SAN DIEGO GAS & ELECTRIC COMPANY

EAST COUNTY SUBSTATION PROJECT
AMENDED CONSTRUCTION WATER SUPPLY PLAN

REVISED JULY 3, 2013

PREPARED BY:

BETA

PREPARED FOR:

SDGE

A Sempra Energy utility℠

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LIST OF ATTACHMENTS

1 – INTRODUCTION

This Construction Water Supply Plan (Plan) describes how San Diego Gas & Electric Company (SDG&E) and its contractors will ensure the availability of one or more confirmed and reliable water sources that, when combined, meet the full water supply needs for construction of the East County (ECO) Substation Project (Project). The Project involves the construction of a new 500/230/138 kilovolt (kV) ECO Substation, rebuild of the Boulevard Substation in a new location, and construction of an approximately 14-mile-long 138 kV transmission line, consisting of overhead and underground segments in southeastern San Diego County.

This Plan was prepared in accordance with Mitigation Measure (MM) HYD-3 of the Mitigation Monitoring, Compliance, and Reporting Program for the Project, which includes a requirement to submit documentation that identifies one or more reliable water sources that, when combined, will meet the Project's full water supply needs during construction.

2 – OBJECTIVES

The purpose of this Plan is to provide a narrative description of how MM HYD-3 is met, including the attachment of separate documents fulfilling the documentation requirement of the MM. The construction water supply sources presented in this Plan accomplish the following objectives:

- Provide a reliable source of construction water to be supplied at a rate required to meet the Project schedule objectives
- Provide documentation from one or more water/utility districts indicating the total amount of water to be provided and the time frame that the water will be made available to support the Project
- Provide documentation from one or more groundwater sources demonstrating SDG&E's ability to legally use water from the source and a study discussing the required elements of MM HYD-3

3 – MITIGATION MEASURE

The full text of MM HYD-3 is provided in the following paragraphs:

HYD-3: Identification of sufficient water supply
Prior to construction SDG&E will prepare comprehensive documentation that identifies one or more confirmed, reliable water sources that when combined meet the project's full water supply construction needs. Documentation will consist of the following:

> *Preparation of a Groundwater Study*. For well water that is to be used, the applicant will commission a groundwater study by a qualified hydrogeologist to assess the existing condition of the underlying groundwater/aquifer and all existing wells (with owner's

permission) in the vicinity of proposed well location/water sources. The groundwater study will evaluate aquifer properties and aquifer storage. The groundwater study will estimate short and long-term well water supplies from each well proposed to be used, and documentation indicating that each well is capable of producing the total amount of water to be supplied for construction from each well. The groundwater study will estimate short- and long-term impacts of the use of the well(s) on the local groundwater production (short-term extraction for construction water and ongoing O&M water), on all project wells, and on other wells in the project area. The groundwater study will include an assessment of the potential for subsidence brought on by project-related water use in the area. The applicant will provide demonstration of compliance will all applicable laws and regulations and will obtain a County of San Diego Major Use Permit for use of any proposed well within the County's jurisdiction prior to construction.

Documentation of Purchased Water Source(s). For water that is to be purchased from one or more water/utility district(s), the applicant shall provide written documentation from such district(s) indicating the total amount of water to be provided and the time frame that the water will be made available to the project. The Sweetwater Authority has provided written confirmation of water availability to support the project. Total confirmed water supplies from the combination of above documented sources shall equal the total gallons of water needed through construction of the project.

4 – CONSTRUCTION WATER SUPPLY NEEDS

The Project requires construction water for the following activities:

- Dust control
  - Substation pads and access roads
  - Transmission line access roads and tower pads
  - Construction yards
  - Pull sites, guard structure locations and other Project components

- Compaction of earth fill
  - Substation pads and access roads
  - Transmission line access roads and tower pads
  - Backfill of underground transmission line trenches

- Concrete pouring and washout
  - Underground transmission line duct banks

- Other miscellaneous activities
  - Restoration of Project sites and temporary irrigation equipment
  - Equipment/vehicle washing for weed control

The total estimated quantity of construction water required to construct the Project is approximately 50 million gallons over the 16-month construction period. Construction water will be required at a relatively low rate at the beginning and end of construction and will peak during mass grading of the ECO Substation pad. The peak daily rate of construction water use will be approximately 500,000 gallons. Construction water will be delivered to on-site storage facilities that will allow water to be delivered at a lower rate than the peak daily consumption rate. On-site storage facilities include the permanent detention basin described in Attachment A: Updated Project Description and ECO Substation Alternative Site, which was submitted to the California Public Utilities Commission (CPUC) on March 4, 2011, as part of SDG&E's comments on the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS). The permanent detention basin will be constructed during initial mass grading activities and will be lined to provide water storage during the later stages of pad grading and throughout construction of the ECO Substation. The maximum daily rate of water delivered to the Project will be on the order of approximately 300,000 gallons.

5 – CONSTRUCTION WATER SUPPLY SOURCES

The following have been identified and determined to be viable and reliable sources that will provide all of the construction water needs for the Project:

5.1 WATER/UTILITY DISTRICTS

- City of San Diego
  - Maximum total volume: 50 million gallons
- Jacumba Community Service District
  - Maximum total volume: 15 million gallons
- Live Oak Springs Water Company
  - Maximum total volume: 35 million gallons

A service confirmation letter, which is included as Attachment A: Service Confirmation Letter, City of San Diego, was issued from the City of San Diego Water Department confirming that 50 million gallons of water will be made available during construction of the Project. In addition, service confirmation letters have been issued from Jacumba Community Service District and Live Oak Springs Water Company, which are included as Attachment B: Service Confirmation Letter, Jacumba Community Service District Administrative Code and Attachment C: Service Confirmation Letter, Live Oak Springs Water Company, respectively.

SDG&E has also received a copy of Jacumba Community Service District's Domestic Water Supply Permit from the California Department of Health Services, which is included as Attachment D: Domestic Water Supply Permit, California Department of Health Services. The California Department of Health Services confirmed that the Jacumba Community Service District water system meets the criteria for and is classified as a community water system, as discussed on page 2 of the Domestic Water Supply Permit.

The San Diego County Zoning Ordinance requires a Major Use Permit (MUP) for "Groundwater Extraction Operations"; however, the ordinance excludes public water systems permitted by the Department of Health Services from the definition of a Groundwater Extraction Operation. Moreover, Government Code Section 53091(e) provides that "zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment or transportation of water," which exempts local agencies from applicable county or city zoning ordinances. As a result, an MUP for groundwater extraction located within the Jacumba Community Service District is not required from the County of San Diego. Confirmation from the County of San Diego that an MUP is not required is included as Attachment E: Withdrawal of Major Use Permit Application, County of San Diego.

5.2 GROUNDWATER SOURCES

- Wells located on the southeastern portion of the Campo Indian Reservation
    - Maximum total volume: 53.75 million gallons

A groundwater study and summary report, included as Attachment F: Environmental Navigation Services Inc. Report, was prepared by a qualified hydrogeologist to assess the existing condition of the underlying groundwater/aquifer and all existing wells located in the southeastern portion of the Campo Indian Reservation. The study evaluated the aquifer properties and storage capacity and found that the aquifer contained sufficient groundwater to support extraction of up to 53.75 million gallons during construction without impacting short- or long-term local groundwater production or wells in the Project area. The study also addressed the potential for subsidence.

Attachment 4 to Attachment F: Environmental Navigation Services Inc. Report includes a letter from Muht-Hei, Inc. confirming the legal authority of the Campo Band of Mission Indians to sell water for use off reservation for construction purposes without an MUP from San Diego County. This interpretation is consistent with San Diego Zoning Ordinance Section 1006(c), which states that "the Zoning Ordinance shall not apply to Indian Reservation lands within the County of San Diego."

The Final EIR/EIS estimated that construction of the Project would require the use of approximately 30 million gallons of water during construction. Although this Plan discusses an increase in the estimated amount of water needed for construction of the Project, this amount is still consistent with the analysis of impacts in the Final EIR/EIS.

6 – PLAN IMPLEMENTATION

Implementation of this Plan will be achieved by pre-construction planning in the following sequence:

1. Identify potential construction water sources
2. Investigate availability and deliverable water volume for each potential source
3. Obtain a groundwater study performed by a qualified hydrogeologist for all groundwater sources
4. Confirm compliance with all applicable laws and regulations
5. Execute service agreements with each approved source prior to construction

All of the sources identified in this Plan have been determined to be available sources with the deliverable quantities listed in Section 5 – Construction Water Supply Sources. It is anticipated that two or more of these sources will be used during construction. The overall goal is to use the sources closest to the Project site to minimize transportation costs and impacts.

Construction water from the City of San Diego Water Department is assumed to be available at any time over the entire construction period of the Project, and by itself would be able to supply the entire construction water quantity for the Project, but requires long-distance trucking to the site. The Jacumba Community Service District, Live Oak Springs Water Company, and Campo Indian Reservation have been confirmed as compliant with applicable laws and regulations to provide water for construction of the Project, as discussed in Section 5 – Construction Water Supply Sources. In addition, the associated service confirmation letters and groundwater study have been included as attachments to this Plan. The Jacumba Community Service District, Live Oak Springs Water Company, and Campo Indian Reservation are much closer to the Project site, and will be utilized together with water from the City of San Diego to meet the peak daily volume requirements. These sources collectively provide sufficient capacity to meet the Project's construction water needs.

SDG&E will document compliance with MM HYD-3 throughout construction through submittal of a monthly water consumption report to the CPUC.

7 – MONITORING PLAN

Non-water utility/districts (i.e., Campo Indian Reservation) that are not subject to regulation by Title 22 of the California Code of Regulations (CCR) Section 64554, New and Existing Source Capacity, will implement monitoring to assess potential impacts to water levels and sensitive groundwater ecosystems. All groundwater production wells supplying construction water and existing residential/monitoring wells within the 0.5-mile radius of the production wells will be monitored. In the event that a property owner chooses to not participate in the monitoring program, documentation will be provided to the CPUC indicating that the property owner chose to not participate in the testing program.

Each groundwater production well will be fitted with a meter to document the volume of water pumped. Volumes will be recorded on a daily basis during production and reported weekly to the CPUC. In order to monitor long-term water level trends, pressure transducers will be installed in each groundwater production well and residential/monitoring wells. The pressure transducers will be programmed to record measurements every 15 minutes. In addition to these automatically recorded water level measurements, manual depth-to-water measurements will be taken at each well on a monthly basis during periods of groundwater pumping using a water level sounder. The date and time of measurement, the measuring point elevation (in feet above mean sea level), and the status of well pumping will be recorded, along with depth-to-water measurements. Water level elevation will be calculated by subtracting the depth-to-water measurement from the measuring point elevation. All water level data will be provided to the CPUC on a monthly basis in a digital format (e.g., Microsoft Excel) for the duration of the Project.

8 – REFERENCES

County of San Diego. Zoning Ordinance. Online. http://www.sdcounty.ca.gov/dplu/zoning/index.html. Site visited September 24, 2012.

ECO Substation Project. Final Environmental Impact Report/Environmental Impact Statement. 2012. Online. http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/ECO_Final_EIR-EIS.htm. Site visited May 23, 2012.

ATTACHMENT A: SERVICE CONFIRMATION LETTER, CITY OF SAN DIEGO

THE CITY OF SAN DIEGO

January 11, 2013

Mr. Don Houston
Environmental Project Manager
San Diego Gas & Electric

Dear Mr. Houston:

The City of San Diego Public Utilities Department (PUD) has been contacted by San Diego Gas & Electric (SDG&E) regarding construction of the SDG&E East County Substation Project (Project) located near Jacumba, California. The Project will require construction water for grading, fire suppression, dust control and other construction related activities. The permitting authority for the Project, the California Public Utilities Commission (CPUC), requires that SDG&E and its contractors obtain written documentation from all potential sources of construction water stating that a specific quantity of water will be available for use on the Project during a specified period of time.

PUD issued a Fire Hydrant Meter Permit (Permit) to SDG&E's construction contractor, Beta Engineering, on November 14, 2012. The Permit includes a meter install date of November 26, 2012, and is valid for 1 year. An extension may be requested by the applicant prior to expiration of the Permit.

At the request of SDG&E, PUD hereby confirms that up to 50 million gallons of water shall be available for Project use during the period November 26, 2012 through November 26, 2013. Upon approval of an extension of the Permit, the use period may be extended through November 26, 2014.

Walter Cooke
Water Production Superintendent
Public Utilities Department, System Operations Division

TF\jm

cc: Jesus Meda, Deputy Director, PUD, System Operations Division
Stan Medina, Deputy Director, PUD, Construction and Maintenance Division
Johnny Mitchell, Water Systems District Manager, PUD, Construction and Maintenance Division

Public Utilities Department
2797 Caminito Chollas • San Diego, CA 92105-5097
Tel (619-) 527-7470 Fax (619) 527-8098

ATTACHMENT B: SERVICE CONFIRMATION LETTER, JACUMBA COMMUNITY SERVICE DISTRICT ADMINISTRATIVE CODE

JACUMBA COMMUNITY SERVICE DISTRICT
JACUMBA COMMUNITY PARK
1266 RAILROAD STREET
PO BOX 425
JACUMBA, CA 91934
(619)766-4359 PHONE
(619)766-9061 FAX

October 2, 2012

Beta Engineering California LP
9990 Mesa Rim Road, Suite 150
San Diego, CA 92121

Attn: Brian Donald, PE
Project Manager

Subject: **SDG&E East County Substation Project**
Construction Water

Dear Donald,
Jacumba Community Service District has been contacted by Beta Engineering regarding construction of the SDG&E East County Substation project located near Jacumba, California scheduled to begin in the near future. The project will require construction water for grading and dust control activities. The permitting authority for the project, the California Public Utilities Commission (CPUC), requires that SDG&E and its contractors obtain documentation from all potential sources of construction water stating that a specific quantity of water will be available for the project construction over a specific time period.

Jacumba Community Service District understands that Beta Engineering is exploring the feasibility of several sources of construction water for the project. It is possible that a significant portion of the construction water needs will be met by obtaining commitments from these other sources.

At the request of Beta Engineering, Jacumba Community Service District hereby confirms that up to 15 million gallons of non potable water, dependent on the water table will be available for project use from the Jacumba Community Service District over a 20 month period beginning November 1, 2012 ending on July 1, 2014.

Sincerely,
Jacumba Community Service District

Tom Lindenmeyer
General Manager

ATTACHMENT C: SERVICE CONFIRMATION LETTER, LIVE OAK SPRINGS WATER COMPANY

Live Oak Springs Water and Power Company
37820 Old Highway 80, P.O. Box 1241, Boulevard, CA 91905 * 619-889-8666
nazar@liveoaksprings.com

October 26, 2012

Beta Engineering California LP

Attn: Brian Donald, PE
Project Manager

Subject: East County Substation Project
Construction Water

Dear Mr. Donald,

This is confirmation that water is available at Live Oak Springs Water Company.

Live Oak Springs Water Company has been contacted by Beta Engineering (BETA) regarding construction of the SDG&E East County Substation project located near Jacumba, California scheduled to begin in the near future, and as we understand it water sold to Beta by LOSWC would be used for grading, dust control and other construction related activities.

Based on our experience and production of water for other projects in the past, Live Oak Springs Water Company confirms that up to 35 million gallons of water or more will be available for project use from the Live Oak Springs Water Company over a 20 month period beginning November 1, 2012 and ending on July 1, 2014, or later.

Sincerely,

Nazar Najor

Nazar Najor, Manager
Live Oak Springs Water Company

ATTACHMENT D: DOMESTIC WATER SUPPLY PERMIT, CALIFORNIA DEPARTMENT OF HEALTH SERVICES

State of California—Health and Human Services Agency
Department of Health Services

California
Department of
Health Services

DIANA M. BONTÁ, R.N., Dr. P.H.
Director

GRAY DAVIS
Governor

December 30, 2002

Tom Lindenmeyer
General Manager
PO Box 425
Jacumba, CA 91934

Dear Mr. Lindenmeyer:

JACUMBA COMMUNITY SERVICE DISTRICT - SYSTEM NO. 3710011
FULL SYSTEM PERMIT (NO. 05-14-02P-015)

The State Department of Health Services has issued a domestic water supply permit for the Jacumba Community Service District. The permit and engineering report are enclosed. Please advise the Department in writing within 30 days if you do not agree to the permit or the permit conditions.

If you have any questions regarding this letter, please contact Roger Keister at (619) 645-2573 or myself at (619) 525-4497.

Sincerely,

Brian Bernados, P.E.
District Engineer
San Diego District

cc: County of San Diego, Department of Environmental Health

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STATE OF CALIFORNIA

DEPARTMENT OF HEALTH SERVICES

Certificate of Issuance

OF A

WATER SUPPLY PERMIT

TO

JACUMBA COMMUNITY SERVICE DISTRICT

This is to certify that a water supply permit (**Permit # 05-14-02P-015**) has been issued to the Jacumba Community Service District on **September 30, 2002**, to supply water for domestic purposes to the City of Jacumba. The permit was issued by the Department of Health Services, pursuant to the provisions of Division 104, Part 12, Chapter 4, Article 7, of the California Health and Safety Code. The permit is subject to the requirements of Title 22, California Code of Regulations, and to the conditions provided in the water supply permit.

A copy of the water supply permit is on file with the Jacumba Community Service District or may be obtained by contacting the San Diego District Office of the Department of Health Services, Drinking Water Field Operations Branch, 1350 Front Street, San Diego, CA 92101.

Brian Bernados

Brian Bernados P.E., San Diego District Engineer

STATE OF CALIFORNIA

DOMESTIC WATER SUPPLY PERMIT

Issued To

JACUMBA COMMUNITY SERVICE DISTRICT

3710011

By The

California Department of Health Services,

Division of Drinking Water & Environmental Management Branch

PERMIT NUMBER 05-14-02P-015 DATE: 12/30/2002

WHEREAS:

1. The Jacumba Community Service District water system was inspected on December 13, 2002, by the California Department of Health Services to issue a new public water system permit.

2. This public water system is known as the Jacumba Community Service District whose headquarters is located on 1266 Railroad Street, Jacumba, CA 91934.

3. The legal owner of the Jacumba Community Service District water system is the Jacumba Community Service District. The Jacumba Community Service District, therefore, is responsible for compliance with all statutory and regulatory drinking water requirements and the conditions set forth in this permit.

4. The public water system is as described briefly below (a more detailed description of the permitted system is described in Section 1.3 of the attached Permit Report):

   The water system is a small community water system that supplies water for domestic purposes to approximately 500 residents through 234 service connections. The Jacumba Community Service District obtains water from two wells. The primary source is well No. 4 and well No. 5 is the secondary source. The District maintains 2 different pressure zones with 1 booster station and one 0.2 MG bolted steel reservoir for storage of treated water. There are no interconnections with any other water system.

5. The service area of the Jacumba Community Service District shall be discussed in section 1.5 of the Permit Report.

And WHEREAS:

1. The Jacumba Community Service District has submitted all of the required information relating to the proposed operation of the Jacumba Water System.

2. The California Department of Health Services has evaluated all of the information submitted by the Jacumba Community Service District.

3. The California Department of Health Services has the authority to issue domestic water supply permits pursuant to Health and Safety Code Section 116540.

THEREFORE: The California Department of Health Services has determined the following:

1. The Jacumba Community Service District water system meets the criteria for and is hereby classified as a community water system.

2. The water system has demonstrated that Jacumba Community Service District water system has sufficient source capacity to serve the anticipated water demand for at least 5 years.

3. The design of the water system complies with the Water Works Standards and all applicable regulations except that Well No. 4 does not have a 50 ft. sanitary seal.

4. Provided the following conditions are complied with, the Jacumba Community Service District water system should be capable of providing water to consumers that is pure, wholesome, and potable and in compliance with statutory and regulatory drinking water requirements at all times.

THE JACUMBA COMMUNITY SERVICE DISTRICT IS HEREBY ISSUED THIS DOMESTIC WATER SUPPLY PERMIT TO OPERATE THE JACUMBA COMMUNITY SERVICE DISTRICT WATER SYSTEM.

The Jacumba Community Service District (District) shall comply with the following permit conditions:

Safe Drinking Water Act

1. The District shall comply with all State laws applicable to the District, including, but not limited to the Health and Safety Code and any regulations, standards, or orders adopted there under.

Approved Sources & Treatment

2. This permit authorizes the District to use the following sources: Well No. 4 as the primary source and Well No. 5 as a standby source.

Source	Status	Capacity	PS Code
Well No. 4	Active	200 gpm	3710011-004
Well No. 5	Standby	180 gpm	3710011-005

3. The District shall provide reliable chlorination for Wells No. 4 and Well No. 5 at all times. The only approved treatment includes the following process:

Facility	Treatment	Location/Remark
Chlorinator	Sodium Hypochlorite	At Well Head

4. The District will generate an Emergency Chlorination Plan and submit a copy to the Department by March 31, 2003.
5. No changes, additions, or modifications shall be made to the sources or treatment in Provisions No. 2 and 3 unless an amended water permit has first been obtained from the Department.
6. By July 1, 2003, the District shall drill, equip, and test a new well.

Maximum Contaminant Levels

7. All water supplied by the District for domestic purposes shall meet all Maximum Contaminant Levels (MCLs) established by the State Department of Health Services. If the water quality does not comply with the California Drinking Water Standards, treatment shall be provided to meet standards.

Cross-Connection Control Program

8. The District must submit a copy of their cross-connection control ordinance to the Department by March 31, 2003.
9. The District must establish a contract with a certified cross-connection control specialist by March 31, 2003.
10. The District shall maintain an active cross-connection control program in accordance with the Regulations Relating to Cross-Connections, California Code of Regulations, Title 17. All cross connections shall be abated within 30 days of their identification.

Annual surveys shall be conducted thereafter. Backflow prevention devices shall be tested at least yearly. The District shall submit an annual report to the Drinking Water Field Operations Branch system outlining the cross-connection control program for the previous year including the name and certification of the person assigned to the program, number of inspections made, number of backflow devices installed in the system and the number of devices tested and repaired.

Water Quality Monitoring

11. The District shall generate a Disinfectants/Disinfection Byproduct rule monitoring plan by March 31, 2003.

12. Prior to using a new source, and to continue using the existing source for domestic purposes, bacteriological and complete chemical analysis of the water produced, including general mineral, general physical, inorganic chemicals, nitrates, and nitrites shall be submitted to the SDHS-DWFOB, San Diego District Office, to determine compliance with the California Drinking Water Quality Standards. The analyses shall be made by an approved laboratory and shall be submitted on state approved forms

13. Prior to using a new well the District shall obtain and submit to the Department, copies of the geological logs (State Well Driller's Report), completed well data forms and plot plan of the well sites showing all sources of contamination within 200 feet of the wells.

14. The District shall monitor the distribution system for bacteriological water quality according to a Department-approved Coliform Sample Siting Plan. A bacteriological analyses report shall be submitted to this office by the tenth of the month following sampling signed by the Manager, Superintendent, or Chief Operator including a list of water quality complaints and any reports of waterborne illnesses received from consumers.

15. Pursuant to CCR, Title 22, Section 64451, all water quality monitoring results obtained in a calendar month shall be submitted to the Department on paper by the tenth day of the following month.

16. Pursuant to CCR, Title 22, Section 64451, all chemical analysis shall be performed by a State-certified laboratory. The District must require their contract laboratory to report water quality results to the Department using Electronic Data Transfer (EDT) using the Primary Station Code (PS_Code). This requirement excludes bacteriological monitoring, which shall be submitted directly to the Department on paper.

17. The District shall contact this office by phone concerning any acute violation or the occurrence of a hazardous situation in a timely manner. MCL violations will require public notification and corrective action.

Storage Reservoirs Basic Design

18. The storage reservoirs shall comply with the California Waterworks and American Water Works Association (AWWA) design and construction standards. Distribution reservoirs shall be covered. Vents, overflows, drain outlets and other openings shall be located and constructed to protect the water in the reservoir from contamination. Vents and overflows shall be screened and adequately air-gapped to prevent cross-connections. Overflows shall be large enough to dispose of reservoir overflow rates equal to the maximum reservoir-filling rate. Provisions shall be made to facilitate removal of floating material from the free water surface and for dewatering the

reservoir. Outlets shall be designed and constructed to minimize movement of sediment from the reservoir floor to the distribution system water mains. Provisions shall be made for isolating the reservoir(s) and appurtenant facilities from the distribution system without causing pressure problems in the distribution system.

19. Distribution reservoir sites shall not be used for non-water works purposes that would either result in unrestricted public access, compromise security, or create a contamination hazard.

20. Reservoirs shall be disinfected and sampled for bacteriological quality in accordance with the AWWA procedures for disinfecting tanks and reservoirs prior to domestic use.

Storage Reservoir Coating/lining

21. The District shall use only NSF drinking water approved reservoir coatings, linings and their adhesives for its storage reservoirs. Otherwise, a VOC sample shall be collected after the newly coated/lined reservoir is filled and a minimum 5 day soaking period is allowed. In addition to the chemicals on the standard list (Method 524) analyses shall be made for ortho-Xylene, para-Xylene, meta-Xylene, methylethylketone (MEK), methylisobutylketone (MIBK) and any other solvent in the coating/lining adhesive included in the material Safety Data Sheet (MSDS) must also be included in the sample analysis. The results of the VOC analysis must be submitted to the Department.

Distribution System

22. The distribution system shall comply with all applicable California Waterworks and American Water Works Association (AWWA) design and construction standards and in compliance with the SDHS-DWFOB Guidelines for the Separation of Water and Sewer Lines. At least 10 feet horizontal and 1-foot vertical separation shall be maintained between the water and sewer lines. Water lines should always cross above sewer lines. Special construction standards and materials shall be provided where the minimum separation cannot be met.

Direct Additives

23. Pursuant to CCR, Title 22, Section 64700, no chemical or product shall be added to the drinking water as part of the treatment process unless it has been certified as meeting the specifications of the American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 60.

Annual Report to DHS

24. The District shall submit the Annual Report on the status and condition of the domestic water system as directed by the Department.

This permit supersedes all previous domestic water supply permits issued for this public water system and shall remain in effect unless and until it is amended, revised, reissued, or declared to be null and void by the California Department of Health Services. This permit is non-transferable. Should the Jacumba Community Service District water system undergo a change of ownership, the new owner must apply for and receive a new domestic water supply permit.

Any change in the source of water for the water system, any modification of the method of treatment as described in the Permit Report, or any addition of distribution system storage reservoirs shall not be made unless an application for such change is submitted to the California Department of Health Services.

This permit shall be effective as of the date shown below.

FOR THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES

Brian Bernados

Brian Bernados, PE
District Engineer

Dated: 12-30-02

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ATTACHMENT E: WITHDRAWAL OF MAJOR USE PERMIT APPLICATION, COUNTY OF SAN DIEGO

ERIC GIBSON
DIRECTOR

County of San Diego

DEPARTMENT OF PLANNING AND LAND USE

5201 RUFFIN ROAD, SUITE B, SAN DIEGO, CALIFORNIA 92123-1666
INFORMATION (858) 694-2960
TOLL FREE (800) 411-0017
www.sdcounty.ca.gov/dplu

November 21, 2011

ESJ U.S. Transmission LLC.
Alberto Abreu, Director Project Development
Sempra Global
101 Ash Street, HQO8B
San Diego, CA 92101

WITHDRAWAL OF MAJOR USE PERMIT APPLICATION

CASE NUMBERS: 3300-10-014 (P); ER. 09-22-001 PROJECT NAME: ESJ-US Generation-Tie Line Project; Old Highway 80, Jacumba, Mountain Empire Subregional Planning Area; APN; 660-040-32

Dear Mr. Abreu:

The Department of Planning and Land Use (DPLU) has determined that the Major Use Permit for groundwater extraction located within the Jacumba Community Service District is not required. The zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water….." Gov. Code, section 53091(e). This exemption applies to the facilities of public agencies, such as water districts. Therefore, the County has withdrawn your Major Use Permit Application and has reversed $3060 back to your trust PLU trust account 09-0107420, for the time spent processing the application. If you have any questions or need additional information, please contact me at (858) 694-301, Patrick Brown or at Patrick.Brown@sdcounty.ca.gov

Sincerely,

Patrick P. Brown

Patrick Brown, Project Manager
Project Planning Division

cc: AECOM, Inc. Michael Page, 1420 Kettner Boulevard, Suite 500, San Diego, CA 92101
Ed Sinsay, Team Leader, Department of Public Works, M.S.O650
David Sibbet, Planning Manager, Department of Planning and Land Use M.S.O650

ATTACHMENT F: ENVIRONMENTAL NAVIGATION SERVICES INC. REPORT

Mr. Jed Francis
Jed Francis, Inc. (JFI)
9530 Haggeman Road
Bakersfield, CA 93312

June 14, 2013
8 pages plus attachments

RE: Evaluation of Short-term Construction Water Supply Obtained from the Southeastern Portion of the Campo Indian Reservation.

ENSI has prepared this summary report per your request to evaluate the potential short-term water supply using water wells located within the southeastern portion of the Campo Indian Reservation (**Figures 1 and 2**, the "Site"). This is an area that has been considered to be used to provide construction water for the previously-proposed Campo Landfill, and for the Shu'luuk Wind Project. It is understood that the Shu'luuk Wind Project will not require water for the next two years and the Campo Kumeyaay Nation Government (formerly known as the Campo Band of Mission Indians) has recently approved the use of the Site for your commercial purposes.

Under consideration by JFI is a contract to supply construction water to support the construction of a SDG&E electrical power substation known as the East County (ECO) Substation Project[1]. The 58-acre substation will be located at 47317 Old Highway 80, Jacumba, between Interstate 8 and the U.S./Mexico Border. It is understood the Project will require 150 AcFt of water over an approximately 2-year construction period. Thus this evaluation considers the short-term (maximum 2-year, potentially less) production of non-potable construction water from the Site. Water requirements are expected to vary over time, with the bulk of the water needed this year. The proposed groundwater demand is estimated to be 165 AcFt, assuming an additional 10% to allow for losses prior to use.

This summary is intended to provide the information request described in mitigation measure MM HYD-3, associated with the San Diego Gas & Electric East County Substation Project (Application A.09-08-003) Final Environmental Impact Report/Environmental Impact Statement. A description of MM HYD-3 is included as **Attachment 1**.

The proposed water supply is located within 1,462 acre watershed within a sparsely inhabited portion of the Camp Indian Reservation. Multiple wells are available for use within the central portion of the watershed (**Figure 2**). As further detailed in this summary report the aquifer system is primarily comprised of highly weathered granitic rock (tonolite) with a storage capacity of 2,559 acre-feet (AcFt[2]). Annual rainfall in the watershed is approximately 15 inches per year, with an annual average recharge rate of 230 AcFt/yr. Based on review of the potential impact of short-term (maximum 2-year) groundwater use, 165 AcFt can be obtained from the Site without significant impacts. Over two years the current residential and proposed demand would total 177 AcFt, approximately equal to the long-term annual extraction rate of 173 AcFt/yr determined from long-term historical rainfall data and recharge rates further described in **Attachment 2**.

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[1] A Project description is available at: http://www.sdge.com/key-initiatives/eco-substation/eco-substation-project

[2] This summary reports water volume in acre-feet, the amount of water that can cover one acre to a depth of one foot (approx.. 326,000 gallons). For reference 165 AcFt would be required to irrigate approximately 40 to 55 acres of alfalfa.

Included in this summary letter is supporting information specific to:

- Aquifer Description, Recharge, and Storage
- Proposed Water Supply Wells
- Groundwater Demand and Potential Impact of Pumping
- Potential for Subsidence
- Compliance with Laws
- Conclusion

It is based on the following:

- *Water Supply Evaluation Proposed Campo Landfill Project.* Dated October 8, 2008. Prepared for BLT, Inc. Prepared by Environmental Navigation Services, Inc. (ENSI, 2008) This report was included in the Draft Campo Regional Landfill Supplemental EIS, dated February 2010, prepared by the US Bureau of Indian Affairs (BIA).

  The ENSI (2008) report evaluated whether the proposed landfill project demand could be met over the 30 year landfill operation period - it did not examine the maximum sustainable water extraction rate.

- Re-examination of the impact of water production described in ENSI, 2008 to examine the long-term sustainable pumping rate using significance criteria currently used by the County of San Diego Department of Planning and Land Use. The 2008 study was also updated to include rainfall date through June 2013. The long-term rate of water extraction for the Site has been determined to be 173 AcFt/year for the 1,462 acre watershed.

  Relevant portions of the previous report have been revised, together with updated water balance calculations (Excel spreadsheets), and are included in **Attachment 2**.

- Recent well testing and preparation work conducted by JFI specific to existing wells HG-21A, and HG-60. These wells have a combined tested capacity of 160 gpm, or 256 AcFt per year. Additional capacity may also be provided by well HG-31 and other wells available for use within the area depicted in **Figure 2**. [**Attachment 3**]

Aquifer Description, Storage, and Recharge

<u>Aquifer Description</u>
The water supply is based on a 1,462-acre watershed located within the southeastern portion of the Campo Indian Reservation (**Figure 2**). Field observations demonstrate the rock exposed within the watershed is a highly weathered granitic rock known as tonolite. The area is generally covered in soils developed in place by extensive weathering (**Figure 3**), with limited exposures/outcrops of rock. The surficial rock, locally described as decomposed granite (DG), transitions with depth to unweathered rock.

From a hydrogeologic perspective, the aquifer (or hydrogeologic unit) is entirely within one granitic rock type- tonolite. Groundwater within the aquifer system is generally described to occur under unconfined conditions with the majority of groundwater in storage occurring within the DG. The depth to groundwater varies from approximately 8 to 90 ft below ground surface, and generally decreases (gets nearer to ground surface) in the lower elevations of the watershed. Water levels within the watershed vary seasonally in response to rainfall recharge that primarily occurs during winter.

Underlying the DG is unweathered bedrock. Water storage and transmission in the bedrock is comparatively limited due to fracture flow conditions. Variable confined to unconfined conditions are expected to occur depending on the interconnectivity of the fracture network and DG relative to wells completed in the aquifer system.

Groundwater Storage

Groundwater occurs in an aquifer system comprised of both weathered and unweathered tonolite (DG). This water supply analysis focuses on the extent and thickness of saturated DG because this is the portion of the aquifer that stores the majority of groundwater. The extent of saturated DG in the watershed is shown in **Figure 4** (from ENSI, 2008). For purposes of this water supply evaluation it is assumed that an average of 30 feet of saturated DG occurs in the watershed. The calculation is based on the contour map of the saturated thickness of DG in the watershed as follows:

Area 0 to 20 ft: 1462 acres, with an average of 5 ft of saturated DG
Area 20 to 60 ft: 671 acres, with an average of 40 ft of saturated DG
Area 60 to 100 ft: 222 acres, with an average of 80 ft of saturated DG
Area > 100 ft: 110 acres, with an average of 110 ft of saturated DG

Groundwater in storage is calculated based on the types and volume of rock as detailed in **Attachment 2** where DG has a storage capacity of 5%, and underlying rock has a storage capacity of 0.05% (by volume). In total the calculations support a storage capacity of 2,559 AcFt (2,193 AcFt in DG and 366 AcFt bedrock) within the 1,462 acre watershed.

Recharge

An annual average recharge rate of 230 AcFt/year has been calculated for the watershed using a monthly soil moisture balance methodology. Incorporated into the analysis are historical precipitation data (1945 to 2012), evapotranspiration rates, soil moisture capacity, and surface water runoff rates. The analysis was done using historical rainfall data for Campo, CA. Each month a calculation is made to compare the soil moisture content with the historical rainfall rate. The water is either returned to the atmosphere as evapotranspiration, leaves as runoff, or enters the subsurface as recharge when the soil moisture holding capacity is exceeded (i.e. the soil is 'wet'). Further description is included in **Attachment 2**.

The rainfall recharge rate varies monthly and seasonally. There are extended periods where rainfall is insufficient to sufficiently wet the soil and allow water to pass into the ground as recharge. Conversely, during 'wet' years when recharge significantly exceeds the pumping rate, storage is exceeded and recharge is effectively rejected.

The soil moisture balance methodology used here to determine historical recharge rates is based on the extent and type of soils within the watershed. The US Department of Agriculture's Natural Resources Conservation Service (NRCS, formerly known as the US Soil Conservation Service) maintains a library of soils maps for the area. (http://websoilsurvey.nrcs.usda.gov). **Figure 3** shows the surficial soils in the water supply watershed. All of these soils are derived from the in-place weathering of granitic rock and generally reflect the surficial geology. The soils data are further described in **Attachment 2**.

Recharge occurs across the watershed and may be enhanced by water that temporarily accumulates in washes and drainage channels. Stormwater flows following high-intensity rainfall events are infrequent and of short duration. There are no perennial streams or surface waters (ponds or lakes) within the watershed that would be affected by short- or long-term groundwater use.

Proposed Water Supply Wells

There are numerous groundwater monitoring/test wells within the watershed that were installed during the 1990s for a proposed landfill project. JFI has subsequently converted and tested two wells, HG-21A and HG-60, for production well use. These existing landfill monitoring/test wells were converted for use as water supply wells by enlarging the boreholes for the installation of inner well casing.

Follow-up pumping tests conducted by Thing Drilling Company of Alpine, CA have demonstrated short-term production rates of 60 gpm in HG-21A, and 100 gpm in HG-60. The two wells have a total capacity of 160 gpm, approximately 256 AcFt per year. HG-31, described by AECOM (2012)[3] is also available for use with a reported capacity of 25 gpm. Long-term well capacity rates may be less; however, additional wells such as HG-31 are available within the water supply area (depicted in **Figure 2**). Approximate locations are indicated in **Figure 2** - specific location information is considered confidential by the Tribal Government.

Operation of these two wells at an annual rate 165 AcFt/yr (the total project demand) would be at approximately 64% of their measured short-term capacity.

Groundwater Demand and Potential Impact of Pumping

<u>Current Groundwater Demand</u>

The Site area is sparsely inhabited as a large portion of the southeastern Reservation is commercially zoned and was reserved until recently for the construction of a regional landfill. The recent study conducted by AECOM (2012) for a similarly-sized watershed supports that there are 12 residence served by private wells within the watershed with an estimated demand of 6 AcFt/yr.

[3] Groundwater Resource Evaluation Shu'luuk Wind Project, Campo Reservation, Campo, San Diego County, California. Dated December 2012. (AECOM, 2012) Contained within a Draft Environmental Impact Statement Prepared for the Campo Band of Mission Indians and the Southern California Agency Bureau of Indian Affairs. Prepared by: AECOM, 7807 Convoy Ct, Suite 200 San Diego, California 92111.

Potential Impact of Pumping

Although the County of San Diego has no jurisdiction over land or groundwater use on the Reservation, *the County of San Diego's Groundwater Ordinance and Guidelines for Determining Significance – Groundwater Resources* were used as guidelines for the Site analyses[4]. The County Department of Planning and Land Use (DPLU) significance guidelines were generally developed for application to the California Environmental Quality Act (CEQA). There are two primary significance criteria to be addressed for the Site:

Criteria 1)

Will the short-term groundwater use cause the volume of water in groundwater storage drop to less than 50% of the aquifer capacity based on the projected pumping rates?

Criteria 2)

Will groundwater use cause off-Reservation water levels to drop more than 5%, based on well with 400 feet of water (in this case a 20 foot drop)?

In both cases the wellfield is conservatively assumed to operate for one year or less and pump 165 Acft of water.

Criteria 1 has been conservatively assessed using the water balance analysis described in **Attachment 2**. A maximum annual use of 173 AcFt/yr has been determined to be not significant for long-term pumping. A long-term aquifer water balance was calculated using the historical rainfall record based on the rate of recharge from the soil, the amount of water that can be stored in the aquifer, and the amount of water pumped from the aquifer on an annual basis. In any given year the volume of water in the aquifer will vary depending on the relative recharge rate and groundwater demand. If pumping demand is less than the recharge rate there is no change in groundwater storage. Years with recharge in excess of the aquifer storage and groundwater use lead to a condition where the excess recharge is rejected. Conversely, following periods of low rainfall, continued depletion of groundwater from storage occurs. The overall results of the long-term water balance calculation are shown in **Figure 5** for the 1462-acre watershed. The volume of water in storage decreases in years where the pumping rate exceeds recharge, but never to less than 50% of the aquifer volume as mandated by the DPLU significance criteria.

The long-term pumping rate is a conservative standard when applied to a 2-year project. Review of **Table 1** demonstrates that the short-term demand represent a small percentage of the overall aquifer storage, is less than the average annual recharge rate, and will be readily replenished by rainfall recharge. A rate higher than 173 AcFt/yr could be supported under Criteria 1 because this short-term water supply analysis differs from long-term sustainable water supply evaluation, for example those done locally for the County of San Diego Department of Planning and Land Use, in that it allows for short-term aquifer depletion provided that the water will be replenished by recharge within a period of a few years.

[4] Dated 3/19/2007 and available at: http://www.sdcounty.ca.gov/pds/procguid.html#Groundwater

Criteria 2 is addressed by examining the short-term impact of instantaneously pumping[5] 165 AcFt from the aquifer system without any offsetting rainfall recharge. Here the focus is on potential off-Reservation water level impacts. (For reference the closest off-Reservation point is 1,250 feet from the wellfield as depicted in **Figure 2**.) Water levels will change proportionally to the amount of groundwater storage, in this case water that is ultimately drained from the overlying DG portion of the aquifer system. The water level declines are greatest at the pumping wells, and form a 'cone of depression' where water levels changes diminish with distance away from pumping wells.

A 20 foot drop in water level within weathered rock (DG) with a storage coefficient of 5% corresponds to the pumping of one AcFt of water per acre. Thus for illustration if the pumping-related water level decline is evenly spread around an area being pumped, 165 acres would produce 165 AcFt with a less than significant 20-ft water level decrease absent any rainfall recharge. This is a conservative approximation- the water levels within the cone of depression will be higher than 20 feet within the well field and less than 20 feet at the outer limits of the pumping influence.

Here the primary concern is whether significant water level decline (i.e greater than 20 feet) will occur off-Reservation. The center of the wellfield area is approximately 2250 feet from the closest Reservation Boundary (to the southwest as shown in **Figure 2**). Thus potential on-Reservation pumping impacts could extend radially over an area of approximately 365 acres if a 2250 foot radius is extended around the center of the wellfield. Pumping would be within the 110 acre wellfield area shown in **Figure 2** within the Campo Reservation where the extent of saturated DG ranges from approximately 40 to 100 feet (see **Figure 4**). If the short-term demand of 165 acre-feet is combined with one year of residential use (6 AcFt) a total of 171 AcFt would be withdrawn from an approximately 365 acre area. Under this circumstance there would be an average water level drop of 9.4 feet over the area based on a 5% storage capacity, much less than the 20-ft significance criteria. Again this is a conservative assessment as the water level changes rapidly decrease with distance.

In summary the proposed 165 AcFt short-term demand (171 AcFt when combined with existing use and obtained in one year) is less than the 230 AcFt/yr annual rainfall, approximately 6% of the total aquifer storage capacity, can be obtained from the Reservation with no significant off-Reservation water level impacts, and is approximately the same as the long-term sustainable rate of 173 AcFt/yr. Based on these findings no mitigation monitoring is necessary. ENSI (2008) did recommend a monitoring program based on the considerations that the proposed project was to be implemented over a 30-year period and included a landfill that would have created a large impermeable area within the watershed and disrupt rainfall recharge.

[5] The overall volume and potential off-Reservation impact of pumping is generally the same independent of the production rate for the unconfined aquifer system.

Table 1. Summary of Hydrologic Water Balance Calculations

Watershed Area	1,462 acres	See Figure 2
Groundwater Storage (AcFt)	2,559	2,193 AcFt in Decomposed Granite (avg. saturated thickness of 30 feet) 366 from bedrock (avg. saturated thickness of 500 feet)
Average Annual Rainfall Rate (1945 to 2012)	14.58 inches/yr 1,776 Acft/yr in watershed	See Attachment 2
Average Annual Recharge Rate (1945 to 2012)	230 AcFt/yr	See Attachment 2
Long-term sustainable pumping rate	173 AcFt/yr	Based on maximum extraction of 50% of groundwater in storage, 1945 to 2012 (173 AcFt is 6.8% of total storage)
Proposed Extraction Rate and duration	165 AcFt	150 AcFt + 10% Over a maximum of two years.
One-year Extraction Rate, Including Existing Uses	171 AcFt/yr	Includes 6 AcFt/yr existing use for 12 residences.
Net Recharge (Recharge - Pumping)	+ 59 AcFt (1-year) + 283 AcFt (2-year)	If all water obtained in one year, or over two years (including existing use of 6 AcFt/yr)
Percentage of Storage Used (annual demand absent rainfall recharge)	6.4% 6.7% 6.8%	165 AcFt for project 171 AcFt for project and existing uses 173 AcFt based on 50% storage criterion

Potential for Subsidence
Neither study discussed the potential for subsidence as it is generally not of concern because the Site is located in crystalline rock terrain. As described in the Final EIR/EIS for the ECO Substation project (page D.13.8): "The risk factors for groundwater withdrawal induced subsidence—deep, extensive accumulation of soft, unconsolidated alluvial deposits and compressible clay beds—are not present in the project area where groundwater extraction is proposed (ECO Substation and Tule Wind project areas). The underlying rock units are granitic hard rock in these areas, and the alluvial thickness is limited. The granitic rock aquifer is too rigid to subside in response to water-level changes."

Compliance with Laws
The water supply is located within the Campo Indian Reservation and not subject to County of San Diego or State of California jurisdiction. It is subject to laws and regulations applicable to the Campo Reservation. See attached letter (**Attachment 4**) that has been provided to JFI.

Conclusions

This summary report examines and supports the short-term pumping of 165 AcFt of water from a 1462 acre watershed with a storage capacity of 2559 AcFt. The amount of groundwater in storage greatly exceeds the proposed short-term and existing demand where the proposed demand is approximately 6% of total groundwater in the storage within the water supply area. Rainfall recharge, here calculated to be 230 AcFt/yr on an average annual basis, exceeds the short-term demand on an annual basis and will readily replenish the aquifer system. The short-term demand is also less than the long-term sustainable demand of 173 AcFt/yr determined using water balance calculations based on historical rainfall data.

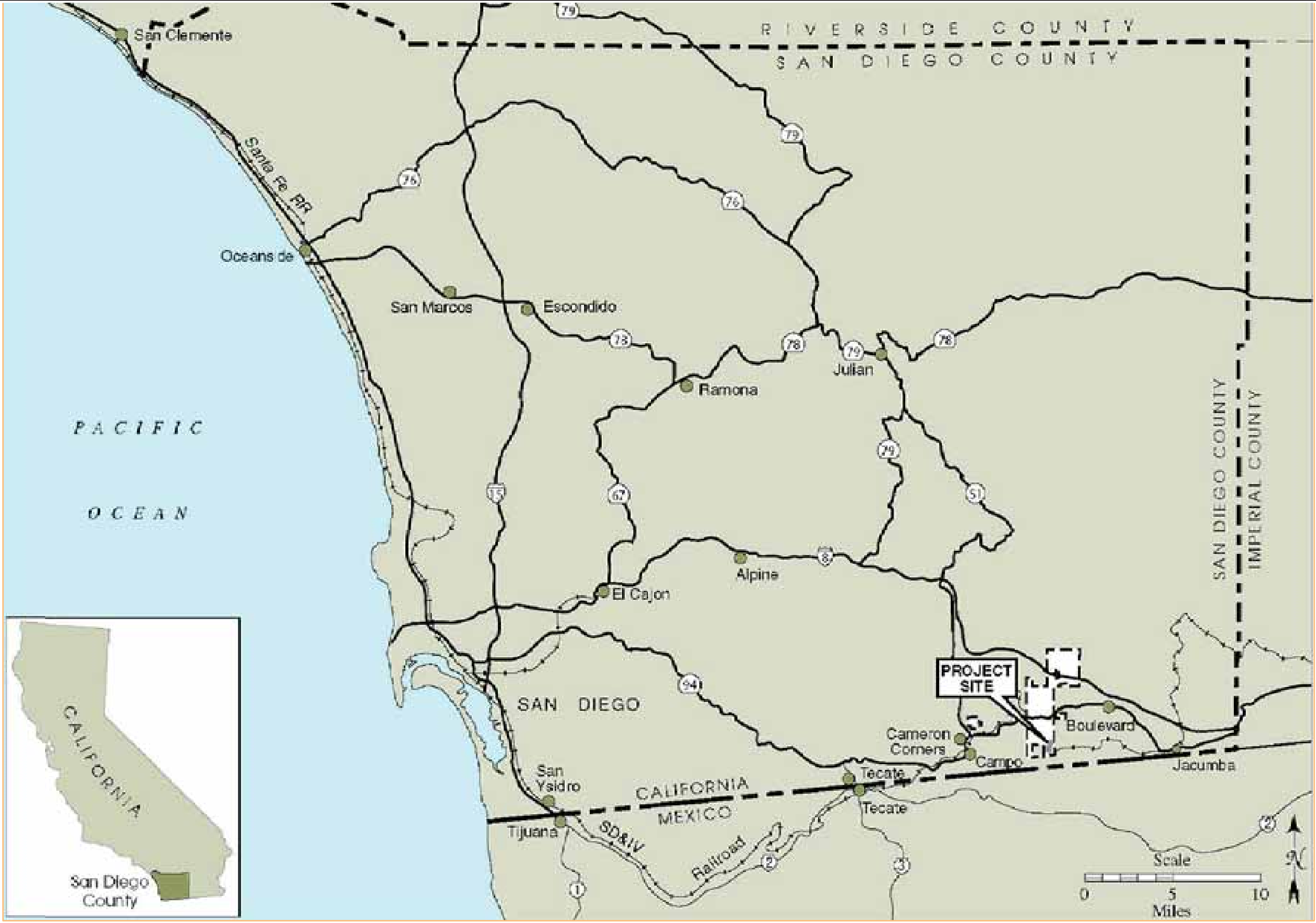
If you have any further questions, please feel free to contact the undersigned.

Sincerely,

Jay W. Jones PG#4106
Environmental Navigation Services, Inc.

Attachments:
Figure 1. Site Location Map
Figure 2. Study Area Map
Figure 3. Soils in the Watershed
Figure 4. Extent of Saturated DG in the Watershed
Figure 5. Long-term Water Balance, 1462-acre Watershed

Attachment 1. MM HYD-3 (from the October 2011 Final EIR/EIS)
Attachment 2. Supplemental Water Balance Calculations
Attachment 3. Supplemental Well and Test Logs, Wells MW-21A and HG-60
Attachment 4. Letter to JFI from Muht-Hei, Inc.

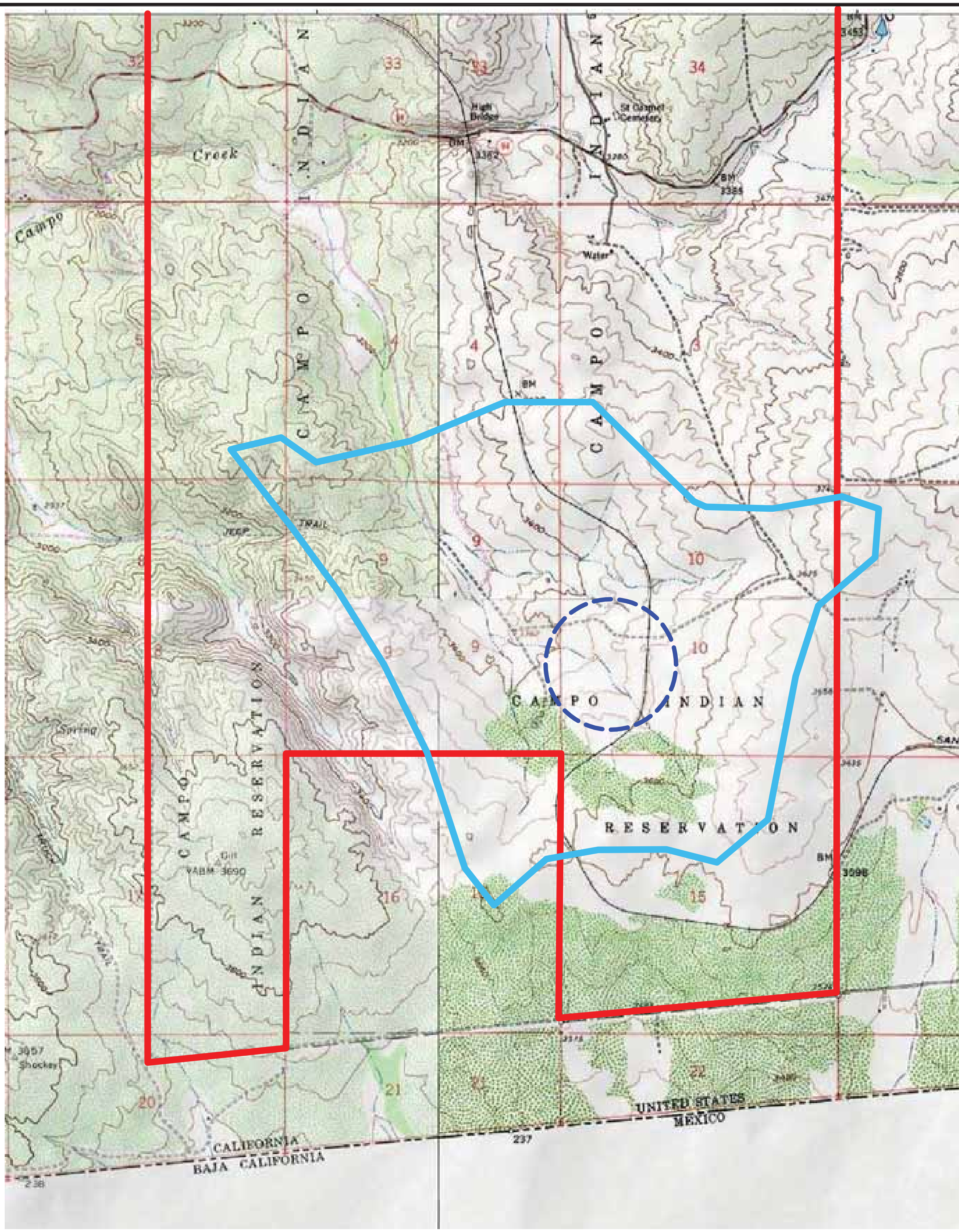


Environmental Navigation Services, Inc.	EXPLANATION BLOCK	**SITE LOCATION MAP** Campo Indian Reservation San Diego County, California
SCALE: AS SHOWN	Map Source: SEIS, 2008	

PE/PG	Project Number	Figure
JWJ	SECWS	1

Project Manager	Drafter	Date
JWJ	CM	06/13/2013

C:\Drawing Files\Environmental Navigation Services\SE Campo Water Supply\Rpt B\Fig 2, Wtr Supply Area - 06/13/2013



Environmental Navigation Services, Inc.

0	0.25	0.5

APPROXIMATE SCALE (MILES)

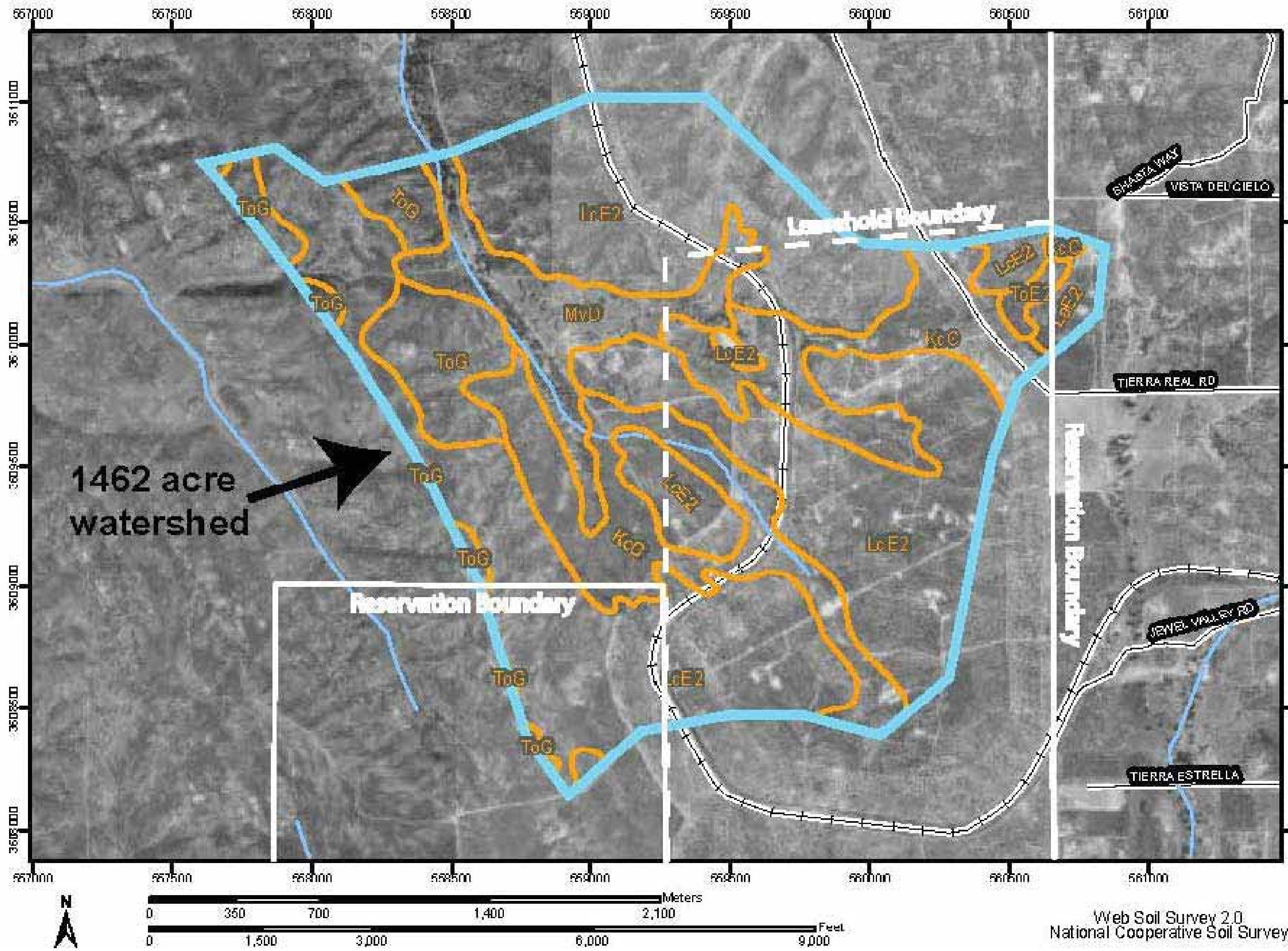
EXPLANATION BLOCK

- ENSI 2008 STUDY AREA
- RESERVATION BOUNDARY
- AREA SUPPLY WELL LOCATION

WATER SUPPLY STUDY AREA

Campo Indian Reservation
San Diego County, California

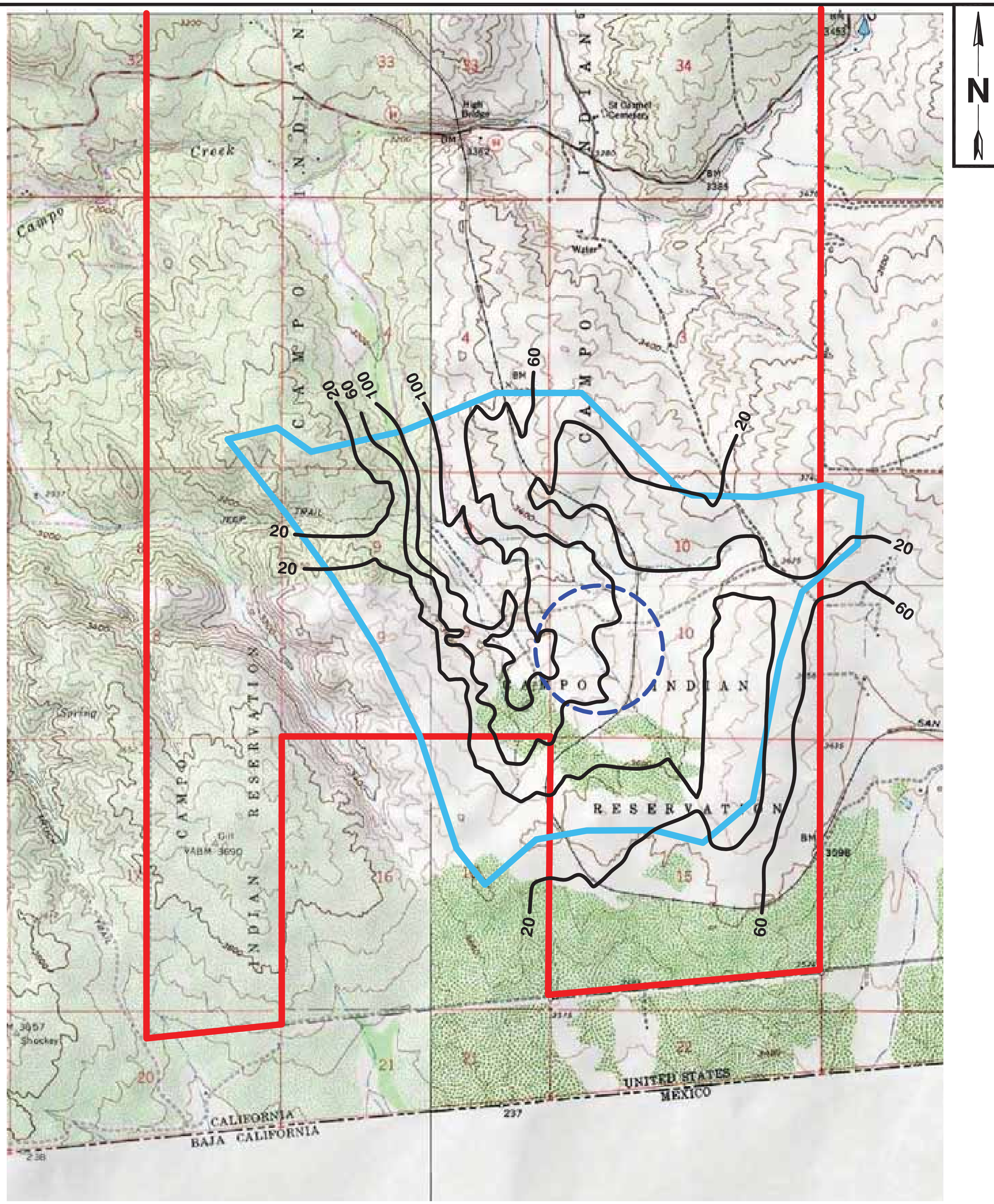
PE/PG	Project Number		Figure
JWJ	SECWS		2
Project Manager	Drafter	Date	
JWJ	CM	06/13/2013	



Environmental Navigation Services, Inc.	EXPLANATION BLOCK NOTE: Image Source ENSI, 2008		**SOILS WITHIN THE WATER SUPPLY WATERSHED** Campo Indian Reservation San Diego County, California
SCALE AS SHOWN			PE/PG: JWJ; Project Number: SECWS; Figure: 3; Project Manager: JWJ; Drafter: CM; Date: 06/13/2013

C:\Drawing Files\Environmental Navigation Services\SE Campo Water Supply\Rpt B\Fig 3, Soils Within The Wtr Supply Wtrshd - 06/13/2013

C:\Drawing Files\Environmental Navigation Services\SE Campo Water Supply\Rpt B\Fig 4, Extent Of Saturated DG In The Wtrshd - 06/13/2013



Environmental Navigation Services, Inc.

0 0.25 0.5

APPROXIMATE SCALE (MILES)

EXPLANATION BLOCK

ENSI 2008 STUDY AREA

RESERVATION BOUNDARY

AREA SUPPLY WELL LOCATION

EXTENT OF SATURATED DG IN THE WATERSHED

Campo Indian Reservation
San Diego County, California

PE/PG	Project Number		Figure
JWJ	SECWS		4
Project Manager	Drafter	Date	
JWJ	CM	06/13/2013	

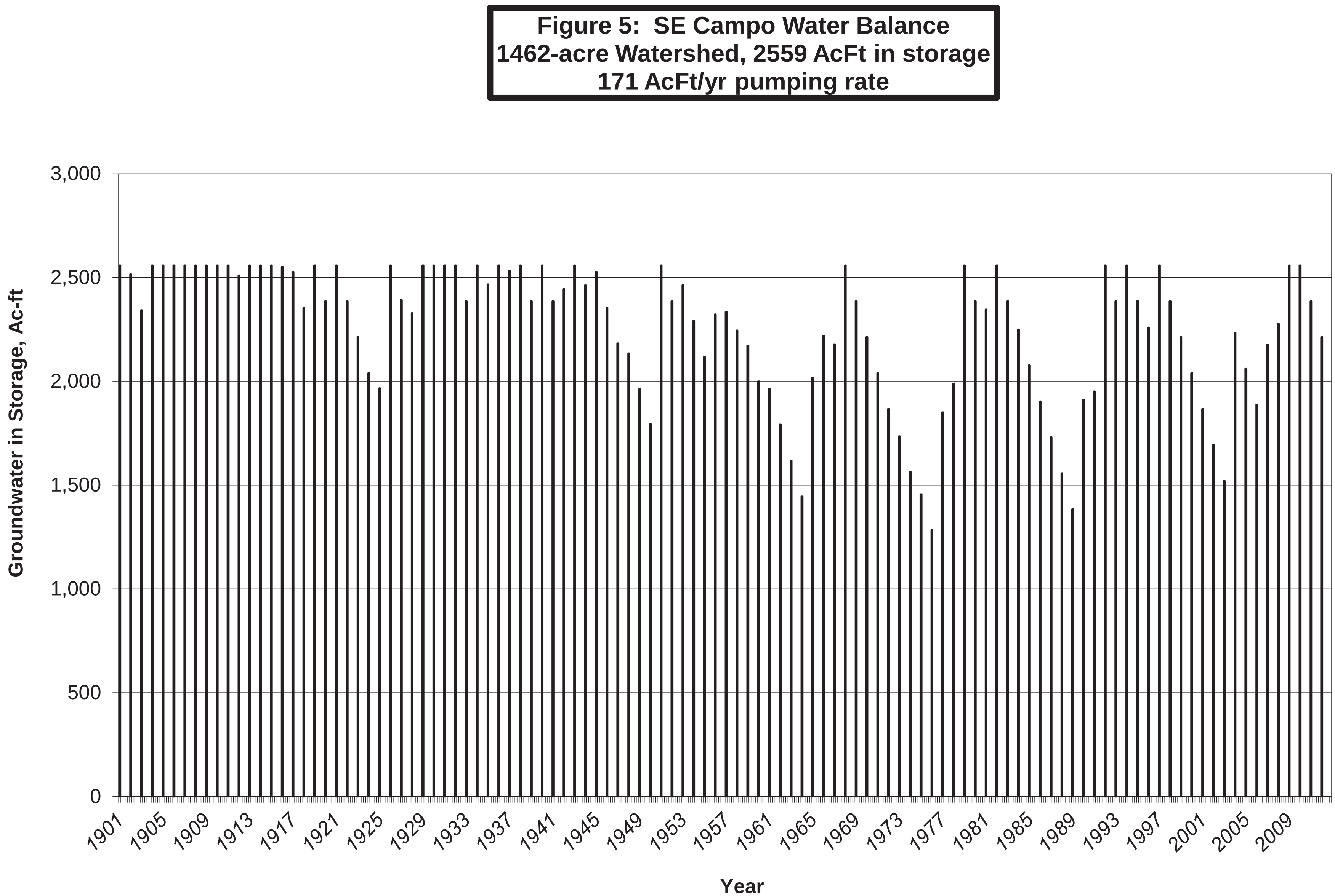


Figure 5: SE Campo Water Balance
1462-acre Watershed, 2559 AcFt in storage
171 AcFt/yr pumping rate
Groundwater in Storage, Ac-ft
3,000
2,500
2,000
1,500
1,000
500
0
1901
1905
1909
1913
1917
1921
1925
1929
1933
1937
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
Year

Attachment 1.
MM HYD-03

MM HYD-3 **Identification of sufficient water supply.** Prior to construction, the applicant will prepare comprehensive documentation that identifies one or more confirmed, reliable water sources that when combined meet the project's full water supply construction needs. Documentation will consist of the following:

Preparation of a groundwater study. For well water that is to be used, the applicant will commission a groundwater study by a qualified hydrogeologist to assess the existing condition of the underlying groundwater/aquifer and all existing wells (with owner's permission) in the vicinity of proposed well location/water sources. The groundwater study will evaluate aquifer properties and aquifer storage. The groundwater study will estimate short- and long-term well water supplies from each well proposed to be used, and documentation indicating that each well is capable of producing the total amount of water to be supplied for construction from each well. The groundwater study will estimate short- and long-term impacts of the use of the well(s) on the local groundwater production (short-term extraction for construction water and ongoing O&M water), on all project wells, and on other wells in the project area. The groundwater study will include an assessment of the potential for subsidence brought on by project-related water use in the area. The applicant will provide demonstration of compliance with all applicable laws and regulations and will obtain a County of San Diego Major Use Permit for use of any proposed well within the County's jurisdiction prior to construction.

Documentation of Purchased Water Source(s). For water that is to be purchased from one or more water/utility district(s), the applicant shall provide written documentation from such district(s) indicating the total amount of water to be provided and the timeframe that the water will be made available to the project. (For possible water district sources, refer to project-specific mitigation measures in the MMRP.)

Total confirmed water supplies from the combination of above documented sources shall equal the total gallons of water needed through construction of the project.

A water tank holding approximately 120,000 gallons of water would be maintained on the ECO Substation site for use during O&M. The water would primarily be used for temporary landscape irrigation, fire protection, and other standard facility uses. Monthly water use would range from 180 to 750 gallons of water, depending on the time of year and weather conditions. The water would be obtained from permitted municipal sources, groundwater sources, or a combination of

Attachment 2.
Water Balance Calculations

1.0 WATER BALANCE EVALUATION

The purpose of this attachment is to explain and present the water balance evaluation conducted for the 1462 acre watershed within the southeast portion of the Campo Indian Reservation. It is an update of the analysis presented in ENSI (2008) for a long-term water supply to support a proposed landfill project. In this case a long-term (indefinite) aquifer water balance was conducted and is presented as a conservative measure of the potential impact of short-term (2-year) pumping. Although the County of San Diego has no jurisdiction over land or groundwater use on the Reservation, *the County of San Diego's Groundwater Ordinance and Guidelines for Determining Significance – Groundwater Resources* were used as guidelines[1].

A summary of this analysis is provided in **Table 2** after Section 1.3.

1.1 Introduction

This analysis of the long-term available water supply compares groundwater withdrawal rates to the amount of groundwater remaining in storage after groundwater recharge is calculated for the aquifer system based on historical rainfall data. The analysis is based on a constant withdrawal rate. Many years the aquifer remains at or near full capacity since the long-term withdrawal rate is a relatively small percentage of the total volume of groundwater in storage and the average annual rainfall recharge rate is greater than the long-term withdrawal rate.

The extent of the aquifer for the water balance analysis (**Figures 2** and **4**, in summary report) is based on a surface water watershed surrounding a central wellfield.

1.2 Methodology

The long-term available groundwater supply is primarily limited by rainfall recharge rates and groundwater storage. The groundwater recharge rate is calculated for this analysis using a monthly soil moisture balance methodology. The groundwater storage is based on the interpretation of site-specific data. Incorporated into the analysis are historical precipitation data (1945 to 2012), evapotranspiration rates, soil moisture capacity, and surface water runoff rates.

Precipitation is either returned to the atmosphere as evapotranspiration, leaves as runoff, or enters the subsurface as recharge. During years when recharge significantly exceeds pumping, storage is exceeded and recharge is effectively rejected. Relative to the aquifer water balance, this 'excess recharge' is implicitly incorporated within the conventional water balance components of stream baseflow (surface discharges from the aquifer), and net groundwater outflow from the watershed- both of which will increase during years with high rainfall.

[1] Dated 3/19/2007 and available at: http://www.sdcounty.ca.gov/pds/procguid.html#Groundwater

Each of the water balance components are described in the following sections.

1.2.1 Groundwater Recharge

Groundwater recharge occurs across the entire watershed. The recharge rate is based on rainfall, runoff, and areally- averaged soil properties.

Groundwater extraction for the Project will be limited to the wellfield area shown in **Figures 2** and **4**, the water balance calculations reflect the concentration of pumping from the 1,462 acre watershed.

Rainfall. The historical rainfall record used for this analysis was obtained from the Campo weather station, a site that has been in operation since the 1800s. The period of record used in this analysis is between the years 1900 and 2013, with an emphasis on the years since 1945. The historical data from Campo, CA are shown in **Figure A.1**. It is a combination of data used by the DPLU to develop Figure 5, and rainfall data obtained for the Campo, CA from the Western Regional Climate Center (www.wrcc.dri.edu) for station number 041424. Review of the rainfall data shows that rainfall rates have generally decreased since the mid-1940s in the area. Because the water supply should be reliable under low rainfall conditions, the period of record since 1945 is viewed as the most critical for this evaluation.

The County of San Diego DPLU rainfall map provides contours depicting the average annual rainfall rates across the county and incorporates the effect of terrain and other factors to extrapolate the rainfall station data. **Figure A.2** shows the average annual rainfall for the Project area. Comparison of the Campo rainfall with the rainfall map (for 1971 to 2001) shows that the average Campo rainfall is 15.26 inches per year whereas the DPLU map indicates an average rainfall of approximately 15 to 18 inches per year. While the DPLU map suggests a higher effective rainfall rate could be used for the site, the Campo rainfall data have not been adjusted (i.e. increased) and are conservatively used without revision for this analysis.

Evapotranspiration. The evapotranspiration rate is the rate that plants and soil lose water to the atmosphere by normal plant respiration and soil drying. Climatic parameters such as temperature, cloud cover, and wind strongly affect hydrologic conditions. The overall effect of these parameters can be seen in the rate of evaporation and plant transpiration (termed evapotranspiration, or ET). The ET rate used in this study is based on a state-wide monitoring system known as CIMIS (www.cimis.water.ca.gov). The California Irrigation Management Information System (CIMIS) is a program in the Office of Water Use Efficiency (OWUE), California Department of Water Resources (DWR) that manages a network of over 120 automated weather stations in the state of California. CIMIS was developed in 1982 by the California Department of Water Resource and the University of California at Davis to assist California's irrigators to manage their water resources efficiently. The ET data published by CIMIS for Zone 16 were used in this report. The annual reference ET rate for Zone 16 is 62.51 inches/yr. For example, based on the reference ET rate, an irrigated turf will require over 5 Acft of water per acre per year.

Soil Types and Soil Moisture Capacity. The soils within the watershed have been mapped on an aerial photograph and classified by the US Department of Agriculture as shown in **Figure 3** in the summary report. The areas for each soil type in the watershed were calculated using the mapping software provided by the USDA on their website (http://websoilsurvey.nrcs.usda.gov). The hillsides of the watershed are predominantly LcE2, La Posta rocky loamy coarse sand, with a relatively low water retention and soil moisture capacity. The soils within the central drainage are mapped as MvD, Mottsville loamy coarse sand. **Table 1,** below, summarizes the acreage of each of the soil types in the watershed together with the typical soil thicknesses and the soil moisture capacity for each soil type. A calculation of the average soil moisture capacity was done based on the reported soil types. A soil moisture capacity of 2.4 inches is judged to be a reasonable value for soils in the watershed.

Table 1. Soil Moisture Capacity for Soils in Watershed

Data source: Natural Resources Conservation Service (http://websoilsurvey.nrcs.usda.gov)

	Acreage	pct	Drainage Class	Hydrologic Soil Group	SM Cap. (in./in.)	Max. Soil Thickness (in.)	Calculated SM Cap (in.)	Water Capacity (in.)
Upland/ Tributary Areas								
KcC Kitchen Creek loamy coarse sand, 5 to 9 percent slopes	289.4	19.8%	SED	B	0.07	54	3.78	4.90
LaE2 La Posta loamy coarse sand, 5 to 30 percent slopes, eroded	19.7	1.3%	SED	B	0.06	29	1.74	1.80
LcE2 La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	908.5	62.1%	SED	B	0.06	27	1.62	1.70
ToE2 Tollhouse rocky coarse sandy loam, 5 to 30 percent slopes, eroded	9.8	0.7%	SED	D	0.11	16	1.76	1.80
ToG Tollhouse rocky coarse sandy loam, 30 to 65 percent slopes	114.9	7.9%	SED	D	0.11	16	1.76	1.80
	1342.3	92%				weighted avg:	**2.10**	**2.40**
Drainage Channel								
MvD Mottsville loamy coarse sand, 9 to 15 percent slopes	119.7	8.2%	ExD	A	0.07	60	4.20	4.20
	119.7	8.2%				weighted avg:	**4.20**	**4.20**
	1462.0	100%				overall weighted avg:	**2.27**	**2.55**
						midpoint:	**2.4**	

Drainage Classes: Excessively Drained (ExD)/ Somewhat Excessively Drained (SED) / Well-drained/ Moderately Well Drained
Somewhat Poorly Drained (SPD), Poorly Drained, Very Poorly Drained

Hydrologic soil groups are based on estimates of runoff potential.
Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet.
These consist mainly of deep, well drained to excessively drained sands or gravelly sands.
These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet.
These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture.
These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet.
These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.
These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet.
These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Soil Moisture Balance Recharge Calculations. A soil moisture balance methodology is used in this Report to determine the rate of groundwater recharge. The overall water balance is determined on a monthly basis using historical rainfall data. Each month that rainfall occurs, recharge will occur if the amount of rainfall exceeds the soil moisture capacity, water lost to surface water runoff, and the amount of water consumed by plants and lost to evaporation and plant transpiration (termed potential evapotranspiration, or pET). Note that the pET rate in this case primarily accounts for evaporation from soil since non-irrigated native plants tend to have very low ET rates.

The soil moisture balance equation written in terms of recharge for month i is given by:

$$Recharge_i = ppt_i - runoff_i - pET_i - (SM_i - SM_{i-1})$$

where:
ppt, is the rainfall in month i
pET, is the potential evapotranspiration rate in month i
SM, is the soil moisture in month i and previous month i-1
runoff, is the surface water runoff in month i as given by:

$$runoff_i = ppt_i * pct * (SM_{i-1}/SMcap)$$

where:
runoff, is the volume of runoff in month i
pct, the runoff coefficient,
is the assumed maximum percentage of rainfall runoff in month i
SM, is the soil moisture at the time of rainfall
(The antecedent moisture condition, previous month i-1)
SMcap, is the soil moisture capacity for the soil, a constant

All values herein are expressed in inches. Volumes are calculated based upon the area of consideration. An Excel spreadsheet developed for these calculations is included at the end of this Attachment.

Recharge occurs when the precipitation exceeds runoff, evapotranspiration, and the soil moisture capacity. Water can be stored in the soil at an amount up to the soil moisture capacity. Each month the antecedent moisture condition is evaluated to determine if the soil moisture capacity has already been met. If the soil is already at the soil moisture capacity, and the next month's rainfall exceeds the amount of water 'lost' by evapotranspiration and runoff, recharge will be immediate. Runoff in the soil moisture balance is calculated as a function of the preceding month's soil moisture condition and is a maximum when the soil is saturated. Here a runoff coefficient value of 20 percent is used.

A long-term aquifer water balance is then calculated using the historical rainfall record based on the rate of recharge from the soil, the amount of water that can be stored in the aquifer, and the amount of water pumped from the aquifer on an annual basis. In any given year the volume of water in the aquifer will vary depending on the relative recharge rate and groundwater demand. If there is no pumping demand, there is no change in groundwater storage. Years with recharge in excess of the aquifer storage and groundwater use lead to a condition where the excess recharge is rejected. Conversely, following periods of low rainfall, continued depletion of groundwater from storage occurs.

1.2.2 Groundwater in Storage

Groundwater occurs within the void space of the granitic rock that comprises the aquifer. Within unweathered crystalline rock the void space occurs solely within rock fractures. In decomposed granite (DG), the void space occurs in pore spaces created from the weathering of minerals as well as from rock fractures. Fracture zones in the DG are typically highly fractured and deeply weathered.

The groundwater storage capacity of the aquifer system is defined as the ratio of the volume of water released from the aquifer to the volume of aquifer containing the water when water is withdrawn from the aquifer under pumping conditions or as a result of a decrease in water levels. The storage coefficient of an unconfined aquifer is termed the specific yield; for a confined aquifer the value is termed the specific storage. The fractured rock aquifer system may occur under a mix of confined and unconfined conditions, depending upon the character and extent of fracturing within the rock. Here the term storage coefficient is used to define the amount of extractable water available within the aquifer.

Typically the storage capacity of unweathered crystalline rock is quite low and ranges between 0.1 and 0.01 percent of the rock volume. A value of 0.01 percent (storage coefficient, $S = 1 \times 10^{-4}$) is generally accepted for similar analyses of crystalline rock with low fracture density, increasing to 0.1 percent ($S= 1 \times 10^{-3}$) for highly fractured bedrock. Hydrologic test data obtained at the Project site, as summarized by Golder (2008), generally support a higher storage coefficient of 0.05 because the crystalline rock at the Project site is highly fractured and deeply weathered.

Weathered granite (DG) has a much higher storage capacity than unweathered granite due to the development of intergranular porosity via mineral weathering. The DG is an important element to the water balance and overall hydrology of this and similar watersheds. The hydraulic properties of DG were well-summarized by Davis and DeWiest (1966, p.320) where they note that “Effects of weathering may extend more than 300 feet in regions of intense weathering. Depths of weathering of 5 to 50 feet, however, are normally encountered. Hydrated minerals in weathered rock at the surface will form loose aggregates which have porosities in excess of 35 percent. The porosity decreases with depth to zones in which the original rock-forming minerals are only partly altered.” They further state that the overall porosity is on the order of 2 to 10 percent at depth.

A study by Tugrul (2004) examined in detail weathered rock, including granodiorite and tested the rock for both total and effective porosities, and showed that the effective porosity (the porosity available for water flow) ranged from 3.5 to 9%. Extensive testing of slightly to moderately weathered Oracle granite conducted by Jones (1983) compared total porosity values measured from rock samples with downhole geophysical methods and determined that overall porosity ranged from 2 to 6%, with the highest porosity values corresponding to weathered/altered rock. A site-specific value of 6 to 8% was derived from a streamtube analysis of recharge and water level data for the landfill site provided in an unpublished 1997 BS Thesis by J.A. Crosby at San Diego State. Work done by the USGS in nearby Descanso (Duell, 1994) and Lee Valleys (Kaehler and Hsieh, 1994) for weathered rock within valleys indicated that specific yields of weathered rock under pumping conditions are on the order of 1 to 3%.

The storage coefficient values will locally vary across the site as a function of the degree of fracturing and weathering within the rock mass, so the values used herein represent volume averages. A storage coefficient of 5% (0.05) is used for DG, and an intermediate storage value of 0.05% (5×10^{-4}) is used for the underlying rock in this Report. A value of 5 percent is generally accepted for use in water supply studies locally reviewed and approved by the County of San Diego Department of Planning and Land Use.

Figure 4 (in report) summarizes the DG aquifer system evaluation in terms of the extent and thickness of saturated DG expected to occur in the watershed. The contour map is based on data used in groundwater model prepared by Golder (2008).

DG Storage (2,193 Acft) Based on analysis of **Figure 4** an average saturated thickness of 30 feet has been calculated. The 1,462 acre watershed area is calculated to contain 2,193 Acft of water based on an average 5% storage coefficient.

Bedrock Storage (366 Acft) The calculation of the amount of water in storage within the unweathered rock assumes an average saturated thickness of 500 feet, an area of 1,462 acres, and a storage coefficient of 0.05%. This evaluation assumes that wells up to 500 feet below the water table (or below the DG/bedrock interface where DG occurs) can be installed to provide groundwater from the underlying bedrock aquifer system. Wells drilled in excess of 1,000 feet in depth are increasingly becoming common in the area, so the assumed 500 foot saturated thickness for bedrock is conservative.

Combined Storage. The total volume of groundwater in storage is calculated to be 2,559 Acft.

1.2.3 Long-term Groundwater Availability

Estimates of the amount of groundwater recharge were conducted using an Excel spreadsheet that calculates the soil moisture balance (and recharge) on a monthly basis between July 1900 and June 2013 using the equations explained in Section 3.2.1. The analysis focuses on the period from 1945 to 2012. (The calculation methodology follows that used by a FORTRAN program named Recharge2, written by Dr. David Huntley of San Diego State University and generally accepted for similar projects by the DPLU). The Excel spreadsheet printouts are included at the end of this Attachment.

The basis for the analysis includes the following:

1) Historical rainfall data from the Campo, CA weather station and the DPLU rainfall map.
2) Evapotranspiration rates obtained from CIMIS (climate zone 16).
3) Estimates of the groundwater storage of the DG and underlying crystalline rock.
4) Soils data obtained from the US Department of Agriculture. An area-weighted average value of 2.4 inches is used for the soil moisture capacity in the water balance calculations (see **Table 1**).
5) A general description and field review of the watershed.

The following assumptions were made for the watershed:

1) No significant volumes of groundwater flow are discharged as surface water flow based on an absence of perennial surface water in the watershed.

The calculated change in groundwater storage is shown in **Figure 5** (in the summary report) based on a constant annual extraction rate of 173 Acft/yr. It is based on a 1,462-acre watershed with a total storage capacity of approximately 2,559 Acft. The chart depicts the effect of seasonal recharge and groundwater withdrawal on an annual basis. It shows that there are multiple periods of approximately 5 years or more where demand exceeded recharge and water is withdrawn from storage. "El Nino"-type rainfalls occurred with well-above average rainfall and provided for complete recovery of the aquifer system and are evident in the rainfall record (**Figure A.1**).

The following observations can be made for the period of record from 1945 to 2012:

- The average recharge rate, 230 AcFt/yr, exceeds the withdrawal rate of 173 AcFt/yr. Thus there are many years where the aquifer is fully recharged by rainfall and no decrease in groundwater storage occurs due to pumping on an annual basis.

- The effect of pumping increases for years where recharge does not offset groundwater use. During dry years water is derived from subsurface storage. On average the aquifer remains at 81.8 percent effect of capacity.

1.3 Discussion

The methodology used in this report represents one approach to the evaluation of groundwater recharge and storage and is the approach currently used by the County of San Diego DPLU to examine the potential impact of pumping on groundwater-dependent developments[2]. It is based on readily-available locally-valid data such as precipitation, evapotranspiration, soil properties, and aquifer extent and thickness. It is recognized that the calculation parameters may vary from those presented herein; however, the overall approach was conservative to accommodate potential variability and uncertainty.

[2] See for example: http://www.sdcounty.ca.gov/dplu/docs/GRWTR-Guidelines.pdf
located in: http://www.sdcounty.ca.gov/pds/procguid.html#Groundwater

Table 2. Water Supply Summary

Component	
Watershed Area	1,462 acres
Proposed Wellfield	Centrally located- see Figure 2 in text
Groundwater Storage, Acft (1062 acre sub-area)	2,559 Acft total: 2,193 in Decomposed Granite (avg. saturated thickness of 30 feet) 366 from bedrock (avg. saturated thickness of 500 feet)
Rainfall, 1945 to 2012 (Campo, CA)	14.58 inches/yr 1,776 Acft/yr in watershed
Soil Moisture Capacity	2.4 inches (**Table 1**)
Rainfall Recharge Rate, Avg Annual	230 Acft/yr 8.74% of annual rainfall
Maximum Pumping Rate, not exceeding 50% of storage	173 AcFt/yr
Years with no net Groundwater Depletion	19 of 66 years (29%)
Annual Maximum Pumping Rate, as percentage of Annual Recharge	75%
Annual Maximum Pumping Rate, as percentage of Annual Rainfall	9.7%
Annual Maximum Pumping Rate, as percentage of Groundwater Storage	6.8%
Current estimated demand within the watershed. 12 residences with assumed use of 0.5 AcFt/yr	6 AcFt/yr

2.0 REFERENCES

Abbott, D.W., 2007. *Fractured Rock Aquifers- Positive Correlation between Well Depths and Estimated Hydraulic Conductivity.* Groundwater Resources Association of California Winter 2007 Hydrovisions [v16, no.4, p.4 and 5]) (http://www.grac.org/Winter_2007.pdf)

Davis, S.N., and R DeWiest, 1966. Hydrogeology. J. Wiley Pub.

DPLU, 2004. Groundwater Limitations Map (http://www.co.san-diego.ca.us/dplu/Resource/docs/3~pdf/precip030104_small.pdf)

Duell, L.F., Jr., 1994, Water resources of the Descanso Area, San Diego County, California: U.S. Geological Survey Water-Resources Investigations Report 90-4014, 26 pages.

Ellis and Lee, 1919. Geology and ground waters of the western part of San Diego County, CA. USGS Water Supply Paper 446. 321 p.

Golder, 2008. Proposed landfill hydrogeology report in process for BLT, Inc.

Jones, J.W. 1983. Structural, Hydraulic, and Geophysical Properties of Granite near Oracle, Arizona. MS Thesis. University of Arizona. Content also available in Jones, J.W, E.S. Simpson, S.P. Neuman, and W.S. Keys. Field and Theoretical investigations of Fractured Crystalline Rock near Oracle, Arizona. US Nuclear Regulatory Commission Report NUREG/CR-3736, 1985.

Kaehler, C.A., and Hsieh, P.A., 1994,
Hydraulic properties of a fractured-rock aquifer, Lee Valley, San Diego County, California: U.S. Geological Survey Water Supply Paper 2394, 64 p.

Moyle, W.R., Jr., and Downing, D.J., 1978, Summary of water resources for the Campo, Cuyapaipe, La Posta, and Manzanita Indian reservations and vicinity, San Diego County, California: U.S. Geological Survey Open File Report 77-684, 39 p

Olmsted, F.H., 1953, Geologic features and water resources of Campo, Mesa Grande, and La Jolla reservations (Calif.): U.S. Geological Survey Open-File Report 53-201, 103 p.

Singhal B.B.S, and R.P. Gupta, 1999. Applied Hydrogeology of Fractured Rocks. Kluwer Academic Pub.

Tugrul, A., 2004. The effect of weathering on pore geometry and compressive strength of selected rock types from Turkey. Engineering Geology 75, p 215-227.

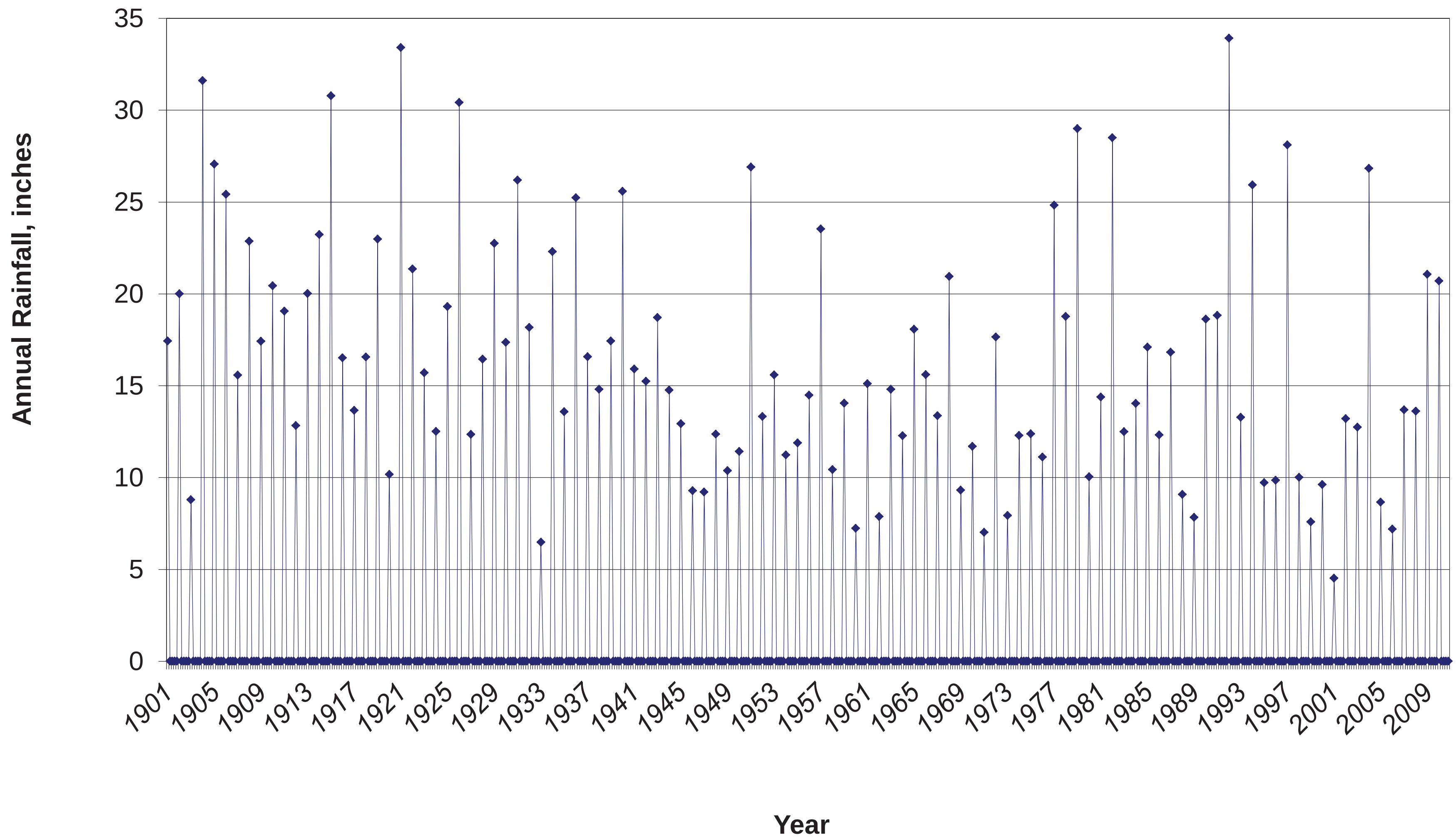
SAIC, 2008. Supplemental Environmental Impact Study for the Proposed Campo Landfill, Campo Indian Reservation, CA

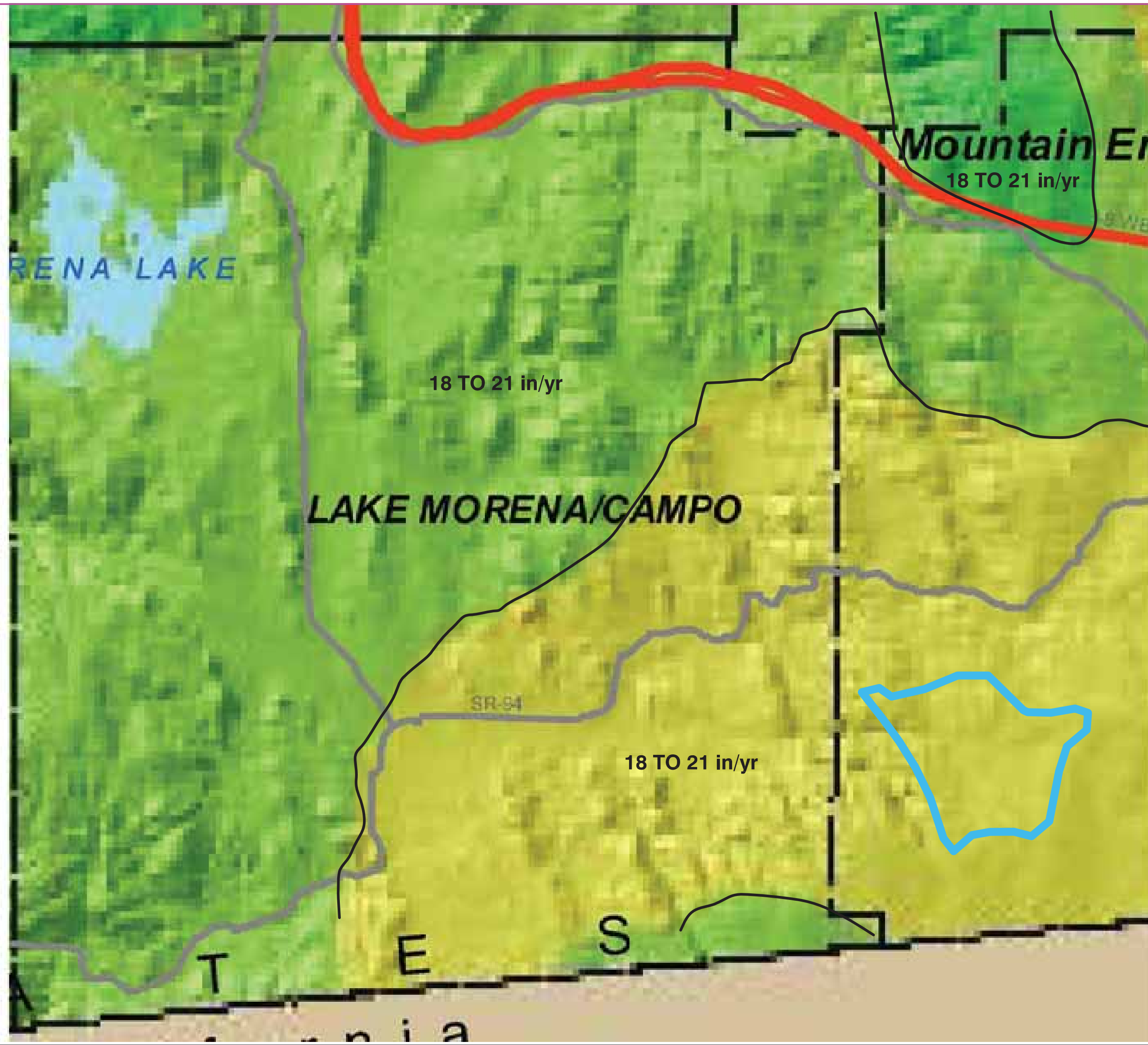
3.0 LIMITATIONS

This report evaluates changes in aquifer conditions related to the Project's groundwater demands. The evaluation uses a water balance methodology currently accepted by the County of San Diego Department of Planning and Land Use for groundwater-dependent projects, and also evaluates potential water level changes due to pumping. These estimates, similar to all geologic and hydrologic measurements, are subject to uncertainty. Water level observations and ongoing hydrological analyses during pumping are required as part of the mitigation monitoring program to more precisely assess the potential impact of groundwater pumping at the site.

This report does not guarantee, either explicitly or implicitly, that existing or future water wells installed for the Project will provide sufficient quantity and quality of water. Groundwater naturally high in total dissolved solids, radionuclides, or minerals such as arsenic, iron, and sulfate occurs in granitic terrain and ongoing water quality testing is required to assess the water obtained from the wellfield. Also, the results and findings of this report are limited to historical conditions and do not preclude the potential for drought conditions in excess of those observed between 1900 and 2012.

Figure A.1
Annual Rainfall at Campo, CA
(WRCC Station 1424)





Environmental Navigation Services, Inc.

NOT TO SCALE

EXPLANATION BLOCK

ANNUAL RAINFALL AT SITE FROM DPLU, 2004

Campo Indian Reservation
San Diego County, California

PE/PG	Project Number		Figure
JWJ	SECWS		A.2
Project Manager	Drafter	Date	
JWJ	CM	06/13/2013	

C:\Drawing Files\Environmental Navigation Services\SE Campo Water Supply\Rpt B\Fig A.2, Annual Rainfall At Site From DPLU 2004 - 06/13/2013

RECHARGE CALCULATIONS: Soil Moisture Balance

ver. June11, 2013

Proposed Short-term Water Supply, SE Campo Indian Reservation

Rainfall Statistics (inches/yr)			
maximum	33.9	(1992-1993)	
minimum	4.5	(2001-2002)	
average	16.4	14.58	...total and since 1945
st dev	6.6	6.3	...total and since 1945
30 year avg (1971 to 2001)		15.3	
DPLU Map Rainfall (15 to 18 in/yr)		16.5	avg
Difference (increase)		1.08	
Adjustment Factor		1.00	(rf)

Soil Parameters	
2.4	Soil Moisture Capacity, smcap
0.2	Runoff Coefficient, roff

Indicates Input Variables

Campo Evaporation and pET

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	total
CIMIS 16: ET rate	9.30	8.37	6.30	4.34	2.40	1.55	1.55	2.52	4.03	5.70	7.75	8.70	**62.51**
CIMIS 9	7.44	6.82	5.70	4.03	2.70	1.86	2.17	2.80	4.03	5.10	5.89	6.60	**55.14**
CIMIS 16	9.30	8.37	6.30	4.34	2.40	1.55	1.55	2.52	4.03	5.70	7.75	8.70	**62.51**
Lake Morena Evap.	8.82	6.39	2.39	2.29	2.80	6.29	2.20	1.70	2.40	4.40	6.10	7.30	**53.07**

Campo Rainfall: 1900- 2012 (water years, July to June)

WATER YEAR ending		July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Annual RF Total	Annual Runoff& Rechge (inches)	by pct.	
1901		0.61	0.63	0.00	1.02	0.43	0.23	4.28	4.72	4.00	1.33	0.07	0.12	**17.44**		**17.44**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.80	0.26	0.00	0.00		**2.01**	12%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.37	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.33	1.26	0.00	0.00	0.00	0.00		**1.59**	9%	recharge
1902		2.24	0.00	0.00	0.03	2.27	3.04	1.85	4.93	2.30	3.23	0.11	0.00	**20.00**		**20.00**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.74	0.46	0.18	0.00	0.00		**1.61**	8%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.79	2.40	0.67	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.00	0.00		**1.06**	5%	recharge
1903		0.00	0.00	0.47	0.03	0.00	0.00	0.41	2.68	4.19	0.49	0.52	0.00	**8.79**		**8.79**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00		**0.07**	1%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.32	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1904		0.85	1.59	0.64	0.13	0.00	1.82	4.32	11.94	6.87	0.92	2.53	0.00	**31.61**		**31.61**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.10	2.39	1.37	0.18	0.00	0.00		**4.04**	13%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.27	2.40	2.40	2.40	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.54	7.03	1.47	0.00	0.00	0.00		**9.04**	29%	recharge
1905		0.00	0.25	0.68	0.00	5.85	1.12	2.98	3.69	10.20	1.60	0.70	0.00	**27.07**		**27.07**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.22	0.49	0.74	2.04	0.32	0.00	0.00		**3.81**	14%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	2.40	1.97	2.40	2.40	2.40	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	1.05	0.00	0.51	0.43	4.13	0.00	0.00	0.00		**6.12**	23%	recharge
1906		0.18	2.12	0.90	0.10	3.23	7.15	5.24	1.67	3.91	0.25	0.41	0.26	**25.42**		**25.42**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.49	1.05	0.33	0.51	0.03	0.00	0.00		**2.41**	9%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.83	2.40	2.40	1.55	1.43	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	0.00	3.54	2.64	0.00	0.00	0.00	0.00	0.00		**6.18**	24%	recharge
1907		0.00	0.00	0.00	2.46	0.25	0.12	4.21	4.90	1.91	0.71	1.01	0.00	**15.57**		**15.57**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.38	0.02	0.00	0.00		**1.38**	9%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	0.28	0.00	0.00	0.00				
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.26	1.40	0.00	0.00	0.00	0.00		**1.66**	11%	recharge

1908			0.26	0.00	0.40	1.72	0.77	1.83	8.41	5.43	4.05	0.00	0.00	0.00	**22.87**		**22.87**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.20	1.09	0.81	0.00	0.00	0.00		**2.09**	9%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.28	2.40	2.40	2.40	0.00	0.00	0.00				
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	4.54	1.82	0.00	0.00	0.00	0.00		**6.37**	28%	recharge
1909			0.00	0.00	0.00	0.00	3.44	5.82	4.93	0.66	2.25	0.32	0.00	0.00	**17.42**		**17.42**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.50	0.99	0.13	0.10	0.00	0.00	0.00		**1.72**	10%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	1.04	2.40	2.40	0.54	0.00	0.00	0.00	0.00			63%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	2.41	2.39	0.00	0.00	0.00	0.00	0.00		**4.80**	28%	recharge
1910			3.44	0.05	1.94	1.03	1.12	0.15	4.65	5.70	1.40	0.96	0.00	0.00	**20.44**		**20.44**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.14	0.28	0.00	0.00	0.00		**1.42**	7%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	0.00	0.00	0.00	0.00			80%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.70	2.04	0.00	0.00	0.00	0.00		**2.74**	13%	recharge
1911			0.40	0.00	0.00	0.00	0.10	2.08	0.64	0.00	10.67	3.51	1.52	0.15	**19.07**		**19.07**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.70	0.03	0.00		**0.76**	4%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	2.40	0.21	0.00	0.00			74%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.24	0.00	0.00	0.00		**4.24**	22%	recharge
1912			0.15	0.20	0.00	0.98	0.92	0.00	2.75	5.27	1.90	0.33	0.13	0.20	**12.83**		**12.83**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.38	0.01	0.00	0.00		**0.91**	7%	runoff
1913			0.36	1.77	0.00	0.05	2.39	1.49	5.85	4.07	0.92	2.34	0.78	0.00	**20.02**		**20.02**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.18	0.00	0.00	0.00		**1.00**	5%	runoff
	SM param		-8.94	-6.60	-6.30	-4.29	-0.01	-0.06	4.30	3.95	-0.71	-3.36	-6.97	-8.70				
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	1.90	0.74	0.00	0.00	0.00	0.00		**2.64**	13%	recharge
1914			0.75	0.00	0.22	0.88	0.76	3.99	6.36	4.47	1.74	1.50	2.56	0.00	**23.23**		**23.23**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.89	0.35	0.01	0.00	0.00		**2.53**	11%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	0.11	0.00	0.00	0.00			69%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.04	3.54	1.06	0.00	0.00	0.00	0.00		**4.63**	20%	recharge
1915			0.50	0.35	0.00	0.00	1.20	3.40	20.44	0.90	3.81	0.19	0.00	0.00	**30.79**		**30.79**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	3.15	0.18	0.25	0.01	0.00	0.00		**3.59**	12%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.85	2.40	0.78	0.56	0.00	0.00	0.00			39%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	15.19	0.00	0.00	0.00	0.00	0.00		**15.19**	49%	recharge

1916			0.18	0.85	0.43	0.85	0.00	2.32	4.85	2.88	0.80	2.79	0.57	0.00	**16.52**		**16.52**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.58	0.16	0.00	0.00	0.00		**1.05**	6%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.77	2.40	2.40	0.00	0.00	0.00	0.00			85%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	1.36	0.00	0.00	0.00	0.00	0.00		**1.36**	8%	recharge
1917			0.93	0.00	0.03	0.00	0.35	0.00	1.62	2.73	7.55	0.00	0.25	0.20	**13.66**		**13.66**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.18	0.00	0.00	0.00		**0.19**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.28	2.40	0.00	0.00	0.00			90%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	0.00	0.00	0.00		**1.22**	9%	recharge
1918			0.10	2.17	0.00	1.10	1.89	2.19	0.75	4.04	3.07	1.08	0.17	0.00	**16.56**		**16.56**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.39	0.05	0.00	0.00		**0.48**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	1.52	0.56	0.00	0.00	0.00			97%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1919			0.57	0.15	0.20	1.20	3.66	1.01	1.90	7.44	5.84	0.66	0.35	0.00	**22.98**		**22.98**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.66	1.17	0.13	0.00	0.00		**2.18**	10%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	1.26	0.72	1.07	2.40	2.40	0.00	0.00	0.00			75%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.93	0.64	0.00	0.00	0.00		**3.57**	16%	recharge
1920			0.00	1.00	0.15	1.10	0.12	0.79	2.90	0.51	0.95	0.15	2.50	0.00	**10.17**		**10.17**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00		**0.06**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.00	0.00			99%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1921			5.30	0.60	0.35	2.12	0.38	11.85	4.55	3.54	2.84	1.03	0.85	0.00	**33.41**		**33.41**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.71	0.57	0.10	0.00	0.00		**2.29**	7%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	1.21	0.00	0.00	0.00			62%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	7.90	2.09	0.31	0.00	0.00	0.00	0.00		**10.30**	31%	recharge
1922			7.10	1.32	0.25	0.53	1.65	3.39	1.40	1.96	1.68	1.93	0.00	0.15	**21.36**		**21.36**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.28	0.16	0.00	0.00	0.00		**0.65**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.84	1.69	1.13	0.00	0.00	0.00	0.00			97%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1923			1.35	0.62	1.60	1.10	0.05	3.29	0.35	0.00	5.47	1.88	0.00	0.00	**15.71**		**15.71**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.23	0.00	0.00		**0.28**	2%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.74	0.54	0.00	1.44	0.00	0.00	0.00			98%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1924			0.00	0.00	0.00	0.50	1.50	3.17	0.36	0.41	1.96	3.78	0.00	0.83	**12.51**		**12.51**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.00		**0.06**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.62	0.43	0.00	0.00	0.00	0.00	0.00			99%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1925			0.31	0.00	0.00	2.88	2.29	1.06	1.50	2.00	0.35	8.92	0.00	0.00	**19.31**		**19.31**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00			96%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00		**0.82**	4%	recharge
1926			0.00	0.07	0.00	0.00	1.25	4.62	1.00	16.50	4.20	1.26	1.31	0.21	**30.42**		**30.42**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.20	2.54	0.84	0.25	0.00	0.00		**3.84**	13%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.85	2.40	2.40	0.00	0.00	0.00			49%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.67	0.00	10.89	0.00	0.00	0.00	0.00		**11.56**	38%	recharge
1927			0.00	0.52	0.00	2.43	0.00	4.00	0.96	2.48	1.26	0.28	0.42	0.00	**12.35**		**12.35**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.37	0.19	0.00	0.00	0.00		**0.75**	6%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.81	1.77	0.00	0.00	0.00	0.00			94%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00		**0.05**	0%	recharge
1928			0.00	0.00	0.00	0.33	1.10	2.94	3.19	3.95	2.95	1.99	0.00	0.00	**16.45**		**16.45**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.79	0.59	0.22	0.00	0.00		**1.97**	12%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.39	2.40	2.40	1.32	0.00	0.00	0.00			83%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.64	0.00	0.00	0.00	0.00		**0.90**	5%	recharge
1929			0.00	3.23	0.52	0.00	0.00	0.00	8.26	1.23	4.04	0.62	4.85	0.00	**22.75**		**22.75**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.37	0.06	0.00	0.00		**0.68**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.11	1.12	0.00	0.00	0.00			78%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	4.31	0.00	0.00	0.00	0.00	0.00		**4.31**	19%	recharge
1930			1.12	0.00	0.35	0.00	3.45	0.00	3.18	5.86	0.40	2.51	0.49	0.00	**17.36**		**17.36**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.08	0.00	0.00	0.00		**0.88**	5%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	1.05	0.00	1.63	2.40	0.00	0.00	0.00	0.00			85%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.77	0.00	0.00	0.00	0.00		**1.77**	10%	recharge
1931			0.00	0.00	0.00	0.81	3.93	6.21	1.70	11.73	0.34	1.38	0.00	0.10	**26.20**		**26.20**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.79	0.34	2.35	0.07	0.00	0.00	0.00		**3.55**	14%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	1.53	2.40	2.40	2.40	0.00	0.00	0.00	0.00			49%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	3.00	0.00	6.86	0.00	0.00	0.00	0.00		**9.86**	38%	recharge
1932			0.00	0.00	0.00	0.50	0.00	6.91	6.20	0.00	0.00	2.98	1.44	0.14	**18.17**		**18.17**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00	0.00		**1.24**	7%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	0.00	0.00	0.00	0.00	0.00			58%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	2.96	3.41	0.00	0.00	0.00	0.00	0.00		**6.37**	35%	recharge
1933			0.00	0.00	0.00	0.00	0.98	1.80	0.00	2.23	0.54	0.00	0.04	0.90	**6.49**		**6.49**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1934			0.17	2.29	0.00	0.80	1.03	2.94	4.00	5.83	2.88	2.34	0.02	0.00	**22.30**		**22.30**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.46	1.17	0.58	0.24	0.00	0.00		**2.45**	11%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.39	2.40	2.40	1.25	0.00	0.00	0.00			75%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.98	2.14	0.00	0.00	0.00	0.00		**3.12**	14%	recharge
1935			0.03	2.55	0.43	0.08	0.18	1.00	0.50	5.58	2.20	1.03	0.00	0.00	**13.58**		**13.58**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.05	0.00	0.00		**0.49**	4%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.57	0.00	0.00	0.00			92%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00		**0.66**	5%	recharge
1936			0.33	0.92	0.28	1.24	0.46	6.23	4.05	7.15	3.56	0.75	0.27	0.00	**25.24**		**25.24**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.81	1.43	0.71	0.12	0.00	0.00		**3.07**	12%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	1.93	0.00	0.00	0.00			59%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	2.28	1.69	3.20	0.00	0.00	0.00	0.00		**7.17**	28%	recharge

1937		0.60	0.00	0.00	0.00	0.00	1.68	1.95	4.79	6.32	1.08	0.16	0.00	**16.58**		**16.58**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.21	1.26	0.22	0.00	0.00		**1.71**	10%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.53	2.40	2.40	0.00	0.00	0.00			82%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	1.03	0.00	0.00	0.00		**1.21**	7%	recharge
1938		0.03	0.12	0.00	0.12	0.09	5.54	2.90	3.42	1.85	0.73	0.01	0.00	**14.81**		**14.81**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.68	0.37	0.01	0.00	0.00		**1.65**	11%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	0.22	0.00	0.00	0.00			71%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	1.59	0.77	0.22	0.00	0.00	0.00	0.00		**2.58**	17%	recharge
1939		0.00	0.35	5.30	0.44	0.71	0.68	2.49	4.22	0.31	2.72	0.21	0.00	**17.43**		**17.43**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.06	0.00	0.00	0.00		**0.39**	2%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94	2.40	0.00	0.00	0.00	0.00			98%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1940		0.00	0.00	0.22	1.55	0.69	6.81	1.29	3.62	5.65	5.00	0.73	0.02	**25.58**		**25.58**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.65	1.13	1.00	0.10	0.00		**3.14**	12%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.14	2.40	2.40	1.70	0.00	0.00			74%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	2.86	0.00	0.19	0.49	0.00	0.00	0.00		**3.54**	14%	recharge
1941		0.10	0.95	0.05	3.22	0.81	3.04	1.40	2.58	2.04	1.70	0.02	0.00	**15.91**		**15.91**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.29	0.24	0.00	0.00		**0.70**	4%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.34	1.40	0.00	0.00	0.00	0.00			96%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1942		0.00	0.00	0.00	0.46	0.13	1.56	5.85	1.95	2.79	2.43	0.00	0.08	**15.25**		**15.25**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.43	0.12	0.00		**0.94**	6%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.01	2.40	1.83	0.59	0.00	0.00	0.00			81%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	1.91	0.00	0.00	0.00	0.00	0.00		**1.91**	12%	recharge
1943		0.00	0.30	0.00	0.61	0.00	4.99	1.67	8.11	1.40	1.11	0.45	0.08	**18.72**		**18.72**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.33	1.62	0.28	0.00	0.00	0.00		**2.24**	12%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	0.00	0.00	0.00	0.00			61%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	1.04	0.00	3.97	0.00	0.00	0.00	0.00		**5.01**	27%	recharge
1944		0.00	0.01	0.05	0.00	5.43	0.89	0.79	1.73	5.23	0.55	0.03	0.05	**14.76**		**14.76**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.18	0.11	0.14	0.08	0.06	0.00	0.00		**0.58**	4%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	2.40	1.74	0.98	0.19	1.39	0.00	0.00	0.00			92%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.63**	4%	recharge
1945		0.10	1.80	0.05	0.14	0.25	5.91	0.96	1.01	2.18	0.50	0.04	0.00	**12.94**		**12.94**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.15	0.05	0.00	0.00	0.00		**0.40**	3%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.81	0.30	0.00	0.00	0.00	0.00			82%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	1.96	0.00	0.00	0.00	0.00	0.00	0.00		**1.96**	15%	recharge
1946		0.83	0.05	0.14	1.45	3.30	1.91	0.46	0.32	0.42	0.40	0.01	0.00	**9.29**		**9.29**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.14	0.05	0.00	0.00	0.00	0.00	0.00		**0.20**	2%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.90	1.26	0.17	0.00	0.00	0.00	0.00	0.00			98%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1947		0.00	0.36	0.13	0.46	0.66	2.79	0.07	1.96	2.32	0.21	0.06	0.20	**9.22**		**9.22**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		**0.01**	0%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1948		0.00	0.00	0.22	1.10	0.00	2.56	4.33	2.24	1.39	0.11	0.41	0.00	**12.36**		**12.36**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.45	0.25	0.00	0.00	0.00		**1.06**	9%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.01	2.40	2.12	0.00	0.00	0.00	0.00			83%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.00		**1.03**	8%	recharge
1949		0.00	0.00	0.00	0.77	1.09	2.42	2.74	1.19	1.68	0.48	0.01	0.00	**10.38**		**10.38**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.10	0.00	0.00	0.00		**0.51**	5%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.87	2.06	0.73	0.00	0.00	0.00	0.00			95%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1950		0.10	0.00	0.22	0.00	0.41	0.34	4.00	1.39	1.12	3.57	0.27	0.00	**11.42**		**11.42**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.12	0.00	0.00	0.00		**0.40**	3%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.27	0.00	0.00	0.00	0.00			96%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00		**0.05**	0%	recharge
1951		0.44	1.34	0.01	1.09	0.82	7.19	5.05	0.95	8.40	1.62	0.00	0.00	**26.91**		**26.91**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	1.01	0.19	0.58	0.32	0.00	0.00		**2.11**	8%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	0.83	2.40	0.00	0.00	0.00			63%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	3.24	2.49	0.00	2.22	0.00	0.00	0.00		**7.95**	30%	recharge
1952		1.24	0.00	0.00	0.00	2.85	3.13	1.04	1.05	2.28	1.24	0.49	0.01	**13.33**		**13.33**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.12	0.18	0.13	0.01	0.00	0.00	0.00		**0.44**	3%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.45	2.03	1.52	0.05	0.00	0.00	0.00	0.00			97%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1953		0.04	0.01	0.00	0.00	1.14	0.18	4.89	2.49	6.45	0.16	0.18	0.05	**15.59**		**15.59**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	1.27	0.03	0.00	0.00		**1.80**	12%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.37	2.40	0.00	0.00	0.00			75%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.00	1.12	0.00	0.00	0.00		**2.06**	13%	recharge
1954		1.42	0.03	0.13	0.00	0.68	0.75	3.85	1.23	0.68	0.52	1.95	0.00	**11.24**		**11.24**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.06	0.00	0.00	0.00		**0.29**	3%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	1.01	0.00	0.00	0.00	0.00			97%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1955		0.82	1.90	0.00	0.00	1.14	1.77	1.70	1.75	0.00	2.36	0.45	0.00	**11.89**		**11.89**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.00	0.00	0.00		**0.09**	1%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.37	0.00	0.00	0.00	0.00	0.00			99%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1956		0.65	0.00	0.00	0.07	0.00	0.40	7.05	0.78	1.57	1.09	2.60	0.28	**14.49**		**14.49**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.09	0.00	0.00	0.00		**0.24**	2%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.66	0.00	0.00	0.00	0.00			77%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.00	0.00	0.00	0.00	0.00		**3.10**	21%	recharge
1957		0.01	0.65	0.44	2.17	0.84	1.34	0.72	5.23	6.55	4.90	0.60	0.09	**23.54**		**23.54**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.98	0.08	0.00		**2.37**	10%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	1.60	0.00	0.00			83%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	1.21	0.00	0.00	0.00		**1.52**	6%	recharge

1958			1.40	0.81	0.30	0.00	0.80	0.09	1.12	5.61	0.00	0.17	0.14	0.00	**10.44**		**10.44**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00	0.00	0.00			93%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00		**0.69**	7%	recharge
1959			0.03	0.16	0.34	0.50	0.13	2.93	2.97	4.10	0.45	1.95	0.49	0.00	**14.05**		**14.05**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.82	0.09	0.00	0.00	0.00		**1.25**	9%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.38	2.40	2.40	0.00	0.00	0.00	0.00			85%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.76	0.00	0.00	0.00	0.00		**0.82**	6%	recharge
1960			0.17	0.03	1.59	0.16	1.67	0.07	1.09	0.16	2.28	0.00	0.02	0.00	**7.24**		**7.24**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1961			0.00	0.62	0.00	0.37	0.77	2.08	3.61	4.53	2.12	0.00	0.90	0.11	**15.11**		**15.11**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.91	0.42	0.00	0.00	0.00		**1.49**	10%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.53	2.40	2.40	0.49	0.00	0.00	0.00			83%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.03	1.10	0.00	0.00	0.00	0.00		**1.13**	8%	recharge
1962			0.00	0.00	0.00	0.07	0.00	0.65	0.42	3.03	1.72	1.86	0.00	0.13	**7.88**		**7.88**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00		**0.07**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00			99%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1963			0.00	0.63	2.45	1.35	1.77	0.31	2.12	1.34	3.22	0.95	0.67	0.00	**14.81**		**14.81**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00		**0.06**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1964			0.00	0.03	0.07	0.39	1.88	1.83	0.80	0.00	1.20	6.03	0.05	0.00	**12.28**		**12.28**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00		**0.02**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.33	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1965			0.36	0.13	0.00	0.00	9.03	4.31	1.35	1.40	1.16	0.05	0.07	0.22	**18.08**		**18.08**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.86	0.27	0.26	0.10	0.00	0.00	0.00		**1.49**	8%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.20	1.08	0.00	0.00	0.00	0.00			58%	ET bal
	Recharge		0.00	0.00	0.00	0.00	4.23	1.90	0.00	0.00	0.00	0.00	0.00	0.00		**6.13**	34%	recharge
1966			0.39	0.19	0.20	0.46	0.83	7.00	1.42	0.00	1.03	3.54	0.48	0.06	**15.60**		**15.60**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00		**0.28**	2%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.27	0.00	0.00	0.00	0.00	0.00			79%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	0.00	0.00		**3.05**	20%	recharge
1967			0.34	0.49	0.00	0.00	3.65	4.23	0.58	0.73	2.19	0.85	0.28	0.03	**13.37**		**13.37**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.44	0.12	0.09	0.00	0.00	0.00	0.00		**0.64**	5%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	1.25	2.40	1.43	0.00	0.00	0.00	0.00	0.00			87%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	1.09	0.00	0.00	0.00	0.00	0.00	0.00		**1.09**	8%	recharge
1968			1.88	0.06	0.00	0.05	0.72	1.66	8.30	5.67	1.96	0.10	0.43	0.12	**20.95**		**20.95**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.08	1.13	0.39	0.00	0.00	0.00		**1.60**	8%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.11	2.40	2.40	0.33	0.00	0.00	0.00			62%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	4.38	2.02	0.00	0.00	0.00	0.00		**6.40**	31%	recharge
1969			0.01	0.00	0.20	0.02	1.85	0.26	0.85	0.96	3.95	1.18	0.00	0.03	**9.31**		**9.31**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1970			0.03	2.66	0.08	0.12	1.28	2.66	1.12	1.22	0.40	1.46	0.67	0.00	**11.70**		**11.70**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.00	0.00		**0.17**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.11	0.68	0.00	0.00	0.00	0.00	0.00			99%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1971			*0.07*	*1.00*	*0.25*	*1.18*	*0.05*	*3.60*	*0.00*	*0.18*	*0.00*	*0.24*	*0.14*	*0.31*	**7.02**		**7.02**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00		**0.01**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.05	0.50	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1972			*0.00*	*0.04*	*0.14*	*1.87*	*2.60*	*2.55*	*1.70*	*3.13*	*5.24*	*0.29*	*0.09*	*0.00*	**17.65**		**17.65**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.04	0.17	0.35	0.86	0.06	0.00	0.00		**1.48**	8%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.20	1.20	1.35	1.96	2.40	0.00	0.00	0.00			92%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1973			*0.00*	*0.09*	*0.00*	*0.05*	*1.69*	*0.11*	*4.29*	*0.07*	*1.24*	*0.24*	*0.16*	*0.00*	**7.94**		**7.94**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00		**0.01**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00	0.00	0.00	0.00			96%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00		**0.34**	4%	recharge
1974			*1.28*	*0.13*	*0.31*	*2.32*	*0.39*	*1.24*	*0.40*	*1.02*	*3.40*	*1.58*	*0.11*	*0.12*	**12.30**		**12.30**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1975			*0.09*	*0.00*	*0.18*	*0.07*	*2.15*	*0.63*	*0.07*	*5.47*	*1.81*	*1.85*	*0.06*	*0.00*	**12.38**		**12.38**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.03	0.00	0.00		**0.39**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.18	0.00	0.00	0.00			92%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00		**0.55**	4%	recharge
1976			*0.61*	*0.00*	*2.85*	*0.24*	*1.02*	*0.76*	*3.10*	*0.35*	*0.85*	*0.19*	*1.15*	*0.00*	**11.12**		**11.12**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00		**0.05**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1977			*0.00*	*1.18*	*0.00*	*0.88*	*0.25*	*1.90*	*7.79*	*5.38*	*5.45*	*1.48*	*0.53*	*0.00*	**24.84**		**24.84**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.22	1.08	1.09	0.30	0.00	0.00		**2.69**	11%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.35	2.40	2.40	2.40	0.00	0.00	0.00			65%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	3.96	1.78	0.33	0.00	0.00	0.00		**6.08**	24%	recharge
1978			*0.00*	*0.01*	*0.16*	*0.06*	*3.05*	*4.45*	*3.99*	*1.95*	*4.88*	*0.03*	*0.19*	*0.00*	**18.77**		**18.77**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.24	0.80	0.39	0.74	0.01	0.00	0.00		**2.18**	12%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.65	2.40	2.40	1.83	2.40	0.00	0.00	0.00			75%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.91	1.64	0.00	0.00	0.00	0.00	0.00		**2.55**	14%	recharge

1979			*0.00*	*0.16*	*0.04*	*0.82*	*0.26*	*0.69*	*11.82*	*8.82*	*3.72*	*1.87*	*0.80*	*0.00*	**29.00**		**29.00**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.76	0.74	0.33	0.00	0.00		**2.83**	10%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.09	0.00	0.00	0.00			47%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	7.87	4.54	0.00	0.00	0.00	0.00		**12.41**	43%	recharge
1980			*0.55*	*0.00*	*0.00*	*0.28*	*0.00*	*0.54*	*0.91*	*2.64*	*4.22*	*0.80*	*0.10*	*0.00*	**10.04**		**10.04**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00		**0.06**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.31	0.00	0.00	0.00			99%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1981			*0.05*	*0.03*	*0.31*	*0.19*	*1.35*	*0.03*	*5.04*	*2.15*	*4.30*	*0.82*	*0.12*	*0.00*	**14.39**		**14.39**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.73	0.16	0.00	0.00		**1.31**	9%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.03	2.30	0.00	0.00	0.00			83%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.00	0.00	0.00	0.00	0.00		**1.09**	8%	recharge
1982			*0.33*	*0.56*	*0.37*	*0.13*	*4.42*	*3.44*	*2.23*	*4.82*	*9.78*	*2.23*	*0.19*	*0.00*	**28.50**		**28.50**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.58	0.45	0.96	1.96	0.45	0.00	0.00		**4.39**	15%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	2.02	2.40	2.40	2.40	2.40	0.00	0.00	0.00			63%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.93	0.23	1.34	3.79	0.00	0.00	0.00		**6.29**	22%	recharge
1983			*0.01*	*4.05*	*0.68*	*1.16*	*2.45*	*3.20*	*0.12*	*0.00*	*0.04*	*0.24*	*0.00*	*0.55*	**12.50**		**12.50**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00		**0.03**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.05	1.70	0.27	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1984			*1.51*	*2.29*	*0.67*	*0.18*	*1.43*	*4.25*	***0.26***	*1.59*	*1.46*	*0.27*	*0.04*	*0.09*	**14.04**		**14.04**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.15	0.02	0.00	0.00	0.00		**0.22**	2%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.11	0.18	0.00	0.00	0.00	0.00			96%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00		**0.30**	2%	recharge
1985			*1.74*	*0.01*	*0.33*	*0.69*	*4.53*	*1.76*	*0.75*	*3.53*	*3.47*	*0.28*	*0.01*	*0.00*	**17.10**		**17.10**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.31	0.15	0.45	0.69	0.04	0.00	0.00		**1.65**	10%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	2.13	2.34	1.54	2.40	1.84	0.00	0.00	0.00			90%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1986			*0.35*	*0.06*	*1.32*	*2.12*	*0.57*	*0.72*	*1.66*	*2.55*	*2.58*	*0.31*	*0.08*	*0.01*	**12.33**		**12.33**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00		**0.05**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.14	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1987			*0.00*	*0.65*	*0.48*	*3.13*	*2.48*	*1.82*	*3.49*	*1.93*	*0.00*	*2.48*	*0.36*	*0.01*	**16.83**		**16.83**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.37	0.00	0.00	0.00	0.00		**0.48**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.08	0.35	2.29	1.70	0.00	0.00	0.00	0.00			97%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1988			*0.02*	*1.65*	*0.00*	*0.00*	*1.08*	*2.12*	*1.05*	*1.18*	*1.65*	*0.21*	*0.13*	*0.00*	**9.09**		**9.09**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.00		**0.06**	1%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.07	0.00	0.00	0.00	0.00	0.00			99%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1989			*0.00*	*0.00*	*0.17*	*0.36*	*0.03*	*0.29*	*3.06*	*1.78*	*0.70*	*0.99*	*0.23*	*0.22*	**7.83**		**7.83**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.04	0.00	0.00	0.00		**0.27**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.77	0.00	0.00	0.00	0.00			97%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1990			*0.11*	*0.18*	*0.62*	*0.04*	*0.56*	*1.30*	*1.35*	*2.23*	*12.18*	*0.05*	*0.00*	*0.00*	**18.62**		**18.62**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00		**0.01**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00	0.00			69%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.75	0.00	0.00	0.00		**5.75**	31%	recharge
1991			*0.62*	*0.00*	*0.35*	*0.58*	*0.30*	*2.83*	*3.24*	*5.05*	*4.94*	*0.68*	*0.23*	*0.01*	**18.83**		**18.83**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.35	1.01	0.99	0.14	0.00	0.00		**2.48**	13%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.28	2.40	2.40	2.40	0.00	0.00	0.00			78%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.22	1.52	0.00	0.00	0.00	0.00		**1.74**	9%	recharge
1992			*0.75*	*2.05*	*0.01*	*0.24*	*0.06*	*4.04*	*18.61*	*6.51*	*1.53*	*0.00*	*0.12*	*0.00*	**33.92**		**33.92**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	3.72	1.30	0.31	0.00	0.00	0.00		**5.33**	16%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	0.00	0.00	0.00	0.00			37%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.09	13.34	2.69	0.00	0.00	0.00	0.00		**16.12**	48%	recharge
1993			*0.00*	*0.00*	*0.00*	*0.30*	*1.49*	*1.16*	*1.70*	*4.14*	*3.14*	*1.35*	*0.00*	*0.00*	**13.28**		**13.28**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.46	0.10	0.00	0.00		**0.61**	5%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	1.77	0.88	0.00	0.00	0.00			95%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1994			*0.00*	*1.22*	*0.00*	*0.19*	*0.68*	*0.97*	*10.12*	*3.28*	*6.63*	*1.26*	*1.10*	*0.48*	**25.93**		**25.93**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.33	0.25	0.00	0.00		**2.23**	9%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	0.00	0.00	0.00			62%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	6.17	0.10	1.27	0.00	0.00	0.00		**7.55**	29%	recharge
1995			*0.06*	*0.64*	*0.28*	*0.00*	*0.08*	*0.57*	*1.54*	*3.20*	*2.76*	*0.53*	*0.07*	*0.00*	**9.73**		**9.73**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00		**0.16**	2%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00			98%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1996			*0.00*	*0.07*	*0.03*	*1.56*	*0.92*	*1.07*	*4.33*	*1.53*	*0.02*	*0.22*	*0.00*	***0.11***	**9.86**		**9.86**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00		**0.31**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.41	0.00	0.00	0.00	0.00			93%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00		**0.38**	4%	recharge
1997			*0.10*	*0.07*	*1.93*	*0.16*	*1.74*	*4.21*	*1.60*	*10.37*	*4.40*	*2.35*	*1.17*	*0.02*	**28.12**		**28.12**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.32	2.07	0.88	0.47	0.00	0.00		**3.74**	13%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	2.40	0.00	0.00	0.00			65%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.26	0.00	5.78	0.00	0.00	0.00	0.00		**6.04**	21%	recharge
1998			*0.10*	*0.20*	*0.20*	*0.03*	*1.17*	*1.42*	*1.66*	*0.83*	*0.62*	*3.31*	*0.01*	*0.46*	**10.01**		**10.01**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00		**0.01**	0%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00			100%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
1999			*0.12*	*0.01*	*0.14*	*0.00*	*0.01*	*0.21*	*0.75*	*4.20*	*1.47*	*0.46*	*0.01*	*0.21*	**7.59**		**7.59**	
	Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00		**0.21**	3%	runoff
	Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.68	0.00	0.00	0.00	0.00			97%	ET bal
	Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge

2000		*0.00*	*0.13*	*0.30*	*0.65*	*0.39*	*0.04*	2.49	3.28	1.36	0.97	0.01	0.00	**9.62**		**9.62**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.19	0.00	0.00	0.00		**0.45**	5%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94	1.70	0.00	0.00	0.00	0.00			95%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2001		0.12	0	0.24	0	1.11	1.02	0.4	0.12	1.12	0.39	0	0	**4.52**		**4.52**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2002		0.19	0	1.16	0.03	1.04	1.86	0.18	4.09	2.2	1.55	0.91	0	**13.21**		**13.21**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00		**0.29**	2%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	1.57	0.00	0.00	0.00	0.00			98%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2003		1.93	1.49	0.38	0	0.55	1.26	0.68	4.45	0.66	1.34	0	0	**12.74**		**12.74**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00		**0.11**	1%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.93	0.00	0.00	0.00	0.00			99%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2004		0.14	0.01	0	8.59	1.08	4.74	5.17	4.89	1.6	0.58	0.04	0	**26.84**		**26.84**	
Runoff		0.00	0.00	0.00	0.00	0.22	0.43	1.03	0.98	0.00	0.32	0.00	0.00		**2.97**	11%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	2.40	1.08	2.40	2.40	2.40	0.00	0.00	0.00	0.00			62%	ET bal
Recharge		0.00	0.00	0.00	1.85	0.00	1.44	2.59	1.39	0.00	0.00	0.00	0.00		**7.27**	27%	recharge
2005		0.47	2.53	0.01	0.62	0.11	0	0.99	1.3	0	2.25	0.22	0.16	**8.66**		**8.66**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			100%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2006		0.52	0.03	0.07	0.36	0.17	1.19	0.75	3.08	0.22	0.77	0.04	0	**7.20**		**7.20**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00		**0.01**	0%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00			100%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2007		0.18	0	0	0.17	0.32	2.68	7.29	2.45	0.38	0	0.22	0	**13.69**		**13.69**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.49	0.07	0.00	0.00	0.00		**1.25**	9%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.13	2.40	2.33	0.00	0.00	0.00	0.00			63%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	3.78	0.00	0.00	0.00	0.00	0.00		**3.78**	28%	recharge
2008		0	1.35	0	0	1.8	6.2	0.2	3.7	0.09	0.24	0	0.03	**13.61**		**13.61**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.32	0.02	0.00	0.00	0.00		**0.38**	3%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.05	2.23	0.00	0.00	0.00	0.00			81%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	2.25	0.00	0.00	0.00	0.00	0.00	0.00		**2.25**	17%	recharge
2009		0	0	0.03	0.03	0.7	4.86	6.6	5.13	1.37	2.35	0	0	**21.07**		**21.07**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	1.32	1.03	0.27	0.00	0.00	0.00		**2.62**	12%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.40	2.40	0.00	0.00	0.00	0.00			58%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.91	3.73	1.58	0.00	0.00	0.00	0.00		**6.22**	30%	recharge
2010		0.07	0	0.08	3.22	1.19	8.22	0.24	4.93	1.64	0.39	0.72	0	**20.70**		**20.70**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.45	0.33	0.00	0.00	0.00		**0.82**	4%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	2.40	1.09	2.40	0.01	0.00	0.00	0.00			72%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	4.27	0.00	0.65	0.00	0.00	0.00	0.00		**4.92**	24%	recharge
2011		0.22	1.28	0.22	0.64	3.39	1.62	0.73	2.01	2.88	2.85	0	0	**15.84**		**15.84**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.13	0.06	0.04	0.00	0.00	0.00	0.00		**0.24**	2%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.99	1.06	0.24	0.00	0.00	0.00	0.00	0.00			98%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge
2012		0.39	0.67	0.59	0.37	0.59	2.74	2.28	1.52	1.78	0	0	0	**10.93**		**10.93**	
Runoff		0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.24	0.14	0.00	0.00	0.00		**0.61**	6%	runoff
Soil Mo.	0.00	0.00	0.00	0.00	0.00	0.00	1.19	1.92	0.92	0.00	0.00	0.00	0.00			94%	ET bal
Recharge		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		**0.00**	0%	recharge

0 RF data missing (calculations underestimate total)

RECHARGE CALCULATIONS: Annual Recharge, Aquifer Storage, and Groundwater Use

SM capacity	**2.40**	inches					input variables
runoff coeff.	**0.20**	%	**20.00**	%			
storage DG	**0.05**		**5.00**	percent effective porosity			
DG aq area	**1462.00**	acres					
storage frx	**0.0005**		**0.05**	percent effective porosity (500 ft deep)			
WS aq area	**1462.00**	acres					
DG sat_depth	**30.00**	feet			**14.58**	Avg Rainfall, inches	
Eff. capacity	**1279.25**	Available Ac-ft (50% allowed)			**1777**	Avg Rainfall, Acft	
pumping rate	**173.00**	Ac-ft/yr	**107**	in gpm (24 hr/day)	**9.7%**	Pumping, as % of rainfall	
			154,434	gallons per day			

lowest remaining aquifer vol	**4**	Ac-ft	In 1976...(based on 50% of total)	
1945 to 2007	**1283**	of total	**50%**	percent
average aquifer volume	**2092**	Acft	**81.8%**	avg percent

DG storage	**2193**	total, Acft	**1097**	"allowed per SD Co DPLU"
Rock storage	**366**	total, Acft	**183**	"allowed per SD Co DPLU"
	2559	total	**1279**	50% of total capacity (cap)

Initial Aquifer Volume at beginning of calc. period **1279** full (calculations based on 50% of total aquifer volume)

Recharge Rate	**8.74%**	as % of RF
1945 to 2012	**230**	AcFt/yr

		Annual Recharge				Start aquifer volume	End aquifer volume	Net Recharge to Aquifer (water rejected if aquifer is a maximum volume)		
		inches	pct of RF	Acft	Net -pump'g		(w/pumping)	In	Rej'd	Rej'd
YEAR	**RF**					**Acft**	**Acft**	**Acft**	**Acft**	**pct**
1901	**17.44**	1.59	9.1%	193.23	20.23	1279.25	1279.25	173.00	20.23	10%
1902	**20.00**	1.06	5.3%	129.70	-43.30	1279.25	1235.95	129.70	0.00	0%
1903	**8.79**	0.00	0.0%	0.00	-173.00	1235.95	1062.95	0.00	0.00	0%
1904	**31.61**	9.04	28.6%	1101.47	928.47	1062.95	1279.25	389.30	712.18	65%
1905	**27.07**	6.12	22.6%	745.96	572.96	1279.25	1279.25	173.00	572.96	77%
1906	**25.42**	6.18	24.3%	752.62	579.62	1279.25	1279.25	173.00	579.62	77%
1907	**15.57**	1.66	10.7%	202.24	29.24	1279.25	1279.25	173.00	29.24	14%
1908	**22.87**	6.37	27.8%	775.81	602.81	1279.25	1279.25	173.00	602.81	78%

1909	**17.42**	4.80	27.6%	584.75	411.75	1279.25	1279.25	173.00	411.75	70%
1910	**20.44**	2.74	13.4%	333.82	160.82	1279.25	1279.25	173.00	160.82	48%
1911	**19.07**	4.24	22.2%	516.57	343.57	1279.25	1279.25	173.00	343.57	67%
1912	**12.83**	1.02	8.0%	124.64	-48.36	1279.25	1230.89	124.64	0.00	0%
1913	**20.02**	2.64	13.2%	321.15	148.15	1230.89	1279.25	221.36	99.79	31%
1914	**23.23**	4.63	19.9%	564.58	391.58	1279.25	1279.25	173.00	391.58	69%
1915	**30.79**	15.19	49.3%	1850.51	1677.51	1279.25	1279.25	173.00	1677.51	91%
1916	**16.52**	1.36	8.2%	165.55	-7.45	1279.25	1271.80	165.55	0.00	0%
1917	**13.66**	1.22	9.0%	149.10	-23.90	1271.80	1247.90	149.10	0.00	0%
1918	**16.56**	0.00	0.0%	0.00	-173.00	1247.90	1074.90	0.00	0.00	0%
1919	**22.98**	3.57	15.5%	434.77	261.77	1074.90	1279.25	377.35	57.42	13%
1920	**10.17**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1921	**33.41**	10.30	30.8%	1255.13	1082.13	1106.25	1279.25	346.00	909.13	72%
1922	**21.36**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1923	**15.71**	0.00	0.0%	0.00	-173.00	1106.25	933.25	0.00	0.00	0%
1924	**12.51**	0.00	0.0%	0.00	-173.00	933.25	760.25	0.00	0.00	0%
1925	**19.31**	0.82	4.2%	99.90	-73.10	760.25	687.15	99.90	0.00	0%
1926	**30.42**	11.56	38.0%	1407.94	1234.94	687.15	1279.25	765.10	642.84	46%
1927	**12.35**	0.05	0.4%	6.09	-166.91	1279.25	1112.34	6.09	0.00	0%
1928	**16.45**	0.90	5.5%	109.71	-63.29	1112.34	1049.05	109.71	0.00	0%
1929	**22.75**	4.31	18.9%	525.10	352.10	1049.05	1279.25	403.20	121.90	23%
1930	**17.36**	1.77	10.2%	216.13	43.13	1279.25	1279.25	173.00	43.13	20%
1931	**26.20**	9.86	37.6%	1201.55	1028.55	1279.25	1279.25	173.00	1028.55	86%
1932	**18.17**	6.37	35.1%	776.08	603.08	1279.25	1279.25	173.00	603.08	78%
1933	**6.49**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1934	**22.30**	3.12	14.0%	380.20	207.20	1106.25	1279.25	346.00	34.20	9%
1935	**13.58**	0.66	4.9%	80.41	-92.59	1279.25	1186.66	80.41	0.00	0%
1936	**25.24**	7.17	28.4%	873.55	700.55	1186.66	1279.25	265.59	607.96	70%
1937	**16.58**	1.21	7.3%	147.96	-25.04	1279.25	1254.21	147.96	0.00	0%
1938	**14.81**	2.58	17.4%	313.84	140.84	1254.21	1279.25	198.04	115.80	37%
1939	**17.43**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1940	**25.58**	3.54	13.9%	431.83	258.83	1106.25	1279.25	346.00	85.83	20%
1941	**15.91**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1942	**15.25**	1.91	12.5%	232.11	59.11	1106.25	1165.36	232.11	0.00	0%
1943	**18.72**	5.01	26.8%	610.14	437.14	1165.36	1279.25	286.89	323.25	53%
1944	**14.76**	0.63	4.3%	76.76	-96.25	1279.25	1183.01	76.75	0.00	0%
1945	**12.94**	1.96	15.1%	238.79	65.79	1183.01	1248.80	238.79	0.00	0%
1946	**9.29**	0.00	0.0%	0.00	-173.00	1248.80	1075.80	0.00	0.00	0%
1947	**9.22**	0.00	0.0%	0.00	-173.00	1075.80	902.80	0.00	0.00	0%
1948	**12.36**	1.03	8.3%	124.95	-48.05	902.80	854.75	124.95	0.00	0%
1949	**10.38**	0.00	0.0%	0.00	-173.00	854.75	681.75	0.00	0.00	0%
1950	**11.42**	0.05	0.4%	6.09	-166.91	681.75	514.84	6.09	0.00	0%
1951	**26.91**	7.95	29.5%	968.45	795.45	514.84	1279.25	937.41	31.04	3%
1952	**13.33**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1953	**15.59**	2.06	13.2%	250.50	77.50	1106.25	1183.75	250.50	0.00	0%
1954	**11.24**	0.00	0.0%	0.00	-173.00	1183.75	1010.75	0.00	0.00	0%
1955	**11.89**	0.00	0.0%	0.00	-173.00	1010.75	837.75	0.00	0.00	0%
1956	**14.49**	3.10	21.4%	377.68	204.68	837.75	1042.44	377.68	0.00	0%
1957	**23.54**	1.52	6.5%	185.19	12.19	1042.44	1054.62	185.19	0.00	0%
1958	**10.44**	0.69	6.6%	84.07	-88.94	1054.62	965.69	84.07	0.00	0%
1959	**14.05**	0.82	5.8%	99.71	-73.29	965.69	892.40	99.71	0.00	0%

1960	**7.24**	0.00	0.0%	0.00	-173.00	892.40	719.40	0.00	0.00	0%
1961	**15.11**	1.13	7.5%	138.23	-34.77	719.40	684.63	138.23	0.00	0%
1962	**7.88**	0.00	0.0%	0.00	-173.00	684.63	511.63	0.00	0.00	0%
1963	**14.81**	0.00	0.0%	0.00	-173.00	511.63	338.63	0.00	0.00	0%
1964	**12.28**	0.00	0.0%	0.00	-173.00	338.63	165.63	0.00	0.00	0%
1965	**18.08**	6.13	33.9%	746.59	573.59	165.63	739.23	746.59	0.00	0%
1966	**15.60**	3.05	19.6%	371.59	198.59	739.23	937.82	371.59	0.00	0%
1967	**13.37**	1.09	8.1%	132.72	-40.28	937.82	897.54	132.72	0.00	0%
1968	**20.95**	6.40	30.5%	779.72	606.72	897.54	1279.25	554.71	225.01	29%
1969	**9.31**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1970	**11.70**	0.00	0.0%	0.00	-173.00	1106.25	933.25	0.00	0.00	0%
1971	**7.02**	0.00	0.0%	0.00	-173.00	933.25	760.25	0.00	0.00	0%
1972	**17.65**	0.00	0.0%	0.00	-173.00	760.25	587.25	0.00	0.00	0%
1973	**7.94**	0.34	4.3%	41.42	-131.58	587.25	455.67	41.42	0.00	0%
1974	**12.30**	0.00	0.0%	0.00	-173.00	455.67	282.67	0.00	0.00	0%
1975	**12.38**	0.55	4.4%	67.01	-105.99	282.67	176.68	67.01	0.00	0%
1976	**11.12**	0.00	0.0%	0.00	-173.00	176.68	3.68	0.00	0.00	0%
1977	**24.84**	6.08	24.5%	740.17	567.17	3.68	570.86	740.17	0.00	0%
1978	**18.77**	2.55	13.6%	310.79	137.79	570.86	708.65	310.79	0.00	0%
1979	**29.00**	12.41	42.8%	1511.46	1338.46	708.65	1279.25	743.60	767.86	51%
1980	**10.04**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1981	**14.39**	1.09	7.6%	132.80	-40.20	1106.25	1066.05	132.80	0.00	0%
1982	**28.50**	6.29	22.1%	766.93	593.93	1066.05	1279.25	386.20	380.73	50%
1983	**12.50**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1984	**14.04**	0.30	2.1%	36.55	-136.45	1106.25	969.80	36.55	0.00	0%
1985	**17.10**	0.00	0.0%	0.00	-173.00	969.80	796.80	0.00	0.00	0%
1986	**12.33**	0.00	0.0%	0.00	-173.00	796.80	623.80	0.00	0.00	0%
1987	**16.83**	0.00	0.0%	0.00	-173.00	623.80	450.80	0.00	0.00	0%
1988	**9.09**	0.00	0.0%	0.00	-173.00	450.80	277.80	0.00	0.00	0%
1989	**7.83**	0.00	0.0%	0.00	-173.00	277.80	104.80	0.00	0.00	0%
1990	**18.62**	5.75	30.9%	700.54	527.54	104.80	632.34	700.54	0.00	0%
1991	**18.83**	1.74	9.3%	212.53	39.53	632.34	671.87	212.53	0.00	0%
1992	**33.92**	16.12	47.5%	1963.47	1790.47	671.87	1279.25	780.38	1183.08	60%
1993	**13.28**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1994	**25.93**	7.55	29.1%	919.60	746.60	1106.25	1279.25	346.00	573.60	62%
1995	**9.73**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1996	**9.86**	0.38	3.9%	46.30	-126.70	1106.25	979.55	46.30	0.00	0%
1997	**28.12**	6.04	21.5%	735.39	562.39	979.55	1279.25	472.70	262.68	36%
1998	**10.01**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
1999	**7.59**	0.00	0.0%	0.00	-173.00	1106.25	933.25	0.00	0.00	0%
2000	**9.62**	0.00	0.0%	0.00	-173.00	933.25	760.25	0.00	0.00	0%
2001	**4.52**	0.00	0.0%	0.00	-173.00	760.25	587.25	0.00	0.00	0%
2002	**13.21**	0.00	0.0%	0.00	-173.00	587.25	414.25	0.00	0.00	0%
2003	**12.74**	0.00	0.0%	0.00	-173.00	414.25	241.25	0.00	0.00	0%
2004	**26.84**	7.27	27.1%	885.90	712.90	241.25	954.15	885.90	0.00	0%
2005	**8.66**	0.00	0.0%	0.00	-173.00	954.15	781.15	0.00	0.00	0%
2006	**7.20**	0.00	0.0%	0.00	-173.00	781.15	608.15	0.00	0.00	0%
2007	**13.69**	3.78	27.6%	460.96	287.96	608.15	896.11	460.96	0.00	0%
2008	**13.61**	2.25	16.5%	274.13	101.13	896.11	997.23	274.13	0.00	0%
2009	**21.07**	6.22	29.5%	758.29	585.29	997.23	1279.25	455.02	303.27	40%
2010	**20.70**	4.92	23.8%	599.69	426.69	1279.25	1279.25	173.00	426.69	71%
2011	**15.84**	0.00	0.0%	0.00	-173.00	1279.25	1106.25	0.00	0.00	0%
2012	**10.93**	0.00	0.0%	0.00	-173.00	1106.25	933.25	0.00	0.00	0%

Attachment 3.
Supplemental Well and Test Logs, Wells MW-21A and HG-60

Existing wells HG-21A and HG-31 were initially installed as unlined test wells for the formerly-proposed Campo Landfill. They were prepared for water production by overdrilling followed by the installation of casing (PVC SDR 17) and a pea gravel filter packing within the well annulus.

HG-21A has a total depth of 480 feet, with an estimated yield of 60 gpm (1-hour air lift test).

HG-31 has a total depth of 360 feet, with an estimated yield of 100 gpm (1-hour air lift test). HG-31 is nearby to well HG-60. As described in AECOM (2012). HG-60 has a reported well capacity of 25 gpm. These wells may be used together.

The well logs, and the exact well locations within the Reservation, are confidential. While not applicable to the Campo Reservation, confidentiality of drillers logs is consistent with State Law (California Water Code 13752),

Attachment 4.
Letter to JFI from Muht-Hei, Inc.

Muht-Hei Inc.

Jed Francis
Jed Francis, Inc.
9530 Hageman Road, Suite B-356
Bakersfield, California 93312

Re: Sales and Storage Agreement

Dear Mr. Francis:

I write in connection with the Sales and Storage Agreement ("Agreement") that is to be entered into between Muht-Hei, Inc. d/b/a Campo Materials Company ("CMC") and Jed Francis, Inc. ("JFI").

Muht-Hei ("MHI") is a corporation formed under tribal law and wholly owned by the Campo Band of Mission Indians ("the Band"). MHI's delegated authority from the General Council of the tribe includes "authority and responsibility for the management, development, and operations of the real and personal property together with all buildings and improvements thereon as set forth in Section 4" of the First Amended and Restated Articles of Incorporation ("Articles"). MHI Articles, Section 9(1).

Pursuant to this corporate authority, MHI is granting JFI the right to use water at the CMC facility pursuant to the terms and conditions set forth in the Agreement. The property on which the water source is located is trust land beneficially owned by the Band. The delegation of authority to MHI in Section 9(1) of its Articles by the General Council does not require additional Council approval.

The Agreement contains no restriction that would prohibit JFI from using the water for construction purposes for off-Reservation projects, provided JFI's use remains within the safe yields as determined by previous studies. The Band will monitor groundwater drawdowns, and the Agreement expressly reserves the right to discontinue drafts if there is evidence of excessive depletion. Drafts will remain within the sustained yield calculations for the basin drawn and will not result in a measurable effect on off-Reservation storage.

This Agreement has not been submitted to the BIA. BIA approval is unnecessary because the Agreement does not encumber tribal land, has a term of fewer than seven years, and requires no federal action that would trigger a NEPA process.

Sincerely,

MUHT-HEI, INC.

By: Marcus Cuero
Marcus Cuero, President

Read & Approved

Ralph Goff

Ralph Goff
Chairman
Campo Band of Mission Indians