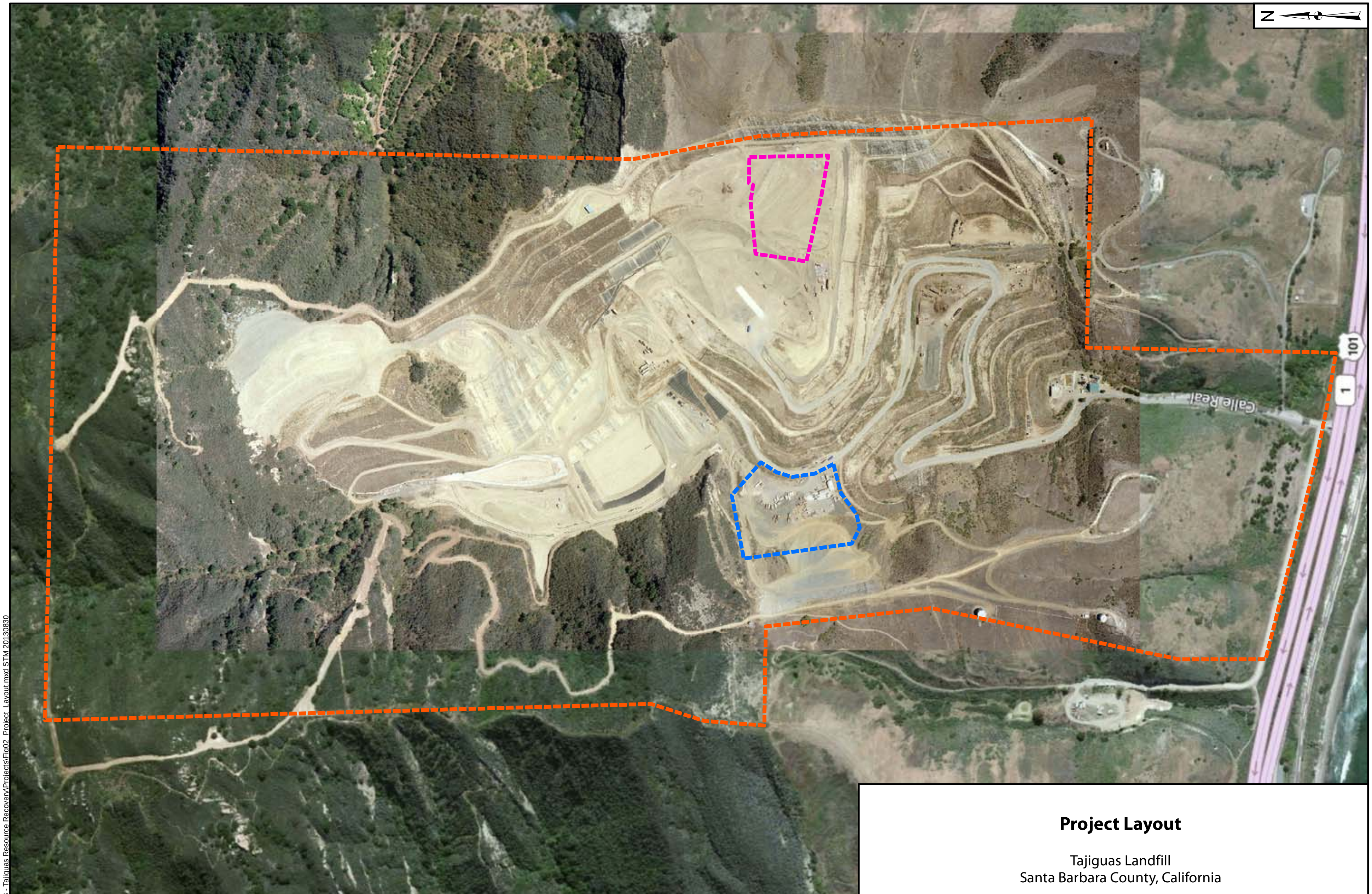
Tajiguas Landfill
Santa Barbara County, California

Geosyntec consultants

Figure 1

Santa Barbara | February 2013

SantaBarbara-01\Data P:\GIS\SB0653 - Tajiguas Resource Recovery\Projects\Fig01_Site_Location_Map.mxd HLE 20130226



Project Layout

Tajiguas Landfill
Santa Barbara County, California

Legend

- Composting Area
- Materials Recovery Facility / Anaerobic Digestion Facility
- Landfill Property Boundary

800 400 0 800 Feet

Geosyntec consultants

Figure 2

Santa Barbara | August 2013

SantaBarbara-01\Data P:\GIS\SB0653 - Tajiguas Resource Recovery\Projects\Fig02_Project_Layout.mxd STM 20130830

Legend

- Existing Well
- Proposed Well
- Former Well
- Landfill Property Boundary
- Contact Between Geologic Formations

800 400 0 800 Feet

Tm: Monterey Shale
Tr: Rincon Shale
Tvq: Vaqueros Formation
Tsa: Sespe and Alegria Formation
Tg: Gaviota Formation

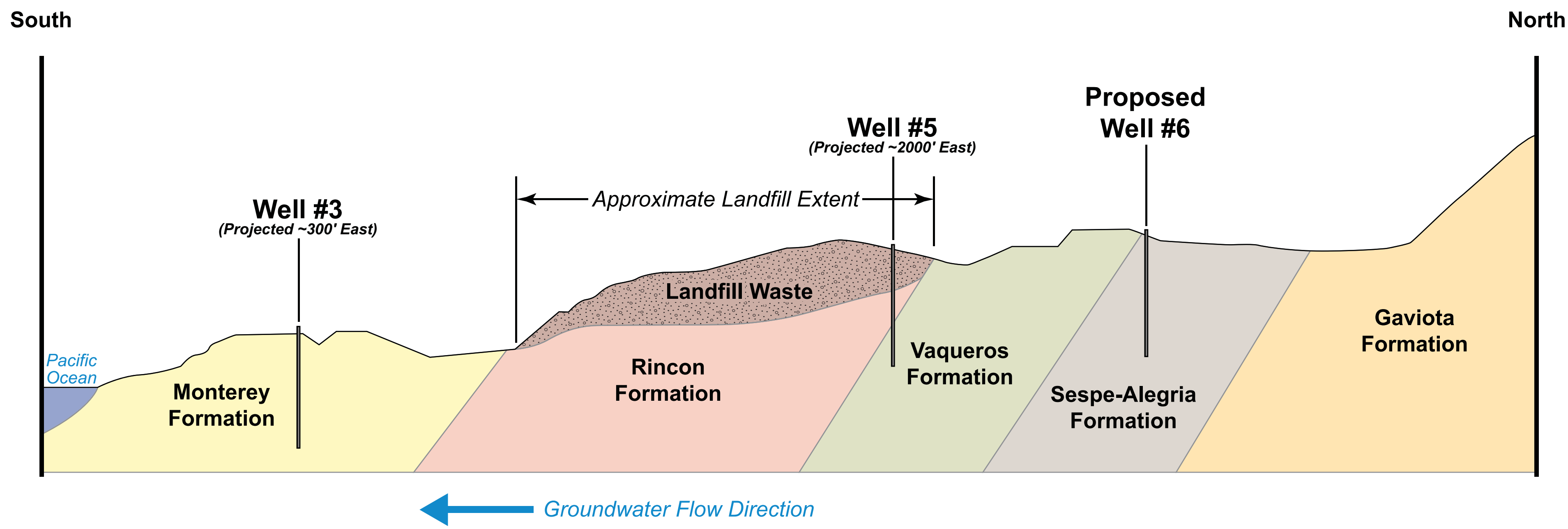
Site Geology and Well Locations

Tajiguas Landfill
Santa Barbara County, California

Geosyntec consultants

Figure **3**

Santa Barbara | August 2013



Not to Scale

Generalized Schematic Cross-Section

Tajiguas Landfill
Santa Barbara County, California

Geosyntec
consultants

Figure **4**

Santa Barbara | May 2013

APPENDIX A

May 24, 2013

John Dewey
CEO
Mustang Renewable Power Ventures, LLC
750 Pismo St.
San Luis Obispo, CA 93401

Dear John:

RE: Tajiguas Resource Recovery Project – Preliminary Water Supply, Storage, Transmission and Distribution, Revision 1

This revision adds biofilter water consumption as well as updates to landscape irrigation and composting area water storage and re-use.

1.0 Water Supply and Treatment

There are two operating wells and two closed wells on the Tajiguas Landfill site. Table 1 summarizes key features of these wells. All of the wells have relatively low yields and the landfill has had challenges in meeting its own water needs during dry years. Therefore, Tajiguas Resource Recovery Project (TRRP) will require its own well to supply the MRF and ADF.

Table -1 Existing Landfill Water Wells

Well #	Distance to site (ft.)	Aquifer Name	Yield (GPM)	Water Table Elevation (ft.)
2 (closed)	On-site	Vaqueros	20	250
3	1700 ft. S	Monterey	12	210
4 (closed)	850 ft. NE	Sespe Allegria	30	250
5	2200 ft. E	Vaqueros	15	434

The project site overlies the Vaqueros formation aquifer. Vaqueros aquifer waters typically contain elevated Total Dissolved Solids (TDS), sulphates and chlorides due to the presence of ancient marine shale. The well quality records for Well 4 and Well 5 exhibit similarly elevated TDS, sulphates and chloride levels although they are within California and EPA drinking water standards. Well # 3 has significantly higher sulphate and chloride levels, with TDS levels more than twice as high. In addition, Well #3 has very elevated iron levels. Prior studies have identified safe yield constraints on the Vaqueros supply and the landfill currently uses Well 5, a Vaqueros well.

Therefore it is recommended that the proposed MRF and ADF supply well be located north-east of the proposed water tank (Well 6), roughly 1200 feet north of the TRRP site. This well will draw water from the Sespe Allegria formation. Exhibit W-1 shows the proposed water storage and distribution system.

Anticipated well yield is approximately 10-20 GPM. Careful planning will be required to stage the initial filling of the water storage tank and percolate tanks.

Chlorine disinfection may be required to keep the treated water potable and to inhibit algae growth within the storage tank and water mains.

1.1 Fire Protection

The fire flows and fire flow storage were calculated in accordance with the California 2010 Fire Code, Title 24, Chapter 9 and Table B.105.

Table – 2 Fire Protection Requirements

Building/ Type	Building Area (SF)	Fire Flow (GPM)	Sprinkler Credit	Adjusted Building Area (SF)	Fire Duration	Fire storage (Gallons)
ADF, Type IA	63400	2750	50%	1375	2	165,000
MRF, Type IIA	58800	3500	50%	1750	2	210,000

The MRF has the higher fire flow requirement, so 210,000 gallons of fire storage will be provided.

1.2 Process Water

The MRF has no process water requirements other than wash-down of some work areas. Daily wash down is estimated as 500 GPD.

The ADF has an estimated daily wash down requirement of 500 GPD. The digestion process utilizes three storage tanks of percolate with a combined volume of 300,000 gallons. The digestion process is a closed loop system. All percolate is recovered and recycled.

1.3 Domestic Water

Based on the CalGreen 2010 Building Code, estimated domestic water consumption is 1745 GPD. This represents a 28.5% reduction from the 2006 Uniform Plumbing Code and incorporates water saving devices such as low flush toilets and aerating faucets. California environmental health regulations dictate that all domestic water meets the standards for human consumption, even if the water is used for flushing toilets or showers.

1.5 Biofilter Water Use

The biofilters which remove odors from the MRF and ADF air streams before discharging the air to the atmosphere also consume water to keep the biofilter media moist and functioning. The biofilters consume 6964 GPD (7.801 acre-ft/yr). 85% of this water is lost to the atmosphere as evaporation. 15% is collected as condensate. Clean condensate from the humidifier is recycled through the biofilter. Dirty condensate from the biofilter is conveyed to the wastewater treatment system. In order to minimize water use and wastewater disposal, domestic wastewater can be treated and re-used for humidification of the biofilter. These recycling measures will reduce biofilter net water consumption by approximately 32% to 4736 GPD or 5.30 acre-feet/year.

1.6 Compost Process Water Requirements

The compost finishing process is estimated to require up to 2200GPD (0.60 acre-ft/yr) to replace water lost to evaporation during the driest months of the year. The source of this water will be Well #5. The Composting Area will also be a source of water (storm water runoff) following rainfall events. 2.90 acre-feet of runoff will be used for compost watering in an average year. A more comprehensive discussion of the runoff collection, treatment, storage and reuse is found in *Tajiguas Resource Recovery Project – Composting Area,* John Kular Consulting, October, 2012.

Table 1 – Summary of Average Net Water Consumption

Component	MRF GPD/Acre-Ft/Yr.	ADF GPD/Acre-Ft/Yr.	Composting Acre-Ft/Yr.
Domestic Use	1645/1.84	100/0.11	N/A
Wash Down	500/0.61	500/0.61	N/A
Biofilter*	3818/4.28	918/1.02	N/A
Compost Watering	N/A	N/A	0.60

* Net consumption after wastewater and condensate recycling.

2.0 Water storage

2.1 Water Storage (MRF & ADF)

Water for consumption and fire protection will be stored in a 220,000 gallon tank adjacent to the proposed well on a ridge to the north and west of the TRRP facilities. The tank site is located at an elevation of 610 feet above mean sea level. The tank capacity provides the equivalent volume of the fire flow plus four days of water consumption. The tank will be 50 feet in diameter and 15 feet tall to minimize the visual impact.

2.2 Water Storage (Landscape Irrigation)

Approximately 1.8 acres of landscaped area surrounding the MFR and ADF buildings will be irrigated with recycled water (treated waste water from the MRF and ADF buildings). Annual recycled water re-use is anticipated to be 2.02 acre-feet/year.

2.3 Water Storage and Treatment (Composting Area)

Composting Area pad runoff will be stored in a 325,000 gallon storage tank (See Exhibit CFA-) located on a pad approximately 800 feet northeast of the Composting Area. Storm water runoff from the Composting Area pad will be collected via asphalt swales and into a baffled Baker tank, and then pumped into the Composting Area Runoff Collection Tank. The RWQCB requires that composting operations capture and treat the 1:25-year storm runoff. The 25 year runoff volume is projected to be 220,000 gallons. The possibility of successive large storm events led to sizing the Composting Area Runoff Collection Tank for 325,000 gallon capacity.

When the runoff is re-used to water the compost it will be pumped through a bag filtration system and into a 5000 gallon polyplastic tank beside the Baker tank. A portable sprayer and 500 gallon trailer mounted tank will be used to spray the filtered runoff onto the compost piles to keep them moist.

3.0 Water Transmission

Well water will be transmitted from the storage tank to the TRRP distribution network via an 8” PVC, C900, Class 200 or equivalent HDPE transmission main. The size of the transmission and distribution mains has been verified for the projected fire flow using EPANET software. Due to the difference in elevation between the water tank and the TRRP site, pressure class 200 psi equivalent pipes will be required.

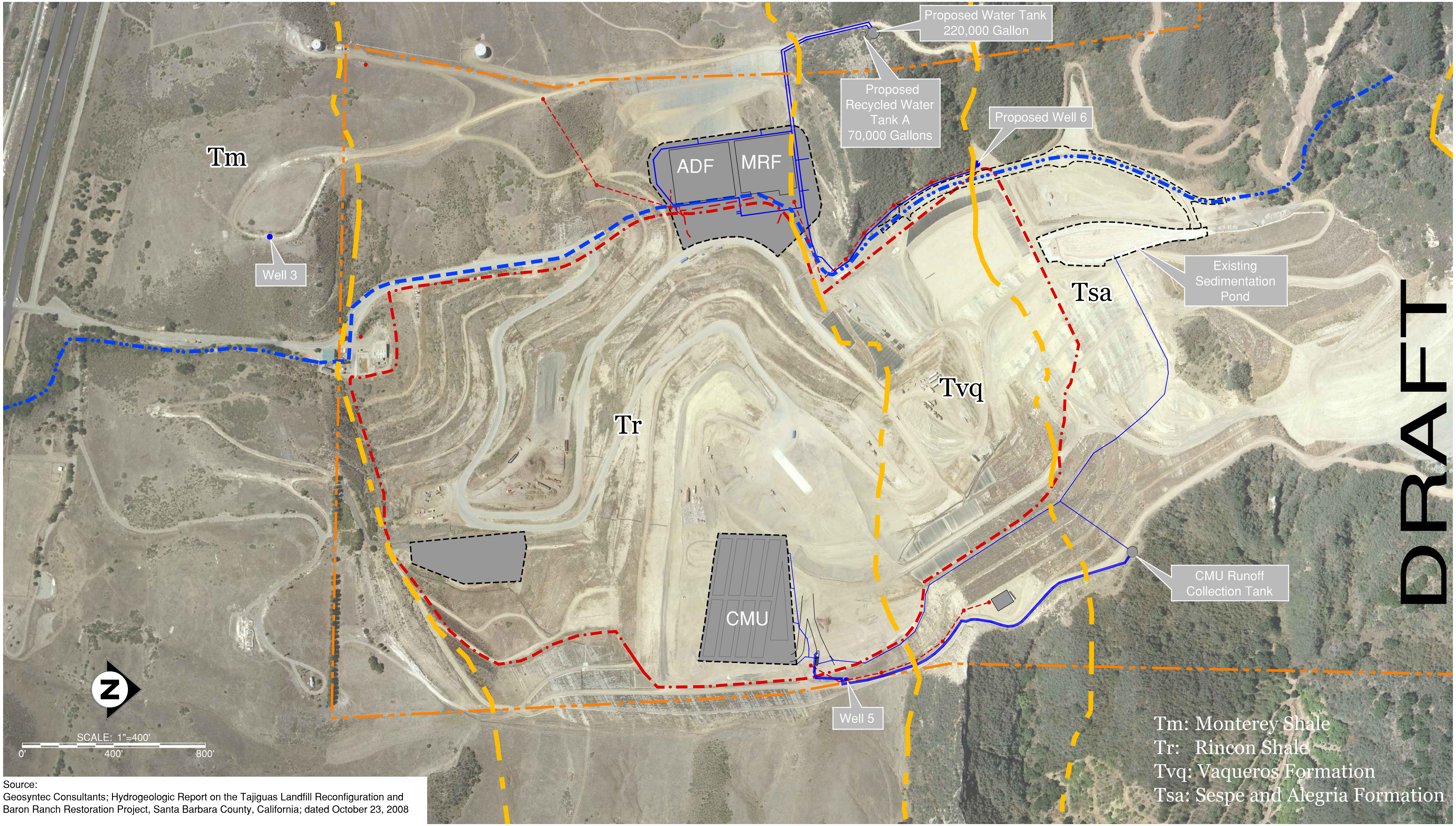
4.0 Water Distribution

The MRF and ADF water distribution network consists of a single 8” diameter main encircling the ADF and MRF facilities. Fire hydrants will be located opposite the exterior building faces. Fire hydrant leads will be 6” diameter. The building sprinkler systems will be fed with 6” leads. The domestic water systems will be fed from the 8” distribution main but will be protected by double check valve assemblies.

This analysis was performed based upon conceptual site design. The analysis should be re-visited when more detailed plans are available. Thank you for the opportunity to be of service to Mustang Renewable Power Ventures. If you have any questions, please contact the undersigned at 661-663-7732 or john@kularconsult.com

Sincerely,

John Kular, RCE 64920
President
John Kular Consulting



Source:
Geosyntec Consultants; Hydrogeologic Report on the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project, Santa Barbara County, California; dated October 23, 2008

W:\Projects\Tajiguas\Drawings\Exhibits\TRRP W-1 Hydrogeologic.dwg

Prepared by:

John Kular Consulting
10901 Rockridge Way, Bakersfield, CA 93311
661-663-7732 kularconsult.com

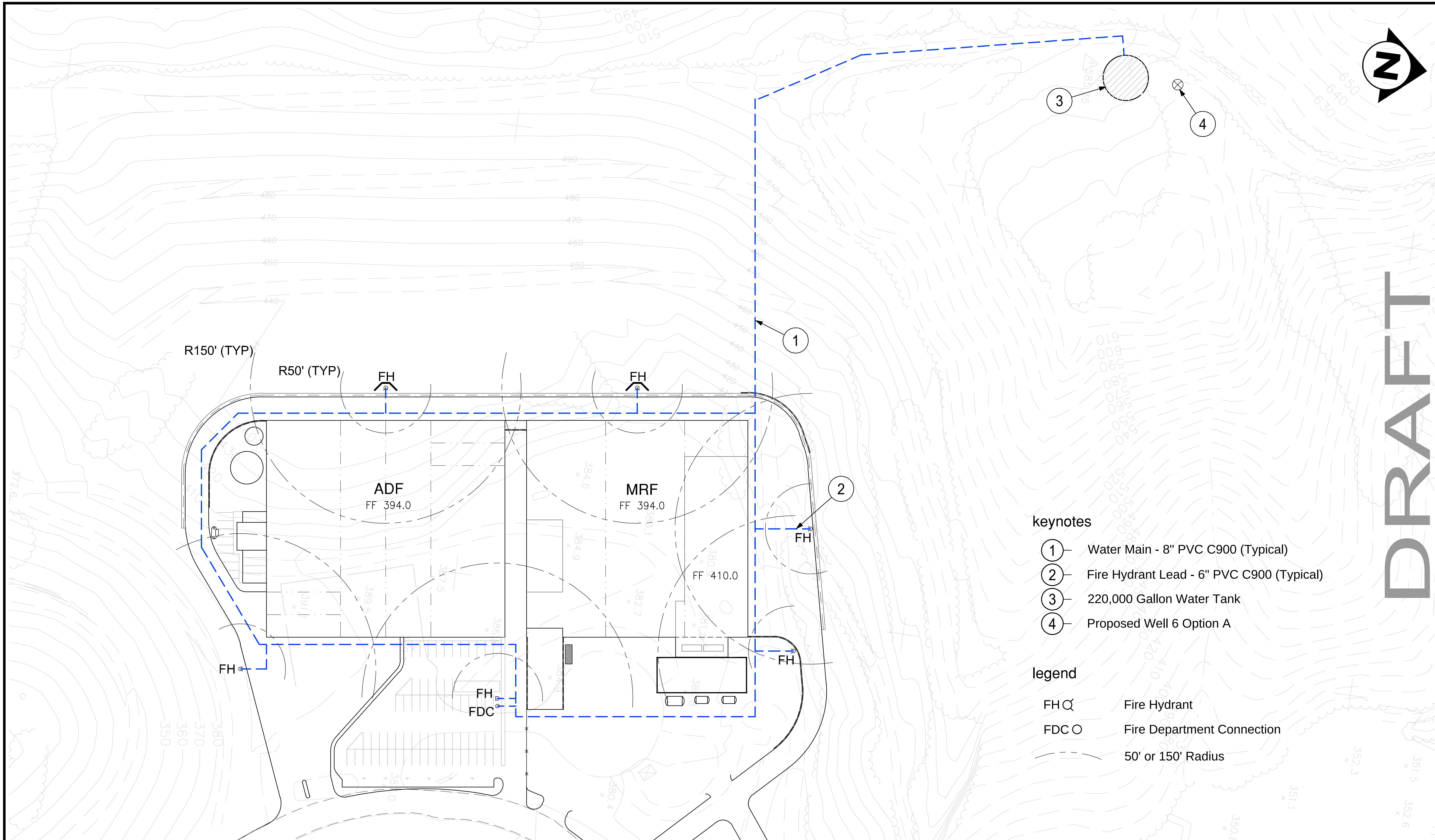
Legend

- Landfill Boundary
- Existing Water Lines
- Proposed Water Lines
- Well
- Contact Between Geologic Formations
- Pila Creek
- Pila Creek (Underground)
- Permitted Waste Disposal Area

Tajiguas Resource Recovery Project

Exhibit W-1

Hydrogeologic Units and Well Locations



prepared by
John Kular Consulting
10901 Rockridge Way, Bakersfield, CA 93311
661-663-7732 kularconsult.com

SCALE: 1"=400'
400' 200' 0' 200' 400'

Tajiguas Resource Recovery Project

Exhibit W-2

ADF & MRF Water Distribution and Fire Protection Plan

7/18/2012

Water Budget Workbook

Beta Version 1.01

May 11, 2010

Califonia Department of Water Resources
Statewide Integrated Water Management
Water Use and Efficiency Branch

This program calculates Maximum Applied Water Allowance (MAWA) and Estimated Total Water Use (ETWU) based on reference evapotranspiration from Appendix A in the Model Water Efficiency Landscape Ordinance

Instructions

Cells with pale blue background are for entering data
Results show in cells with tan background
Messages and warnings are displayed in cells with yellow background

1) Select city by clicking on pale blue cell and choosing a city from the drop down menu

ETo appears in the tan cell below the name of the city

2) Enter total landscape area, including Special Landscape Area (SLA)

SLA means an area of the landscape dedicated solely to edible plants , areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.

3) Enter square footage of SLA, if any

Required for additional water for SLA (0.3 ETAF accounts for the additional water)

4) MAWA results appear in the tan cells

5) If you are considering effective precipitation (Eppt), enter the value . Eppt is 25% of total annual precipitation

6) For comparison, MAWA without effective precipitation is displayed below

MAWA without Eppt (Gallons)

1,381,470.55

Maximum Applied Water Allowance Calculations for New and Rehabilitated Landscapes

Enter value in Pale Blue Cells
Tan Cells Show Results
Messages and Warnings

Click on the blue cell on right to Pick City Name	Santa Barbara	Name of City
ET_o of City from Appendix A	40.60	ET_o (inches/year)
Enter total landscape including SLA	78,408.00	LA (ft^2)
Enter Special Landscape Area	0.00	SLA (ft^2)
Results:		
MAWA = (ET_o) x (0.62) x [(0.7 x LA)+(0.3 x SLA)]	-	Gallons
	-	Cubic Feet
	-	HCF
	-	Acre-feet
	-	Millions of Gallons

MAWA calculation incorporating Effective Precipitation (Optional)

ET_o of City from Appendix A	40.60	ET_o (inches/year)
Landscape Area	78,408.00	LA (ft^2)
Special Landscape Area	0.00	SLA (ft^2)
Enter Effective Precipitation	5.75	Eppt (in/yr)
Results:		
MAWA=(ET_o - Eppt) x (0.62) x [(0.7 x LA)+(0.3 x SLA)]	1,185,913.16	Gallons
	158,534.06	Cubic Feet
	1,585.34	HCF
	3.64	Acre-feet
	1.19	Millions of Gallons

Estimated Total Water Use
Equation:

$ETWU = (ET_o) \times (0.62) \times [(PF \times HA/IE) + SLA]$

Enter values in Pale Blue Cells

Tan Cells Show Results

Messages and Warnings

Enter Irrigation Efficiency (equal to or greater than 0.71)	0.71
Irrigation Efficiency Default Value	0.71

Plant Water Use Type	Plant Factor
Low	0 - 0.3
Medium	0.4 - 0.6
High	0.7 - 1.0
SLA	1.00

Hydrozone	Plant Water Use Type (s) (low, medium, high)	Plant Factor (PF)	Hydrozone Area (HA) (ft^2)	PF x HA (ft^2)
1	Low	0.80	0	0
2	Medium	0.40	0	0
3	Medium	0.40	0	0
4	Low	0.30	78,408	23,522
5	Low	0.20	0	0
7	Low	0.30	0	0
				0
				0
				0
				0
				0
				0
				0
				0
				23,522
	SLA	1	0	0
		Sum	78,408	

Results

MAWA =	1,185,913	ETWU=	715,777	Gallons	**ETWU complies with MAWA**
			95,686	Cubic Feet	
			957	HCF	
			2.20	Acre-feet	
			0.72	Millions of Gallons	

TAJIGUAS RESOURCE RECOVERY PROJECT
TABLE 4 - WATER BUDGET
7/17/2012

Input | Calculated

Water Sources			ANNUAL	Units	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Totals/Aves	Source of data and/or calculation:
Rainfall depth			23.0	inches	5.3	6.0	3.5	0.8	0.8	0.2	0.0	0.1	0.0	2.2	2.0	2.1	23.0	CIMIS Calculator, Station 94 Goleta Foothills
	Monthly fraction				23%	26%	15%	3%	3%	1%	0%	0%	0%	10%	9%	9%	100%	
Compost Pad	Rainfall Runoff/mo			ft3	29,859	33,803	12,394	4,507	4,507	-	-	-	-	12,394	11,268	11,831	120,562	JKC Compost Calculations, Step 4 Assume 80% of monthly rainfall occurs in single event
	Leachate Runoff/mo			ft3	1,641	1,641	1,641	1,641	1,641	1,641	1,641	1,641	1,641	1,641	1,641	1,641	19,697	JKC Compost Calculations, Step 1
	Combined Runoff			ft3	31,500	35,444	14,036	6,148	6,148	1,641	1,641	1,641	1,641	14,036	12,909	13,472	140,259	
				GPD ave	7,855	8,839	3,500	1,533	1,533	409	409	409	409	3,500	3,219	3,360	2,915	
				Gals/Mo	235,654	265,156	105,001	45,996	45,996	12,279	12,279	12,279	12,279	105,001	96,571	100,786	1,049,278	
Combined Runoff			**3.220**	**acre-ft**	**0.723**	**0.814**	**0.322**	**0.141**	**0.141**	**0.038**	**0.038**	**0.038**	**0.038**	**0.322**	**0.296**	**0.309**	**3.220**	
Well 5 water supply			**0.000**	**acre-ft**							**-**	**-**	**-**					
			3.220	**acre-ft**														
MFR & ADF Buildings																		
Wash-down		1,000 GPD	1.120	acre-ft	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	1.120	Estimate
Domestic		1,745 GPD	1.955	acre-ft	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	1.955	CalGreen
Effluent & Combined Runoff Supply			**3.075**	**acre-ft**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**0.256**	**3.075**	wash-down, domestic & runoff
Effluent Supply		2,745 GPD	**3.075**	**acre-ft**	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,745	2,745	wash-down & domestic only
				Gals/Mo	82,350	82,350	82,350	82,350	82,350	82,350	82,350	82,350	82,350	82,350	82,350	82,350	988,200	
Water Uses			ANNUAL	Units	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
Compost watering	Monthly volume		**1.726**	**acre-ft**	**0.098**	**0.105**	**0.132**	**0.174**	**0.173**	**0.179**	**0.183**	**0.183**	**0.154**	**0.137**	**0.110**	**0.099**	**1.726**	JKC Compost calculations Step 7
				Gals/Mo	31,866	34,356	42,953	56,611	56,209	58,379	59,584	59,584	50,023	44,720	35,802	32,267	562,354	
	daily volume		1,562	GPD	1,062	1,145	1,432	1,887	1,874	1,946	1,986	1,986	1,667	1,491	1,193	1,076	1,562	
	apply runoff			GPD	7,855	8,839	3,500	1,533	1,533	409	409	409	409	3,500	3,219	3,360	2,915	1049278
	net surplus/(deficit)			GPD	6,793	7,693	2,068	(354)	(340)	(1,537)	(1,577)	(1,577)	(1,258)	2,009	2,026	2,284	1,353	
	apply stored water			GPD				354	340	1,537	1,577	1,577	1,258					
	apply well 5 water			GPD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	surplus (deficit)			GPD	6,793	7,693	2,068	0	(0)	0	0	0	(0)	2,009	2,026	2,284	1,353	
	Filtered discharge			GPD	3,000	2,500	2,000							2,500	2,500	2,500		0
	adjusted surplus (deficit)			GPD	3,793	5,193	68	0	(0)	0	0	0	(0)	(491)	(474)	(216)	1,353	
				Gals/Mo	113,788	155,800	2,048	5	(13)	11	5	5	(4)	(14,720)	(14,231)	(6,481)		
Tank A	Cumulative Storage			Gals	113,788	269,588	271,636	261,021	250,808	204,709	157,404	110,099	72,356	57,636	43,405	36,924		
Composting Area Runoff Collection Tank																		
					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual	
Biofilters	1	19%		GPD	901	891	810	702	672	484	342	356	366	556	782	945		ADF
	2	47%		GPD	2,159	2,136	1,942	1,681	1,610	1,161	819	854	877	1,332	1,874	2,264		MRF Recycle
	3	34%		GPD	1,584	1,567	1,424	1,233	1,181	851	601	626	643	977	1,374	1,660		MRF Tip Floor
	Total	100%		GPD	4,644	4,594	4,176	3,616	3,463	2,496	1,762	1,836	1,887	2,864	4,030	4,869		
				Gals/Mo	139320	137820	125280	108480	103890	74880	52860	55080	56610	85920	120900	146070		
Effluent supply 1/3 of effluent, R-O treated water					27176	27176	27176	27176	27176	27176	27176	27176	27176	27176	27176	27176	326106	0.94
Well 6 supplementary water					112145	110645	98105	81305	76715	47705	25685	27905	29435	58745	93725	118895	881004	Gallons
																	2.704	acre-ft
Landscape Irrigation	Monthly fraction				5%	6%	7%	10%	10%	11%	11%	11%	10%	8%	6%	5%	100.00%	CIMIS Calculator, Station 94 Goleta Foothills
Landscape Irrigation			**2.197**	**acre-ft**	**0.110**	**0.132**	**0.154**	**0.220**	**0.220**	**0.242**	**0.242**	**0.242**	**0.220**	**0.176**	**0.132**	**0.110**	**2.197**	DWR Water Budget Workbook
				Gals/Mo	35,787	42,944	50,101	71,573	71,573	78,730	78,730	78,730	71,573	57,258	42,944	35,787	715,731	
Landscape Irrigation need				GPD	1,193	1,431	1,670	2,386	2,386	2,624	2,624	2,624	2,386	1,909	1,431	1,193		Use Station 94 ET as monthly proportion for irrigation needs
Effluent 2/3 supply- R-O rejected water				GPD	1,839	1,839	1,839	1,839	1,839	1,839	1,839	1,839	1,839	1,839	1,839	1,839		
Biofilter discharge				GPD	92	92	92	92	92	92	92	92	92	92	92	92		
	Surplus water			GPD	738	500	261	(455)	(455)	(693)	(693)	(693)	(455)	22	500	738		
				Gals/Mo	22,147	14,989	7,832	(13,640)	(13,640)	(20,797)	(20,797)	(20,797)	(13,640)	675	14,989	22,147	(20,532)	
Tank B	Accumulated Storage			Gals/Mo	22,147	37,136	**44,968**	31,328	17,688	-	-	-	-	675	15,664	37,811		
Effluent Storage Tank																		

Compost Pad Area & Leachate Volume Calculations-Cornell University Model
Mustang TRRP Scenario 3C

Inputs:		**Outputs:**				
Output AD	66,900	Tonnes/yr	73,590	Tons/year		
Input Composting	111,500	Tonnes/yr	60/40 digestate/structural material			
Compost density	0.65	T/m3				
Conversion factors:	1.10	tons/Tonne	35.320	cf/m3	2,205	lbs/Tonne
Input Composting	122,906	tons/yr.				
Compost density	40.6	lbs/ft3				

Windrow Turning Activity		
15363	Tons (total mass of windrows)	
2373	Tons/hour (Vermeer CT 1010 capacity)	Max 3250 CY/hr
6.5	hours	

Dry weather leachate production

Step 1

122,906	tons/yr	compost
10,242	tons/mo.	compost
60%	initial moisture content by weight	
0.5%	moisture loss as leachate	
51.21	tons/mo.	leachate
3414	lbs/day	"
54.71	ft3/day	"
0.0006	cfs	"
0.28	gpm	"
409	gpd	"

Cured Compost Storage

Step 3

1	pile	
152	length	
100	width	
20	height	
404,800	Volume	should exceed cell F15
15,200	Area (ft^2)	
0.35	Area (Acres)	

Compost volume and area

Step 2

10,242	tons/mo.	Finished Compost 40%	4,097	tons/mo
40.6	lbs/ft3		49,163	TPY
504,888	ft3		11,690	T/Acre
1.5	months of compost finishing time			
757,332	revised compost volume			

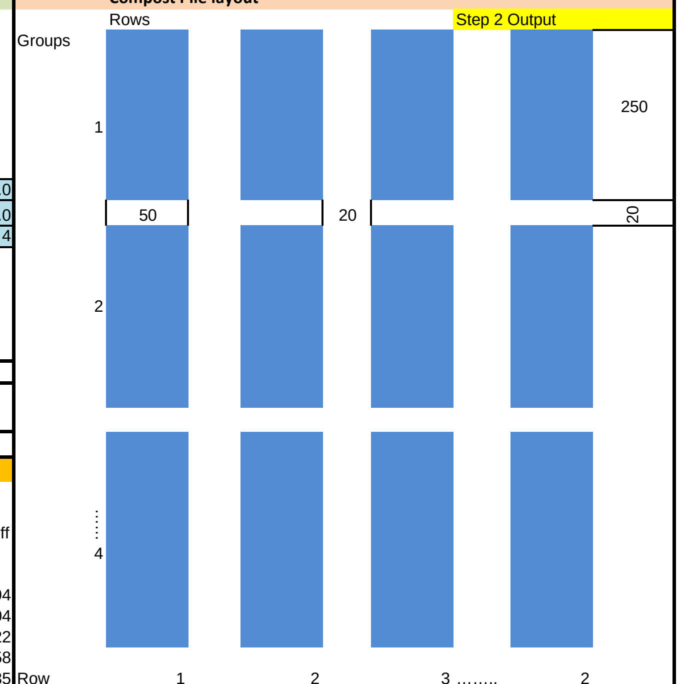
Row height and width based on Vermeer CT 1010 windrow turner

Row length (ft)	250	Row height (ft)	9.0
Distance between rows (ft)	20	Row width (ft)	50.0
Access distance (ft) (at end of rows)	20	Row groups	4

Total volume (ft^3)	757,332
X-section Area (ft^2)	369
Windrow length (ft)	250
Calculated # of rows	2.1
Actual # of rows	2
Area (ft^2)	**168,000**
Compost Area (acres)	**2.30**

Dimensions of Raw Storage Pad:		
Width	**300**	(ft)
Length	**560**	(ft)
	4.21	**Total Acres**

Compost Pile layout



Leachate Runoff

Step 4

Assume 24 hour storm duration, 60% of rainfall falls in 1 hour

Using actual site plan areas				Event	Rainfall depth	Surface Runoff	Rainfall on piles	Retained Volume	Compost runoff	Total runoff	Avg runoff rate
Gross Area	4.55		198,198	Month or Year	in.	ft3	ft3	ft3	ft3	ft3	ft3/s
bare surface	1.94	43%	84,506	APR, MAY	0.80	5,634	7,579	7,579	-	5,634	0.94
compost covered surfa	2.61	57%	113,692	FEB	6.00	42,253	56,846	56,846	-	42,253	7.04
50%	initial moisture content by weight			JAN	5.30	37,324	50,214	50,214	-	37,324	6.22
63%	moisture content at saturation			OCT	2.20	15,493	20,843	20,843	-	15,493	2.58
1,997	tons retained moisture			NOV	2.00	14,084	18,949	18,949	-	14,084	2.35
62,026	ft3 max. retained moisture			DEC	2.10	14,789	19,896	19,896	-	14,789	2.46
1.42	ac-ft max. retained moisture			2, MAR	3.50	24,648	33,160	33,160	-	24,648	4.11
				5	4.61	32,465	43,677	43,677	-	32,465	5.41
				10	5.55	39,084	52,582	52,582	-	39,084	6.51
				25	6.71	47,253	63,573	62,026	1,547	48,800	8.13
				50	7.56	53,239	71,626	62,026	9,600	62,839	10.47
				100	8.38	59,014	79,395	62,026	17,369	76,382	12.73

Evaporation Step 5

Summation of Compost Watering Step 7

Based on California Climate Weather Data Spreadsheet, provided by DWR

CIMIS Station no. 94 Goleta Foothills

Monthly ET	Fraction of annual total	Month	Monthly Evaporation (% of ET) 10%	Digestate Windrows Surface	Cured Compost Pile	Water required	Water required	Water required Evaporation	Evaporation	manipulation	heat	Total	total	Ave.
			in.	s.f.	s.f.	c.f.	gallons	acre-ft.	acre-ft.	acre-ft.	acre-ft.	acre-ft.	gal.	gal/Day
2.29	0.05	1	0.229	113,692	15,200	2,460	18,398	0.056	0.056	0.038	0.004	0.098	31,866	1,062
2.60	0.05	2	0.260	113,692	15,200	2,793	20,889	0.064	0.064	0.038	0.004	0.105	34,356	1,145
3.67	0.07	3	0.367	113,692	15,200	3,942	29,486	0.090	0.090	0.038	0.004	0.132	42,953	1,432
5.37	0.11	4	0.537	113,692	15,200	5,768	43,144	0.132	0.132	0.038	0.004	0.174	56,611	1,887
5.32	0.11	5	0.532	113,692	15,200	5,714	42,742	0.131	0.131	0.038	0.004	0.173	56,209	1,874
5.59	0.11	6	0.559	113,692	15,200	6,004	44,911	0.138	0.138	0.038	0.004	0.179	58,379	1,946
5.54	0.11	7	0.554	113,692	15,200	5,950	44,510	0.137	0.137	0.038	0.004	0.178	57,977	1,933
5.74	0.12	8	0.574	113,692	15,200	6,165	46,117	0.142	0.142	0.038	0.004	0.183	59,584	1,986
4.55	0.09	9	0.455	113,692	15,200	4,887	36,556	0.112	0.112	0.038	0.004	0.154	50,023	1,667
3.89	0.08	10	0.389	113,692	15,200	4,178	31,253	0.096	0.096	0.038	0.004	0.137	44,720	1,491
2.78	0.06	11	0.278	113,692	15,200	2,986	22,335	0.069	0.069	0.038	0.004	0.110	35,802	1,193
2.34	0.05	12	0.234	113,692	15,200	2,513	18,800	0.058	0.058	0.038	0.004	0.099	32,267	1,076
49.68	1.00		4.968			53,361	399,141	1.225	1.225	0.452	0.044	1.721	560,747	1,536

Compost aerobic digestion heat generated water loss Step 6

Compost weight processed 51.2 tons/mo.

102,422 lbs/mo

			water loss			annual
		lbs	c.f.	gallons	acre-ft	acre-ft
Assume	5% per month	5,121	80	595	0.002	0.02
	10% per month	10,242	159	1,190	0.004	0.04
	20% per month	20,484	318	2,379	0.007	0.09
	30% per month	30,727	477	3,569	0.011	0.13

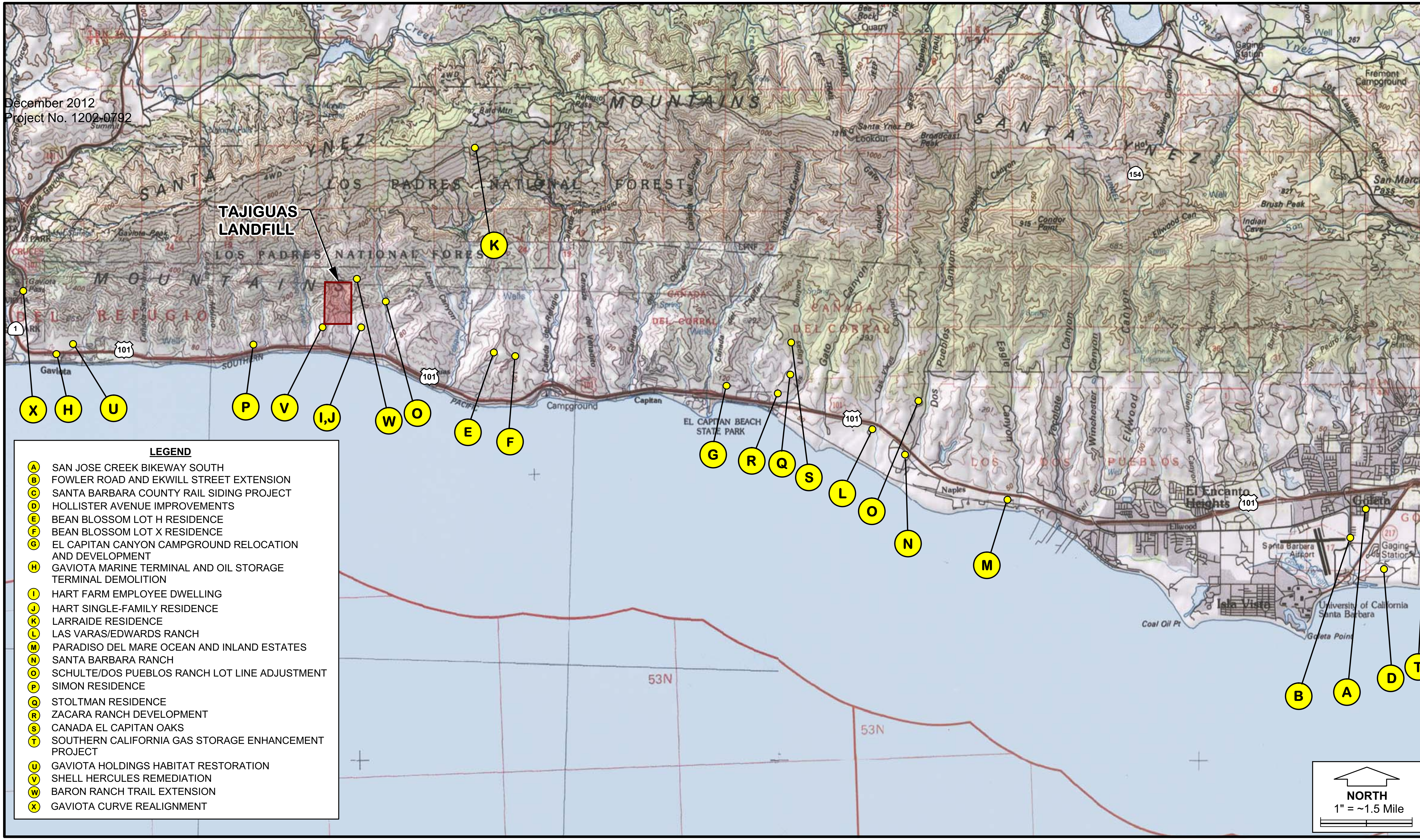
TRRP Water Budget Summary

Project Component	Water Use	Daily Use	Annual Use
		GPD	Acre-Feet/year
MRF	Domestic	1645	1.843
MRF	Wash-down	500	0.560
ADF	Domestic	100	0.112
	Wash-down	500	0.560
Biofilters	Humidification		
ADF		1350	1.512
MRF, sorting and recycling		3239	3.629
MRF, tip floor		2375	2.661
Scenario 1			
All facilities at Tajiguas, no water recycling			
Net water consumption at Tajiguas		9709	10.876
Scenario 2			
All facilities at Tajiguas, water recycling			
Gross water consumption		9709	10.876
recover 10% of humidification water		-971	-1.088
Recover 33% of effluent		-906	-1.015
Net water consumption at Tajiguas		7832	8.774
Scenario 3, Part 1			
MRF at SCRTS, ADF at Tajiguas			
Gross water consumption at Tajiguas		1950	2.184
recover 10% of humidification water		-135	-0.151
No recycling of effluent			
Net water consumption at Tajiguas		1815	2.033
Scenario 3, Part 2			
MRF at SCRTS			
Gross water consumption at SCRTS		8896	9.966
recover 10% of humidification water		-890	-0.997
No recycling of effluent			
Net water consumption at SCRTS		8006	8.969

Note:

Independent of all scenarios there is an additional 0.60 acre-ft/yr water use at the Composting Area. This figure is not included I the table above since the potential water source is a different well and hydrogeologic formation than the other TRRP facilities at Tajiguas Landfill.

APPENDIX B



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ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS
Tajiguas Landfill Resource Recovery Project

CUMULATIVE PROJECT LOCATION MAP
FIGURE 3-14