FIRE PROTECTION PLAN

for the

Tule Wind Project

Prepared for the County of San Diego

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ACRONYMS

AFFF	Aqueous Film Forming Foam
ANSI	American National Standards Institute
BLM	Bureau of Land Management
CAL FIRE	California Department of Forestry and Fire Protection
CBC	County Building Code
CCR	California Fire Code
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CSA	County Service Areas
CSD	Community Service District
CSLC	California State Lands Commission
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FMZ	Fire Management Zone
FMP	Fire Management Plan
FPP	Fire Protection Plan
GACC	Geographic Area Coordination Center
GO	General Order
gpm	Gallons per minute
HVAC	Heating, ventilation, and air conditioning
I-8	Interstate 8
IBR	Iberdrola Renewables, Inc.
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Fire Code
kV	Kilovolt
MW	Megawatt
NCC	National Control Center
NEPA	National Environmental Protection Act
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
O&M	Operations and maintenance
PDF	Project Design Feature
ROW	Right-of-Way
SanGIS	San Diego Geographic Information Source
SCADA	Supervisory Control and Data Acquisition System
SDFCA	San Diego County Fire Authority
SDRFPD	San Diego Rural Fire Protection District
SODAR	Sonic detection and ranging
SRA	State Responsibility Areas
TVMP	Transmission Vegetation Management Program

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EXECUTIVE SUMMARY

Tule Wind, LLC, a wholly owned subsidiary of Iberdrola Renewables, Inc. (TULE WIND, LLC) is proposing to construct and operate the Tule Wind Project (proposed project) near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and transmission line, a project collector substation, an operations and maintenance (O&M) building, transportation haul routes and access roads, a temporary concrete batch plant, a temporary parking area, temporary laydown staging areas, and meteorological towers. The project is proposed on lands administered by the Bureau of Land Management (BLM), California State Lands Commission (CSLC), Tribal lands, and privately-owned lands under the jurisdiction of the County of San Diego.

The project is located in an area with varied topography with gentle to moderate slopes, and a range in elevation between 3,600 to 5,600 feet above mean sea level. Vegetation includes a variety of types of scrub, chaparrals, and non-native grasslands, in addition to agriculture, disturbed, landscaped and developed lands. The site is located within the interior and desert climate zones. Rainfall averages 11 to 18 inches a year with the lowest amount occurring in the eastern portion of the project area. The project area has been identified by California Department of Forestry and Fire Protection (CAL FIRE) as being located in a high to very high fire hazard severity area. However, there have been no fires mapped in the project area in recent history.

Fire Agency Jurisdiction: The responsibility for fire suppression within the project area is shared by the San Diego County Fire Authority (SDFCA), San Diego Rural Fire Protection District (SDRFPD), CAL FIRE, BLM and Tribal governments. The portions of the project area located on privately owned lands fall within the jurisdiction of the SDCFA County Service Areas (CSA) 111 and 135, SDRFPD, and CAL FIRE. CAL FIRE has the primary responsibility for wildfire protection within State Responsibility Areas (SRA).

Emergency Response to the project area is provided by the CAL FIRE Monte Vista dispatch center. According to the dispatch center, per the Automatic Aid Agreement, the area is located in an SRA and the first alarm dispatched to a vegetation fire is the same whether it is on private, state, federal, or tribal lands.

Fire Protection Plan (FPP): The FPP evaluates adequate emergency services, fire access, water supply, ignition resistant construction and fire protection systems, fire fuel assessment, fire behavior modeling, defensible space and vegetation management, and cumulative impacts.

The FPP evaluates the potential for adverse effects of construction, and operations and maintenance of a proposed project that may result in a wildland fire occurring on or adjacent to the project. The FPP also evaluates the positive environmental effects that may occur due to the development of this project.

The Project Design Features (PDFs) and proposed plans are presented in the FPP to exhibit how the potential fire impacts to the surrounding area and the community will be mitigated. The project addresses the applicable federal, state, and local fire regulations, including the California

Fire Code and the County Consolidated Fire Code. The project is consistent with the County of San Diego Department of Planning and Land Use recommendations including fuel modification.

As a mitigation measure to reduce the potential for fire ignition within the wind turbine nacelle to a level less than significant, a fire suppression system shall be provided in each wind turbine nacelle and in the operation and maintenance facility. Fire Suppression technology in the nacelle is in development and TULE WIND, LLC will be an early adopter of this technology. At this early stage, TULE WIND, LLC does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle, including the associated electrical equipment in the nacelle.

The project components effects' have been analyzed using California Environmental Quality Act (CEQA), County of San Diego's Wildland Fire and Fire Protection Guidelines, and California Public Utilities Commission (CPUC) Guidelines to determine the potential for fire ignition. Based on application of the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance, it has been determined that construction and operation and maintenance of the proposed project would result in a less than significant impact with the implementation of PDFs and required Mitigation Measures. In addition, the project's contribution to cumulative impacts with the implementation of PDF and identified mitigation measures are less than cumulatively considerable.

1.0 INTRODUCTION

This FPP has been prepared for the proposed project. TULE WIND, LLC is proposing to construct and operate the proposed project near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and 138 kV transmission line, a project collector substation, an operations and maintenance building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, temporary laydown (staging) areas, and meteorological towers. The majority of the project would be built on lands administered by the BLM although turbines and other project components are also proposed on the Ewiiaapaayp Reservation, Manzanita and Campo Reservation (access only), lands administered by the California State Land Commission (CSLC), and privately-owned lands under the jurisdiction of the County of San Diego. The BLM is the Lead Agency under National Environmental Protection Act (NEPA), the CPUC is the Lead Agency under CEQA, and the County of San Diego is the permitting agency for the Major Use Permit and Building Permits.

The largest owner/operator of wind generation in the world, TULE WIND, LLC, which is a subsidiary of Iberdrola Renewables, Inc. owns and operates over 2,600 wind turbines at 43 wind farms totaling 4.8GW of wind generating capacity across the United States. TULE WIND, LLC has over 49 million operating hours on its U.S. fleet.

Since fire danger in the project area is a significant concern, the project is being designed to eliminate or minimize potential ignition sources. TULE WIND, LLC has participated in numerous meetings with fire agency personnel from various agencies, including CAL FIRE, SDCFA, SDRFPD, and BLM Fire, to discuss the overall approach to providing appropriate fire prevention, protection, and suppression as part of the project. A site meeting was conducted at TULE WIND, LLC's Dillon Wind Farm in Palm Springs, California on August 12, 2010 and included staff from the SDCFA, SDRFPD, and CAL FIRE, as well as Mr. Jim Hunt of Hunt Research. The meeting included a briefing by the site manager of the Dillon Wind Farm. The site manager provided a briefing on the Supervisory Control and Data Acquisition System (SCADA) system and how it is linked to the on-site monitoring system and to TULE WIND, LLC's National Control Center (NCC) in Portland, Oregon, which is staffed 24-hours per day. The operational system implemented at the Dillon Wind Farm would be very similar to the system implemented for the proposed project. To address potential sources of ignition risk, the project is being designed with features and components to reduce the risk of wildland fire below a level of significance.

The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. As part of the assessment, the property location, topography, geology, combustible vegetation (fuel types), climatic conditions, and fire history were all taken into consideration in developing the FPP. The FPP addresses water supply, access (including secondary/emergency access where applicable), structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. The FPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect one or more-at-risk communities and essential infrastructures.

1.1 Project Location, Description, and Environmental Setting

1.1.1 Project Location

The general project location is shown in **Figure 1**. The project area lies in the McCain Valley in the In-Ko-Pah Mountains, just north of U.S. Interstate-8 (I-8) and Live Oak Springs. The area is accessible via the Crestwood Road, Ribbonwood Road, and McCain Valley Road exits off of I-8. The primary access routes to the project area will be from Ribbonwood and McCain Valley Roads. The majority of the project is proposed on lands administered by the BLM although turbines and other project components are also proposed on the Ewiiaapaayp Reservation, Manzanita and Campo Reservation (access only), lands administered by the CSLC, and privately-owned lands under the jurisdiction of the County of San Diego.

The proposed wind turbines will be located on a series of north-to-south and northwest-to-southeast ridges. The project site layout is shown in **Figure 2**. The majority of the area is composed of undeveloped land. The project area encompasses approximately 24,500 acres; however, the construction footprint of the project would impact approximately 725acres, and does not include the entire parcels.

The fire agencies' jurisdictional responsibilities are shown in **Figure 3** and outlined in more detail in Section 1.2.

1.1.2 Project Description

TULE WIND, LLC is proposing to construct and operate the Tule Wind Project located near Boulevard, California. The proposed project will consist of wind turbines, an overhead and underground electrical collection system and transmission line, a project collector substation, an O&M building, transportation haul routes and access roads, a temporary concrete batch plant, a parking area, a temporary laydown (staging) areas, and meteorological towers.

The Tule Wind Project will consist of the following components:

- Up to 128 wind turbines, ranging in size between 328 and 492 feet in height and generating capacity between 1.5 megawatts (MW) and 3.0 MW, to produce 201 MW of electricity;
- A 34.5 kilovolt (kV) transmission collector cable system linking each turbine to the next and to the project collector substation, which will run principally underground except in select areas where cultural, environmental, or logistical conditions require an overhead line;
- A 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation;
- A 5-acre collector substation site and 5-acre O&M building site;
- Access roads between turbines, as well as improvements to existing roadways and new roadways to accommodate construction and delivery of equipment;
- A temporary batch plant for construction located on a 5-acre area;
- A temporary 10-acre parking area;
- Nineteen 2-acre temporary lay down areas; and
- Three permanent meteorological towers and one sonic detection and ranging (SODAR) unit or light detecting and ranging (LIDAR) unit.
- Up to three temporary use water wells for construction (on private land only, not be placed on public lands).
- One permanent water well and septic tank for the O&M building.

The maximum build-out of the project allows for up to 201 MW of installed wind turbine capacity. This 201 MW could consist of as many as 128 1.5 MW turbines, as little as 67 3.0 MW turbines, or some intermediate mix of turbines ranging in output from 1.5 MW to 3.0 MW. Turbines with a smaller output can be spaced closer together, whereas turbines with a larger output require larger spacing. At this time, the 128-turbine layout proposes 96 wind turbines on BLM land, 18 turbines on Tribal lands, 7 turbines on State lands, and 7 turbines on privately owned land, commonly known as Rough Acres Ranch.

The project will include an approximate 5,000 square foot, pre-engineered metal O&M building, located next to the collector substation to house operations personnel and critical spare parts. A typical O&M Building is illustrated in **Figure 4**.[1] The O&M building will include a foundation, with electrical and heating, ventilation, and air conditioning (HVAC) systems. The O&M building will also include a septic system and well to provide up to 5 gallons per minute of potable water throughout operations. Once the project is operational, the O&M facility will use approximately 2,500 gallons per day of water.

The only staffed structure as part of the project is the proposed O&M building. The project is expected to be supported by up to 12 full time employees on the O&M staff. Typically, O&M staff will be present on-site during normal business hours.

The proposed location for the project collector substation is shown on **Figure 2**. Construction will generally consist of the installation of concrete pads and electric transformers. Areas not covered by concrete pads will be surfaced with gravel to minimize erosion and surface runoff, and to provide fire protection through prevention of weedy growth. The collector substation will be fenced with security fencing to minimize the potential for entry by non-authorized personnel. A typical substation site is included as **Figure 5**.[2]

Proposed turbine locations are shown on **Figure 2**. The wind tower foundations will be approximately 60 feet in diameter, and 7 to10 feet deep. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the 200-foot radius area would be performed, annually prior to May 1 and more often as needed. A typical turbine tower design is illustrated in **Figure 6**. A typical turbine site is illustrated in **Figure 7**. A typical turbine nacelle with labeled internal equipment is illustrated in **Figure 8**.

Three permanent meteorological towers will also be installed; their locations are noted on **Figure 2**. The towers will be free standing (no guy wires) and approximately 196 feet high with a concrete foundation. Installation will follow all safety measures contained in TULE WIND, LLC's Health and Safety Manual. A permanent sonic detection and ranging SODAR unit will also be placed on-site and fenced.

Electricity generated by the wind turbines will be collected through 34.5kV collector lines and delivered to the project collector substation. The 34.5kV collector lines will principally be placed underground, except in locations where site-specific conditions require that they run aboveground. Typical overhead 34.5 kV single circuit collector line is shown in **Figure 9a** and a typical overhead 34.5 kV double circuit collector line is shown in **Figure 9b**.

[1] Note: Figure 4 is a typical example and does not identify the required fuel modification zone. However, as described within this Draft FPP, a minimum 100-foot radius fuel modification zone will be provided.
[2] Note: Figure 5 is a typical example and does not identify the required fuel modification zone. However, as described within this Draft FPP, a minimum 100-foot fuel modification zone will be provided.

After the electricity is stepped up to 138 kV at the project collector substation, an approximate 9.2-mile long 138 kV transmission line will interconnect the project collector substation with SDG&E's proposed Rebuilt Boulevard Substation, which is part of the SDG&E ECO Substation Project. A typical 138kV steel tangent pole is shown in **Figure 10**.

1.1.3 Environmental Setting

The project area site visit was conducted by consultant Robin Church on January 28, 2010. The project area is located on BLM, State, County, and Tribal lands in the area north of the community of Boulevard, CA. The project area is located south of the Cleveland National Forest and west of Anza-Borrego Desert State Park.

1.1.3.1 Topography

The topography of the area is gently-to-moderately sloping with an elevation ranging between about 3,600 and 5,600 feet above mean sea level. Given the site location and size, slopes are widely variable with aspects in every direction. Tule Creek is the primary drainage feature in the project vicinity and drains the central portion of McCain Valley, towards the southeast as shown in **Figure 11**.

1.1.3.2 Vegetation and Fuels

The native vegetation type within the project area is predominantly chaparral and related shrublands. The existing vegetation was mapped by HDR Engineering, Inc. (**Appendix A,** Biological Resources Maps). Vegetation included a variety of types of scrub, chaparrals and non-native grasslands, in addition to agriculture, disturbed, landscaped and developed lands. Overall the chaparrals dominate the project area. Accumulation of fuels in these shrubland systems is a natural process. However in the past century, human wildfire ignitions have had a greater influence on the shrubland fire frequency due to the steep population rise in Southern California (Keeley and Fotheringham, 2003). This is especially evident at lower elevations where agricultural expansion followed by rapid urban growth has extended into wildland areas, introducing more ignitions and increasing the number of wildfires across the landscape.

1.1.3.3 Climate and Fire History

San Diego County is an extremely fire-prone landscape. San Diego County is dominated by a Mediterranean-type climate with mild, wet winters and hot, dry summers. The County is divided into five climate zones from the coast to the desert (Climates of San Diego County, Agricultural Relationships, University of California, Agricultural Extension Service, and U.S. Weather Bureau). These climate zones are determined by several factors: proximity to the ocean, terrain, elevation, and latitude. The site is located within the interior and desert climate zones. Rainfall averages 11 to 18 inches a year with the lowest amount occurring in the eastern portion of the project area.

The climate in central San Diego County supports dense, drought-adapted shrublands that are highly flammable, especially in the fall as fuel moistures reach very low levels. The combination of the climate and drought adapted shrubs results in a fire season that is year around. Most critically, winds originating from the Great Basin, locally known as Santa Anas, which create extreme fire weather conditions characterized by low humidity, sustained high-speed winds, and extremely strong gusts. Santa Ana winds typically blow from the northeast over the Peninsular Range. As the air is forced through coastal mountain passes, wind speeds of 40 miles per hour (mph) at measured at ground level can be maintained for hours with gusts from 70 to 115 mph possible (Schroeder et al., 1964). Santa Ana winds create extremely dangerous fire conditions and have been the primary driver of most of Southern California's catastrophic wildfires.

Santa Ana winds are at their peak during fall and early winter months, which marks the height of fire season. Because of the presence of dense, dry fuels and periodic Santa Ana winds, southern California has been characterized as having one of the most fire-prone landscapes in the world. **Figure 12** presents a map of San Diego County overlain with Fire Hazard Severity Zones, defined as a measure of the likelihood that an area will burn combined with the severity of burn behavior characteristics (such as intensity, speed, and embers produced).

1.2 Fire Agency Jurisdiction

The responsibility for fire suppression within the project area is shared by the SDCFA, SDRFPD, CAL FIRE, BLM and Tribal governments. The portions of the project located on privately-owned lands fall within the jurisdiction of the SDCFA CSA 111 and 135, SDRFPD, and CAL FIRE. CAL FIRE has the primary responsibility for wildfire protection within SRAs. Fire Responsibility Areas and fire stations are shown in **Figure 3**.

San Diego County Fire Authority (SDCFA)

The San Diego County Fire Authority was created by the County Board of Supervisors in July 2008 to improve fire protection and emergency medical services in the region. The goal of the SDCFA is to unify the administrative support, communications and training of 15 rural fire agencies and extend around the clock protection to 1.5 million acres of the unincorporated County lands that previously had either limited, or part-time on-call protection, by 2012.

San Diego Rural Fire Protection District (SDRFPD)

The San Diego Rural Fire Protection District was formed on May 18, 1983 through the consolidation of 13 East County volunteer fire departments. SDFPD, under a cooperative fire protection agreement with CAL FIRE, protects an area of approximately 720 square miles and provides emergency medical services, structural fire protection and rescue services. SDRFPD also responds to wildland fires; although wildland fire protection within this area is primarily the responsibility of CAL FIRE and the United States Forest Service (USFS).

California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE is the state's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CAL FIRE has joined with federal and local agencies to form a statewide mutual aid system. This system insures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction.

County Service Areas (CSA)

CSAs are organized under the authority of the Board of Supervisors to provide a level of emergency response within a defined jurisdictional boundary by using volunteers. CSAs have defined boundaries and most participate in the Fire Mitigation Fee program, which funds facilities and equipment, but the CSAs lack the authority to adopt a fire code or provide official response to planning and building projects. A portion of the project is located within CSAs 135 and CSA 111.

Bureau of Land Management (BLM)

BLM has land use jurisdiction throughout the majority of the project area. However, BLM has no local emergency response resources.

The BLM maintains several programs in the disciplines of fire suppression, preparedness, fuels management, prevention and education, community assistance, and protection and safety, all of which are intended to safely protect the public, natural landscape, and wildlife habitat from fire-related damage. The various programs of the BLM are discussed briefly below.

- The Fire and Aviation Directorate Program is tasked with providing aerial firefighting support for fires occurring on BLM lands. Aircraft used by the BLM are BLM-owned and contracted.
- The Community Assistance and Protection Program includes mitigation and prevention, education, and community outreach. Experts within this program are typically deployed to fire-prone areas before a fire starts to educate the community regarding fire management and suppression activities.
- The Fuels Management Program focuses on protecting communities and natural resources while providing for local economic opportunities. Through this program, fuels are effectively managed through collaboration with local communities and agencies in the form of community wildfire protection programs, fuels treatment, biomass utilization, and local fuels management contracts.

It should be noted that in addition to maintaining these programs, the BLM provides funding for firefighting efforts (through Community Assistance Grants) in the rural areas of San Diego County. In the past, funding has been used for wildfire training to local volunteers responsible for responding to fires on BLM lands. In San Diego County, BLM lands are under a Direct Protection Agreement with CAL FIRE, which specifies that CAL FIRE provides fire response resources and is responsible for conducting investigations regarding the recovery of fire suppression costs (CPUC and BLM 2008a).

The project is located within the California Desert District Planning Area and in the El Centro Fire Management Zone (FMZ) of the BLM. The current Fire Management Plan (FMP) for the California Desert District was developed in 1998 and was designed around a “fire management zone” concept based on distinct vegetation communities and the strategies for fire suppression within each of those communities. The intent was for objectives and constraints identified for fire-suppression activities to be developed by Land Use Plan decisions associated with resources.

The FMP categorized the Planning Area as FMZ 6, which is a CAL FIRE Direct Protection Area. CAL FIRE is the primary fire protection agency for BLM-administered lands in the area (CPUC and BLM 2008a).

The primary objective of CAL FIRE is to suppress all vegetation fires of 10 acres or less upon initial attack, based on “assets at risk analysis,” which favors protection of structures in the urban interface. CAL FIRE and BLM operate under a Cooperative Fire Protection Plan that implores CAL FIRE to consider BLM’s resource protection standards in order to develop the least-cost/least-damaging suppression strategy possible. BLM is required to send a resource advisor to work directly with the CAL FIRE incident commander to ensure resource values are fully protected or at least mitigated. This requirement is applicable to all vegetation fires occurring in the Planning Area.

Tribal Lands

Emergency response to fires on tribal lands is provided by the Campo Indian Reservation Fire Department by agreement with the other tribes. The Fire Department has one Type III brush fire engine, and staffing is variable from day to day. They are dispatched as part of the first alarm fire assignment to the project area, as described in Adequate Emergency Services, Section 4.1.

1.3 Applicable Regulations, Plans, and Standards

This section summarizes federal, state and local regulations, plans and standards relevant to fire suppression and fire prevention.

1.3.1 Federal Regulations and Nationally Recognized Standards

This section provides a description of the regulations and guidance pertinent to the project. As described in the following sections, a wide range of standards are used throughout the industry. The BLM is the federal lead agency under the National Environmental Policy Act (NEPA). This FPP will serve as part of the analysis in the Environmental Impact Statement (EIS). The NEPA analysis will be based upon the Council on Environmental Quality (CEQ) regulation for implementing NEPA (40 Code of Federal Regulations [CFR] 1500 et seq.), and the BLM NEPA Handbook (H-1790-1).

According to a 2004 Federal Energy Regulatory Commission (FERC) report, the vast majority of transmission owners follow the National Electrical Safety Code (NESC) rules or American National Standards Institute (ANSI) guidelines, or both when managing vegetation around transmission system equipment. The NESC manages electric safety rules, including transmission wire clearance standards, whereas the applicable ANSI code manages the practice of pruning and removal of vegetation. However, in California, the CPUC has adopted General Order (GO) 95 rather than NESC as the key electric safety standard for the state. The following standards, guidelines, rules and regulations identify requirements and suggested practices for vegetation management in transmission line corridors.

In addition the National Fire Protection Association (NFPA) has prepared a Standard (guidance document) on Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations (NFPA 850) that contains relevant information.

National Electric Safety Code 1977, 2006

The NESC is a national code covering a variety of basic provisions regarding electric supply stations, overhead electric supply and communication lines, and underground electric supply and communication lines. It contains work rules for construction, maintenance, and operation of electric supply and communication lines and equipment. The NESC must be adopted by states, and the State of California has adopted its own standard (GO 95; discussed in Section 1.3.2) governing overhead transmission lines in the State. Therefore, the NESC is not discussed further.

North American Electric Reliability Council (NERC)

NERC is a nonprofit corporation whose members are ten regional reliability councils. NERC's function is to maintain and improve the reliability of the North American integrated electric transmission system, including preventing outages from vegetation located on transmission right-of-ways (ROWs), minimizing outages from vegetation located adjacent to ROWs and maintaining clearances between transmission lines and vegetation along transmission ROWs. As a result of the recommendations following the August 14, 2003 blackouts on the East Coast, NERC was charged with developing a vegetation management standard that would be applicable to all utilities and that would provide greater specificity than the NESC and ANSI standards.

Standard FAC-003-1, Transmission Vegetation Management Program (TVMP), became effective April 7, 2006, and mandatory for all utilities, pursuant to Section 1211 of the Energy Policy Act of 2005. This standard applies to all transmission lines operated at 200 kV and above and to any lower voltage lines considered critical to the reliability of the electric system in the region. The transmission line owner must prepare, and keep current, a formal TVMP. The TVMP must identify and document clearances between vegetation and overhead, ungrounded supply conductors, taking into consideration transmission line voltage, the effects of ambient temperatures on conductor sag under maximum design loading, and the effects of wind velocities on conductor sway. Minimum clearance distances must be no less than those set forth by the Institute of Electrical and Electronics Engineers (IEEE) Standard 516-2003.

Institute of Electrical and Electronics Engineers Standard 516-2003

The IEEE is a leading authority in setting standards for the electric power industry. Standard 516-2003, Guide for Maintenance Methods on Energized Power Lines, provides minimum vegetation-to-conductor clearances to maintain electrical integrity.

National Fire Protection Association (NFPA) Codes, Standards, Practices and Guides

NFPA® codes, standards, recommended practices, and guides ("NFPA Documents"), are developed through a consensus standards development process approved by ANSI. This process brings together professionals representing varied viewpoints and interests to achieve consensus on fire and other safety issues. NFPA standards are recommended guidelines and nationally accepted good practices in fire protection but are not law or "codes" unless adopted as such or referenced as such by the California Fire Code or the Local Fire Agency.

- NFPA 850, Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2010: NFPA 850 was prepared for the guidance of those charged with the design, construction, operation, and protection of electric generating plants and high voltage direct current converter stations that are covered by the scope of this document. This document provides fire hazard control recommendations for the safety of construction and operating personnel, the physical integrity of plant components, fire protection systems and equipment, and the continuity of plant operations.
- NFPA 10, Fire Extinguishers: A long-standing standard, which specifies the types, sizes, rating and locations for portable fire extinguishers. It also provides information on how to calculate the number and size of portable fire extinguishers needed.
- NFPA 11, Fire fighting foam (Low, Medium, and High Expansion Foam): NFPA 11 is a longstanding standard, which provides recommendations for design and installation of firefighting foam systems and portable equipment. It also provides recommendations regarding calculating the amount of foam concentrate and solution needed on a flammable or combustible liquid fire.
- NFPA 13, Standard for Installation of Sprinkler systems: NFPA 13 is the standard for design and installation of fire sprinkler systems in a building. It provides the requirements for the type of system needed in a particular occupancy, water supply, sprinkler head flow and pressures, the locations of sprinkler heads, and installation of the system. This standard is referenced by the California Fire Code.
- NFPA 22, Standard for water tanks for private fire protection: Provides recommendations for the design, construction and installation of water storage tanks for private fire protection systems.
- NFPA 30, Flammable and Combustible Liquids Code: This standard provides recommendations for storage, use and handling of flammable and combustible liquids. It provides detailed information regarding tank storage, spacing, dispensing of liquids, portable containers and other related operations. NFPA 30 is referenced by the California Fire Code.
- NFPA 70, National Electrical Code: NFPA 70 is the standard for the design and installation of electrical systems. It includes recommendations for various types of occupancies and also provides recommendations and criteria for the location and installation of "explosion proof" electrical systems.
- NFPA 72, National Fire Alarm and Signaling Code: NFPA 72 is the standard for the design, installation and operation of fire alarm systems in various occupancies. This standard is used by fire alarm system designers when designing and installing a system. It is utilized also by Fire Agencies when reviewing plans for new systems.

- NFPA 497, Classification of Flammable liquids, Gases and Vapors, and for Electrical Area Installations in Chemical process areas: NFPA 497 is the standard, which is utilized along with NFPA 70 to determine flammable gas, flammable liquid and combustible liquid hazards and recommend the areas which require explosion proof electrical systems. It also sets forth the extent of the classified areas. Although the title says chemical process areas, it is used as a standard for explosion proof electrical as it defines various risks and contains numerous diagrams to help the electrical system designer.

International Fire Code (IFC)

The IFC is published by the International Code Council, is a code which may be adopted by a jurisdiction. It forms the basis of the current California Fire Code (CCR Title 24, part 9). The IFC is the underlying nationally recognized code that sets standards and requirements to safe guard against the threat fires may pose to public health, safety, and the environment. The IFC, when adopted by a jurisdiction, regulates the planning, construction, and maintenance of development in all areas.

International Wildland-Urban Interface Code

The International Wildland-Urban Interface Code is published by the IFC, and is a model code addressing wildfire issues.

1.3.2 State Regulations and Standards

This section provides a description of the regulations and guidance pertinent to the to management of vegetation as they relate to the reliability of electric transmission systems as regulated by the CPUC, GO 95, CAL FIRE objectives to reduce wildfire and hazard clearance standards, the California Code of Regulations (CCRs), and CAL FIRE recovery costs project.

California Public Utilities Commission

GO 95: Rules for Overhead Electric Line Construction

GO 95 is the key standard governing the design, construction, operation, and maintenance of overhead electric lines in the State. It was adopted in 1941 and updated most recently in 2006. GO 95 includes safety standards for overhead electric lines, including minimum distances for conductor spacing, minimum conductor ground clearance, standards for calculating maximum sag, and vegetation clearance requirements. The latter, governed by Rule 35, is summarized here.

GO 95: Rule 35, Tree Trimming, defines minimum vegetation clearances around power lines. Rule 35 guidelines specify, at the time of trimming require:

- 4 feet radial clearances are required for any conductor of a line operating at 2,400 volts or more, but less than 72,000 volts;
- 6 feet radial clearances are required for any conductor of a line operating at 72,000 volts or more, but less than 110,000 volts;

- 10 feet radial clearances are required for any conductor of a line operating at 110,000 volts or more, but less than 300,000 volts (this would apply to the project);
- 15 feet radial clearances are required for any conductor of a line operating at 300,000 volts or more.

GO 95 has been periodically updated over the last six decades. Under Public Utilities Code Section 1708.5, any person may petition the Commission to amend the regulation.

CAL FIRE

CAL FIRE has a primary objective of reducing wildfire occurrence and enforcing fire hazard clearance standards around structures and utilities in order to protect the public from loss of life property and resources. Within CAL FIRE jurisdiction areas, the LE-38 Fire Safety Inspection Program is implemented for community outreach enforcement of fire safe codes. These laws include the California Public Resources Codes (PRC) 4291, 4292, and 4293 that define defensible space clearance requirements around private structures and aboveground power lines.

CCR, Title 14 Section 1254 (described below) applies to minimum clearances around utility poles. CAL FIRE inspections of utility facilities entail making notes on violations and defects in the infrastructure. Joint inspections of electrical facilities by CAL FIRE and the utility company are encouraged for the mutual benefit of fire prevention on the part of each entity. Violations identified during inspections must be brought into compliance before the utility follow-up inspections otherwise the responsible party could face misdemeanor charges for violating fire safety laws. In the event that a fire safety violation results in a fire, the inspection records can be used later in fire-cause investigations to determine the liable party. The responsible party could pay for the resulting damage of the wildfire through the CAL FIRE Civil Cost Recovery Program, described below.

In the section of Southern California where the project is proposed, the power line hazard reduction standards are applicable year round due to the scope of the fire season. More detailed descriptions of the applicable codes and regulations and images of exempt and non-exempt power line structures may be found in CAL FIRE Power Line Fire Prevention Field Guide (CAL FIRE 2008).

- PRC § 4291, Reduction of Fire Hazards Around Buildings, requires 100 feet of vegetation management around all buildings, and is the primary mechanism for conducting fire prevention activities on private property within CAL FIRE jurisdiction.
- PRC § 4292, Powerline Hazard Reduction, requires clearing vegetation inside a 10-foot circumference of such pole or tower which supports a switch, fuse, transformer, lightning arrestor, line junction, or which is a dead end or corner pole.
- PRC § 4293, Powerline Clearance Required presents guidelines for line clearance.
- CCR, Title 14 Section 1254 presents guidelines for minimum clearance requirements around utility poles.

CCR, Title 14 Section 1254

The firebreak clearances required by PRC § 4292 are applicable within an imaginary cylindrical space surrounding each pole or tower on which a switch, fuse, transformer or lightning arrester is attached and surrounding each dead-end or corner pole, unless such pole or tower is exempt from minimum clearance requirements by provisions of CCR, Title 14 Section 1255 or PRC § 4296.

The radius of the cylindroids is 10 feet measured horizontally from the outer circumference of the specified pole or tower with height equal to the distance from the intersection of the imaginary vertical exterior surface of the cylindroid with the ground to an intersection with a horizontal plane passing through the highest point at which a conductor is attached to such pole or tower. Flammable vegetation and materials located wholly or partially within the firebreak space shall be treated as follows:

- At ground level – remove flammable materials, including but not limited to, ground litter, duff and dead or desiccated vegetation that will propagate fire;
- From 0 to 8 feet above ground level – remove flammable trash, debris or other materials, grass, herbaceous and brush vegetation. All limbs and foliage of living trees shall be removed up to a height of 8 feet;
- From 8 feet to horizontal plane of highest point of conductor attachment – remove dead, diseased or dying limbs and foliage from living sound trees and any dead, diseased or dying trees in their entirety.

CCR, Title 14, Forest Practice Rules Article 8, Rule #918 Fire Protection

The requirements of Title 14, Section 918 applies to all vegetation operations in SRAs. This includes patrols for two hours subsequent to vegetation removal activities to ensure that the activity has not sparked a fire.

CAL FIRE Civil Cost Recovery Program

The CAL FIRE Civil Cost Recovery Program was established to recover the cost of fighting fires caused by people (or entities) that violate the law or were negligent in their actions. For overhead electric lines, these violations are generally related to non-compliance with vegetation clearance requirements.

California Code of Regulations - California Building and Fire Codes

California Code of Regulations, Title 24 parts 2 & 9, (http://osfm.fire.ca.gov/). Title 24 contains several International Codes that address fire safety including the International Fire Code, International Building Code. Additional safety regulations adopted by the California Building Standards Commission include the Uniform Mechanical Code, and Uniform Plumbing Code, which are also part of the California Code of Regulations.

California Environmental Quality Act

The CPUC is the state lead agency under CEQA. This FPP will serve as part of the basis for analysis in the Environmental Impact Report (EIR). Appendix G of CEQA Guidelines does not specify evaluation criteria for identifying potentially significant impacts regarding for fire fuel management. Section 15382 of the *CEQA Guidelines* states that a significant effect on the environment means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air and water. The CEQA analysis will be conducted pursuant to Section 15060-15065 of the *CEQA Guidelines*.

1.3.3 Regional and Local Regulations and Standards

CAL FIRE San Diego Unit "Pre-Fire Management Plan 2009"

As directed by the California State Fire Plan, the CAL FIRE San Diego Unit has prepared a "Pre-fire Management Plan" that encompasses 1,237,201 acres of SRA within San Diego County and Western portions of Imperial County. This document was last updated in 2005. Of particular concern to the unit is the continuation of drought induced tree and vegetation mortalities caused by bark beetle infestations. By proclamation of the Governor, CAL FIRE has taken steps to reduce the fire hazard by allowing the immediate removal of dead and dying trees from landowners' properties. This proclamation also directs CAL FIRE to protect public safety by clearing effective evacuation and emergency response routes and by establishing fire safe evacuation centers. In order to facilitate these projects, CAL FIRE San Diego is to coordinate and cooperate with all agencies involved. Areas of high priority that will be focused on for future fire prevention activities will be determined based on ignition trends and fire history. The overall goal of the San Diego Pre-Fire Management Plan is to protect public safety and assets by reducing wildfire ignitions and increasing initial attack successes.

County of San Diego

The County of San Diego Department of Planning and Land Use (DPLU) is the permitting authority for the Major Use Permit (MUP) and Building Permits. The main entities that are responsible for ensuring the health and public safety in unincorporated areas of the County are provided by San Diego County and fire protection districts (FPDs). The enforcement responsibilities within CAL FIRE and the FPDs are by any person designated by the FPD's Chief to exercise the powers and perform the duties of the fire code official as set forth in their respective fire code as ratified by the Board of Supervisors. In the unincorporated areas of the County outside of a FPD, the enforcement responsibility lay with the person designated by the Chief Administrative Officer of San Diego County or his/her authorized representative.

County of San Diego Building and Fire Codes (Divisions 1, 2 and 6, San Diego County Code of Regulatory Ordinances)

Following the October 2003 and fall 2007 wildfires, assessments were made of damaged and destroyed homes in an effort to identify areas where codes could be strengthened in order to enhance the chances of a structure surviving a wildfire. As a result, in February 2008, the County further amended the Fire Code and Building Code to include strengthened ignition-resistive construction requirements, modifying the previous two-tiered system and requiring "enhanced" standards for all new construction.

The County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are described in detail in the next section of this FPP.

2.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The FPP must evaluate the adverse environmental effects that a proposed project may have from wildland fire and properly mitigate those impacts to ensure that development projects do not unnecessarily expose people or structures to a significant risk of loss, injury or death involving wildland fires. Detailed guidelines for the determination of significance are identified in the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance (see http://www.co.san-diego.ca.us/dplu/docs/Fire-Guidelines.pdf), as are guidelines for preparing Fire Protection Plans (*see* http://www.co.san-diego.ca.us/dplu/docs/Fire-Report-Format.pdf).

This section of the FPP must include the following Guidelines for the Determination of Significance:

1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

2. Would the project result in inadequate emergency access?

3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

4. Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

These County significance guidelines are analyzed in Section 6.1, and consider emergency services, fire access, water, ignition resistant construction and fire protection, fire fuel assessment, defensible space and vegetation management.

Second, the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance explain that an affirmative response to or confirmation of any one of the following Guidelines will generally be considered a significant impact related to wildland fire and fire protection as a result of project implementation, in the absence of scientific evidence to the contrary. These additional Guidelines would become significant where:

1. The project cannot demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code.

2. A comprehensive FPP has been required and the project is inconsistent with its recommendations including fuel modification.

3. The project cannot meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect.

These significance guidelines are analyzed in Section 6.2.

Third, the CPUC and BLM are considering potential project effects according to the following four guidelines, which overlap with the previously described County guidelines. The CPUC Guidelines are as follows:

1. Would the presence of project facilities (overhead transmission lines, overhead collector lines, and/or wind turbines) significantly increase the probability of a wildfire?

2. Would project construction and/or operation and maintenance and decommissioning activities significantly increase the probability of a wildfire?

3. Would the presence of the overhead transmission lines, overhead collector lines, and/or wind turbines reduce the effectiveness of firefighting?

4. Would project activities contribute to an increased ignition potential and rate of fire spread through the introduction of non-native plants?

The CPUC/BLM significance guidelines are considered in Section 6.2.

3.0 ANTICIPATED FIRE BEHAVIOR IN THE VICINITY

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, and shown on **Figure 13**. The fire history of the area was reviewed and is depicted on **Figure 14**. Fire history information was derived from CAL FIRE and the San Diego Geographic Information Source (SanGIS) Data Warehouse from July 2008. The assessment includes most fires greater than 10 acres in size, however not all historic fires may be documented. Approximately half of the project area is identified as unburned over the past one hundred years. A large majority of the project area was burned in the 1944 fire, with smaller portions burned during the Carrizo (1983), Ribbonwood (2005), and the 1919 fire. Additional fires located near the project area include the Cottonwood (1999), Manzanita (1992), and McCain (1995). A complete list of identified fires presented in **Figure 14** is listed in **Appendix D** of this document.

A review of the 2003 and 2007 Fire Storms in San Diego County are enough to illustrate the result of a wildland fire during extreme fire conditions. Within San Diego County, these fires include the Paradise, Otay, Cedar, Witch, Guejito, Rice, Harris, Laguna, Horse, and Poomacha fires. Extreme weather conditions in the height of fire season drove the wildfires to expand rapidly into major events.

Recent reports by CAL FIRE and the CPUC have highlighted the fire risks associated with powerlines. CAL FIRE documented their analysis of the causes associated with the Witch, Guejito, and Rice fires of 2007 (http://www.fire.ca.gov/fire_protection/fire_protection_firereports.php) in a series of published reports. Key findings indicate that winds in the vicinity of the fire area peaked at velocities approaching 50 mph. In each case the fires started when the lines came in contact with each other, vegetation, or other wires, causing sparks that ignited dry vegetation. The Witch Fire was associated with a 69 kV line, and the Guejito and Rice fires were associated with 12 kV lines. The CPUC report (http://docs.cpuc.ca.gov/published/Graphics/87470.PDF) also documents peak winds in the 50 to 60 mph range. The CPUC reports conclude that winds in that velocity range are not unusual for the area.

4.0 ANALYSIS OF PROJECT EFFECTS

4.1 Adequate Emergency Services

Emergency dispatch is handled by the CAL FIRE Monte Vista dispatch center. According to the dispatch center, per the Automatic Aid Agreement the area is located in a SRA and the first alarm dispatched to a vegetation fire is the same whether it is on private, state, federal, or tribal lands. The following describes the identified fire entities providing service for the project area including: response times, travel distance, travel time, and compliance/non-compliance with the Public Facilities Element of the San Diego County General Plan.

Table 1 describes the agencies, equipment and staffing for the areas in the vicinity of the Project.

Table 1. Fire and Emergency Services Agencies, Equipment, and Staff

Station/Agency	Equipment	Staff
CAL FIRE – Whitestar (Campo)	• Five engines • One bulldozer • Two air tankers • Two helicopters	• Four firefighters • One Battalion Chief • Two hand crews
Boulevard Fire Department Station # 87 (San Diego County Fire Authority)	• One Type I engine • Two Type II engines, • One Type III engine, • One water tender (1,000 gallons)	• Two stipend firefighters
Campo Fire Department	• One water tender; or • One engine company	• Two firefighters
Campo Indian Reservation	• One Type III engine	• Day-to-day staffing varies

Station/Agency	Equipment	Staff
Jacumba Fire Station Station # 43 (San Diego Rural Fire Protection District)	• Engine • 1,500-gallon tender	• Two stipend firefighters
Lake Morena Fire Station Station #42 (San Diego Rural Fire Protection District)	• One engine; or • Water tender	• Two firefighters
Bureau of Land Management	• None	• None
U.S. Forest Service – Cameron, Cottonwood, or Glencliff	• Two engine companies	• Four firefighters per company

For a building fire, the dispatch would be:

- Two or three CAL FIRE engine companies;
- Boulevard Fire Department;
- Campo Volunteer Fire Department;
- San Diego Rural Fire Protection District;
- Campo Indian reservation.

Travel times will vary depending on the responding entity, response route and location of the fire. Travel times have been determined for the following responding entities: Boulevard Fire District, CAL FIRE Whitestar station and Cal FIRE Campo station (see **Figure 3** for station locations).

Emergency response time standards for land use categories in **Table 1** the County of San Diego's Wildland Fire and Fire Protection Guidelines for Determining Significance are provided in three categories shown in the **Table 2**.

Table 2. Emergency Response Travel Times

Land Use Category	Maximum Travel Time	Land Use Category Defined
Town	5 minutes	Single-family residential lots of less than two acres, or more intensive uses such as multi-family residential includes all industrial development and all commercial development except neighborhood commercial.
Estate	10 minutes	Single-family residential lots from two to four acres in size, Includes neighborhood commercial development.
Rural	20 minutes	Large lot single-family residential and agricultural development. Lot sizes of grater than four acres.

The Project areas within the County of San Diego are designated in the County General Plan as General Agriculture 1 du/10, 40 acres (one dwelling unit allowed per 10 or 40 acres), and is zoned as A72 – Agricultural, or S80 Open Space. Because neither the "Town" (1 du per 2 ac.) nor "Estate" (1 du per 2-4 ac.) land use categories defined above would apply to the Project area, the closest applicable land use category is "Rural" with a maximum travel time of 20 minutes.

All land uses within the County are classified into a limited number of "use types," based on common functional, product, or compatibility characteristics. The project is considered to be a Civic Use Type– Major Impact Services and Utility per Section 1350 of the County of San Diego Zoning Ordinance. Emergency response travel times, as found in the County General Plan, were intended to apply to habitable development such as residential and commercial. The only portion of the project which will be occupied on a regular basis is the O&M Building. The 20 minute maximum travel time standard applies to the County portions of the Project alone, but not to those portions of the Project that lie on BLM, SLC, or Ewiiaapaayp tribal land.

Travel times for the Project have been calculated from the nearest station to the following points in the Project: (1) the entrance of the Project site (defined as the intersection of McCain Valley Road and Rocky Knoll Road); (2) the northern County boundary of the Project; (3) the O&M Building on BLM land; and (4) turbine J1, which is the furthest turbine at the terminus of the northern-most string of turbines on Ewiiaapaayp tribal land. Travel times were calculated using NFPA 1142 Table C.11 (b), or based on personal conversations between Jim Hunt and the applicable agency personnel.

The nearest fire station to the entrance of the project area is the Boulevard FD. The next nearest fire stations are the Whitestar CAL FIRE station in Boulevard, on Del Sol road, and the SDRFPD fire station in Jacumba. There is also a CAL FIRE station in Campo on Highway 94 and Buckman Springs Road. **Table 3** identifies the travel times for the stations that would be the first to respond.

Table 3. Estimated Travel Time from Nearest Fire Departments

Station	Location	Route	Distance (miles)	Rate of Speed (MPH)	Travel Time* (minutes)
Boulevard FD Station 87	Entrance	Old Hwy 80 / McCain Valley	**2.9**	35	**5.75**
	Northern County Boundary	Old Hwy 80 / McCain Valley/Turbine Road	5.65 3.7 **Total 9.35**	35 25	10.25 9.53 **Total 19.78**
	O&M Building	Via Ribbonwood / McCain Valley	3.6 7.7 **Total 11.3**	35 25	6.77 19.13 **Total 25.9**
	Turbine (Turbine J1)	Interstate 8 / Crestwood / Turbine Roads	5.87 9.47 **Total 15.34**	35 25	10.6 23.4 **Total 34**

Station	Location	Route	Distance (miles)	Rate of Speed (MPH)	Travel Time* (minutes)
CAL FIRE White Star	Entrance	Tierra Del Sol / Hwy 94 / McCain Valley	**6.2**	35	**11.2**
	Northern County Boundary	Tierra Del Sol / Hwy 94 / McCain Valley/Turbine Road	8.95 3.7 **Total 12.65**	35 25	15.9 9.53 **Total 25.43**
	O&M Building	Tierra Del Sol / Ribbonwood / McCain Valley	6.2 7.7 **Total 13.9**	35 35	11.2 19.13 **Total 30.3**
	Turbine (Turbine J1)	Tierra Del Sol / Interstate 8 / Crestwood / Turbine Roads	6.39 9.47 **Total 15.86**	35 25	11.5 23.4 **Total 34.9**
Jacumba Fire Station # 43	Entrance	Old Hwy 80/McCain Valley	**6.9**	35	**12.4**
	Northern County Boundary	Old Hwy 80/McCain Valley/Turbine Road	9.7 3.7 **Total 13.4**	35 25	17.1 9.53 **Total 26.6**
	O&M Building	Old Hwy 80/McCain Valley	9.7 7.3 **Total 17**	35 25	17.1 18.2 **Total 35.3**
	Turbine (Turbine J1)	Old Hwy 80/Interstate 8 / Crestwood / Turbine Roads	14 9.47 **Total 23.47**	35 25	24.5 23.4 **Total 47.9**

As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of ignition-resistant materials, and have automated and remotely supervised fire detection and suppression systems (see PDF-24). Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDF and mitigation measures to reduce the risk of fire, as summarized in Section 5.0. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

As discussed previously, a Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC, SDCFA, SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by SDCFA, SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2 Fire Access) for additional information.

4.2 Fire Access

The project area is accessible via the Crestwood, Ribbonwood, and McCain Valley Road exits off of I-8. The primary access routes will be Ribbonwood and McCain Valley Roads. Additional access is provided by Crestwood Road and Old Mine Road and will primarily serve the western portion of the project area including the western ridgeline. Access road locations are shown on **Figure 2**.

To facilitate construction activity, existing and new access road improvements will include widening from approximately 16 to 20-foot widths to 36-foot widths to accommodate large cranes and equipment delivery. The access roads will be restored from the 36-foot temporary width (accommodates large equipment and deliveries) to the widths identified below, after the turbines have been installed.

Upon completion of construction activities, existing and proposed access roads located on land under the jurisdiction of the County of San Diego will be improved to comply with the Department of Public Works Private Road Standard of 24 feet (28 foot graded extent). The main project roads (Ribbonwood Road and McCain Valley Road) throughout the project site will be improved to a maximum of 20 feet to comply with the California Fire Code Standards on lands outside of the County's jurisdiction. Spur roads to the turbines (on land under any jurisdiction) will be improved to a maximum of 18 feet wide to comply with SRA Fire Safe Regulations. These requirements were provided by the SDCFA (personal communication, James Pine, Fire Marshal). A detailed map of County roadways to be upgraded is shown in **Figure 15**.

Thirty feet of fuel management shall occur adjacent to the access roads for the proposed facilities including the turbine roads. This shall be the reduction or where reclaimed of high fuel vegetation to less than 50% cover.

Appropriate site mapping, showing roads, turbines, structures, substation, power line route, and water tank locations will be provided to SDRFPD and other local response agencies for use during emergencies. Maps will also be kept in a KNOX data box at the main entrance to facility. The maps shall be submitted to the SDRFPD for approval. The KNOX box will also contain a copy of the Emergency Response Plan and Emergency action checklists, and TULE WIND, LLC 24/7 contact information.

4.3 Water

4.3.1 Projects outside a Public or Private Water District.

TULE WIND, LLC will need to construct a well and septic system on-site to obtain water for potable and sewer use at the O&M building. The proposed O&M building will be approximately 5,000 square feet in size, and will include a well to provide up to 5 gallons per minute of potable water and a septic system. It is anticipated that the O&M facility will use approximately 2,500 gallons of water per day. In addition to the water required for use by the facility water must be available in conformance with Sec. 508.2.2 of the County of San Diego Consolidated Fire Code - Water tanks.

The water will be stored in aboveground metal tanks complying with the requirements of the SDRFPD. The tank installation, including all notes on the SDRFPD standard drawing, will be complied with. In addition the tank shall comply with NFPA 22, Private Fire Protection Water Tanks. The water capacity of each tank shall be 10,000 gallons which is the maximum required by the SDRFPD tank standard. In order to allow firefighting aircraft to dip into the tank and obtain water, the top of the tank will be left open.

The capacity of the water tank at the substation will be based upon the demand for the fire sprinkler system plus hand lines for the O&M building (estimated to be 33,000 gallons for a one hour supply to an ordinary Group 2 system per NFPA 13, 2002 ed., Chapter 11), plus hand lines, plus a reasonable allocation for water supply for Fire Engine to generate firefighting foam for 15 minutes at an application density of 0.16 gpm/sq ft from a hose line using a 3% AFFF concentrate, for use on an oil fire in transformer containment. A conceptual estimate at this point, prior to detailed design, is 250 gpm for 15 minutes (3,750 gallons of water) plus 112.5 gallons of foam concentrate for oil firefighting. The actual amount of stored water is to be determined upon detailed design of the substation, transformer secondary containment, and O&M building, and distance of the O&M building from transformers. The actual size of the water tank will be determined by the fire sprinkler contractor and the appropriate agencies, at time of detailed system design. This tank will need to be on an elevated plane or have an approved pump for fire sprinkler supply. A procedure for ongoing inspection, maintenance and filling of tanks will be in place.

TULE WIND, LLC will provide four (4) additional 10,000 gallon water tanks to the SDRFPD for SDRFPD to place at strategic locations based on its expert knowledge throughout the project area. The tanks will be installed and maintained by the TULE WIND, LLC with SDRFPD maintaining adequate water supply for fire protection services. The supplemental water can be utilized as additional fire suppression for the community of Boulevard and BLM lands that have limited access to water.

The tank and fire engine connection for water tanks shall be located on the side of the road. The width of the road at that point should be at least 18 feet (travel width) plus an additional 10 foot width, for a distance of 50 feet, to allow for fire engine to park and connect to the tank, while leaving travel lanes open. Tanks shall be labeled "Fire Water: 10,000 gallons. Open top" in reflective paint.

The purpose of the tank is to allow a fire engine or water tender to refill its onboard water tank and to allow firefighting helicopters to dip into the tank.

Conceptually, the following tank locations could be employed by SDRFPD:

- Near main entrance to site on side of main trunk road; and/or
- At main intersections of access roads; and/or
- On roads to turbine pads, located subject to approval of the SDRFPD and SDCFA Fire Marshal, upon submittal of a detailed drawing; and/or
- At the substation for water supply for fire sprinklers in the O&M building and for water supply for foam making.

Actual tank locations shall be approved by the SDRFPD, and SDCFA Fire Marshal, based on a tank location drawing to be submitted by TULE WIND, LLC Engineers. Drawings shall show tank location, road, and shall include the SDRFPD tank standard drawing and notes.

4.4 Ignition-Resistant Construction and Fire Protection Systems

The section provides a discussion of the ignition resistant construction materials and fire protection systems associated with components of the proposed project. These specific components include the potential ignition sources associated with the project. These include: (1) wind turbines; (2) O&M building; (3) substation transformer; and (4) storage, use and handling of oils, flammable liquid, hazardous materials, and vehicle fluids.

4.4.1 Wind Turbines

The turbines proposed for this project have a number of safety features that minimize the potential for a fire. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. An alarm is indicated on the wind farm SCADA as well as on screens at TULE WIND, LLC's National Control Center in Portland, Oregon. The monitoring system for the SCADA will have an emergency power backup. A fire suppression system shall be provided in each wind turbine nacelle. Fire suppression technology in the nacelle is in development and TULE WIND, LLC will be an early adopter of this technology. At this early stage, TULE WIND, LLC does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle.

There are two basic wind turbine designs:

1. Electrical equipment in the nacelle (Up-Tower).
2. Electrical equipment mounted at ground level (Down-Tower).

On the site tour of TULE WIND, LLC's Dillon Wind Farm (August 12, 2010), attendees viewed a wind turbine that included the electrical equipment mounted at ground level.

1. Up-Tower Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. For example, in one turbine design being considered for the following fire detection components are included and mounted on key power cables within the nacelle:

    - Smoke detectors;
    - Arc-flash sensors; and
    - Over-current sensing transducers.

    Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system, and send an alarm to the on-site O&M facility and the NCC. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

2. Down-Tower turbines being considered for this project have the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved fire access to the site.

Turbine blades are manufactured from composites, fiberglass, carbon fiber, or a combination of each. Given the components of the turbine blades, they are not considered a flammable source.

A fire suppression system shall be provided in each wind turbine nacelle. Fire suppression technology in the nacelle is in development and TULE WIND, LLC will be an early adopter of this technology. At this early stage, TULE WIND, LLC does not know if the fire suppression system will be provided by the wind turbine manufacturer or if it will be an aftermarket system. In either case, the system will have the same effect of providing fire suppression in each wind turbine nacelle, including the associated electrical equipment in the nacelle.

4.4.2 Operations and Maintenance Building

To provide separation of the building and installed equipment from combustible vegetation, gravel will be placed in and around O&M building. The O&M building and the substation will have a minimum of 100 feet of fuel management.

The O&M building is the only new structure proposed that will include TULE WIND, LLC staff during business hours. The O&M building will include the following ignition resistant construction features and fire protection systems:

Ignition Resistant Construction

- The building construction, including walls, penetrations through walls, doors, vents, roof, glazing and any skylights, will comply with the County Building Code Wildland Urban Interface construction standards in Section 92.1.704, and Chapter 7-A of the CBC, and the CFC.
- Any batteries would comply with the requirements in the CFC and would have secondary containment and required ventilation to prevent build up of hydrogen gas.
- Various occupancies in the building, as classified by the CBC, will have the required fire separations and will comply with the CFC and CBC for the type of occupancy and activities therein; for example, storage, or maintenance shop.

Fire Protection Systems

- Fire Sprinkler system will be located within the O&M facility. Monitoring of the system will be supervised by TULE WIND, LLC's NCC and to the offsite 24/7 alarm monitoring company. Determination will be made by TULE WIND, LLC as to supervision by the alarm monitoring company. If there are twenty heads or more, remote supervision of all valves is required by a Fire District approved 24/7 monitoring company. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.
- The SCADA monitoring system will have emergency power backup.
- The control room will be separated from remainder of building by 1-hour fire rated walls for fire safety, will have exterior exits, and will also have a fire sprinkler system.
- The building will have smoke detectors, which will activate an alarm on exterior of building, and are supervised to the Portland NCC. Alarms may not be transmitted to the offsite 24/7 alarm monitoring company, so as to avoid false calls to 911 resulting in an unnecessary response.
- The building will have a KNOX key box on the exterior by the main door for use by firefighters.

4.4.3 Substation Transformers

Ignition Resistant Construction

Transformers contain cooling oil, which can be ignited by an electrical arc. NFPA 850, including Section 10.5.2.6., provides recommendations for transformer protection. These recommendations will be followed. Transformers associated with the substation will be located a minimum of 50 feet from the O&M building and any other buildings, and will have a minimum of 100 feet of fuel modification.

Fire Protection Systems

The transformers will utilize fire walls for exposure protection and secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting water for 15 minutes. NFPA 850 recommends 10 minutes however, per NFPA 11, foam delivery from hand lines assumes an application time frame of 15 minutes Firefighting foam concentrate will be stored at substation for use by firefighters. Typically a 3% AFFF concentrate is used, and the application rate is 0.16 gpm/sq ft for 15 minutes from a firefighter hose line. In concept, the needed gpm flow rate for the hose lines is 250 gpm. This is subject to detailed design and size of the containment. Fire resistant oils can also be used if they do not contain PCB or other toxic materials. Prior to operations of the facility, actual design of the transformer fire protection measures will be determined by TULE WIND, LLC and plans submitted to SDRFPD and SDCFA for approval.

4.4.4 Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels

Ignition Resistant Construction

The proper storage, use, and handling of these materials are regulated under the California Fire Code (CFC). Areas on the project site that store, use or handle these materials will be at least 50 feet from any building or turbine, and shall have a fuel modification zone around them of at least 30 feet and will be constructed in compliance with the CFC.

Fire Protection Systems

Dispensing of any motor vehicle fuels shall comply with the CFC. Spill control will be provided in all areas, and shall contain the contents of the largest container. Electrical systems, shall comply with the CFC and with the National Electrical Code; NFPA 70, and with NFPA 497 where applicable. Grounding and bonding will be provided where necessary. Any transfer or dispensing pumps shall have a remote emergency shut down device 75 feet away. There shall be portable fire extinguishers with a minimum rating of 20 BC, located approximately 50 feet away and mounted on a visible post approximately 4 feet off ground. Safety signage shall be provided for any transfer/dispensing areas and “No Smoking” signs shall be posted.

4.5 Fire Fuel Assessment

The existing vegetation was mapped by HDR Engineering, Inc. (**Appendix A** – Biological Resources Maps). Approximately 96 percent of project area include the following vegetation communities include: upper Sonoran sub-shrub scrub; montane buckwheat scrub; big sagebrush scrub; northern mixed chaparral; semi-desert chaparral; chamise chaparral; redshank chaparral; scrub oak chaparral; upper Sonoran manzanita chaparral; southern north slope chaparral; coast live oak woodland; mule fat scrub; southern willow scrub; southern riparian woodland; and non-native grassland. The remaining four percent of the project area supports land use in the form of rural residential development, agriculture, heavily disturbed land, roads, and non-vegetated channels.

Accumulation of fuels in these shrubland systems is a natural process. However in the past century, human wildfire ignitions have had a greater influence on the shrubland fire frequency due to the steep population rise in southern California (Keeley and Fotheringham, 2003). This is especially evident at lower elevations where agricultural expansion followed by rapid urban growth has extended into wildland areas, introducing more ignitions and increasing the number of wildfires across the landscape.

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, shown on **Figure 12**. The fire history of the area was reviewed and is depicted on **Figure 14**. The source of the fire history information is CAL FIRE and the San Diego Geographic Information Source (SanGIS) Data Warehouse from July 2008. The assessment includes most fires greater than 10 acres in size; however, not all historic fires may be documented. The area has experienced two fires within the project area; the largest was the 1944 fire that affected the western ridge and the McCain Valley area, and the 1983 Carrizo fire which affected a small portion located in the McCain Valley area. Other smaller fires; Ribbonwood 1972 and 1974, and McCain 1995 affected areas of the project that are proposed for transmission line construction.

4.6 Fire Behavior Modeling

As discussed in Section 4.5 the project is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE. A review of the 2003 and 2007 Fire Storms in San Diego County are enough to illustrate the result of a wildland fire during extreme fire conditions. Within San Diego County, these fires include the Paradise, Otay, Cedar, Witch, Guejito, Rice, Harris, and Poomacha fires. Extreme weather conditions in the height of fire season drove the wildfires to expand rapidly into major events. As a result of the fact that the site is known to occur within a high fire hazard severity zone, recent fires illustrating the results of fires occurring within these zones, and the project being a linear non-residential, primarily non-human occupied project fire modeling utilizing the Behave software was not performed. Instead, the fireshed approach that was performed for the Sunrise Powerlink, a similar type project is being utilized.

According to **Figure 12**, the proposed project would be located primarily within a very high fire hazard severity zone (CAL FIRE 2010). CAL FIRE uses Fire Hazard Severity Zones to classify the anticipated fire-related hazard for SRAs. Fire hazard measurements take into account the following elements: vegetation, topography, weather, crown fire production, and ember production and movement. The very high fire hazard severity designation can be attributed to a variety of factors including highly flammable, dense, drought-adapted desert chaparral vegetation, seasonal, strong winds, and a Mediterranean climate that results in vegetation drying during the months most likely to experience Santa Ana winds.

4.6.1 Firesheds

"Firesheds" are defined as regional landscapes that are delineated based on a number of fire-related features including fire history, fire regime, vegetation, topography, and potential wildfire behavior (CPUC and BLM 2008a). The fireshed concept is one way to evaluate fire risk across a given landscape and in relation to proposed projects. As defined in the Sunrise Powerlink

EIR/EIS, the Tule Wind Project is primarily in the La Posta Fireshed with southern portions in the Boulevard Fireshed. The following sections describe the firesheds.

4.6.1.1 Boulevard Fireshed Description

The Boulevard Fireshed is located in the extreme southeastern corner of San Diego County. Nearby communities include Boulevard, Manzanita, and Jacumba, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). Terrain varies throughout the fireshed with elevations ranging from below 1,700 feet amsl to nearly 4,700 feet amsl. Vegetation throughout the fireshed varies, but large portions are dominated by sparse, semi-arid vegetation including desert scrub, chaparral, juniper woodland, and oak woodland. Land ownership within the fireshed includes BLM lands, State lands, tribal lands, and private holdings. Population density is a sparse 34 people per square mile.

Fire History

Fire history within the Boulevard Fireshed indicates that over the last roughly 50 years, 29 wildfires have been recorded. Most fires have been small, either due to lack of fuel or quick response and control. Only three fires have grown to 500 to 1,000 acres and another three fires are considered “major” fires of over 1,000 acres. Large portions of the fireshed have not burned in the last 50 years. The xeric environment within the fireshed supports sparse vegetation, which is likely the primary limiting factor for wildfire ignition and spread. However, invasive annual grasses are establishing throughout the fireshed and may, over time, cause a shift to more frequent and larger fires (CPUC and BLM. 2008a). Recorded ignitions within the fireshed include a variety of sources, including equipment use, vehicles, campfires (including fires from illegal immigrants), debris burning, lightning, smoking, and powerline-related ignitions.

Fire Suppression

The Boulevard Fireshed is divided between the SDRFPD, CAL FIRE, and the SDCFA, Boulevard and Campo Fire Stations. The Boulevard Fireshed is covered by the CAL FIRE Whitestar Station, Boulevard Fire Station, Campo Fire Department, and Jacumba Fire Station. Between these agencies, there are significant firefighting resources to serve the area’s wildfire potential, especially with CAL FIRE’s air attack capabilities that can reach the area within 20 minutes.

Wildfire Modeling Results

The Boulevard Fireshed was modeled (CPUC and BLM. 2008a) for fire behavior, burn probability, and escape potential. Based on those results, and independent San Diego County fire behavior modeling confirmations, the fireshed includes vegetation, topography, and weather that are favorable to wildfire spread. Large expanses of naturally vegetated areas occur throughout the fireshed and could result in large-scale wildfire from an ignition, regardless of source. Supporting this conclusion is CAL FIRE’s Fire Threat ranking, which indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). The proposed project occurs in varying classification areas, but generally occurs within areas ranked high, very high, or extreme (CAL FIRE 2010).

4.6.1.2 La Posta Fireshed Description

The La Posta Fireshed is located directly to the west of the Boulevard Fireshed in southeastern San Diego County and includes the northern portion of the Tule Wind Project. Nearby communities include Boulder Grove, Live Oak Springs, Cuyapaipe, and La Posta, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). The La Posta Fireshed is generally at higher elevations than the Boulevard Fireshed, with elevations ranging from nearly 4,000 feet amsl to nearly 6,000 feet amsl. Vegetation throughout the fireshed varies, with coniferous forests at the higher elevations and sparse chaparral and sagebrush communities in the eastern portions of the fireshed. Land ownership within the fireshed includes USFS lands, BLM lands, State lands, City of San Diego lands, SDG&E lands, County of San Diego lands, and private holdings. Population density is higher than the Boulevard Fireshed at 56 people per square mile.

Fire History

Fire history within the La Posta Fireshed indicates that over the last 50 years, 36 wildfires have been recorded. Most fires have been small, either due to lack of continuous fuels or quick response and control. A total of five fires have grown to 500 to 1,000 acres and another four fires are considered “major” fires of over 1,000 acres. Of note, the 1970 Laguna Fire in this fireshed was ignited by a downed electrical distribution line. Over the 13-year period between 1995 and 2008, there have been 419 reported ignitions. Lightning, campfire, equipment use, vehicle fires, and arson are among the primary causes.

Fire Suppression

Fire suppression responsibilities are tasked to SDRFPD, CAL FIRE, SDCFA and USFS within the La Posta Fireshed. These agencies include significant firefighting resources to serve the area’s wildfire potential, especially with the combined CAL FIRE and USFS air attack capabilities that can reach the area within 20 minutes or less.

Wildfire Modeling Results

The La Posta Fireshed was modeled (CPUC and BLM 2008a) for fire behavior, burn probability, and escape potential. Based on those results, and independent San Diego County fire behavior modeling confirmations, the fireshed includes vegetation, topography, and weather that are favorable to wildfire spread. Large expanses of naturally vegetated areas occur throughout the fireshed and could result in large-scale wildfire from an ignition, regardless of source. Supporting this conclusion is CAL FIRE’s Fire Threat ranking, which indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). Fire Threat classifications vary over the project extent and include rankings of high, very high, or extreme (CAL FIRE 2007a).

4.7 Defensible Space and Vegetation Management

The O&M building will be located on a 5-acre site including a parking lot and will be surrounded by a 4-acre cleared area. The substation facility will have the required 3-acre graveled fenced cleared area around it and will have adequate spacing from transformers and other potential fire sources. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed, annually prior to May 1 and more often as needed.

In conformance with the Section 4702.2 of the County of San Diego Consolidated Fire Code TULE WIND, LLC will provide a minimum of 100 feet of Fuel Management adjacent to buildings (primarily proposed for human habitation) associated with the O&M building and project collector substation.

The area within 50 feet of a building or structure shall be cleared of vegetation that is not fire resistant and re-planted with fire-resistant plants. In the area between 50 to 100 feet from a building all dead and dying vegetation shall be removed. Native vegetation may remain in this area provided that the vegetation is modified so that combustible vegetation does not occupy more than 50% of the square footage of this area. Trees may remain in both areas provided that the horizontal distance between crowns of adjacent trees and crowns of trees and structures is not less than 10 feet.

4.8 Cumulative Impact Analysis

CEQA and NEPA require an analysis of cumulative impacts. Cumulative impacts to fire and fuels management would impact area fire service providers. The SDCFA, SDRFPD, CAL FIRE, BLM and Tribal governments service the surrounding area. The project is located in an area that has the potential for wildfires. The project area has been identified in the County of San Diego Draft General Plan Update (April 2010) as having moderate to very high in the majority of the project area and extreme potential for wildland fires in the western portion of the project area.

The proposed project is considered a connected action with the SDG&E ECO Substation project which is proposing upgrades to the existing substation and a double-circuit 230 kV or a single-circuit 500 kV transmission line and the Energia Sierra Jaurez United States Transmission Generation Tie Line project (ESJ) which proposes either a double circuit 230 kV or a single circuit 500 kV transmission line. The project area is also identified as a proposed transmission route for the Sunrise Power Link project. This would add an additional 230 kV double-circuit or single circuit along McCain Valley Road. In addition to the energy projects, the Campo Indian Reservation is in the process of adding an additional 80 turbines to the existing 25 turbines.

There currently are several energy projects within the general vicinity, presented in **Appendix C**. There are three energy projects, eight transmission and other renewable projects, nine federal development projects, and 39 County Development projects located in the general vicinity of the Tule Wind Project area. Other projects in the area are composed of residential developments, mining operations, cell towers, and commercial development. These additional energy projects could have a cumulative effect on the surrounding area due to wildfire and wildfire management.

The components of the area energy projects may have an affect on fire fighting capability due to the transmission lines and turbines absent implementation of PDFs and Mitigation Measures. Cumulative impact research was conducted for the Tule Wind Project, and three private projects were identified as having impacts due to wildland fire hazards.

The following cumulative impacts have the potential to occur:

- Introduction of non-native plants which can contribute to fire spread rate.

  TULE WIND, LLC will implement a Noxious Weed and Invasive Species Control Plan to reduce the introduction of non-native plants into the project area. Given natural state of the project area consideration of the combined energy projects that are scheduled for development, it is anticipated that collectively non-native plants will be introduced into the area. However, the implementation of the Invasive Species Plan that will be in place for the project will render the project's contribution to this impact less than cumulatively considerable by preventing non-native species from being introduced.

- Alter the natural fire system.

  The project area is considered to be in a high to very high fire danger area and historically has not experienced a catastrophic fire in recent history. The vegetation in the area will be altered due to the construction of the turbines, the roadways, and structures. The mitigation measures that will be in place for the project, including a Disturbed Area Revegetation Plan, will render the project's contribution to this impact less than cumulatively considerable by minimizing the potential for ignition which would result in an alteration to the natural fire system.

- Impact natural resources.

  The project and cumulative projects will impact vegetation communities due to the construction of transmission lines, turbines, and structures. TULE WIND, LLC will implement several Mitigation Measures, including a Disturbed Area Revegetation Plan, which will render the project's contribution to this impact less than cumulatively considerable because temporary impacts to vegetation communities will be revegetated to pre-construction conditions and permanent impacts will be mitigated. A comprehensive analysis is provided in the Biological Technical Report for the project (HDR 2010).

- Impact firefighting effectiveness due to the project components (turbines, transmission lines).

The project and cumulative projects will include wind turbines, transmission lines, and non-residential structures that absent mitigation could hamper firefighting effectiveness. Helicopter use likely will not be limited in the area during a wildland fire because the wind turbines can be shut-down from the on-site O&M building and/or TULE WIND, LLC's NCC in Portland, Oregon, which is staffed continuously. Turbines and transmission structures will include any required FAA lighting and markings, which will make them visible reducing the potential for contact from aerial fire fighting. The transmission lines are spaced far enough apart to not restrict aircraft maneuverability and significantly increase the risk of contact by aircraft or water buckets. Water drops are performed at 150 feet above the ground otherwise known as the "150-foot drop zone". The transmission towers are proposed to be 75 feet in height, less than half the height of the drop.

Ground based fire fighting could be compromised by the presence of downed transmission and collector lines could make an area too dangerous to enter for firefighting/fire suppression activities. In order to prevent this, TULE WIND, LLC shall immediately de-energize the electrical collector and transmission systems during fire emergencies in which SDG&E de-energizes its local 138 kV system (FPP-11). Appropriate fire agencies shall be immediately notified of the line de-energizing. Additionally, TULE WIND, LLC shall provide all appropriate local, state, and federal fire dispatching agencies with an on-call contact person (Fire Coordinator) who has the authority to shut down the line in areas affected by a fire. The transmission line shall be de-energized prior to and during fire suppression activities within 1 mile of the transmission corridor to maintain firefighter safety, and re-energizing shall require notification and approval of all the responsible fire agencies (FPP 11). The project is also improving existing access roads and constructing new roads which will improve access for firefighting.

In addition, A Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC, SDCFA, SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDCFA, SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project. This will prevent the project from contributing to a decrease in service through the additional demand of services from the project.

The PDFs discussed in Section 5.0 will minimize the risk of ignition sources; therefore the project's contribution to this impact is less than cumulatively considerable. Therefore, the project's contribution is considered less than significant for cumulative impacts.

5.0 DESIGN CONSIDERATIONS OR PROJECT DESIGN FEATURES AND MITIGATION MEASURES

This section describes potential sources of fire risk associated with the proposed project and identifies Project Design Features (PDFs) that minimize fire risk and provide fire protection and prevention as it relates to the potential sources of fire risk associated with the project. Mitigation measures are discussed at the end of this section.

5.1 Project Considerations and Associated Fire Risks

The potential sources of fire risk associated with the proposed project include the following and are discussed in detail below.

- Construction activities;
- Electrical 34.5 kV collection and 138 kV transmission system;

- Wind turbines; and
- Operations and maintenance activities.

5.1.1 Construction

For purposes of identifying potential sources of fire risk from the proposed project, the following issues have been identified as having the potential to elevate the risk of fire ignition. **Table 4** below identifies the sources of fire risk associated with particular construction activities. Additionally, **Table 4** identifies and briefly describes PDF that avoid and/or minimize the potential for fire risk associated with the particular construction activities. Detailed discussion of the PDF is provided below in Section 5.2.1.

Table 4. Construction Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	**Project Design Feature (Discussed further in Section 5.2.1) and Code Requirements**
Hot Work occurring during a Red Flag Alert.	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Pioneering Work (initial brush clearing by bulldozer, which can result in ignition to vegetation from engine sparks or bulldozer blade strikes against rocks)	**PDF-2:** Construction, Operations, and Maintenance Fire Prevention/Protection Plan
Some areas may require blasting to obtain the required roadway profiles and to install power poles, underground collector cables, and install turbine foundations.	**PDF-3:** Blasting Plan **PDF-4:** County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability.
Construction waste, consisting of wood waste from wood forms used for concrete foundation construction, additional wastes, consisting of erosion control materials such as straw bales and silt fencing, and packaging materials for associated turbine parts and other electrical equipment could create a fuel hazard.	**PDF-5:** Construction Waste Disposal. As a standard practice, TULE WIND, LLC does not allow construction waste to accumulate. Waste associated with project construction will be contained in metal containers and/or designated cleared construction staging areas (large items). The metal containers and staging areas will be monitored and emptied on a regular basis.
Chemicals such as lubricating oils and cleaners for the turbines create a fuel hazard.	**PDF-6:** *Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels.* The proper storage, use, and handling of these materials are regulated under the California Fire Code (CFC).
Adequate water supply onsite to meet firefighter flow requirements in case of wildfire.	**PDF-7:** See Section 4.3. Based on the well pump tests performed at wells on Rough Acres Ranch and the Ewiiaapaayp Native American Reservation and other off-site water source options, an ample water supply exists for the project construction period. If a fire were to occur in the project area, during construction activities, construction activities would cease and the groundwater available from these

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.1) and Code Requirements
	sources could be used to for fire fighting, in addition to the water tanks identified above. In addition, based on informal conversations with the staff members of the various fire agencies, Lake Tule and other sources could be utilized for firefighting purposes (HDR communication with County Fire Authority).
Inadequate fire or emergency services capacity.	**PDF -8:** Fire and Emergency Service Agreement. A Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC, SDCFA, SDRFPD, and other agencies as appropriate.

5.1.2 Electrical 34.5 kV Collection and 138 kV Transmission System

The project's electrical system will consist of three key elements: (1) an underground and overhead collector system, which will connect the wind turbines at a voltage of 34.5 kV; (2) the project collector substation, where the voltage will be increased from 34.5 kV to 138 kV; and (3) a 138 kV transmission line that will deliver the electricity to the SDG&E proposed Rebuilt Boulevard Substation.

The electrical collection and distribution system will be designed to be in compliance with Rule 250 of the NESC, which covers all wind and ice loading requirements for overhead lines. Pole design will comply with the Avian Powerline Interaction Committee (APLIC) "Suggested Practices for Avian Protection on Power Lines" and anti-perching devices will be utilized where poles are within 0.5 miles of turbines.

34.5 kV Overhead Collector System

Portions of the project's electrical collector system will be aboveground due to the rugged topography of the project area. The overhead collector system is approximately 9.2 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 35 miles in length. Only 26 percent of the collector system is planned to be overhead. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

138 kV Transmission Line

The overhead 138 kV transmission line will begin at the project collector substation and run south on either side of McCain Valley Road, and across I-8 to the SDG&E proposed Rebuilt Boulevard Substation located on Old Highway 80. The transmission line will be constructed as a single circuit without any under build attachments and would be a maximum of 9.7 miles.

A maximum of 116 steel galvanized or weathered steel finish transmission poles will be necessary to support the 138 kV transmission line. The steel galvanized or weathered steel finish poles supporting the transmission line will be approximately 74.5 feet in height; with typical span length of 600 feet and a maximum length of 700 feet.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. The table below identifies the sources of fire risk associated with power lines. Additionally, **Table 5** identifies PDFs that minimize the potential for fire risk associated with power lines. Detailed discussion of each PDF is provided below in Section 5.2.2.

Table 5. Electrical Collector and Transmission System Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.2) and Code Requirements
Vegetation contact with conductors resulting in arcing.	**PDF-9:** The 34.5 kV overhead collector lines as well as the 138 kV transmission lines will be designed in accordance with CPUC GO 95 “Rules For Overhead Electric Line Construction” and the current edition of the NESC to ensure sufficient clearance between conductors and vegetation to prevent contact. For example, the 138kV transmission line will have a minimum clearance from the conductor to the ground of 30 feet and the 34.5 kV overhead collector lines will have a minimum of 18.5 feet. Although, TULE WIND, LLC’s standard practice is to place the lines at a greater distance apart (e.g., 25 feet). Based on regular visual inspections, vegetation removal and management will be conducted below the lines to ensure this clearance is maintained.
Malfunctioning hardware such as transformers and capacitors or arcing from pole mounted hardware.	**PDF-10:** The area within the project substation, which will contain transformers, capacitors, and other electrical components, will be cleared of vegetation, graveled, and maintained vegetation free. In addition, a 5-foot wide area outside the substation fence will be cleared and graveled. A 15-foot diameter area around transformers located at turbine towers will be cleared and graveled. Additional fuel management will occur for a balance of 100 feet from the turbine base. No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing. Equipment within the substation, including transformers, will be protected in compliance with NFPA 850 and the CFC. Fire fighting foam concentrate will be required at the substation location in the event of an oil fire.
Avian contact with power lines.	**PDF-11:** The design of the power lines will comply with APLIC “Suggested Practices for Avian Protection on Power Lines” which is the industry standard developed to minimize avian contact with power lines. Bird caused flashovers are very unlikely for the project because the energized 134 kV conductors will have minimum distances of 30 vertical feet and 12 horizontal feet apart,

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.2) and Code Requirements
	and the 34.5 kV overhead collector lines will have a minimum distance of 18.5 feet Vertical feet and 5 feet horizontal feet apart.
Conductor-to-conductor contact or floating/wind-blown debris contact with conductors or insulators.	**PDF-12:** The lines and associated facilities will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure the design minimizes the potential for inadvertent conductor contact.
Wood support poles being blown down in high winds.	**PDF-13:** Self supporting steel poles will be utilized for the 138 kV transmission line. Steel and wood are being considered for 34.5 kV overhead collector system poles. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.
Dust or dirt on insulators.	**PDF-14:** Periodic visual inspection of the 138 kV transmission line will occur and washing will occur on an "as needed" basis as determined by the visual inspections.
Airplane and/or helicopter contact with conductors or support structures.	**PDF-15:** Electrical collection and transmission system and turbines will include the required FAA and CAL FIRE lighting and markings.

5.1.3 Wind Turbines

Wind turbines have a number of safety features that minimize the potential for fire ignition. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. The installation of the turbine and associated electrical equipment is to be certified by a nationally-recognized third party testing agency. The project will be monitored TULE WIND, LLC's proprietary wind turbine monitoring Supervisory, Control and Data Acquisition system (SCADA). This system will be located in the Operations and Maintenance building (O&M) and will collect operation, performance data, and allow for remote operation of the wind turbines. In addition, this system informs personnel at TULE WIND, LLC's NCC in Portland, Oregon. The monitoring system for the SCADA will have a backup emergency power source.

For purposes of identifying potential sources of fire risk, as it relates to the wind turbines, the following issues have the potential to elevate the risk of fire ignition:

- Nacelle Fire resulting from:
  - Electrical components and wiring;
  - Flammable gear and bearing lubricants;
  - Overheating due to blade over speed, wind or vibration; and
  - Lightning.
- Electrical Components elsewhere in the turbine.

Nacelle Fire

The turbine system is equipped with an arc flash detection sensors optical technology to detect the presence of the initial arc flash, over-current sensing transducers and smoke detectors. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. Should any of these devices register an out-or-range condition, the turbine will shutdown and will disengage from the electrical collection system. In addition, the SCADA system will alarm. The following two types of turbine electrical components are proposed for the project:

1) Up-Tower - Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. The up-tower turbines being considered for this project include fire detection components that are included and mounted on key power cables within the nacelle. The fire detection and safety features include:

- Smoke detectors;
- Arc-flash sensors – Provide a clear arc flash measurement. Since the light emitted during an arc flash event is significantly brighter than normal background light, optical technology can easily detect the light present at the initiation of the flash. If an arch-flash is detected, the turbine will immediately command a shutdown; and,
- Over-current sensing transducers – All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. If any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

A fire suppression system shall be provided in each wind turbine nacelle selected by TULE WIND, LLC for construction. In addition, turbines including all components will be certified by a nationally-recognized third party testing agency.

2) Down-Tower - This type of turbine being considered for the project has the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower; however the same potential for a fire within the electrical components and transformer exists. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved fire access to the site. Portions of the turbine could ignite and could fall to the ground. However, the project is proposing up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the cleared area would be revegetated using low fuel vegetation in a spacing and height configuration approved by the Fire District for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The environmental analysis conducted for the project assumed a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed annually prior to May 1 and more often as needed.

Based on TULE WIND, LLC's experience, burning debris from a nacelle fire could fall up to 100-feet from the turbine; however, this is speculative as the distance that debris would fall is dependant upon the wind conditions of that particular day. Burning material could travel in a windy condition and start a vegetation fire. Burning embers in wind driven vegetation fires can also travel distances from the main fire and start spot fires.

As a supplement to the fire detection and protection features (smoke detectors, arc-flash sensors, over-current sensing transducers, SCADA system, fuel modification, fire extinguishers) provided as part of the turbine design, TULE WIND, LLC will provide one tank at the O&M building and four (4) water tanks with locations to be confirmed with the SDRFPD. Water tanks would be located within portions of the project area that the agencies feel are strategic from a firefighting perspective. Water tanks will be installed and maintained by TULE WIND, LLC, with the SDRFPD maintaining adequate water levels to support fire protection services.

It is possible for fire to occur in the wind turbine nacelles due to the presence of electrical control panel, and capacitor panels. Fires may be caused by electrical malfunctions, arcing in the nacelle, and excessive heat build-up in the nacelle. Hydraulic lubricating oils can also be ignited by an arc.

It is unlikely that fire ignition in the nacelle due to blade over speed would occur due to the design of the turbine blades, which are equipped with a pitch system that allows the blades to be rotated in order to control and stop the turbine. As back-up to the three independent blade pitch systems, the turbines are equipped with a mechanical breaking system. In addition, turbines are equipped with vibration sensors that automatically shut the turbines down if vibration exceeds the normal operating conditions.

Lightning

Wind turbines are vulnerable to lightning strikes due to their height and location on elevated features such as ridges. Turbine blades are manufactured from fire resistant components, composites, fiberglass, carbon fiber, or a combination of all. However, to address this issue, the wind turbines being considered for this project include "grounding" features within the wind turbine blades to reduce the potential for fire due to lighting.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. **Table 6** below identifies the sources of fire risk associated with wind turbines. Additionally, the table identifies PDF that minimize the potential for fire risk associated with wind turbines. Detailed discussion of the PDF regarding turbine components and the tower itself is provided below in Section 5.2.3.

Table 6. Wind Turbine Fire Risk, Project Design Features, and Code Requirements

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.3) and Code Requirements
Nacelle Fire – Electrical • Electrical components and wiring • Flammable gear and bearing lubricants Nacelle Fire – Braking • Overheating due to turbine blade over speed, wind, and vibration	**PDF-16:** **1) Up-Tower -** Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. The up-tower turbines being considered for this project include fire detection components mounted on key power cables within the nacelle. The fire detection features include: • Smoke detectors, • Arc-flash sensors, • Over-current sensing transducers; and • Portable fire extinguishers. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine, disengage it from the electrical collection system, and send a notice through the SCADA system to the NCC in Portland, Oregon. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower. The project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, TULE WIND, LLC's NCC in Portland, Oregon monitors and can control all of TULE WIND, LLC's wind turbines through the SCADA and is staffed 24 hours a day. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. A fire suppression system shall be provided in each wind turbine nacelle selected by TULE WIND, LLC for construction. In addition, turbines including all components will be certified by a nationally-recognized third party testing agency. **(2) Down-Tower -** This type of turbine being considered for the project has the medium voltage electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower. However this turbine style still has the same risk of a fire associated with electrical components as the Up-

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.3) and Code Requirements
	Tower style does. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved fire access to the site. The potential for fire ignition in the nacelle due to blade over speed, wind or vibration is limited due to the design of the turbine blades, which are equipped with a pitch system that allows the blades to be rotated in order to control and stop the turbine in high wind conditions. As back-up to the three independent blade pitch systems, the turbines are equipped with a mechanical breaking system. In addition, turbines are equipped with vibration sensors that automatically shut the turbines down if vibration exceeds the normal operating conditions. Turbine and associated electrical equipment will be certified by a nationally-recognized third party testing agency.
Lightning	**PDF-17:** All wind turbine models for this project will incorporate blade lightning protection systems in accordance with the International Electrotechnical Commission (IEC) TR 61400-24. In addition, the lightning protection will be certified by an independent engineering company (e.g., Germanischer Lloyd, DNV or other appropriate independent engineer). A copy of that certificate will be available with the turbine order. In general, these systems consist of: air-receptors on various locations along the length of the blade, ground-conducting straps in the hub, nacelle, and tower, lightning detection tell-tale circuit cards, and tower grounding to earth.

5.1.4 Operations and Maintenance

Maintenance activities will be limited to areas accessible by the permanent access roads. Typical turbine maintenance activities involve deploying personnel to the turbine to service parts within the turbine, but may also include temporarily deploying a crane within the previously disturbed construction area around the turbine, removing the turbine rotor, replacing generators, and bearings. See discussion below in Section 5.2.1 regarding TULE WIND, LLC's Hot Work Procedure that would be implemented during any operations and/or maintenance activities that occur during Red Flag Alerts.

As described previously, the project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, TULE WIND, LLC's NCC in Portland, Oregon monitors and can control all of TULE WIND, LLC's wind turbines through the SCADA and is staffed 24 hours a day. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.

For purposes of identifying potential sources of fire risk, the following issues have the potential to elevate the risk of fire ignition. **Table 7** identifies the sources of fire risk associated with operations and maintenance activities. Additionally, the table identifies PDF that minimize the potential for fire risk associated with operations and maintenance activities. Detailed discussion of the PDF is provided below in Section 5.2.4.

Table 7. Operations and Maintenance Fire Risk, Project Design Features and Code Requirements

Source of Fire Risk	**Project Design Feature (Discussed further in Section 5.2.4) and Code Requirements**
Off-road vehicle use • Pioneering Work • Sparks from road grading equipment	**PDF-18:** • No off-road vehicle use would be necessary because all wind turbine and associated project components (e.g., substation and O&M building) will be located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed that meet the requirements of the County of San Diego Consolidated Fire Code (2009). • Hot Work Procedure (PDF-1). • Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2). • Road maintenance activities requiring the use of grading equipment will be suspended during red flag events. • Permanently assigned project vehicles will carry, as a minimum, a fire extinguisher, shovel, and two-way-radio.
On highway activities located in particularly hazardous fuel conditions • Idling or parked vehicles and equipment in areas of brush, grass, vegetation.	**PDF-19:** No vehicle will be idle or parked in areas of combustible fuels, such as brush or grass. All wind turbine and associated project components (e.g., substation and O&M building) are located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed.
Chain saw use of any kind	**PDF-1:**Hot Work Procedure (Section 5.2.1)
Operation of generators, pumps, augers, two-cycle motors, or other equipment capable of producing sparks or ample exhaust heat to cause ignition	**PDF-20:** Portable equipment powered by two cycle engines or capable of producing significant exhaust heat will be located within the 100-foot radius surrounding the turbine in which vegetative fuel reduction will take place. **PDF-1:** Hot Work Procedure (Section 5.2.1)

Source of Fire Risk	Project Design Feature (Discussed further in Section 5.2.4) and Code Requirements
Tree removal equipment including but not limited to grinders, chippers, skidders, excavators, etc.	**PDF-1:** Hot Work Procedure (Section 5.2.1) **PDF-2:** Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2).
Grinding and welding	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Working on energized electrical equipment or facilities	**PDF-21:** Work on energized equipment will be avoided whenever possible. Personnel performing work on energized equipment will be trained in applicable OSHA and other safety requirements.
Smoking	**PDF-22:** Limited to cleared areas around the O&M building
Red Flag Warnings	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Turbine Fire – Human Activity (Hotwork)	**PDF-1:** Hot Work Procedure (Section 5.2.1)
Inadequate Site Access	**PDF-23:** Existing access roads will be improved and new access roads will be constructed.
O&M Building Fire Risk	**PDF-24:** O&M building construction will include fire prevention and protection. • Construction to comply with County Building Code (CBC). • O&M building to be surrounded by 4-acre cleared area, with a minimum of 100 feet of fuel management. Structure will comply with County Consolidated Fire Code for defensible space. • Batteries will have secondary containment and required ventilation. • Sprinkler systems will be installed. • SCADA monitoring system will have emergency power source. • CFC and CBC compliance for fire separation. • Control room will have 1-hour fire rated walls. • Building will be equipped with smoke detectors. • Building will be equipped with a Knox box on the exterior by the main door.
Substation, Transformers, or Electrical Fire Risk	**PDF-25:** Transformers walls will have secondary containment adequate to contain the total amount of oil plus firefighting water for 15 minutes. To be approved by SDRFPD and SDCFA.
Inadequate Fire or Emergency Services Capacity	**PDF-8:** Fire and Emergency Service Agreement.
Combustible Storage	**PDF-26:** • Minimize the accumulation of combustible material. Storage of flammable materials in fire rated cabinets. • Perform periodic housekeeping inspections and unsure employees are trained in the use of fire extinguishers. • Combustible storage and trash will be removed from site as soon as possible.

5.2 Project Design Features

Included below is a detailed discussion of the PDF's identified above.

5.2.1 Construction

PDF-1 Hot Work: TULE WIND, LLC will comply with the applicable sections in NFPA 51-B "Fire prevention during welding, cutting and other hot work" and CFC Chapter 26 "Welding and other Hot Work". During Red Flag Alerts, operations involving cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, use of torches, or other similar activity during construction or maintenance activities will be conducted according to NFPA 51-B. Red Flag Warnings are issued by the U.S. National Weather Service. Fire Weather Watches and Red Flag Warnings are normally issued only after: (1) An accurate assessment of fuel conditions has been determined (see "Qualifying Fuels Information" section); and (2) Conferring with the affected agencies or a representative subset of affected agencies, to include the Geographic Area Coordination Center (GACC) Predictive Services Units. This is normally accomplished via morning conference calls hosted by the GACCs. It is to be understood that there may be times when full coordination cannot be accomplished due to schedule and workload issues, and that the ultimate responsibility for the issuance of a watch/warning rests with the NWS forecaster. The project area is located in the National Weather Service San Diego Mountain (CA 258) zone.

TULE WIND, LLC will implement a Hot Work Procedure on-site to minimize the potential for fire ignition. Components of the Hot Work Procedure will include:

- Prior to hot work activity commencing, the on-site TULE WIND, LLC fire safety coordinator will monitor daily the National Weather Service Red Flag Alert system.
- In the event of a Red Flag Alert, prior to hot work activity commencing, the on-site TULE WIND, LLC fire safety coordinator will contact the local fire agency to determine the level of alert specific to the project area.
- The on-site TULE WIND, LLC fire safety coordinator will require all hot work to be conducted according to NFPA 51-B.
- TULE WIND, LLC will require all employees and/or sub-contractors who perform hot work during Red Flag Alerts to be trained under the applicable sections of NFPA 51-B.
- The on-site TULE WIND, LLC fire safety coordinator will have the authority to modify hot work activities associated with construction and/or maintenance activities to the degree necessary to prevent fire ignition.

***PDF-2: Construction Activities* -** Develop and implement a Construction and Maintenance Fire Prevention/Protection Plan. TULE WIND, LLC shall develop a multi-agency Construction and Maintenance Fire Prevention Plan. Plan reviewers shall include: CPUC, CAL FIRE, BLM, CSLC, and the County of San Diego. TULE WIND, LLC shall provide a draft copy of this Plan to each listed agency at least 90 days before the start of construction activities. Comments on the Plan shall be provided by TULE WIND, LLC to all other participants, and TULE WIND, LLC shall resolve each comment in consultation with and to the satisfaction of CAL FIRE, SDRFPD and the SDCFA. The final Plan shall be submitted to CAL FIRE, SDRFPD and SDCFA at least 30 days prior to the initiation of construction activities. TULE WIND, LLC shall fully implement the Plan during all construction and maintenance activities. All construction work on the project shall follow the Construction Plan guidelines and commitments, and Plan contents are to be incorporated into the standard construction contracting agreements for the construction of the project. Primary Plan enforcement and implementation responsibility will remain with TULE WIND, LLC.

At a minimum, Plan contents will include the requirements of Title 14 of the California Code of Regulations, Article 8 #918 “Fire Protection” and the elements listed below:

1. During the construction phase of the project, TULE WIND, LLC shall implement ongoing fire patrols. TULE WIND, LLC shall maintain fire patrols during construction hours and for 1 hour after end of daily construction, and hotwork.
2. Fire Suppression Resource Inventory – In addition to CCR Title 14, 918.1(a), (b), and (c), TULE WIND, LLC shall update in writing the 24-hour contact information and onsite fire suppression equipment, tools, and personnel list on quarterly basis and provide it to the CAL FIRE, SDRFPD, SDCFA, CPUC, BLM, and to state and federal fire agencies.
3. During Red Flag Warning events, as issued daily by the National Weather Service in SRAs and Federal Responsibility Areas (FRA), all non-essential, non-emergency construction and maintenance activities shall cease. Utility and contractor personnel will be informed of changes to the Red Flag event status as stipulated by CAL FIRE.
4. All construction crews and inspectors shall be provided with radio and cellular telephone access that is operational along the entire length of the approved route to allow for immediate reporting of fires. Communication pathways and equipment shall be tested and confirmed operational each day prior to initiating construction activities at each construction site. The radio shall allow communications with other TULE WIND, LLC vehicles and construction trailer. All fires will be reported immediately upon detection.
5. Each member shall carry at all times a laminated card listing pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on contact cards will be updated and redistributed to all crewmembers as needed, and outdated cards destroyed, prior to the initiation of construction activities on the day the information change goes into effect.
6. Each member of the construction crew shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats.
7. Water storage tanks and access roads shall be installed and operational at time of start of construction.

PDF-3: Blasting – As part of the project design, a blasting plan will be prepared. The blasting plan will include identification of planned blasting locations, a description of the planned blasting methods, an inventory of receptors potentially affected by the planned blasting, and to determination the area affected by the planned blasting. Blasting methods will take into consideration the high wildland fire hazard conditions in and surrounding the project area.

Precautions to prevent fire will be included in the blasting plan will include requirements to have all blasting charges capped with soil and/or other materials that are not combustible.

Blasting activities are required to be observed by a Blasting Inspector. A Blasting Inspector is a person on the Sheriff's approved list of inspectors authorized to conduct inspections, before and after a blast. To be on the Sheriff's approved list, an inspector shall be certified by or registered with the International Conference of Building Officials, the International Code Counsel/Counsel of American Building Officials, the Building Officials & Code Administrator or the Southern Building Code Congress International.

PDF-4: County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability – The project will comply with the County of San Diego Consolidated Fire Code, Section 96.1.3301.2, Explosives and Fireworks Applicability. The Fire Code requires a permit application to be issued prior to the start of blasting activities. Blasting activities shall be limited to Monday through Saturday between the hours of 7:00 a.m. and 6:00 p.m. or one-half hour before sunset, whichever occurs first, unless issuance of grant approval. Surrounding residents within 600 feet will be notified in writing within 600 feet of any major blast location or 300 feet from any minor blast location.

PDF-5: Construction Waste Disposal **–** As a standard practice, TULE WIND, LLC does not allow construction waste to accumulate. Waste associated with project construction will be contained in metal containers and/or designated cleared construction staging areas (large items). The metal containers and staging areas will be monitored and emptied on a regular basis.

PDF-6: Storage, Use and Handling of Oils, Flammable Liquids, Hazardous Materials and Vehicle Fuels – As part of the project construction and operations, chemicals such as oils and cleaners for turbines will be properly storage, used, and handled as regulated under the California Fire Code (CFC). Areas on the project site that store, use or handle these materials will be at least 50 feet from any building or turbine, and will have a fuel modification zone around them of at least 30 feet and will be constructed in compliance with the CFC.

Dispensing of any motor vehicle fuels shall comply with the CFC. Spill control will be provided in all areas, and shall contain the contents of the largest container. Electrical systems shall comply with the CFC and with the National Electrical Code; NFPA 70, and with NFPA 497 where applicable. Grounding and bonding will be provided where necessary. Any transfer or dispensing pumps shall have a remote emergency shut down device 75 feet away. There shall be portable fire extinguishers with a minimum rating of 20 BC, located approximately 50 feet away and mounted on a visible post approximately 4 feet off ground. Safety signage shall be provided for any transfer/dispensing areas and "No Smoking" signs shall be posted.

PDF-7: Water Availability – Groundwater Investigation Report (Geo-Logic, December 2010) (**Appendix B**). Over a nine- month construction period, 72 days of maximum road watering and foundation construction would occur simultaneously, the project would require the use of up to 250,000 gallons of water per day, requiring continuous pumping of 124 gallons per minute (24-hours per day, seven days per week) to support the water needs of the project for dust suppression and concrete mixing.

The project is planning to obtain water from wells within the Thing Valley Water Production Area (WPA) on the Ewiiaapaayp Reservation and the Rough Acres Ranch WPA. Two groundwater production wells are located within the Thing Valley WPA. Two wells (6 and 6a) are located within the Rough Acres Ranch WPA; however, seven wells surrounding the project area were evaluated during the groundwater investigation. Four of the wells are currently equipped with pumps and are actively used for municipal water supply or to provide water to livestock. The remaining three wells are either equipped with pumps and are not currently used or have not been equipped with pumps.

Based on aquifer testing conducted as part of the groundwater investigation and well testing, Well No. 6 and No. 6a are capable of producing groundwater at 50 to 60 gpm each. The well test conducted on well No. 6a indicates a specific yield of 60 gpm. A Major Use Permit for water extraction will be required for groundwater pumping at Well No. 6a or other wells located on land under the jurisdiction of the County of San Diego.

There is no requirement for an MUP for groundwater extraction for use of the well on the Ewiiaapaayp Reservation. Results of the testing indicate that the Reservation well can pump rate of 80 gallons per minute (gpm) is possible, but a reduced pumping rate is recommended. In addition, pumping from other reservation wells is possible to provide a supplemental water supply. The project has also received written confirmation from the Jacumba Community Service District (Lindenmeyer 2010) and Live Oak Springs Water Company (Najor 2010) of water supplies available to provide construction water to the project. However, based on the results of the Groundwater Investigation Report (Geo-Logic Associates, December 2010), water from these sources is not required to meet the 124 gpm pump rate.

Based on the lower pumping rate of 50 gpm at Well No. 6a and an 80 gpm pumping rate at the one well tested on the Reservation, the required pumping rate of 124 gpm is achieved. Based on the results of the aquifer pumping test at Well No. 6a, the significance criteria for well interference and 50 percent depletion of groundwater in storage associated with project construction requirements will not be exceeded. Actually, at the gpm rates identified in the Groundwater Investigation Report, a gpm pumping rate of 130 is achieved, which exceeds the project's maximum daily water requirements during construction. Additionally, if the pumping rate at Well No.6a is doubled to 100 gpm, the project would exceed the required gpm pumping rate by 56 gpm/day. Also, it should be taken into consideration that additional wells on the Ewiiaapaayp Reservation may be available for use.

The potential for depletion of groundwater in storage within the McCain Valley is not anticipated. Results of the groundwater demand during a drought period indicate that eight times the anticipated groundwater pumping proposed by the project would be required to draw groundwater to the 50 percent depletion level.

There are four potential additional water supply sources available for the project. The State Correctional Facility is located about one half mile north of Interstate 8 off of McCain Road. This correctional facility maintains two wells with estimated production of 45 and 65 gpm. The Live Oak Springs Resort located south of Interstate 8 on Old Highway 80 about ¾-mile northwest of the intersection with Highway 94 may provide a source of water supply. This resort (and water company) operates a well that pumps about 40,000 gallons per day (25 to 30 gpm) and maintains a 100,000 gallon pond, and two large tanks with an additional 50,000 gallons of storage capacity. They have committed to providing 40,000 for immediate use and up to 80,000 gallons per day with additional storage tanks (pers. comm., September 8, 2010); equivalent to 28 to 55 gpm. The Jacumba Community Service District (CSD) also has indicated that their well produces 200 gpm and they will commit up to 40,000 gallons per day to the project (pers. comm., September 8, 2010); equivalent to about 28 gpm. Finally, the City of El Centro has indicated that they are willing to sell wastewater plant effluent to the project for use during the construction phase.

In summary, as outlined above, the available on-site groundwater can provide the required project water requirements through continuous pumping at a rate of 124 gpm. Current pumping test results indicate at least 130 gpm can be achieved from the two tested wells, and potential greater volumes with a higher volume pump at the Rough Acres Ranch test well. However, with off-site water from the State Correctional Facility, Live Oak Springs Resort, and Jacumba CSD for purchase, an additional 80,000 to 120,000 gallons of water per day, or approximately 55 to 83 gpm of water could be available to support the project water supply needs; ample water for the nine-month construction period. With these additional off-site sources, the combined on-site and off-site water could be equivalent to an estimated 213 gpm could be made available in support of the project.

If a fire were to occur in the project area, construction activities utilizing ground water would cease and the groundwater available from these sources could be used for firefighting purposes. In addition, based on informal conversations with the staff members of the various fire agencies, Lake Tule and other sources would be utilized for firefighting purposes (HDR staff, Pers. Comm.).

TULE WIND, LLC will provide four (4) additional 10,000 gallon water tanks to the SDRFPD to place at strategic locations throughout the site. The tanks will be installed and maintained by TULE WIND, LLC, with SDRFPD maintaining adequate water levels for fire protection services. The water tanks will provide a supplemental water source that can be utilized for additional fire suppression for the community of Boulevard and BLM lands that have limited access to water.

The same wells will provide the source of water during operations. When the project turbines become operational, only a limited quantity of water will be required, estimated at 2,500 gallons per day to supply the operations and maintenance building services and support staff.

5.2.2 Electrical Collection and Transmission System

The project’s electrical system will consist of three key elements: (1) an overhead and underground collector system, which will connect the wind turbines at a voltage of 34.5 kV; (2) the project collector substation, where the voltage will be increased from 34.5 kV to 138 kV; and (3) a 138 kV transmission line which will deliver the electricity to the SDG&E proposed Rebuilt Boulevard Substation.

Portions of the project's electrical collector system will be aboveground due to the rugged topography of the project area. The overhead collector system is approximately 9.4 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 35 miles in length. Only 26 percent of the collector system is planned to be overhead. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

The overhead transmission system is proposed to be a 138 kV overhead transmission line running south from the project collector substation to interconnect with SDG&E's proposed Rebuilt Boulevard Substation. TULE WIND, LLC will utilize steel poles for the transmission lines and TULE WIND, LLC is considering the use of wood and/or steel poles for 34.5 kV distribution lines. The length (in miles) of the proposed 138 kV transmission line totals 9.2 miles with 5.91 miles on BLM lands, 0.26 miles of State of California lands, and 3.05 miles on County of San Diego lands, with no transmission lines located on tribal lands. The following describes the 138 kV transmission line and 34.5 collector line design:

- 138 kV Transmission and 34.5 kV collector line designs will include longer insulators to support the wires. The long insulators assure adequate conductor separation to prevent arcing during high-wind conditions. This design also protects raptors with wide wingspans.
- No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing.
- The transmission line will be designed so under all load conditions, the line will be no closer to the ground than 25 feet. In areas where a distribution circuit is also placed on the pole at a lower elevation, the minimum clearance for the distribution circuit to the ground is 25 feet. The distance between the transmission and distribution circuits is a minimum of 10 feet, assuming worst case conditions maximum sag for the transmission circuit and minimum sag for the distribution circuit.
- Self supporting poles for both 138 kV and 34.5 kV lines will generally be used at locations where the line changes direction rather than guy wires and anchors. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.

PDF-8: Execute a Fire and Emergency Protection Services Agreement - A Fire and Emergency Protection Services Agreement for the project shall be executed between TULE WIND, LLC and the SDRFPD, and other agencies as appropriate. The Agreement shall be executed by all parties prior to commencement of construction of the project. The purpose of the Agreement is to fund the employment and training of personnel, and acquisition and maintenance of equipment to provide fire and emergency protection services for the project. The Agreement will describe the scope of services to be provided by the SDRFPD, and other agencies as appropriate, and will be maintained throughout the life of the project.

TULE WIND, LLC will educate the construction crew and maintenance employees as to potential dangers that may occur during construction and maintenance of the project. To reduce the possibility of fire ignition during hot work, TULE WIND, LLC will implement the Hot Work Procedure and coordinate with local fire authority regarding the specific conditions in the project area. The PDFs discussed in Section 5.2 will minimize the risk of ignition sources; therefore the project's contribution to this impact is less than cumulatively considerable.

PDF-9: Overhead collector lines (138 kV and 34.5 kV) transmission lines - Will be designed in accordance with CPUC GO 95 "Rules for Overhead Electric Line Construction" and the current edition of the NESC to ensure sufficient clearance between conductors and vegetation to prevent contact.

PDF-10: Cleared Areas **-** The area within the project substation, which will contain transformers, capacitors, and other electrical components, will be cleared of vegetation, graveled, and maintained vegetation free. In addition, a 5-foot wide area outside the substation fence will be cleared and graveled. A 15-foot diameter area around transformers located at turbine towers will be cleared and graveled. Additional fuel management will occur for a balance of 100 feet from the turbine base.

No switching devices with moving parts (fused cutouts, switches, reclosers) will be located on the poles. This removes a potential ignition source from arcing. Equipment within the substation, including transformers, will be protected in compliance with NFPA 850 and the CFC. Fire fighting foam concentrate will be required at the substation location in the event of an oil fire.

PDF-11**:** ***Powerline Design*** - The design of the power lines will comply with APLIC "Suggested Practices for Avian Protection on Power Lines" which is the industry standard developed to minimize avian contact with power lines. Bird caused flashovers are very unlikely for the project because the energized 134 kV conductors will have minimum distances of 30 vertical feet and 12 horizontal feet apart, and the 34.5 kV overhead collector lines will have a minimum distance of 18.5 feet vertical feet and 5 feet horizontal feet apart.

PDF-12: Line Design **-** The lines and associated facilities will be designed in accordance with CPUC GO 95 "Rules For Overhead Electric Line Construction" and the current edition of the NESC to ensure the design minimizes the potential for inadvertent conductor contact.

PDR-13: Pole Design- Self supporting steel poles will be utilized for the 138 kV transmission line. Steel and wood are being considered for 34.5 kV overhead collector system poles. If guy wires and anchors are used, they will be rated for a minimum of 150% of expected loading. This design approach eliminates the most likely cause of pole collapse, which is failure of a guy wire and/or anchor.

PDF-14: Transmission Line Maintenance - Periodic visual inspection of the 138 kV transmission line will occur and washing will occur on an "as needed" basis as determined by the visual inspections.

PDF-15: Lighting **-** Electrical collection and transmission system and turbines will include the required FAA and CAL FIRE lighting and markings.

5.2.3 Wind Turbines

The turbines proposed for this project have a number of safety features that minimize the potential for a fire. All electrical components are protected by current limiting devices, either thermal circuit breakers or traditional fuses. The installation of the turbine and associated electrical equipment is to be certified by a nationally-recognized third party testing agency. Should any of these devices register an out-of-range condition, it will immediately command a shutdown of the turbine and will disengage it from the electrical collection system. An alarm is indicated on the wind farm SCADA as well as on screens at TULE WIND, LLC's NCC in Portland, Oregon. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.

PDF-16 Nacelle Fire Risk Reduction

There are two basic wind turbine designs:

(1) Up-Tower - Electrical equipment in the nacelle; and
(2) Down-Tower - Electrical equipment mounted at ground level.

On the site tour of TULE WIND, LLC's Dillon Wind Farm (August 12, 2010), attendees viewed a wind turbine that included the electrical equipment mounted at ground level.

(1) Up-Tower - Turbines with electrical (medium-voltage) equipment in the nacelle have a number of safety devices to detect electrical arc and smoke. For example, the turbine design being considered for the following fire detection components are included and mounted on key power cables within the nacelle:

- Smoke detectors;
- Arc-flash sensors; and
- Over-current sensing transducers.

Should any of these devices register an out-of-range condition, the device immediately commands a shutdown of the turbine and will disengage it from the electrical collection system. The entire turbine is electrically protected by current-limiting switchgear that is installed inside the base of the tower.

The project will be operated and maintained by approximately 12 permanent full-time employees, who will monitor the wind turbines during normal business hours. In addition, TULE WIND, LLC's NCC in Portland, Oregon monitors and can control all of TULE WIND, LLC's wind turbines through the SCADA and is staffed 24 hours a day. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the project, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC.

(2) Down-Tower - This type of turbine being considered for the project has the electrical components installed in metal cabinets inside the base of the tower, and a low-voltage-to-medium-voltage transformer installed adjacent to the transformer. In this configuration, the probability of an uncontained electrical fire in the nacelle is extremely remote, as there are no combustible materials inside the tower. However the same risk of a fire associated with electrical components exists. As with the other turbine type, a tower-based circuit breaker electrically protects the entire machine. The down-tower turbine type will include similar fire detection, fire suppression, and safety features in the nacelle as the up-tower turbine type (e.g., smoke detectors, arc flash mitigation relays and over-current protection), however, fire suppression on the down-tower transformer is unnecessary due to the enclosed conditions and improved access roads.

Regardless of the wind turbine type, installation of the turbines and associated electrical equipment will be certified by a nationally-recognized third party testing agency. In addition, a potential fire risk associated with wind turbines is improperly installed electrical equipment (e.g., technical defects or components in the power electronics, failure of power switches, failure of control electronics, high electrical resistance caused by insufficient contact surface with electrical connections, such as loose connections, insufficient electrical protection concept with respect to the identification of insulation defects and the selectivity of switch-off units, no pole mounted disconnected switches, inadequate surge protection, inadequate grounding due to incorrect design or improper installation).

If fire ignition occurred within the Up-Tower or Down-Tower turbine type due to improperly installed electrical equipment, the fire protection and prevention features identified above would be triggered and the device that registered an out-of-range condition would immediately shutdown and an alarm would be indicated on the wind farm SCADA as well as on screens at TULE WIND, LLC’s NCC in Portland, Oregon. In addition, signage will be posted at the NCC to call a 10 digit 24/7 landline phone number to emergency dispatch center in San Diego County in the case of an emergency.

PDF-17: Lightning - Although a final decision on the type of wind turbine has not been made, the majority of turbine manufacturers have imbedded “grounding” systems within the turbine blades to prevent ignition of a fire due to lighting. All wind turbine models being considered for this project will incorporate blade lightning protection systems. In general, these systems consist of air-receptors on various locations along the length of the blade, ground-conducting straps in the hub, nacelle, and tower, lightning detection tell-tale circuit cards, and tower grounding to earth. The lightning protection systems will be developed in accordance with the International Electrotechnical Commission (IEC) TR 61400-24. In addition, the lightning protection will be certified by a nationally-recognized third party testing agency. As mentioned earlier, TULE WIND, LLC has nearly 50 million operating hours on its U.S. fleet, and over that time, lightning-induced fire has not occurred.

To provide separation of installed equipment from combustible vegetation, gravel will be placed in and around substation, O&M building, wind turbines, and transformers. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management would be performed, annually prior to May 1 and more often as needed.

5.2.4 Operations and Maintenance

TULE WIND, LLC's NCC in Portland, Oregon monitors and controls all of TULE WIND, LLC's wind turbines and is staffed continuously. Primary communications with the wind farm is via Telco T1 lines, and all plants have satellite backup capability. The NCC has the ability to control each turbine individually, as well as control the substation. Should any out-of-range issue occur at the plant, the NCC will contact the sites' dedicated on-call person to deploy to the site to investigate and/or call emergency services if warranted by the type of out-of-range signal transmitted to the NCC. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency. Construction related activities that occur during operations and maintenance activities will be conducted according the same Hot Work Procedure identified above under the PDF. This will minimize the potential for fire ignition.

PDF-18: Off-road Vehicle Use

- No off-road vehicle use would be necessary because all wind turbine and associated project components (e.g., substation and O&M building) will be located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed;
- Hot Work Procedure (PDF-1);
- Construction, Operations, and Maintenance Fire Prevention/Protection Plan (PDF-2).
- Road maintenance activities requiring the use of grading equipment will be suspended during red flag events;
- Permanently assigned project vehicles will carry, as a minimum, a fire extinguisher, shovel, and two-way-radio.

PDF-19: Vehicle Idling - No vehicle will be idle or parked in areas of combustible fuels, such as brush or grass. All wind turbine and associated project components (e.g., substation and O&M building) are located in cleared areas. As part of the project design, existing access roads will be improved and new access roads are proposed.

PDF-20: Portable Equipment - Portable equipment powered by two cycle engines or capable of producing significant exhaust heat will be located within the 200-foot radius surrounding the turbine in which vegetative fuel reduction will take place.

PDF-21: Energized Equipment - Work on energized equipment will be avoided whenever possible. Personnel performing work on energized equipment will be trained in applicable OSHA and other safety requirements.

PDF-22: Smoking - Smoking is limited to cleared areas around the O&M building.

PDF-23: Existing and New Access Roads - As part of the project design, existing access roads will be improved and new access roads are proposed that meet the requirements of the County of San Diego Consolidated Fire Code (2009) where they occur on County lands with the exception of spurs that serve turbines only (See Section 4.2 Fire Access and County Roadway Improvements **Figure 15**). These improvements will have the effect of decreasing fire response times to the project area and general area, in the event of a fire or other emergency.

The proposed access road improvements will also improve public safety should a vegetation fire occur in the area by providing alternate routes of egress. Currently the only public exit road from the McCain Valley area is McCain Valley Road. The proposed connector road between Ribbonwood and McCain Valley Road is proposed as a private road; however, it will not be gated. As a result this road will be available to the community in the event of an emergency. This road will be improved to meet County of San Diego private road standards. Additionally, the turbine roads will improve access allowing fire crews and tanker trucks faster initial response in the project area. Fire and other emergency vehicles will also be able to utilize the access roads to improve response times to remote areas. BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box as discussed in Section 4.2.

PDF-24: Operations and Maintenance Facility - The O&M facility is the only new structure proposed that will include TULE WIND, LLC staff during business hours. The O&M building will include the PDF that provide fire prevention and protection.

- The facility construction, including walls, penetrations through walls, doors, vents, roof, glazing and any skylights, will comply with the County Building Code (CBC) Wildland Urban Interface construction standards in Section 92.1.704, and Chapter 7-A of the CBC, and the CFC.
- The O&M building will be located on a 5-acre site including a parking lot and will be surrounded by a 4-acre cleared area. The substation facility will have the required 3-acre graveled fenced cleared area around it and will have adequate spacing from transformers and other potential fire sources. The project will provide a minimum of 100 feet of fuel management.
- Any batteries would comply with the requirements in the CFC and would have secondary containment and required ventilation to prevent build up of hydrogen gas.
- Various occupancies in the building, as classified by the CBC, will have the required fire separations and will comply with the CFC and CBC for the type of occupancy and activities therein; for example, storage, or maintenance shop.
- Sprinkler system will be installed in the O&M facility. Fire Sprinkler system will be supervised by TULE WIND, LLC's Portland Control center and to the offsite 24/7 alarm monitoring company. Determination will be made by TULE WIND, LLC as to

supervision by the alarm monitoring company. Supervision to a Fire District approved remote alarm monitoring company required based on number of sprinkler heads. Twenty heads requires electrical supervision of all valves in system, pumps, water tank level, etc. CFC Section 903.4.

- The SCADA monitoring system will have emergency power source at the O&M building, in addition to 24/7 monitoring at the NCC. Both TULE WIND, LLC's on-site staff and staff at the NCC will have the emergency contact information for the fire agencies, and will coordinate to make sure that the fire agencies will be called in the event of a fire or medical emergency.
- The control room will be separated from remainder of building by 1-hour fire rated walls for fire safety and will have exterior exits.
- The building will have smoke detectors, which are supervised in Portland control room, activate an alarm on exterior of building, and are supervised to the NCC. Alarms may not be transmitted to the offsite 24/7 alarm monitoring company, so as to avoid false calls to 911 resulting in an unnecessary response.
- The building will have a KNOX key box on exterior by main door for use by firefighters.

Per the requirements of PRC 4291, *Reduction of Fire Hazards Around Buildings*, the project will provide 100 feet of fuel modification around all buildings, and is the primary mechanism for conducting fire prevention activities on property within CAL FIRE jurisdiction. In addition, TULE WIND, LLC will implement a brush management plan at its project O&M facility, turbine pads, and substation. This plan will be consistent with the following County Consolidated Fire Code:

- Under the County Consolidated Fire Code, brush is to be modified within 100 feet (31 meters) of structures in radius, called defensible space (Section 4707.2a). There are two zones to be aware of when creating a defensible space for fire mitigation.
    - Zone 1, From structure out to a minimum of 50 feet: "The area within 50 feet (15 meters) of a building or structure shall be cleared of vegetation that is not fire resistant and/or replanted with fire-resistant plants" (County Fire Code Section 4707.2a).
    - Zone 2, Between 50 to 100 feet from structures: "In the area between 50 to 100 feet (15 to 31 meters) from a building all dead and dying vegetation shall be removed. Native vegetation may remain in this area provided that the vegetation is modified so that combustible vegetation does not occupy more than 50 percent of the square footage of this area" (County Fire Code, Section 4707.2a).

PDF-25: Substation Transformers - Transformers contain cooling oil, which can be ignited by an electrical arc. NFPA 850, including Section 10.5.2.6, provides recommendations for transformer protection. These recommendations will be followed. Transformers associated with the substation will be located approximately 50 feet from the O&M building and will a minimum of 100 feet of fuel management. The substation is proposed to be located adjacent to the O&M building on a 5-acre parcel and will be surrounded by a 3-acre graveled parcel providing a minimum of 100 feet of fuel management around the substation.

Transformers will utilize fire walls for exposure protection and will have secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting water for 15 minutes. NFPA 850 recommends 10 minutes however, per NFPA 11, foam delivery from hand lines assumes an application time frame of 15 minutes. Firefighting foam concentrate will be stored at substation for use by firefighters. Typically a 3% Aqueous Film Forming Foam (AFFF) concentrate is used, and the application rate is 0.16 gpm/sq. ft. for 15 minutes from a firefighter hose line. In concept, the needed gpm flow rate for the hose lines is 250 gpm. This is subject to detailed design and size of the containment. Fire resistant oils can also be used if they do not contain polychlorinated biphenyls (PCBs) or other toxic materials. Prior to operations of the facility, actual design of the transformer fire protection measures will be determined by TULE WIND, LLC and submitted to SDRFPD and SDCFA for approval.

PDF-26: Combustible Storage - Prevention and minimization of fire risk is a primary concern for TULE WIND, LLC. Other typical best management practices related to combustible storage that will be implemented on the project site include:

- Minimizing accumulation of combustible material, only allow storage of flammable materials in fire rated cabinets, ensure all combustible waste material is collected and disposed of properly including the storage of oily rags in approved containers, maintain a list of potential fire hazards at the plant including how sources of ignition will be controlled for each of these potential hazards.
- Perform periodic housekeeping inspections to find and mitigate any fire hazards found, ensure employees and sub-contractors are trained in fire prevention, and ensure employees are trained in the use of fire extinguishers.
- Combustible storage and trash on site during construction and operation phases will be properly stored in a clear area with fuel modification around it, and be away from turbines and the substation. Such storage will be orderly and be removed from the site as soon as possible.

5.3 Mitigation Measures

The fire impacts, PDFs, proposed mitigation measures, and level of significance after implementation PDFs and mitigation measures are presented below in **Table 8.** A detailed description of the significance criteria is further discussed in the Section 6.0, Conclusion.

At this time, the mitigation measures for the Tule Wind Project have not been finalized. Mitigation Measures FF-1 through FF-7 have been presented for public comment in the Draft EIR/EIS for the ECO Substation/Tule Wind/ESJ Gen-Tie Project. The Tule Wind Project will comply with the mitigation measures incorporated into the Final EIR/EIS, as well as any extra mitigation measures specified in this Fire Protection Plan, however, to the extent that any mitigation measures conflict, the Tule Wind Project will comply with and implement the mitigation measure(s) found in the Final EIR/EIS. Mitigation measures that are consistent with the EIR/EIS mitigation measures have been numbered as such with the previous corresponding FPP mitigation number provided in parenthesis.

Table 8. Impacts, Project Design Features, Mitigation Measures, and Significance Criteria

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
First Line of Inquiry – County of San Diego Guidelines			
• Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	***Construction Activities*** (PDF 1-8) ***Electric Collector and Transmission*** (PDF 15) ***Wind Turbine*** (PDF 16 and 17) ***Operations and Maintenance*** (PDF 1, 2, 18–26)	***Construction Activities*** **MM FF-1 (FPP-1): Develop and implement a Construction Fire Prevention/Protection Plan.** The applicant shall develop a multiagency Construction Fire Prevention/Protection Plan for the Tule Wind Project and monitor construction activities to ensure implementation and effectiveness of the plan. Plan reviewers shall include the following: CAL FIRE, Rural Fire Protection District, and SDCFA. The applicant shall provide a draft copy of this plan to each listed agency at least 90 days before the start of any construction activities. Comments on the plan shall be provided by the applicant to all other participants, the applicant shall resolve each comment in consultation with and to the satisfaction of CAL FIRE, Rural Fire Protection District, and SDCFA. The final plan will be approved by the commenting agencies prior to the initiation of construction activities and provided to the applicant for implementation during all construction activities. At minimum, the plan will include the following: o Procedures for minimizing potential ignition	***Construction Activities*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Electric Collector and Transmission*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Wind Turbine*** – Yes, impact will be less than significant with the installation of fire suppression system in each wind turbine nacelle. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		o Vegetation clearing o Fuel modification establishment o Parking requirements o Smoking restrictions o Hot work restrictions • Red Flag Warning restrictions • Fire coordinator role and responsibility • Fire suppression equipment on-site at all times work is occurring • Requirements of Title 14 of the CCR, Article 8 #918 “Fire Protection” for private land portions • Access Road widening (28 foot County roads, 18-foot-wide spur roads) • Applicable components of the SDG&E Wildland Fire Prevention and Fire Safety Electric Standard Practice (2009) • Emergency response and reporting procedures • Emergency contact information • Worker education materials; kick-off and tailgate meeting schedules • Other information as provided by CAL FIRE, Rural Fire Protection District, SDCFA, BLM, California State Land Commission (CSLC),and Tribal Governments Additional restrictions will include the following:	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		• During the construction phase of the project, the applicant shall implement ongoing fire patrols. The applicant shall maintain fire patrols during construction hours and for one (1) hour after end of daily construction, and hotwork. • Fire Suppression Resource Inventory – In addition to CCR Title 14, 918.1(a), (b), and (c), the applicant shall update in writing the 24-hour contact information and on-site fire suppression equipment, tools, and personnel list on quarterly basis and provide it to the Rural Fire Protection District, SDCFA, and CAL FIRE • During Red Flag Warning events, as issued daily by the National Weather Service in SRAs and LRAs, and when the USFS PAL is Very High on CNF (as appropriate), all non-essential, non-emergency construction and maintenance activities shall cease or be required to operate under a Hot Work Procedure (see TULE-PDF-1). • The applicant and contractor personnel shall be informed of changes to the Red Flag event status and PAL as stipulated by CAL FIRE and CNF. • All construction crews and inspectors shall be provided	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		with radio and cellular telephone access that is operational throughout the project area route to allow for immediate reporting of fires. • Each crew member shall be trained in fire prevention, initial attack firefighting, and fire reporting. Each member shall carry at all times a laminated card listing pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on contact cards shall be updated and redistributed to all crewmembers as needed, and outdated cards destroyed, prior to the initiation of construction activities on the day the information change goes into effect. • Each member of the construction crew shall be trained and equipped to extinguish small fires with hand-held fire extinguishers in order to prevent them from growing into more serious threats. Each crew member shall at all times be within 100 yards of a vehicle containing equipment necessary for fire suppression as outlined in the final Construction Fire Prevention/Protection Plan. • Water storage tanks (TULE-PDF-7) shall be installed and operational at the time of start of construction, except where construction of new	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		access roads is necessary to reach the SDRFPD's preferred location for the water tank, in which case the water tank will be installed along with access road construction. The applicant shall fully implement the plan during all construction and maintenance activities. All construction work on the ECO Substation Project, ESJ Project, and the Tule Wind Project shall follow the Construction Fire Prevention/ Protection Plan guidelines and commitments, and plan contents are to be incorporated into the standard construction contracting agreements for the construction of the Tule Wind Project. Primary plan enforcement implementation responsibility shall remain with the applicant and monitored by CAL FIRE, Rural Fire Protection District, and SDCFA. **FPP-3: MOU -** Ensure coordination for emergency fire suppression. IBR shall ensure that personnel, construction equipment, and aerial operations do not create obstructions to firefighting equipment or crews. The following provisions shall be defined based on consultation with CAL FIRE, SDCFA, and SDRFPD. Onsite IBR and contracted personnel shall coordinate fire suppression activities through the active fire agency designated Fire Incident Commander, and emergency ingress and egress to	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		construction-related access roads will remain unobstructed at all times. Construction and/or maintenance work shall cease in the event of a fire within 1,000 feet of the work area. The work area includes the transmission ROW, construction laydown areas, pull sites, access roads, parking pads, turbines, O&M building, and substation and any other sites adjacent to the ROW where personnel are active or where equipment is in use or stored. **FPP-4: Remove hazards from the work area.** TULE WIND, LLC shall comply with Public Resource Code 4291, *Reduction of Fire Hazards Around Building*, to provide 100 feet fuel modification around all buildings, and the County Consolidated Fire Code regarding brush management. TULE WIND, LLC and/or its contractor shall clear brush and dead and decaying vegetation from the work area prior to starting construction and/or maintenance work. The work area includes only those areas where personnel are active or where equipment is in use or stored, and may include portions of the transmission ROW, construction laydown areas, pull sites, access roads, parking pads, turbine pads, O&M building, substation and any other sites adjacent to the ROW where personnel are active or where equipment is in use or stored.	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		FPP-5: Helicopter Use. TULE WIND, LLC shall contact CAL FIRE, SDCFA, and SDRFPD dispatch centers two days prior to helicopter use and will provide dispatch centers with radio frequencies being used by the aircraft, aircraft identifiers, the number of helicopters that will be used while working on or near SRA lands at any given time, and the flight pattern of helicopters to be used. Should a wildfire occur within one (1) mile of the work area, upon contact from a CAL FIRE Incident Commander and/or Forest Aviation Officer, helicopters in use by TULE WIND, LLC will immediately cease construction activities and not restart aerial operations until authorized by the appropriate fire agency. **FPP-6: Roads.** Any BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box at the time the gates are installed. **FPP-7: Combustible Storage. (CFC Chapter 3):** Combustible storage and trash on site during construction and operation phases shall be properly stored in a clear area with fuel modification around it, and be away from turbines and the substation. Such storage shall be orderly and be removed from the site as soon as possible.	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		Electric Collector and Transmission **FPP-8: Perform visual inspections.** TULE WIND, LLC shall perform visual inspections using telescopic equipment on 10 percent of project structures supporting overhead lines annually, such that every project structure has been visually inspected at the end of a 10-year period, for the life of the project. If visual inspection does not reasonably allow inspection of project structures, then Tule Wind, LLC shall perform climbing inspections to supplement such visual inspections. In addition, TULE WIND, LLC will keep a detailed inspection log of inspections, and any potential structural weaknesses or imminent component failures shall be acted upon immediately. The inspection log will be maintained on-site and available for review by CAL FIRE/SDRFPD upon request. **FPP-9: Line Clearance.** For the 138 kV transmission line, TULE WIND, LLC shall establish and maintain adequate line clearance in conformance with CPUC GO 95. Only trees or vegetation with a mature height of 15 feet or less shall be permitted within the transmission right of way except where the transmission line spans a canyon. In addition, tree branches that overhang the ROW within 10 horizontal feet of any	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		conductor shall be trimmed or removed, as appropriate, including those on steep hillsides that may be many vertical feet above the facility. Conductor clearance of 10 radial feet under maximum sag and sway will be maintained at all times. Cleared vegetation shall be removed to comply with requirements of the County of San Diego. During the life of the project, TULE WIND, LLC shall maintain adequate conductor clearances by inspecting the growth of vegetation along the entire length of the overhead transmission line at least once each spring and documenting the survey and results. The inspection log shall be maintained on-site and available for review by CAL FIRE/ SDCFA / SDRFPD upon request. ***Wind Turbine*** **MM FF-5 (FPP-10): Wind Turbine Generator Fire Protection Systems.** Fire detection, warning, and suppression systems for each wind turbine generator will include modern technology and will address, at minimum, the following: a. Use of non-combustible or difficult to ignite materials b. Early fire detection and warning systems c. Maintenance according to manufacturer specifications d. Auto switch-off and complete disconnection from the power supply system	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		e. Ongoing hazard/fire safety training for staff f. Automatic fire extinguishing systems in the nacelle of each wind turbine (stationary, inert gas, or similar). Tule Wind, LLC will implement this technology through the wind turbine manufacturer or an aftermarket supplier. Non-combustible or high flash point lubricant oils. ***Operations and Maintenance*** **MM FF-2 (FPP-2): Revise Existing Wildland Fire Prevention and Fire Safety Electric Standard Practice Plan (2009) to Create the Wildland Fire Prevention and Fire Safety Electric Standard Practice Operation and Maintenance Plan.** Revised plan will address the ECO Substation Project, ESJ Project, and the Tule Wind Project and will be implemented during all operation and maintenance work associated with the project for the life of the project. Important fire safety concepts that will be included in this document are as follows: a. Focused Fire Protection Plan content applicable to the applicant's ongoing operation b. Guidance on where maintenance activities may occur (non-vegetated areas, cleared access roads, and work pads that are approved as part of the project design plans)	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		c. Fuel modification buffers required by the FPP d. When vegetation work will occur (prior to any other work activity) e. Timing of vegetation clearance work to reduce likelihood of ignition and or fire spread f. Coordination procedures with fire authority g. Integration of the project's Construction Fire Prevention/Protection Plan content h. Personnel training and fire suppression equipment. Prior to energizing the Tule Wind Project, Tule Wind, LLC will install a skid-mounted Type VI firefighting unit with at least 100 gallons water capacity and a pump rate of approximately 25- 30 gallons per minute into two (2) of its operations and maintenance pick-up trucks. In addition, also prior to energizing the Tule Wind Project, Tule Wind, LLC personnel will undergo training by San Diego Rural Fire Protection District personnel, or another entity certified to conduct such training, on the proper use of Type VI firefighting equipment to fight incipient fires. i. Red Flag Warning restrictions for operation and maintenance work j. Fire safety coordinator role as manager of fire	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		prevention and protection procedures, coordinator with fire authority and educator k. Communication protocols l. Incorporation of CAL FIRE, San Diego Rural Fire Protection District, and SDCFA reviewed and approved Response Plan mapping and assessment. m. Other information as provided by CAL FIRE, San Diego Rural Fire Protection District, SDCFA, BLM, CSLC, Tribal Governments, and USFS. The applicant will provide a draft copy of the Wildland Fire Prevention and Fire Safety Electric Standard Practice to the agencies listed previously for comment a minimum of 90 days prior to the start of any construction activities. The comments will be provided back to the applicant and plan revisions will address each comment to the satisfaction of the commenting agency. The final plan will be approved by the commenting agencies and provided to the applicant for implementation during all operation and maintenance activities. **MM FF-3: Development Agreement with Rural Fire Protection District and San Diego County Fire Authority (SDCFA).** Provide funding for the training and acquisition of necessary firefighting equipment and services to Rural Fire Protection District/SDCFA to improve the response and	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		firefighting effectiveness near wind turbines, electrical transmission lines, and aerial infrastructure based on fire protection needs and each agency's professional judgment. Although not implementable on BLM or other federal land, the local fire authority will respond through mutual aid to wildfires within its jurisdiction, regardless of land ownership designation. Funding would be provided through a Development Agreement between the applicant and the Rural Fire Protection District and SDCFA which shall be executed prior to construction. **FPP-15: Funding for Fire Inspection.** Tule Wind, LLC shall provide funding to increase SDCFA's fire inspection capabilities to reduce baseline fire risk to offset any risk of wildfire ignition posed by the Tule Wind Project. This funding shall be applied to those uses that in SDCFA's best judgment increase its fire inspection abilities, including but not limited to (1) SDCFA Fire Code Specialist II position to enforce existing fire code requirements, including but not limited to implementing required fuel management requirements (e.g., defensible space), in priority areas to be identified by the SDCFA for the life of the project, and employing volunteer/reserve firefighters as part-time code inspectors on a stipend basis for up to 90 days per year for the life of the	

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		project. Tule Wind, LLC's funding for fire inspection will be provided through its Development Agreement with the SDCFA (see MM FF-3), which shall be executed prior to construction.	
• Would the project result in inadequate emergency access?	As shown in **Table 7**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	No, a less than significant impact is identified.
• Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?	As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	No, a less than significant impact is identified.

Significance Guideline	Project Design Feature	Mitigation Measure	**Significance (Yes/No)** **Significance Determination after Implementation of Project Design Features and/or Mitigation Measures**
• Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	PDF-7	No mitigation is required.	Yes, sufficient water supplies are available. A less than significant impact is identified.
Second Line of Inquiry – County of San Diego Guidelines			
1. Can the project demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code?	PDF-1 through PDF-26. The project will be consistent with the requirements of this plan.	No mitigation is required.	Yes, a less than significant is identified.
2. Will the project be consistent with the recommendations of the Fire Protection Plan, including fuel modification?	PDF-1 through PDF-26. The project will be consistent with the requirements of this plan.	The project will be consistent with the requirements of this plan.	Yes, a less than significant impact is identified.
3. Can the project meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect?	As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. See Section 4.2 Fire Access for additional information.	No mitigation is required.	Yes, a less than significant impact is identified.
Third Line of Inquiry – CPUC / BLM Guidelines			
1. Would the presence of project facilities (overhead transmission lines, and/or wind turbines) significantly increase the probability of a wildfire?	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The PDFs identified for those potential fire risks are applicable to this threshold question and associated fire risks.	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The Mitigation Measures for those potential fire risks are applicable to this threshold question and associated fire risks.	***Construction*** Activities – Yes, impact reduced to a level less than significant after implementation of mitigation.

Significance Guideline	Project Design Feature	Mitigation Measure	**Significance (Yes/No)** **Significance Determination after Implementation of Project Design Features and/or Mitigation Measures**
			Electric Collector and Transmission – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Wind Turbine*** – Yes, impact is less than significant with the installation of a fire suppression system in each wind turbine nacelle. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation.
2. Would project construction and/or operation and maintenance and decommissioning activities significantly increase the probability of a wildfire?	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The PDFs identified for those potential fire risks related to construction and/or operation and maintenance and decommissioning are applicable to this threshold question and associated fire risks.	Please refer to the *First Line of Inquiry – County of San Diego Guidelines*, question number one. The Mitigation Measures for those potential fire risks related to construction and/or operation and maintenance and decommissioning are applicable to this threshold question and associated fire risks.	***Construction*** Activities – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Operations and Maintenance*** – Yes, impact reduced to a level less than significant after implementation of mitigation. ***Decommissioning* –** These activities are very similar to Construction

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
			discussed above. Yes, impact reduced to a level less than significant after implementation of mitigation measures.
3. Would the presence of the overhead transmission lines, overhead collector lines, and/or wind turbines reduce the effectiveness of firefighting?	PDF-9 through PDF-15	**See also FPP-7 and FPP-8** **FPP-11: De-Energize Electrical System**. TULE WIND, LLC shall immediately de-energize the electrical collector and transmission systems during fire emergencies at the direction of SDG&E. The fire agency liaison will coordinate with the SDG&E liaison during a fire incident to identify which, if any, particular electrical lines need to be de-energizes energized. Appropriate fire agencies responding to the incident shall be immediately notified of the line de-energizing. Additionally, TULE WIND, LLC shall provide all appropriate local, state, and federal fire dispatching agencies with an on-call contact person (Fire Coordinator) who has the authority to shut down the line in areas affected by a fire. If the transmission line is de-energized, prior to re-energizing Tule Wind, LLC shall require notify and receive approval from the SDG&E liaison and fire agency representing the responsible fire agencies. **FPP-12: Site Maps**. All responsible agencies shall be provided with maps indicating the location of the water tanks,	Potential impact reduced to a level less than significant after implementation of PDFs and mitigation measures.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		turbines, access roads, and project layout prior to construction, as well as “as-built” maps after completion of construction. Tule Wind, LLC. Will coordinate with the SDCFA to ensure that its construction plans and “as-built” plans are incorporated into the SANGIS public safety layer for GIS mapping purposes prior to energizing the project. **FPP-13: Communication Devices.** In order to easily communicate immediate fire incidence during construction, operation or maintenance of the project, all crews and inspectors shall be equipped with radio and/or cellular phone access that is throughout the project area to allow for immediate reporting of fires and open communication pathways shall be established prior to energizing the project.	
4. Would project activities contribute to an increased ignition potential and rate of fire spread through the introduction of non-native plants		**MM FF-7 (FPP-14): Preparation of Disturbed Area Revegetation Plan.** All areas disturbed during construction activities that will not be continuously included in the long-term maintenance access ROW will be provided native plant restoration in order to prevent non-native, weedy plants from establishing. Disturbed areas that will be included in the long-term maintenance program will not be revegetated as any plants that establish in these areas will be removed on an ongoing (at least annual) basis. This mitigation directs that the temporary disturbance areas will	No, with the implementation of the Noxious Weed and Invasive species Control Plan a less than significant impact is identified.

Significance Guideline	Project Design Feature	Mitigation Measure	Significance (Yes/No) Significance Determination after Implementation of Project Design Features and/or Mitigation Measures
		be revegetated with native plants common to the area through direction detailed in a Habitat Restoration Plan. The Habitat Restoration Plan will be prepared to restore native habitat and to reduce the potential for non-native plant establishment. The restoration plan will incorporate a Noxious Weeds and Invasive Species Control Plan to assist in restoring the construction area to the prior vegetated state and lessen the possibility of establishment of non-native, flammable plant species. A copy of the Revegetation Plan will be provided to the BLM and San Diego County. In addition, prior to the termination of the ROW authorization, a decommissioning plan will be developed and approved by the BLM and other agencies having jurisdiction. The decommissioning plan will include a site reclamation plan and monitoring program. As the wind facility is removed from the site, topsoil from all decommissioning activities will be salvaged and reapplied during final reclamation. All areas of disturbed soil will be reclaimed to native habitat conditions found naturally in the area.	

6.0 CONCLUSION

6.1 Analysis of Additional County Guidelines for Determining Significance

Based on the foregoing analysis in Sections 4.1 through 4.7, the following determinations regarding the first line of inquiry can be made.

6.1.1 Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The project area is mapped as being located within an area of high and very high fire hazard severity as identified by CAL FIRE, and shown on **Figure 11**. As described in Section 5.1, the potential sources of fire risk associated with the proposed project include the following. An analysis of potential impacts associated with each fire risk is provided below.

- ***Construction Activities*** **–** Fire ignition risks and PDFs that address those risks are identified in Section 5.1.1, **Table 4**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-1 through PDF-8), a significant impact related to potential fire ignition during construction activities will occur. Implementation of the Mitigation Measures FF-1, FF-3 and FFP-3 through FPP-7 (**Table 8**) will reduce this impact to a level less than significant.
- ***Electrical 34.5 kV Collection and 138 kV Transmission System*** **-** Fire ignition risks and PDFs that address those risks are identified in Section 5.1.2, **Table 5**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDF (PDF-9 through PDF-15), a significant impact related to potential fire ignition associated with the electrical collection and transmission system will occur. Implementation of the Mitigation Measures FPP-8 and FPP-9 (**Table 8**) will reduce this impact to a level less than significant.
- ***Wind Turbines*** - Fire ignition risks and PDFs that address those risks are identified in Section 5.1.3, **Table 6**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-16 and PDF-17) a significant impact related to potential fire ignition associated with electrical fire in the nacelle or other areas of the turbine will occur. This impact is considered a significant impact. Implementation of Mitigation Measure FF-5 **(Table 8)** and project design features will reduce the potential for fire ignition within the wind turbine nacelle to a level of less than significant.
- ***Operations and Maintenance Activities*** - Fire ignition risks and PDFs that address those risks are identified in Section 5.1.4, **Table 7**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-1, 2, 8, 18 through 26) a significant impact related to potential fire ignition during construction activities will occur. Implementation of the Mitigation Measures FF-2, FF-3, FPP-7 through FPP-9, and FPP-11 through FPP-12, and FPP-15 (**Table 8**) will reduce this impact to a level less than significant.

6.1.2 Would the project result in inadequate emergency access?

As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of ignition-resistant materials, and have automated and remotely supervised fire detection and suppression systems. Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDFs and a mitigation measure to reduce the risk of fire, as summarized in **Table 8**. Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit.

Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2, Fire Access for additional information). A less than significant impact is identified for this issue.

6.1.3 Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

As described above, the project will comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area (see Section 4.2 Fire Access for additional information). The project will not result in substantial adverse impacts associated with the provision of new or physically altered governmental facilities that would cause a significant environmental impact. However, the project is required to upgrade access roads and to provide adequate fuel modification areas to meet fire code requirements. Additionally TULE WIND, LLC shall enter into a Fire and Emergency Protection Services Agreement with the SDCFA, SDRFPD, and other agencies as appropriate. These aspects of the project will result in impacts to biological resources, which area addressed separately as part of the Biological Technical Report (August 2010). This issue will result in a less than significant impact.

6.1.4 Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

As discussed in Section 4.3, Water, the project has sufficient water supplies available to meet the peak construction demand, and operational demand. A less than significant impact is identified for this issue.

6.2 County of San Diego Wildland Fire and Fire Protection Significance Criteria Guidelines

Based on the foregoing analysis in Sections 4.1 through 4.7, the following determinations regarding the second line of inquiry can be made.

6.2.1 Can the Project Demonstrate Compliance With Fire Regulations?

The project will comply with California Fire Code, California Code of Regulations, County Fire Code and the County Consolidated Fire Code as listed in Section 1.3. Accordingly, the project will have a less than significant wildland fire impact.

6.2.2 Has a Fire Protection Plan Been Required and Will the Project Be Consistent With Its Recommendations, Including Fuel Modification?

An FPP has been required for the proposed project. The FPP evaluates adequate emergency services, fire access, water supply, ignition resistant construction and fire protection systems, fire fuel assessment, fire behavior modeling, defensible space and vegetation management, and cumulative impacts.

As part of this FPP, as it relates to the topics identified above, the plan identifies PDFs and mitigation measures to comply with the County of San Diego Consolidated Fire Code, including fuel modification.

As described in Section 5.2.4, the O&M building will have a 4-acre cleared area surrounding building and the substation facility, and the building will be placed such that a 100’ fuel modification zone will give adequate spacing form transformers and potential fire sources. The project proposes up to a 200-foot cleared area around each turbine depending on the site topography at the time of construction. Upon completion of construction, with the exception of an area 60 feet in diameter (gravel up to a 10-foot radius to provide surface stabilization), the 200-foot cleared area would be revegetated with fire safe (non-combustible), low fuel vegetation, in a spacing and height configuration consistent with fire agency standard practices for a distance necessary to provide a minimum of 100 feet of fuel management from the turbine base and/or transformer. The impact analysis in the environmental document assumes a permanent impact to a 200-foot radius around each turbine. Fuel management within the area would be performed, annually prior to May 1 and more often as needed.

In addition, TULE WIND, LLC will implement a brush management plan for the O&M building and substation facility in accordance to San Diego County Consolidated Fire Code to clear brush away from structures.

Accordingly, the project will have a less than significant wildland fire impact.

6.2.3 Can the Project Meet the Emergency Response Objectives Identified in the Public Facilities Element of the County General Plan, or Offer Same Practical Effect?

As discussed in Section 4.1 Adequate Emergency Services, the project is serviced by several fire entities; CAL FIRE; Boulevard Fire Department; Campo Volunteer Fire Department; San Diego Rural Fire Protection District; and Campo Indian reservation.

As shown in **Table 3**, the portions of the project that occur on County lands comply with the County's travel time requirements. The O&M facility is proposed to be located on BLM land and is not subject to this requirement. Nevertheless, the O&M building will be constructed of ignition-resistant materials, and have automated and remotely supervised fire detection and suppression systems. Furthermore, the O&M building is only staffed during business hours.

Similarly, the turbines will be constructed of fire resistant materials and will include PDFs and mitigation measures to reduce the risk of fire, as summarized in Section 5.2.3 Furthermore, the project is performing road improvements to McCain Valley Road and throughout the project area, which will reduce travel times within the general vicinity and provide a community benefit. Therefore, this project would comply with the County's emergency and fire response requirement at the County's northernmost boundary. In addition, due to the remote location and the fact that this is not a residential development, but is a Service and Utility Project with a low occupant load, the available emergency response is adequate. Services would not be adversely affected by implementation of the project. The project will improve and create new access roads, which will have the effect of improving emergency response time to remote locations within the project area. Therefore, the project will have a less than significant wildland fire impact.

6.3 <u>Additional Questions Considered By the California Public Utility Commission and Bureau of Land Management</u>

Based on the foregoing analysis in Sections 4.1 through 4.7, the following determinations regarding the third line of inquiry can be made.

6.3.1 Would the Presence of Project Facilities (Overhead Transmission Lines, Overhead Collector Lines, and/or Wind Turbines) Significantly Increase the Probability of a Wildfire?

34.5 kV Overhead Collector Lines and 138 kV Transmission Lines

The majority of the 34.5 kV collector lines are proposed to be undergrounded and would not significantly increase the probability of a wildfire. The overhead collector system is approximately 9.3 miles in length. The majority of the collector system will be underground. The underground portion of the collector system is approximately 35 miles in length. Only 26 percent of the collector system is planned to be overhead.

The presence of the turbines and overhead 138 kV transmission line will create a new source of potential wildfire ignitions. Line faults could occur as a result of any of the reasons and the fire hazards associated with the turbines is discussed in Section 5.1.2. Any line faults or turbine related events that create sparks that ignite vegetation could result in a wildland fire if the ignition was to occur during extreme weather conditions. Due to the existing high-fire hazard conditions in and surrounding the project area, construction of the project components (transmission line and turbines) could increase the risk of fire. This impact is considered significant because certain ignition sources are unavoidable, for example contact with floating or windblown debris.

The steel galvanized or weathered steel finish poles supporting the transmission line will be approximately 74.5 feet in height; with typical span length of 600 feet and a maximum length of 700 feet. The 34.5 kV overhead collector system will be supported by a maximum of 250 wood or steel poles that will be 60 to 80 feet in height and 2 feet in diameter, with single and double circuit collectors.

Due to the potential for ignitions related to the 34.5 kV overhead lines, 138 kV transmission and lines, or turbines during extreme fire weather, construction and operation of the project within area could significantly increase the likelihood of a fire. A significant impact is identified related to this issue.

The risk of ignitions and risk of damage from a project-related ignition can be reduced to a level of less than significant through the application of PDF-8 through PDF-15 and the Mitigation Measures FPP-8 and FPP-9. (**Table 8**).

Wind Turbine

It is possible for fire to occur in the wind turbine nacelles due to the presence of electrical control panel, and capacitor panels. Fires may be caused by electrical malfunctions, arcing in the nacelle, and excessive heat build-up in the nacelle. Hydraulic lubricating oils can also be ignited by an arc.

Fire ignition risks and PDFs that address fire ignition risks associated with wind turbines are identified in Section 5.1.3, **Table 6**. Based on the high and very high fire hazard conditions in the project area, even after application of the PDFs (PDF-16 and PDF-17) a significant impact related to potential fire ignition associated with electrical fire in the nacelle or other areas of the turbine will occur. This impact is considered a significant impact. Implementation of Mitigation Measure FF-5 (**Table 8**) and project design features will reduce the potential for fire ignition within the wind turbine nacelle to a level of less than significant.

6.3.2 Would Project Construction and/or Operation and Maintenance and Decommissioning Activities Significantly Increase the Probability of a Wildfire?

Construction activities associated with the proposed project would include, but not be limited to, use of vehicles and heavy equipment for vegetation removal and grading, the construction of transmission tower pads and towers, construction of collector tower and tower pads, and the installation of conductors. Additional heavy equipment, vehicles, and tools would be used for preparation construction of the turbine pads, of staging areas, and new roads. The use of heavy equipment along with the personnel required to construct, repair, and maintain the project features line introduce the potential for a variety of wildfire ignition sources to surrounding vegetation fuels and combustible materials (such as diesel fuel and herbicide) associated with project activities.

The use of heavy equipment and the presence of personnel may increase the wildfire ignition potential in the project construction areas compared with existing conditions.

Maintenance activities would include the periodic use of vehicles and presence of personnel and could also include the use of heavy equipment for repairs or replacement of project components. These activities would be far less intensive than construction activities; however, they would recur periodically over the life of the project, supplying an ongoing source of ignitions for 30 years or more. Project-related ignitions within the proposed project corridor have the potential to escape initial attack containment and become catastrophic fires. The areas with heavy fuel loads, steep topography, and exposure to Santa Ana winds would have a higher burn probability and a higher potential for an ignition to escape.

During the operations and maintenance phase of the project, smoking would be limited to the cleared areas around the O&M building and as with the construction phase of the project hot work would be limited during Red Flag alerts.
Based on SDCFA estimates, baseline risk of wildfire exists to approximately 12,000 structures in the very high and high fire risk areas to the west of the Tule Wind project, regardless of whether the Tule Wind project is ever built. Given the very high and high fire risk areas where the project is located and the project's introduction of new potential fire ignition sources, the project has the potential to cause a wildland fire. This issue is considered a significant impact.

The Fire Protection Plan approved by the SDRFPD on November 3, 2010, concluded that the risk of new wildland fire ignition had been mitigated to a less than significant level. Based on coordination and discussion with the SDCFA, it is SDCFA's position that the Tule Wind project's risk of new wildland fire ignition cannot be mitigated below a level of significance without adjusting the baseline fire risk inherent to the project area through a proportional mitigation measure (FFP-15, *Funding for Fire Inspection*. Implementation of FFP-15 would increase the likelihood that structures in the very high and high fire risk areas to the west of the project area would survive a wildland fire, regardless of its cause. By applying a mitigation measure to baseline risk in this way, it is SDCFA's position that the Tule Wind project would offset the project's risk of increasing the probability of wildfire. In summary, FFP-15 would require the applicants to provide funding to increase SDCFA's fire inspection capabilities to reduce baseline fire risk to offset any risk of wildfire ignition posed by the Tule Wind Protect. This funding shall be applied to those uses that in SDCFA's best judgment to increase its fire inspection abilities, including but not limited to one (1) SDCFA Fire Code Specialist II position to enforce existing fire code requirements, including but not limited to implementing required fuel management requirements (e.g., defensible space), and employing volunteer/reserve firefighters as part-time code inspectors on a stipend basis for up to 90 days per year for the life of the project. The funding for the fire code positions would be provided through Development Agreements (see MM FF-3) with the SDCFA, which would be executed prior to construction.

The SDCFA's experience demonstrates that where a fire code inspection results in a notice of violation caused by a failure to maintain defensible space, the property owner rectifies the code violation approximately 80 percent of the time without a second notice. After a second notice, but prior to triggering the time-intensive code enforcement process, approximately 98 percent to 99 percent of the property owners rectify the code violation. Accordingly, by increasing SDCFA's ability to perform fire code inspections, it is SDCFA's position that existing baseline risk of structural damage or destruction due to wildfire could be offset in a timely fashion to approximately 98 percent of the additional structures inspected. In addition, existing baseline risk to the remaining less than 2% of non-compliant structures could also be reduced, although the time period in which that risk can be reduced depends on the rate of SDCFA's code enforcement prosecution.

Accordingly, by increasing the SDCFA's ability to perform inspections to identify properties in violation of defensible space fire codes, it is SDCFA's position that implementation of Proposed FFR-15 would substantially reduce baseline risk of damage or destruction to structures in the very high and high fire risk areas to the west of the Tule Wind project. This reduction of baseline fire risk, which exists regardless of whether the Tule Wind project is built, would offset any additional unavoidable risk of wildfire ignition posed by the Tule Wind project.

Decommissioning

These activities are very similar to Construction discussed above. Impacts would be reduced to a level less than significant after implementation of mitigation measures.

The proposed project would require construction and maintenance activities that will increase the risk of fire to communities, firefighter health and safety, and natural resources. This issue is considered a significant impact. This increase can be mitigated to a level that is less than significant through the application of the PDF-1 through PDF-8 and PDF-17 through PDF-22 and the implementation of Mitigation Measures FF-1, FF-3, and FPP-3 through FPP-7 (**Table 8**).

6.3.3 Would the Presence of the Overhead 138 kV Transmission Lines, Overhead 34.5 kV Collector Lines, and/or Wind Turbines Reduce the Effectiveness of Firefighting?

As described previously, the project design will upgrade roadway widths to provide better infrastructure to the area for fire emergency vehicles. The project would increase the amount of overhead transmission lines, overhead collector lines, but they would be located along roadways and would not impede firefighting apparatus. In addition, the transmission lines will be at a height of approximately 74 feet with a typical span of 600 feet and a maximum of 700 feet, which would give adequate clearance for emergency vehicles and fire truck ladders. Turbines will have a maximum of 328 feet for the steel tower, with a rotor diameter of 328 feet for a maximum height of 492 feet. The turbines will be connected by an access roadway, located approximately one-quarter mile from each other.

Fire and Emergency Access: The project's upgraded access roads, which include County roads, BLM roads and turbine roads, will serve to improve access to areas that are currently not accessible by fire-fighting vehicles and reduce response times.

The project roads will also improve public safety should a vegetation fire occur in the area by providing alternate routes of egress. Currently, the only public exit road from the McCain Valley area is McCain Valley Road. The proposed connector road between Ribbonwood Road and McCain Valley Road is proposed as a private road, however will not be gated. As a result this road will be available to the community in the event of an emergency. Additionally the turbine roads will improve access allowing fire crews and tanker trucks faster initial response to remote portions of the BLM land and/or the project area. Any BLM roads or turbine roads that are proposed to be gated shall be provided with an approved Knox Box as discussed in Section 4.2.

Aerial and Ground-based Firefighting: Any reduction in the ability of fire fighting/suppression activities to occur during extreme weather conditions could, in part, restrict fire fighting/suppression.

With respect to ground-based firefighting effectiveness, improved access roads will enable ground-based firefighters to reach places that were previously inaccessible by vehicle and will enable quicker ingress and egress to the project area to fight fires, and the one 10,000 gallon water tank at the O&M building and four (4) additional 10,000 gallon water tanks will be installed in SDRFPD-approved locations throughout the project area will improve both ground-based and aerial firefighting effectiveness. Furthermore, firefighters are trained to operate and fight fires around electrical transmission lines. Moreover, Development Agreements entered into with SDRFPD and SDCFA will provide funding for equipment, staffing, and training that will improve firefighting effectiveness.

Ground-based fire fighting could be compromised by the presence of downed transmission and collector lines could make an area too dangerous to enter for firefighting/fire suppression activities. This issue is considered a potentially significant impact. Implementation of Mitigation Measure FPP-11 will reduce this significant impact to a level less than significant. Mitigation Measure FPP-11 provides for de-energizing the Tule Wind Project in coordination with the fire agency liaison and SDG&E, if necessary. Taken together, the Tule Wind Project features will improve ground-based firefighting effectiveness, not diminish it.

With respect to aerial firefighting effectiveness, the Tule Wind Project's 138kV transmission line has been designed to parallel the Sunrise Powerlink route. The Tule Wind 138kV transmission line will be approximately 75' high, while the Sunrise Powerlink will be approximately 130' to 160' in height. Accordingly, the Tule Wind project's 138kV line will not add any significant vertical obstructions that will not already be part of the built environment. Furthermore, for those few places where the Tule Wind 138kV transmission line does not parallel the Sunrise Powerlink, its 75' height will not impede aircraft maneuverability, or significantly increase the risk of contact by aircraft or water buckets. Water drops are performed at 150 feet above the ground, otherwise known as the "150 foot drop zone." The 138kV transmission towers are proposed to be 75 feet in height, about half the height of the "150 foot drop" zone.

Pursuant to FAA regulations, all turbines will be equipped with safety lighting and low-reflectivity neutral white paint. These safety features will enable firefighting aircraft to operate safely around the turbines. Furthermore, due to the rugged nature of the terrain and existing Campo Wind Project turbines, aerial firefighting professionals will be focused on aerial impediments during the course of firefighting in the project area. Chief Nissen (SDRFPD) spoke with Ray Chaney (CAL Fire Battalion Chief, Special Ops Battalion), who stated that the determination to perform aerial operations would be made on a case by case basis and would not be prohibited just by the presence of the Tule Wind project (Robin Church personal conversation with Chief Nissen). Aerial firefighting efforts would not be compromised by implementation of the project. This issue is considered a less than significant impact. Implementation of PDFs and Mitigation Measures FF-1, FPP-11 through FPP-13 will be implemented to further reduce impacts to below a level of significance.

Prepare and Implement a Multi-agency Fire Prevention MOU

A Memorandum of Understanding (MOU) for the project shall be created and implemented between IBR, SDCFA, SDRFPD, CAL FIRE, BLM, and other agencies as appropriate. The MOU shall be adopted by all parties prior to energizing the new transmission line. The purpose of this Multi-agency Fire Prevention MOU is to efficiently coordinate all aspects of agency and utility fire prevention plans and practices. The MOU will integrate the following components of the IBR fire plan with existing agency fire plans: fire prevention, firefighter safety, and emergency communication, firefighter training of both ground and aerial utility personnel, and others as appropriate.

6.3.4 Would Project Activities Contribute to an Increased Ignition Potential and Rate of Fire Spread Through the Introduction of Non-Native Plants?

Project activities create the potential for the introduction and spread of non-native, invasive plants. Non-native plants are often spread by human and vehicle vectors in areas of large-scale soil disturbance and importation. These actions along with the opening of the vegetation canopy through the clearing of trees and shrubs involved with the construction and maintenance of the proposed project could contribute to the introduction and proliferation of non-native, invasive plants. Certain invasive plants, like cheatgrass, medusa head and Saharan mustard, can contribute to changes in wildfire frequency, timing and spread (Cal-IPC, 2007). Cheatgrass and medusa head, for example, dry out earlier in the season than native grasses creating fine fuels that are easily ignited. These fine fuels contribute to wildfires igniting earlier in the year and an increased level of fire recurrence. In addition, non-native grasslands have a “spotting” effect during a wildfire, where embers from these grasslands are blown ahead of the fire line, contributing to an increased rate of fire spread. Invasive annual grasses also influence fire spread by creating a fine fuel continuum between patchy, perennial shrubs allowing wildfires to expand further into otherwise sparsely vegetated wildlands (USGS, 2007). Saharan mustard creates dense stands of dry vegetation in desert scrub and coastal sage scrub communities which increases the fire fuels in these otherwise low fire risk areas (Cal-IPC, 2007). The introduction and spread of specific invasive plants within the proposed project ROW would adversely influence fire behavior by increasing fuel load, fire frequency, and fire spread.

The project has been designed to place gravel on roads and around the base of the turbines. This will reduce the area in which invasive weeds can invade in these locations.

The introduction of non-native plants with an increased ignition potential and rate of wildfire spread. To minimize fire impacts due to non-native plants mitigation measure FF-7 will be implemented, with the preparation and implementation of a Noxious Weed and Invasive Species Control Plan. The plan addresses monitoring, education of personnel on weed identification, and methods for treating infestations.

TULE WIND, LLC will prepare and implement the Noxious Weed and Invasive Species Control Plan for pre-construction and long-term invasive weed abatement. The plan will be prepared prior to construction. Where TULE WIND, LLC owns the ROW property, the Plan will include specific weed abatement methods, practices and treatment timing developed in consultation with the San Diego County Agriculture Commissioner's Office and the California Invasive Plant Council (Cal-IPC**)**, or the tribal government, as appropriate. On the ROW easement lands administered by public agencies (BLM, CSLC), and Wildlife Agencies the Noxious Weed and Invasive Species Control Plan will incorporate all appropriate and legal agency-stipulated regulations. The Plan will be submitted to the ROW land-holding governmental entities for final authorization of weed control methods, practices, and timing prior to implementation of the plan on public lands. For those ROW easements located on private lands TULE WIND, LLC will work with the landowners to obtain authorization of the weed control treatment that is required.

In addition to the Noxious Weed and Invasive Species Control Plan, a Habitat Restoration Plan will also be developed upon the completion of the biological technical report and in compliance with the report to minimize or mitigate negative impacts on vulnerable plants and wildlife to the project area. The combination of these two monitoring plans will help to ensure that both revegetation and weed control efforts are successful. Based on implementation of Mitigation Measure FF-7, the Noxious Weed and Invasive Species Control Plan and Habitat Restoration Plan, would reduce impacts to less than significant for the potential for ignitability of fuels through the introduction of non-native plants during construction and/or maintenance is identified. As is previously presented in **Table 8**, the impacts due to the construction and the operations and maintenance of the project would be reduced to a level of less than significance with the implementation of the proposed project design features and required mitigation measures, provided suppression systems are provided in the nacelle, including the associated electrical equipment in the nacelle. All impacts under the first, second, and third lines of inquiry to the significance guidelines have been determined to be a less than significant impact after implementation of project design features and mitigation measures that could expose people and/or structures to a significant risk of loss, injury or death involving wildland fires.

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

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Solvang, CA 93464

8.0 PERSONS AND ORGANIZATIONS CONTACTED

- Chief Nissen, Rural Fire Protection District
- Chief Hendrie, Rural Fire Protection District
- CAL FIRE Monte Vista Dispatch Center
- Boulevard Fire Department
- CAL FIRE Boulevard Fire Station
- James Pine, San Diego County Fire Authority
- FireTrace International

9.0 REFERENCES

Bureau of Land Management (BLM). 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11

CAL FIRE. 2009. "San Diego County Fire Hazard Severity Zones in SRA." March, 2010. Accessed at: http://frap.cdf.ca.gov/webdata/maps/san_diego/fhszs_map.37.jpg

CAL FIRE (California Department of Forestry and Fire Protection) website http://frap.cdf.ca.gov

CAL FIRE. 2008. Power Line Fire Prevention Field Guide, November 2008

California Building Code 2007. Chapter 7A.

California Code of Regulations. Title 14 of the California Code of Regulations (14 CCR), Chapter 7. Fire Protection, Article 4. Fire Prevention Standards for Electrical Utilities.

California Fire Code 2007. California Code of Regulations Title 24, Part 9.

County of San Diego 1979. General Plan – Safety Element.

County of San Diego 2009. Consolidated Fire Code. Adopted 2009.

County of San Diego 2008. Guidelines For Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection

County of San Diego 2008. San Diego County Code of Regulatory Ordinances, Title 9, Fire Code, Ordinance No. 9915, new series.

County of San Diego 2008. San Diego County Code of Regulatory Ordinances, Title 9, Fire and Building Code, Ordinance No. 9915, new series.

CPUC and BLM. 2008a. *Final Environmental Impact Report/Environmental Impact Statement and Proposed Land Use Amendment for the Sunrise Powerlink Project*. SCH # 2006091071; DOI Control # FES-08-54. Prepared by Aspen Environmental Group for CPUC and BLM. Agoura Hills, California: Aspen Environmental Group. October 2008. Declercq, Janm Dr, and Raymond Van Schevensteen. *Performance and Fire Behavior of Step-up Transformers in Wind Turbines*. Belgium.

FERC 2004. Utility Vegetation Management and Bulk Electric Reliability Report from the Federal Energy Regulatory Commission, September 7, 2004. http://www.ferc.gov/industries/electric/indus-act/reliability/veg-mgmt-rpt-final.pdf

Geo-Logic Associates, December 2010, Groundwater Investigation Report.

Johnson, M. L.J. Rew, B.D. Maxwell and S. Sutherland. 2006. The Role of Wildfire in the Establishment and Range Expansion of Nonnative Plant Species into Natural Areas: A review of current literature.

Keeley, J.E. 1998. Postfire ecosystem recovery and management: the October 1993 large fire episode in California. Pages 69-90 in J. M. Moreno, editor. Large forest fires. Backhuys Publishers, Leiden, The Netherlands.

Keeley, J.E. 2002. Native American impacts on fire regimes of the California coastal ranges. Journal of Biogeography, vol. 29, pp.303-320.

Keeley, J.E. 2004. Invasive Plants and Fire Management in California Mediterranean-climate Ecosystems. In M. Arianoutsou (ed) 10th MEDECOS – International Conference on Ecology, Conservation and Management, Rhodes Island, Greece, electronic, no page numbers.

Keeley, J.E. and C.J. Fotheringham. 2003. Impact of past, present and future fire regimes on North American Mediterranean shrublands, pp.218-262. In T.T. Veblen, W.L. Baker, G. Montenegro, and T.W. Swetnam (eds.), Fire and Climatic Change in Temperate Ecosystems of the Western Americas. Springer-Verlang, New York.

Keeley, J.E., and C.J. Fotheringham. 2006. Wildfire Management on a Human-Dominated Landscape: California Chaparral Wildfires in The Wildfire Reader: A century of Failed Forest Policy, George Wuerthner, Ed. 116-131.

Keeley, J.E., C.J. Fotheringham, and Moritz. 2004. Journal of Forestry. "Lessons from the October 2003 Wildfires in Southern California." October/November.

National Fire Protection Association (NFPA) 2010. NFPA® 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations 2010 Edition. NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471.

Public Utilities Commission (PUC) of the State of California. 2006. GENERAL ORDER No. 95 January 2006.

SDG&E Electric Standard Practice Draft Fire Plan, 7/6/06.

SDG&E East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Project Cumulative Scenario Approved and Pending Project List. Provided by Rica Nitka, Dudek via email.

San Diego Geographic Information Source (SanGIS) www.sangis.org

San Diego Rural Fire Protection District. Fire Code – Ordinance 2002-03.

U.S. Dept. of Health & Human Services, National Institute for Occupational Safety and Health (NIOSH): *Firefighters Exposed to Electrical Hazards During Wildland Fire Operations: Hazard ID 15*, Jan.2002.

VdS 3523en : 2008-07 (01). Wind Turbines Fire Protection Guidelines.

10.0 PREPARERS' LIABILITY STATEMENT

RC Biological Consulting, Inc. disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document by TULE WIND, LLC, or any regulatory or permitting agency.

Technical Input Liability Statement:

As fire is dynamic and unpredictable, the technical information provided by Hunt Research Corporation does not guarantee that a fire will not occur or will not cause property damage, injury or loss of life. No expressed or implied guarantees are made regarding the adequacy or effectiveness of the recommendations and requirements in those sections for all situations. Engineering, architecture and construction are out of the scope of Jim Hunt with Hunt Research Corporation.

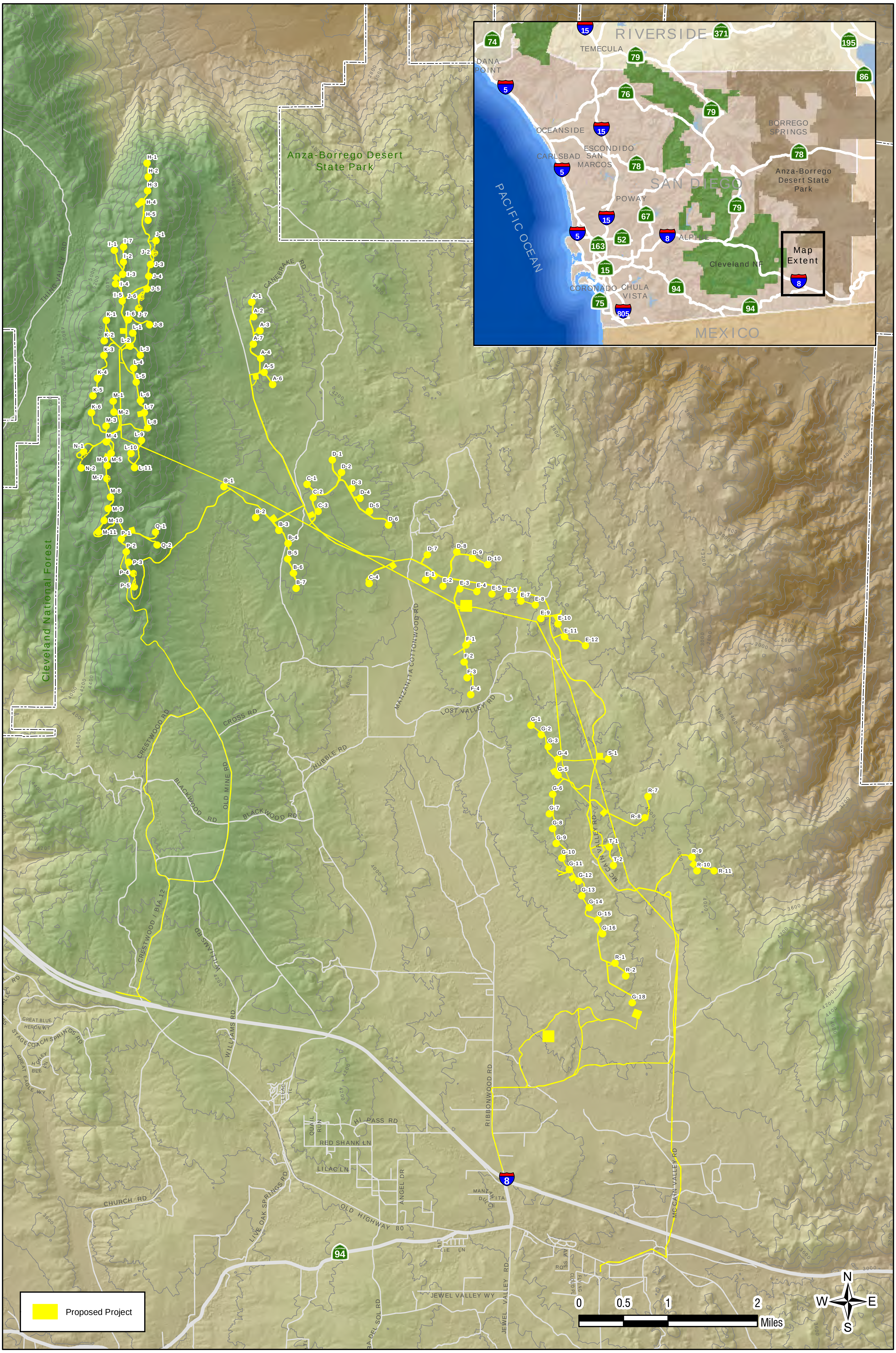

Figure 1
Region and Vicinity

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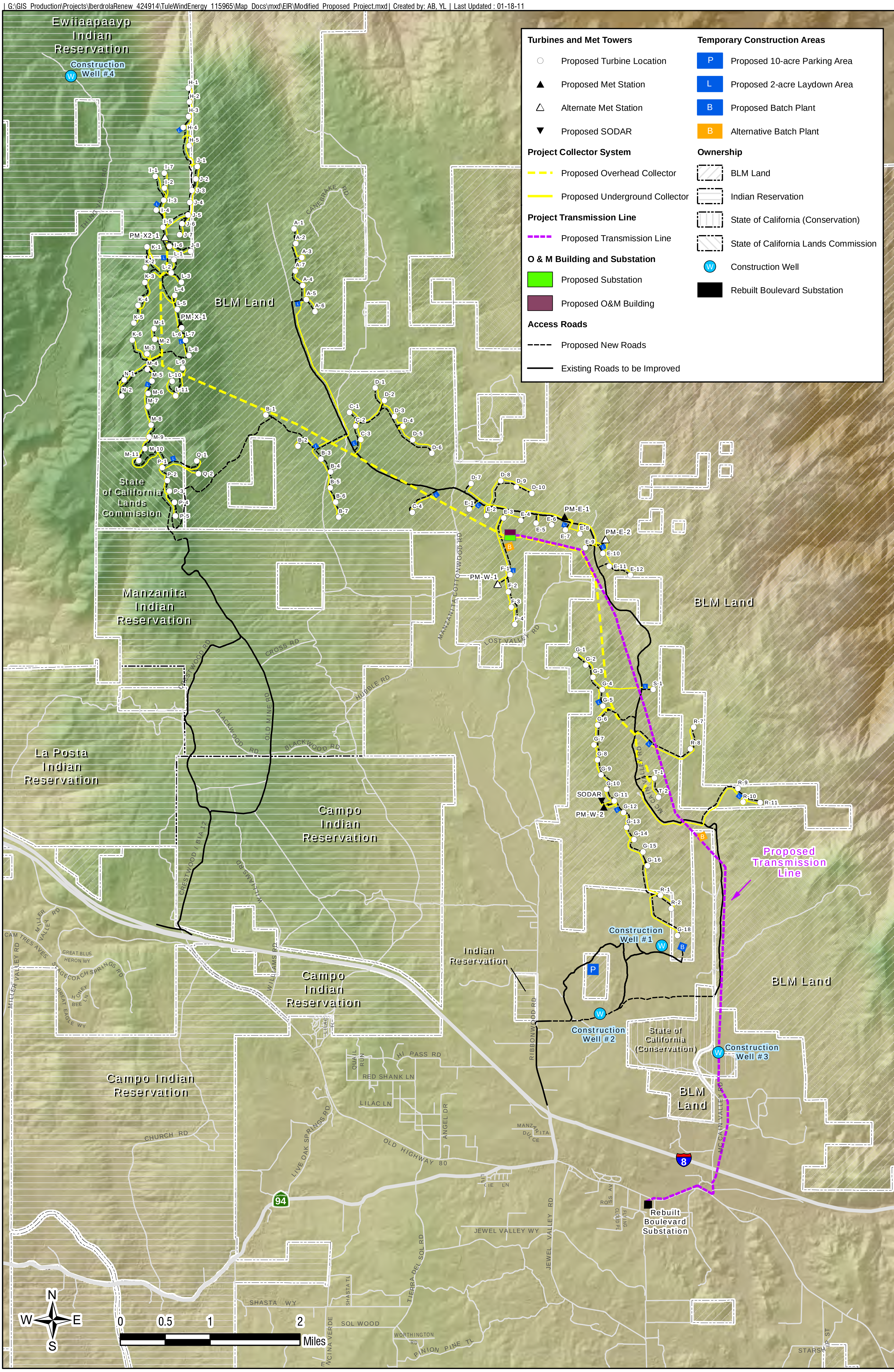


Figure 2
Proposed Project

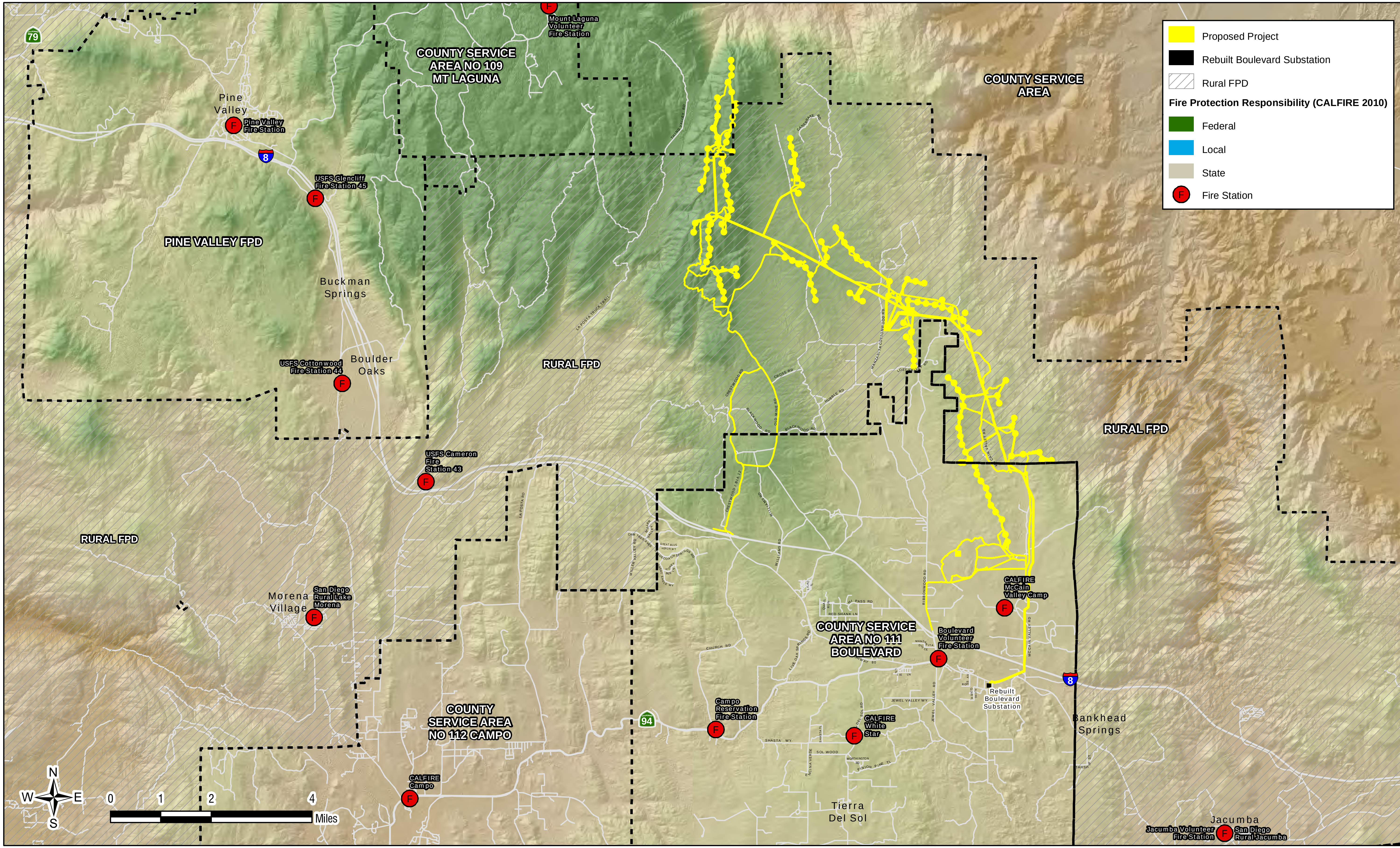
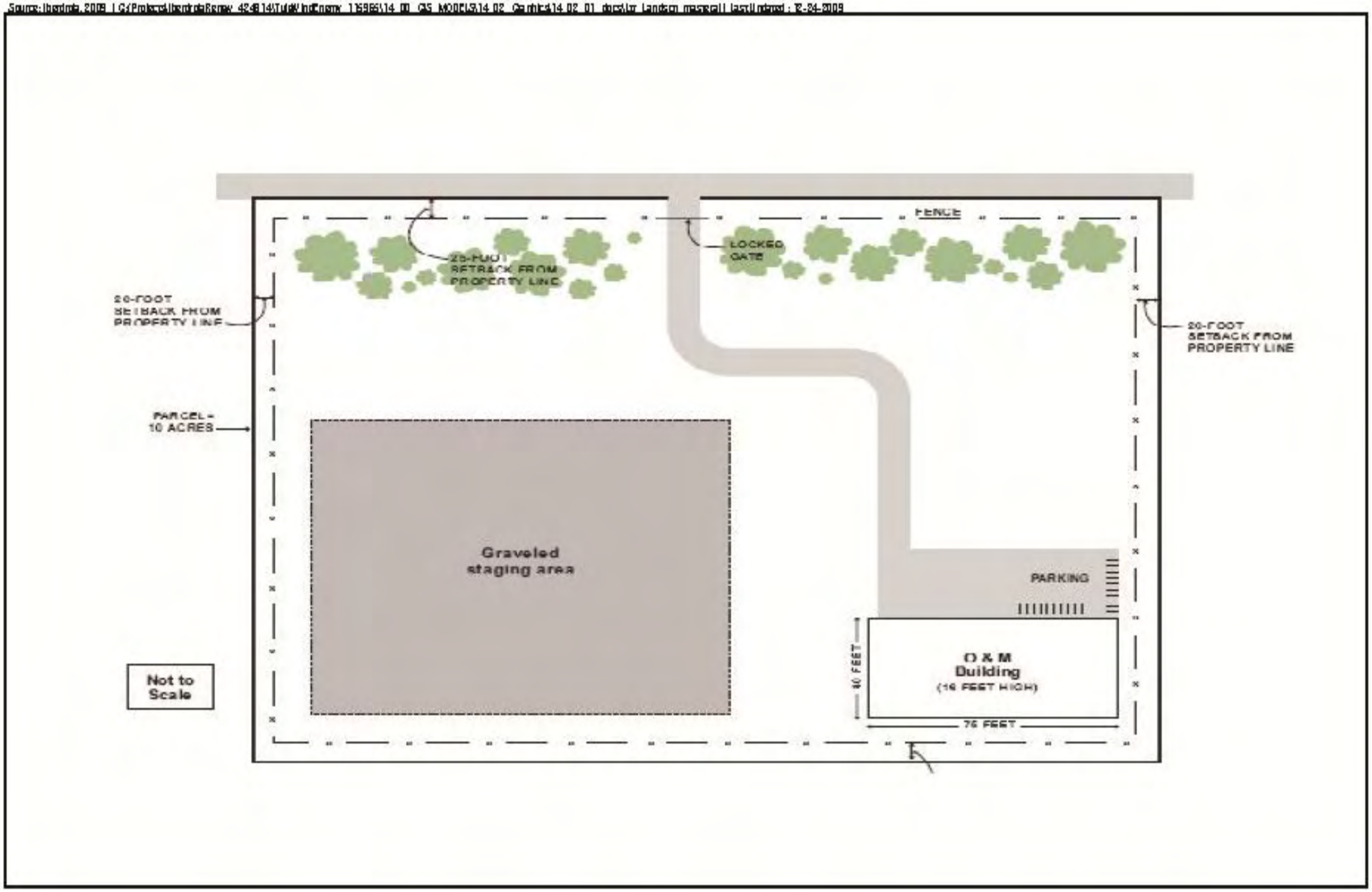


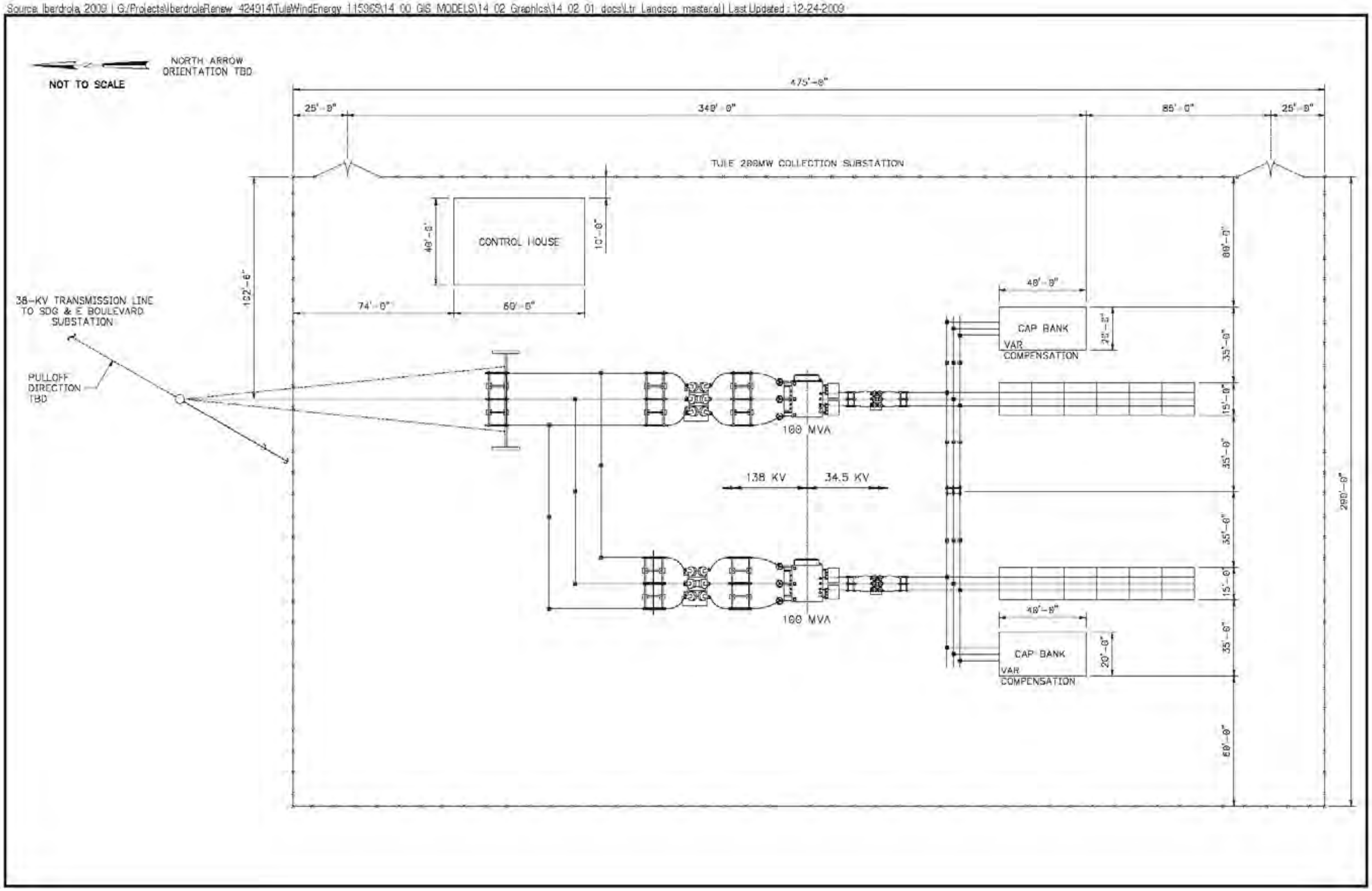
Figure 3
Fire Facilities and Fire District Areas

Source: Iberdrola, 2009

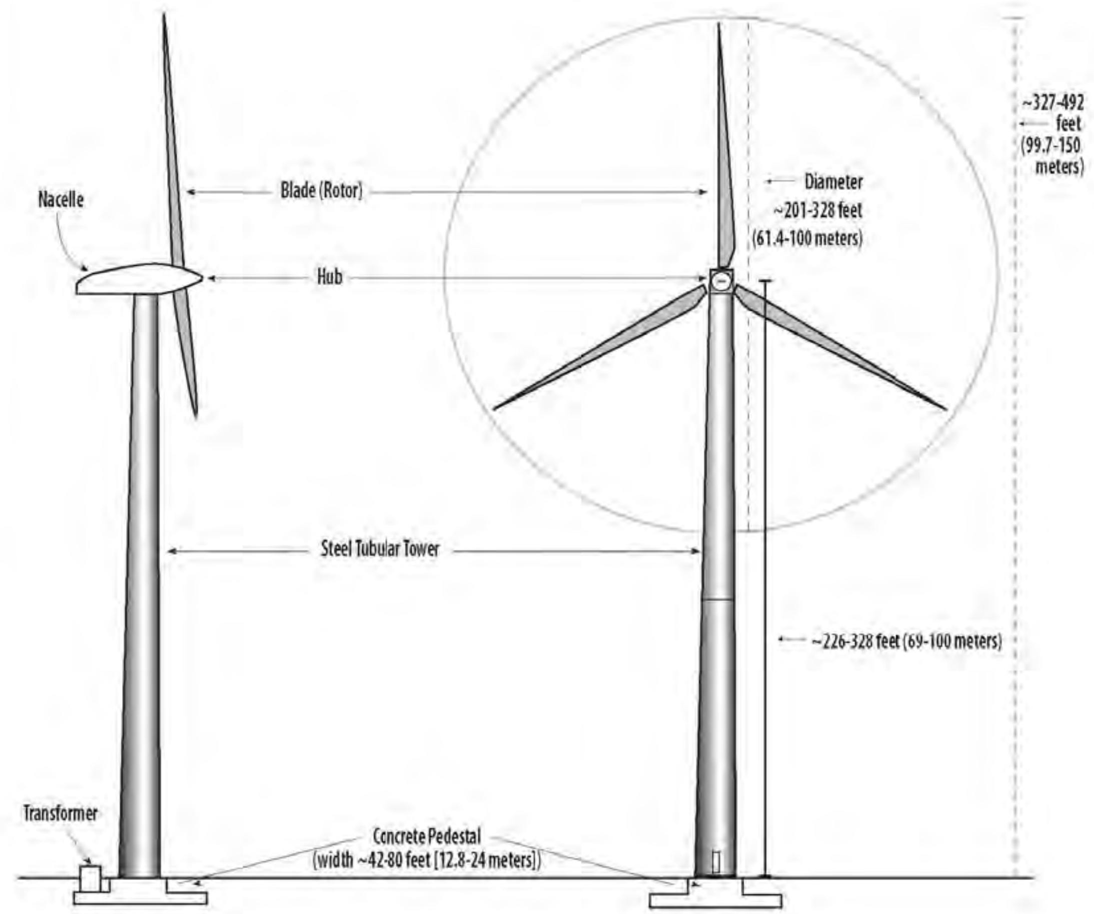


Typical Operations and Maintenance Facility Site **Figure 4**

Source: Iberdrola 2009 | G:/Projects\IberdrolaRenew_424914\TuleWindEnergy_115969\14_00_GIS_MODELS\14_02_Graphics\14_02_01_docs\Ltr_Landscp_master.ai | Last Updated : 12-24-2009



200 MW Collection Plan Station View **Figure 5**



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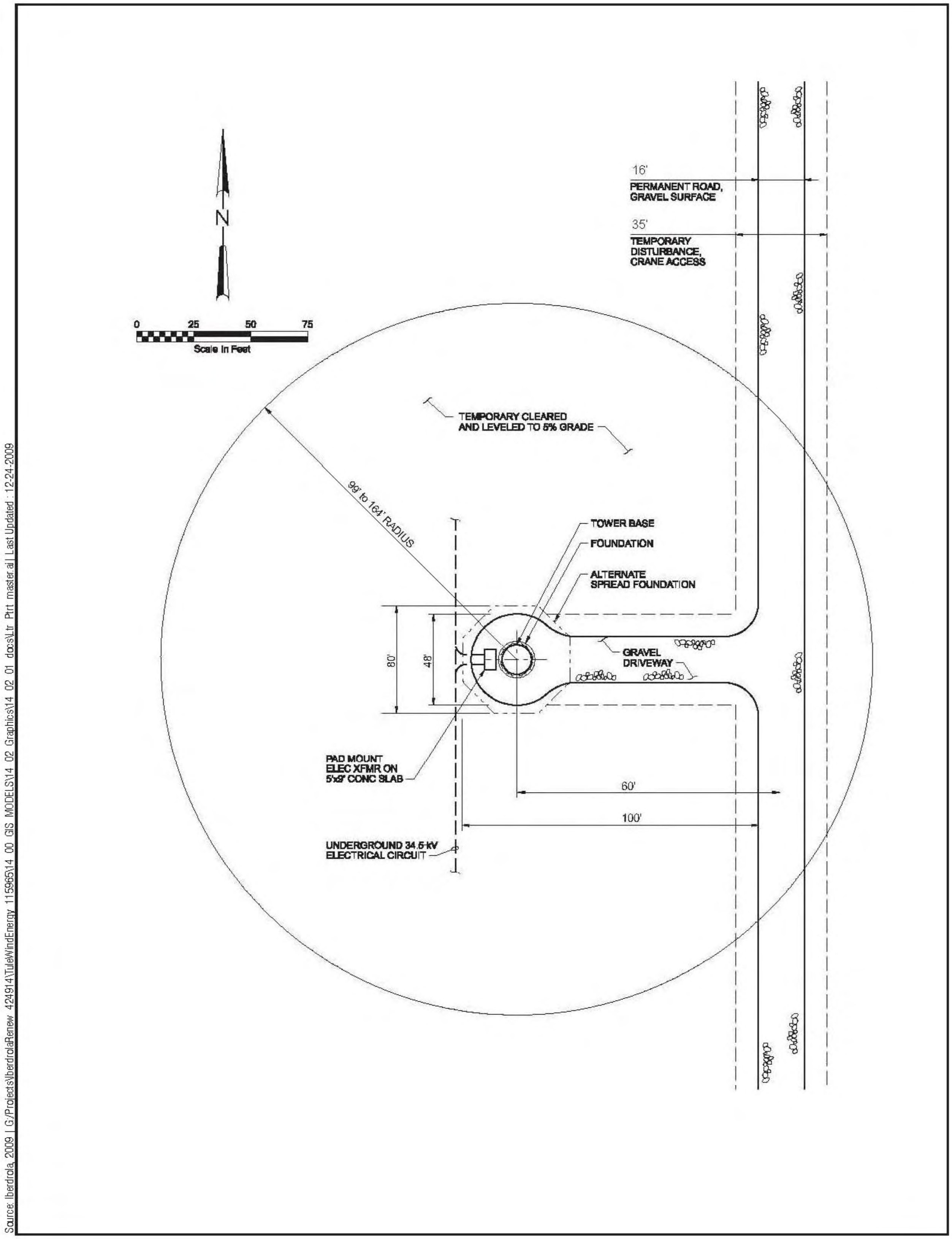
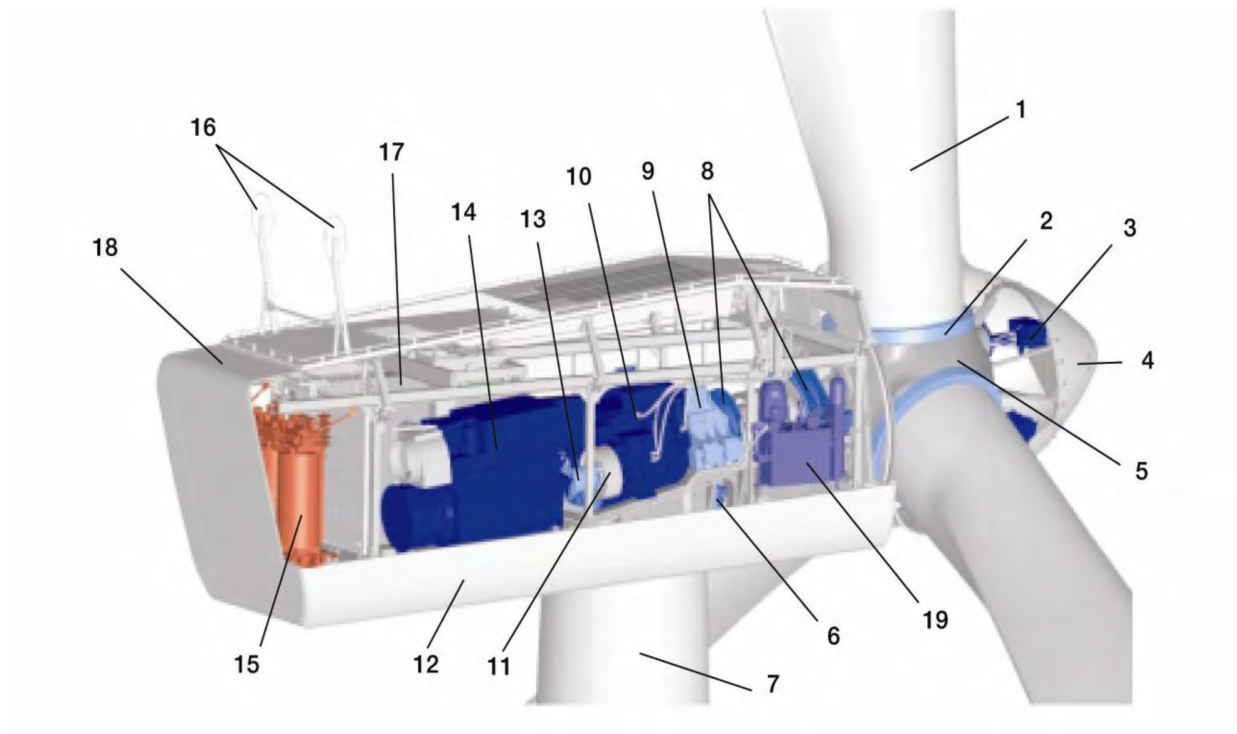
Preliminary Turbine Tower Design **Figure 6**

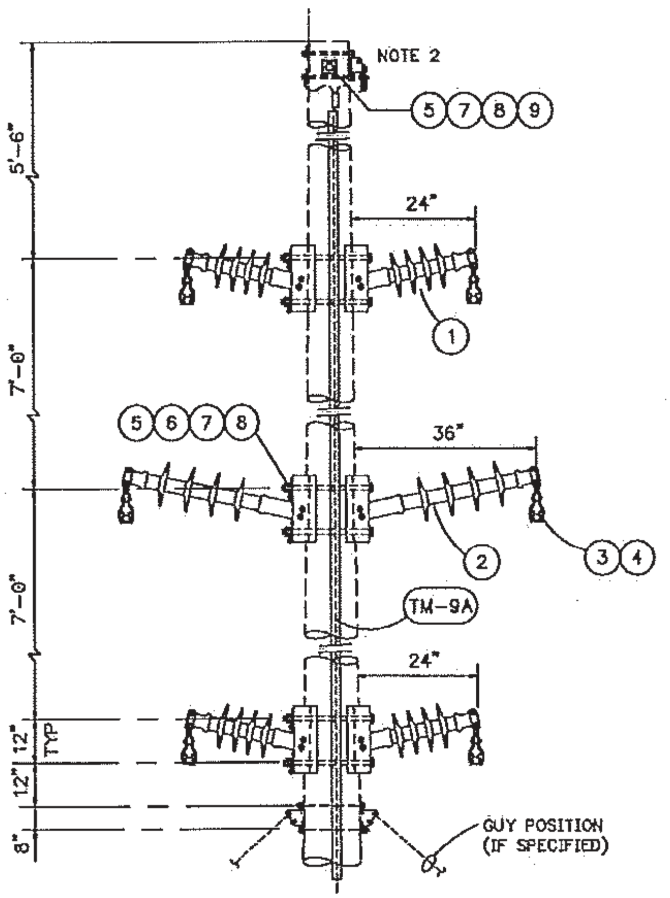


Typical Turbine Site **Figure 7**



1. Blade
2. Blade bearing
3. Hydraulic pitch actuator
4. Hub cover
5. Hub
6. Active yaw control
7. Tower
8. Main bearing house
9. Gear tie rod
10. Gearbox
11. Main disc brake
12. Nacelle support frame
13. Cardan or composite shaft
14. Doubly fed generator
15. Transformer
16. Anemometer and wind vane
17. Top controller
18. Nacelle cover
19. Hydraulic unit

Figure 8

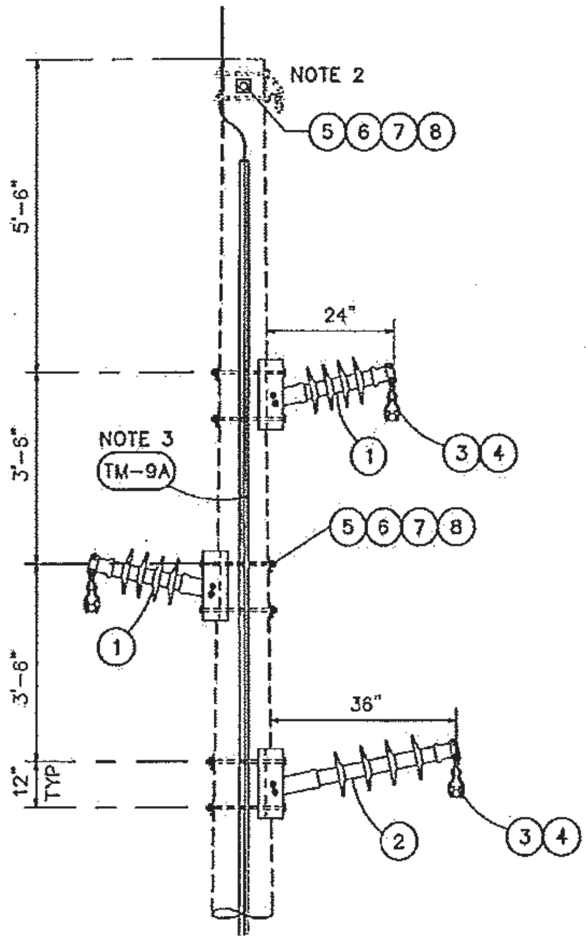


NOTES:
1. DO NOT GROUND INSULATOR BASE HARDWARE.
2. SHEILD WIRE ASSEMBLIES ARE CALLED OUT ON STAKING SHEETS.

ITEM	QTY	MATERIAL
1	4	Insulator, Polymer, Post, Horizontal, 24", 34.5-kV, MACLEAN H291024VX02
2	2	Insulator, Polymer, Post, Horizontal, 36", 34.5-kV, MACLEAN H391036VX01
3	6	Y Clevis-Eye, 25k lbs, PREFORMED YC-5209
4	6	Clamp, suspension, Armor Grip, 1272 AAC "NARCISSUS", PREFORMED AGS-5138
5	7	Bolt, machine, 7/8", by required length
6	6	Washer, round 2"x 1/4", 15/16" dia. hole
7	7	Locknut, 7/8", MF type
8	7	Washer, spring, 7/8"
9	2	Washer, curved, 4" Sq. x 3/8", 15/16" Dia. Hole
TM-9A	1	Pole Ground, Ground Rod

Source: Iberdrola 2009 | G:\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_02_Graphics\14_02_01_docs\Ltr_Prt_masteral | Last Updated : 12-24-2009

Typical Overhead 34.5 kV Single Circuit Collector Line **Figure 9a**

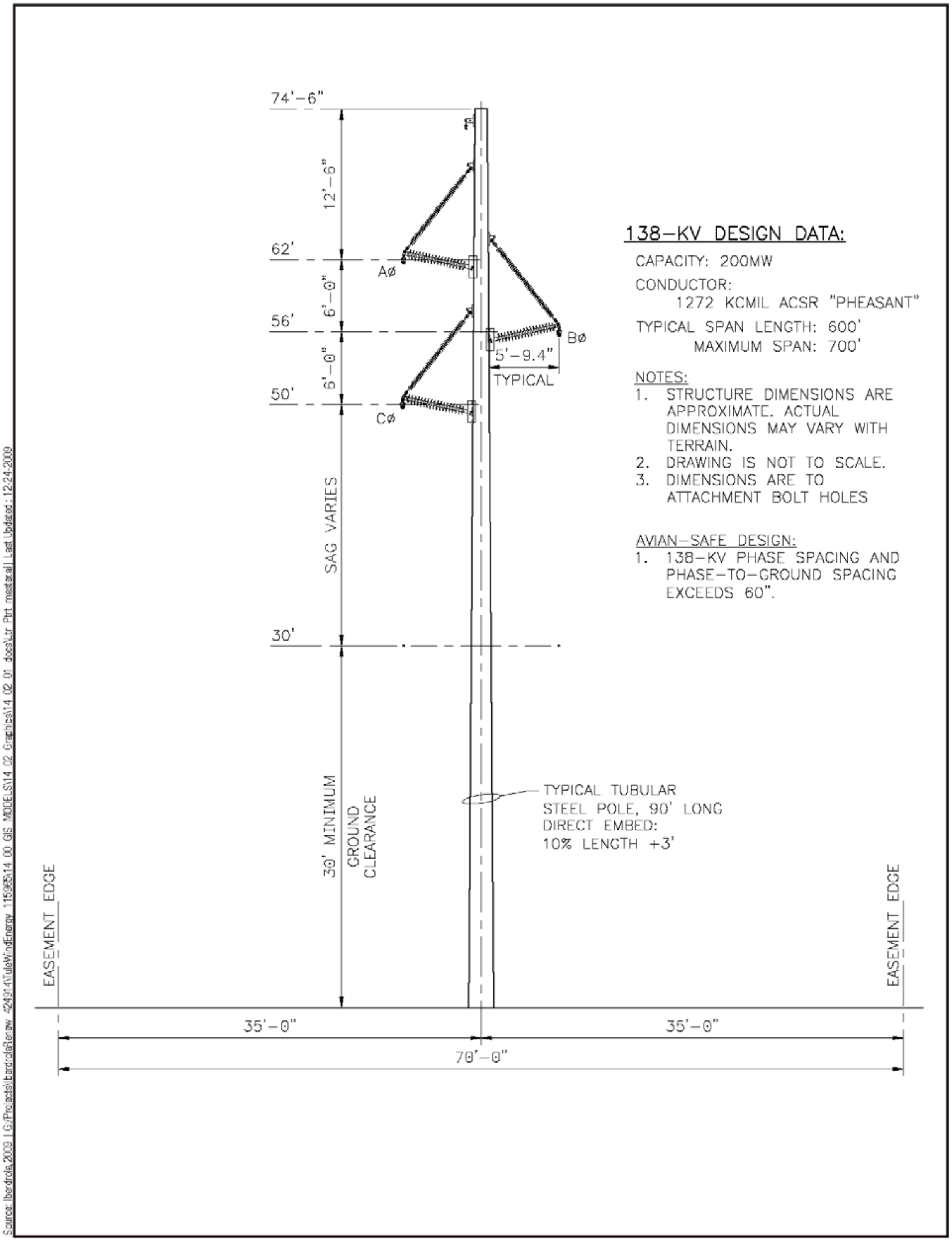


NOTES:
1. DO NOT GROUND INSULATOR BASE HARDWARE.
2. SHIELD WIRE ASSEMBLIES ARE CALLED OUT SEPARATELY ON STAKING SHEETS.
3. SPECIAL MOLDING REQUIRED FOR RAPTOR-SAFE DESIGN.

ITEM	QTY	MATERIAL
1	2	Insulator, polymer, post, horizontal, 24", 34.5-kV, 2½" rod, MACLEAN H291024VX02 OR LAPP CL2-024-210-29-A
2	1	Insulator, polymer, post, horizontal, 36", 34.5-kV, 3" rod, MACLEAN H391036VX01
3	3	Y Clevis-Eye, 25k lbs, PREFORMED YC-5209
4	3	Clamp, suspension, Cushion-Grip, 1272 AAC "NARCISSUS", PREFORMED CGS-1115
5	7	Bolt, machine, ⅞", by required length
6	8	Washer, curved, 4" sq.x ¼", 1⅙" dia. hole
7	7	Locknut, ⅞", MF type
8	7	Washer, spring, ⅞"
TM-9A	1	Pole Ground, Ground Rod

Source: Iberdrola 2009 | G:/Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 02 Graphics\14 02 01 docs\Ltr Prtr master.ai | Last Updated: 12-24-2009

Typical Overhead 34.5 kV Double Circuit Collector Line **Figure 9b**



Typical 138kV Steel Tangent Pole **Figure 10**

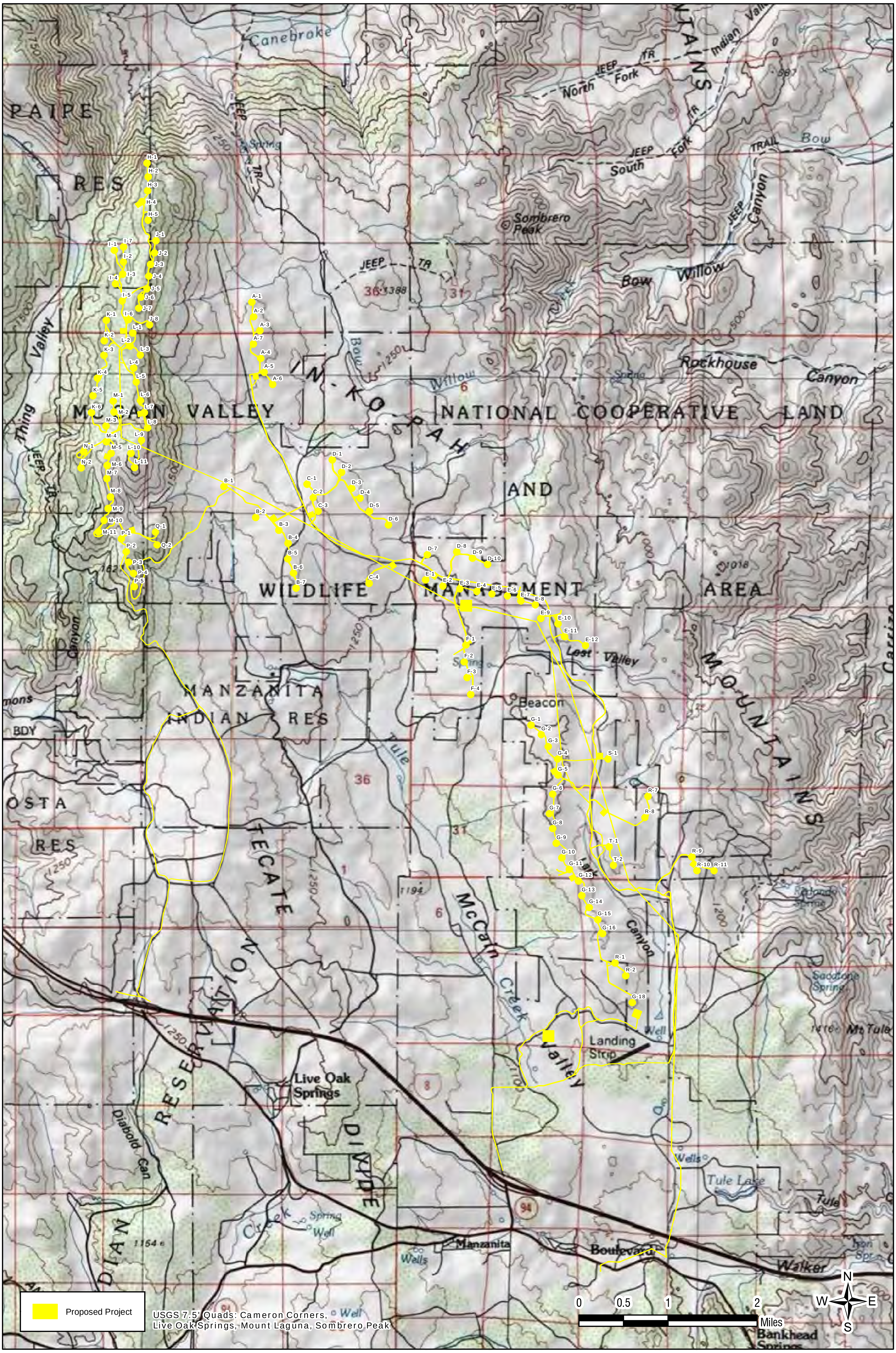


Figure 11
Topographic Map

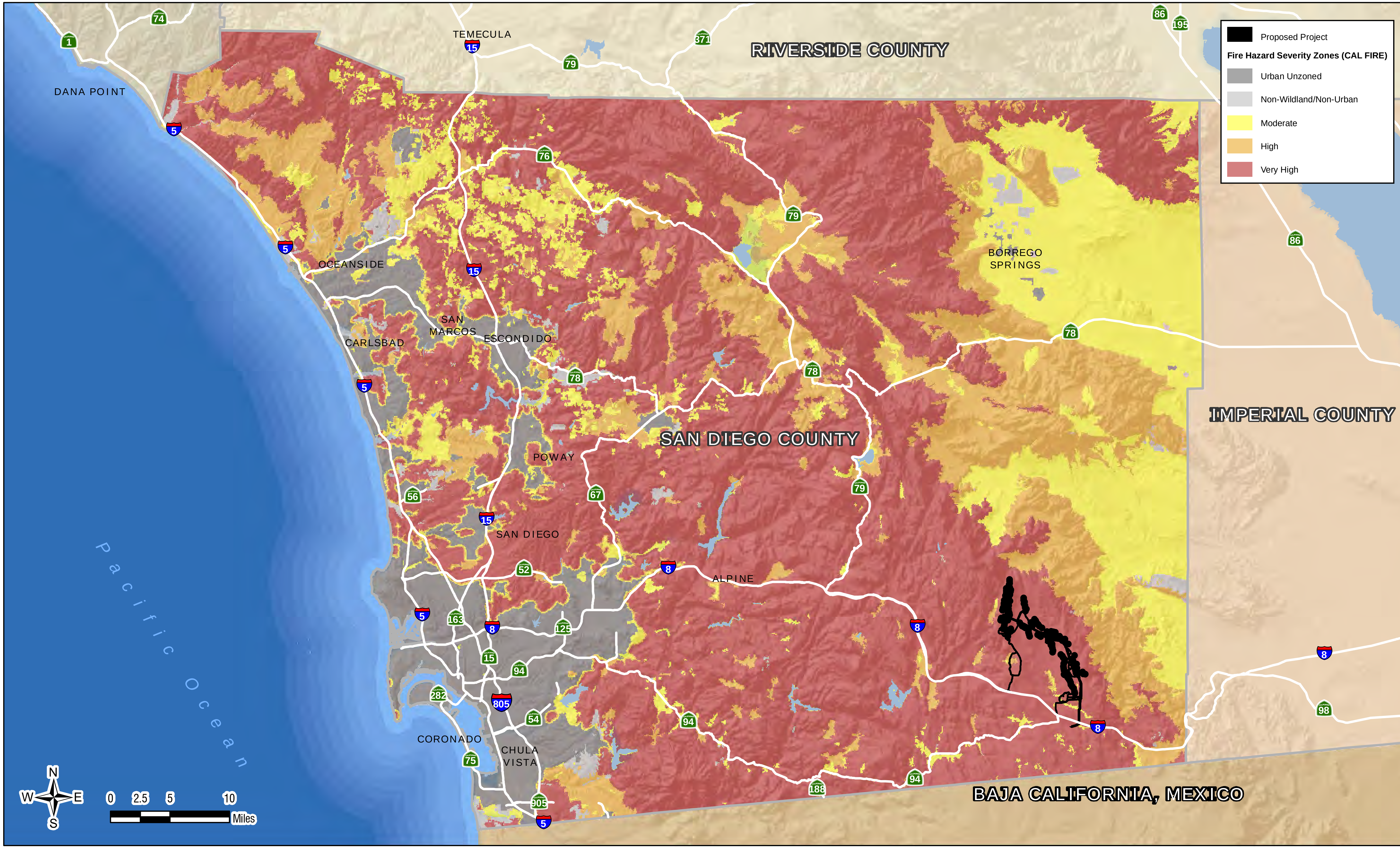


Figure 12
San Diego County Fire Hazard Severity

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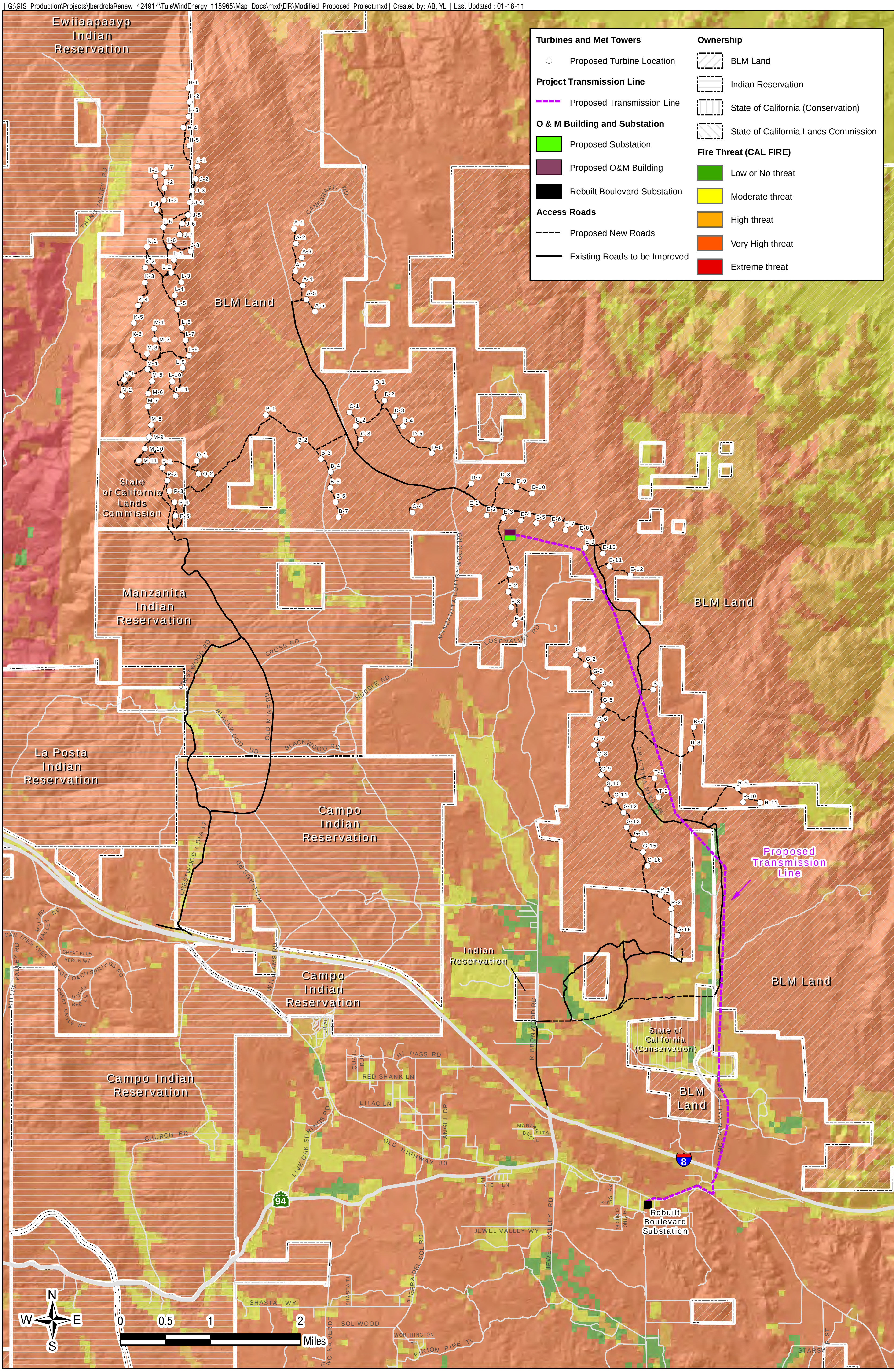


Figure 13
Fire Threat

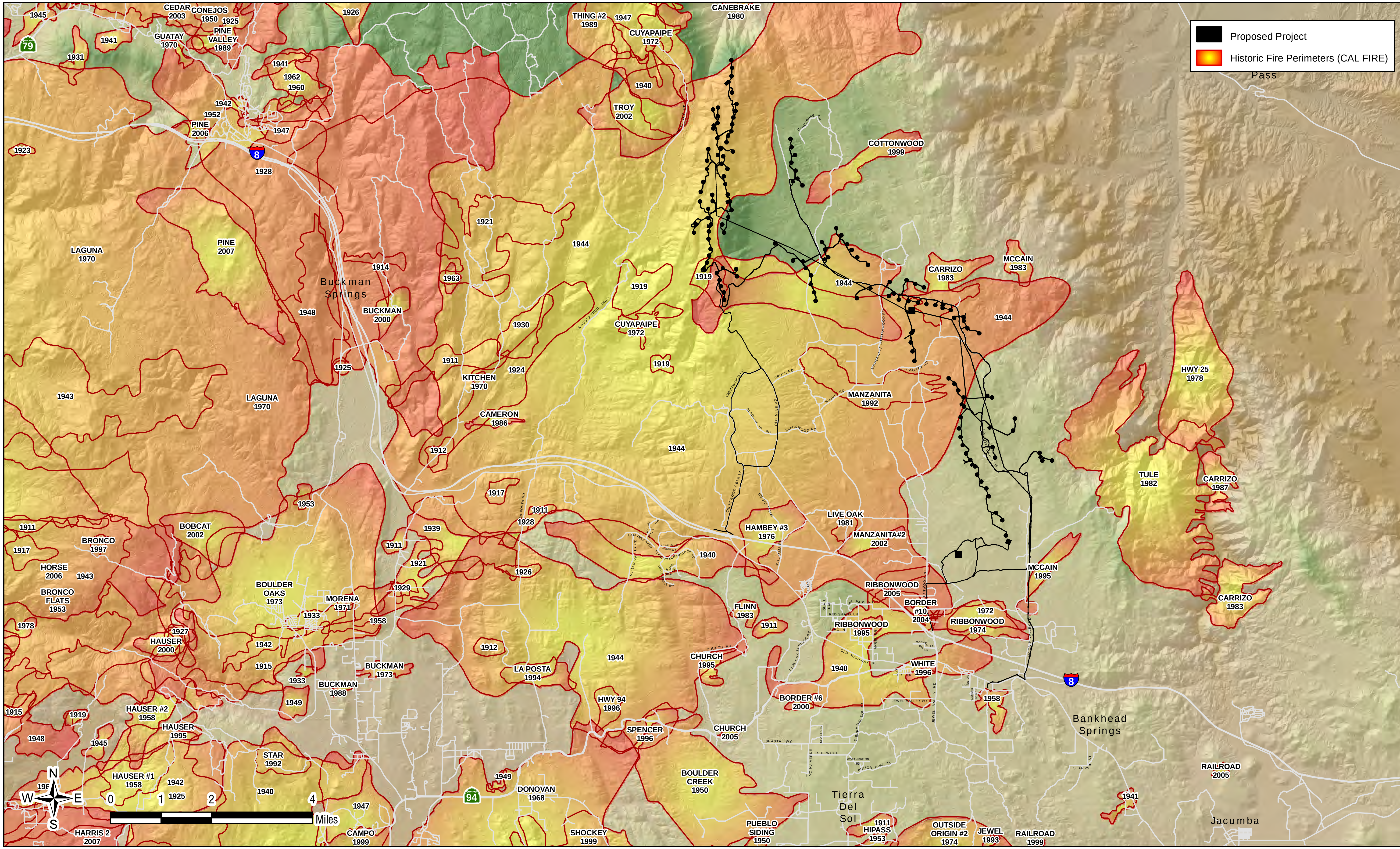


Figure 14
Fire History

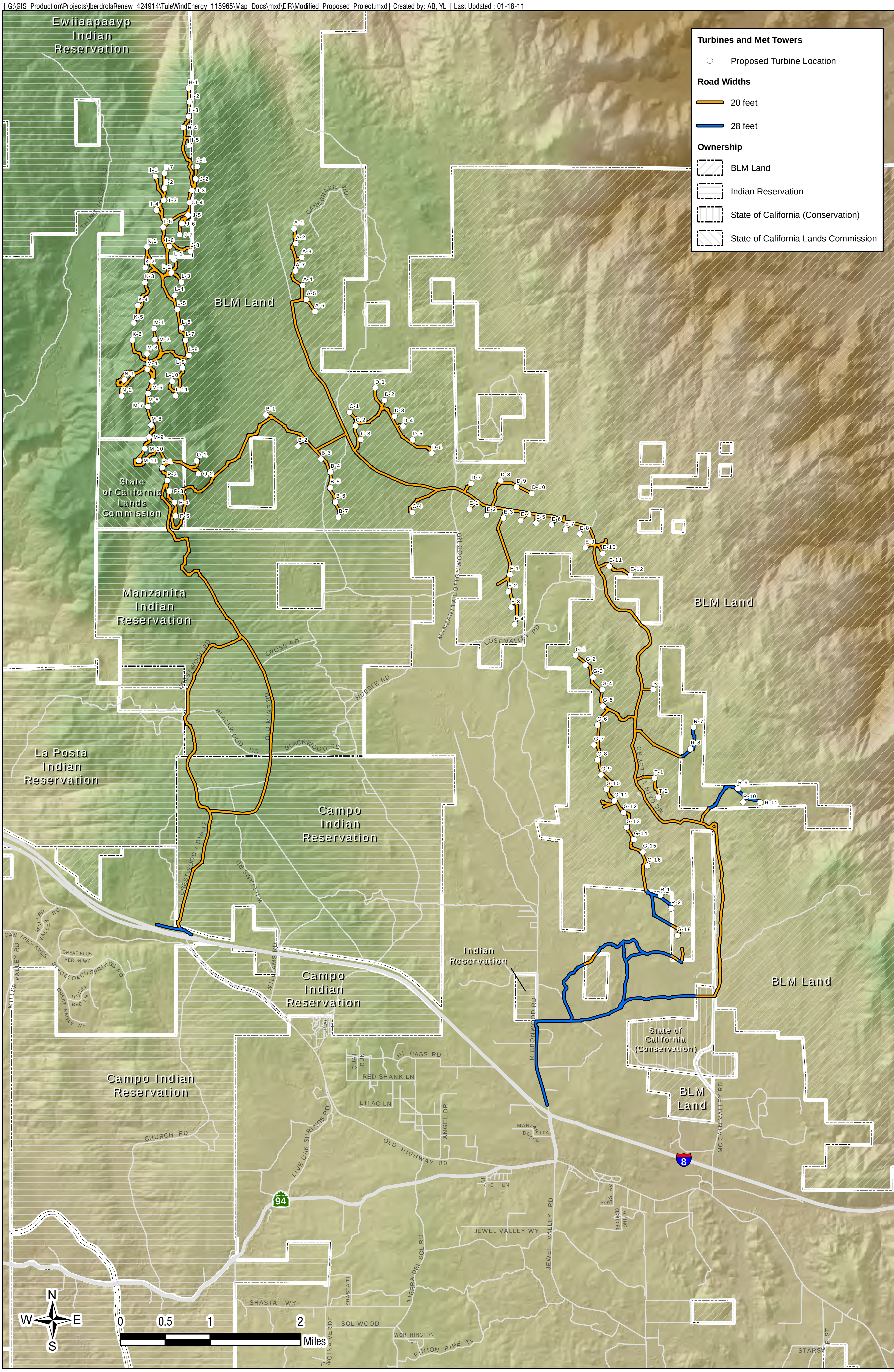
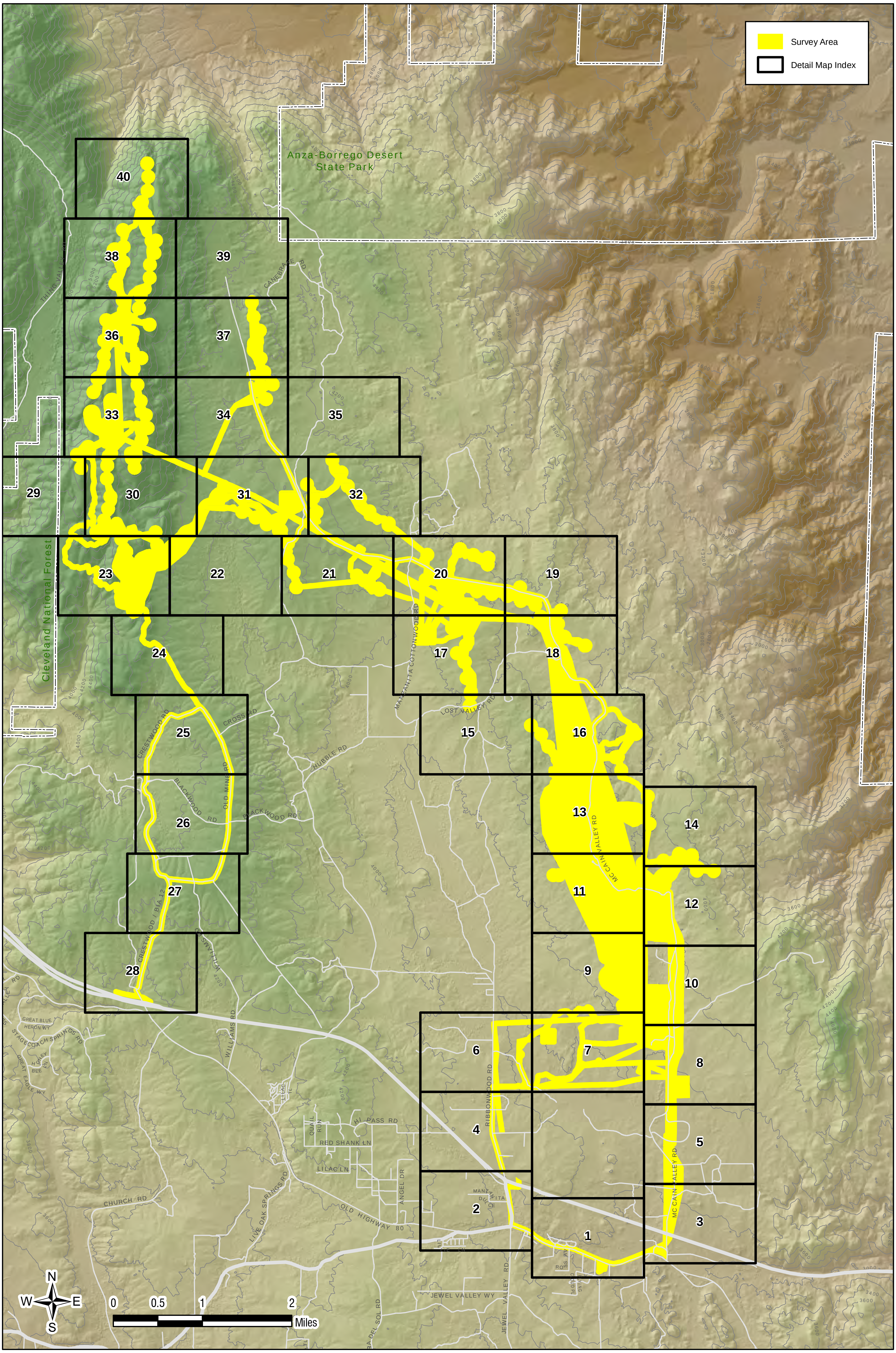


Figure 15
County Roadway Improvments

TECHNICAL APPENDICES

APPENDIX A

Biology Resources Maps



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Map Index

FIGURE 1

Tule, LLC | Tule Wind Project | BTA

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- CLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
- OCLOW Open Coast Live Oak Woodland (71161)
- RS Redshank Chaparral (37300)
- SOC Scrub Oak Chaparral (37900)
- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)

Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 1)

Figure 2

Tule, LLC | Tule Wind Project | BTA

Appendix A: Biological Resources Maps (Index Map 2)

Figure 3

Tule, LLC | Tule Wind Project | BTA

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Appendix A: Biological Resources Maps (Index Map 3)

Figure 4

Tule, LLC | Tule Wind Project | BTA

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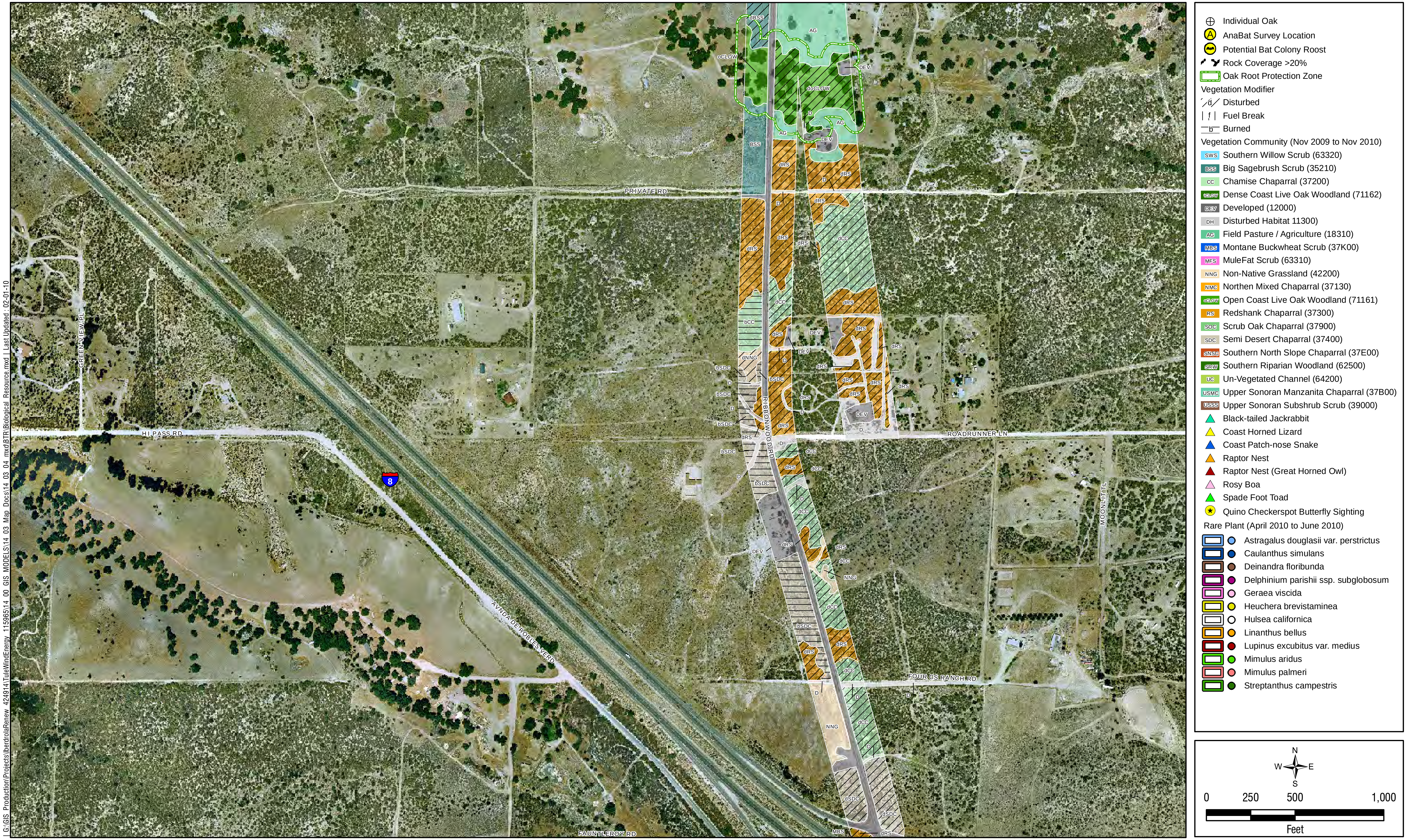

Appendix A: Biological Resources Maps (Index Map 4)

Figure 5

Tule, LLC | Tule Wind Project | BTA

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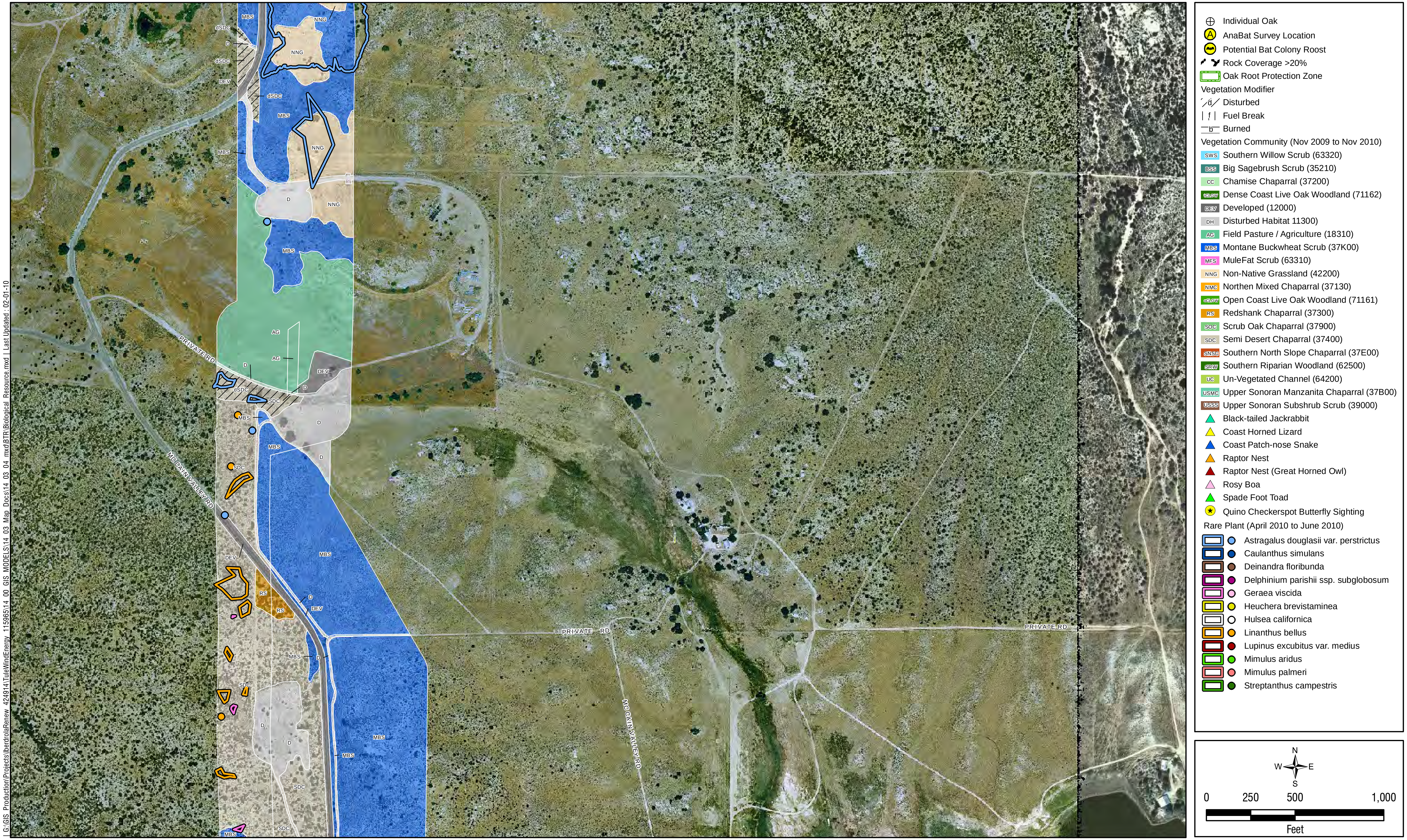

Appendix A: Biological Resources Maps (Index Map 5)

Figure 6

Tule, LLC | Tule Wind Project | BTA

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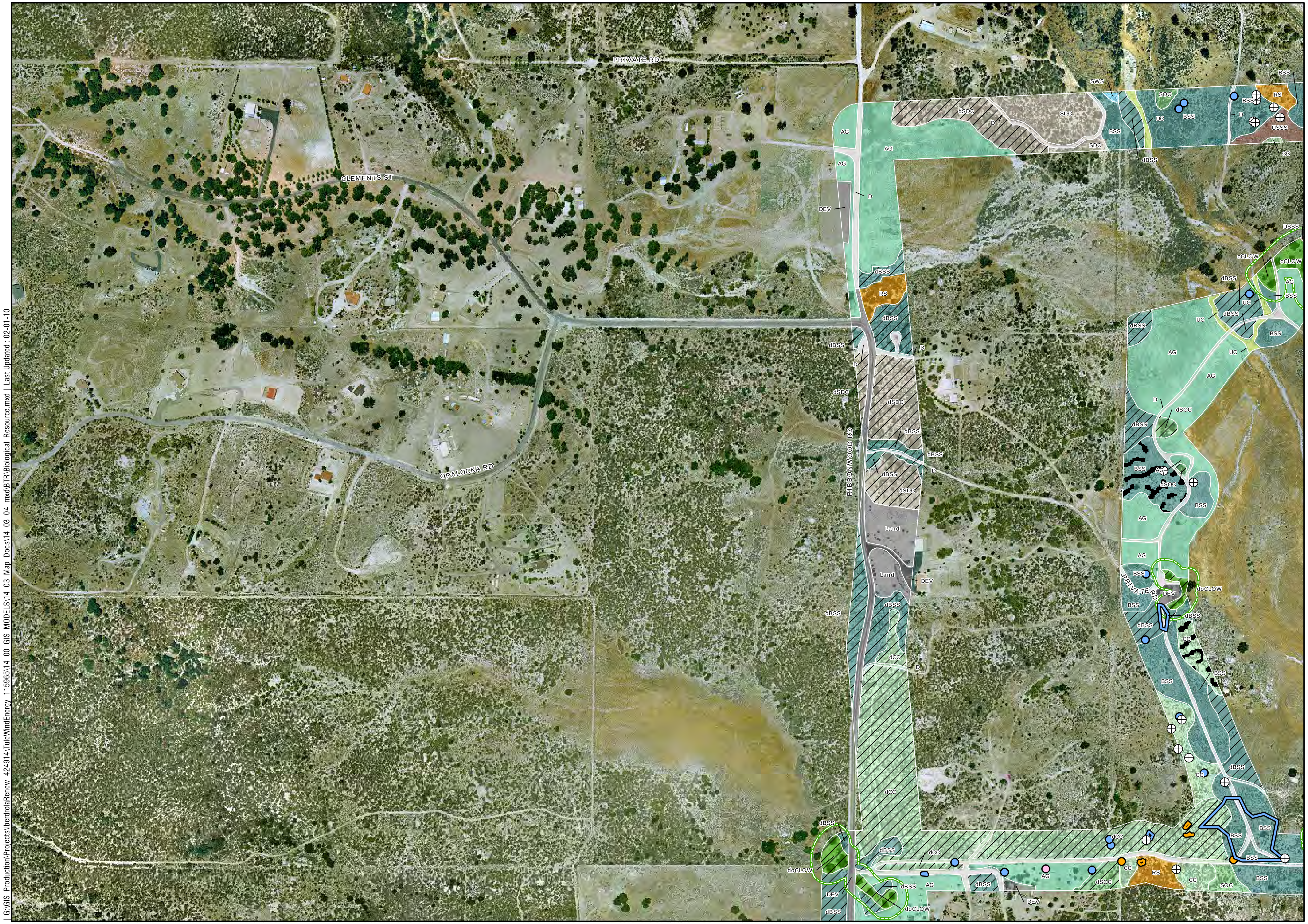

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
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- d Disturbed
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Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

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- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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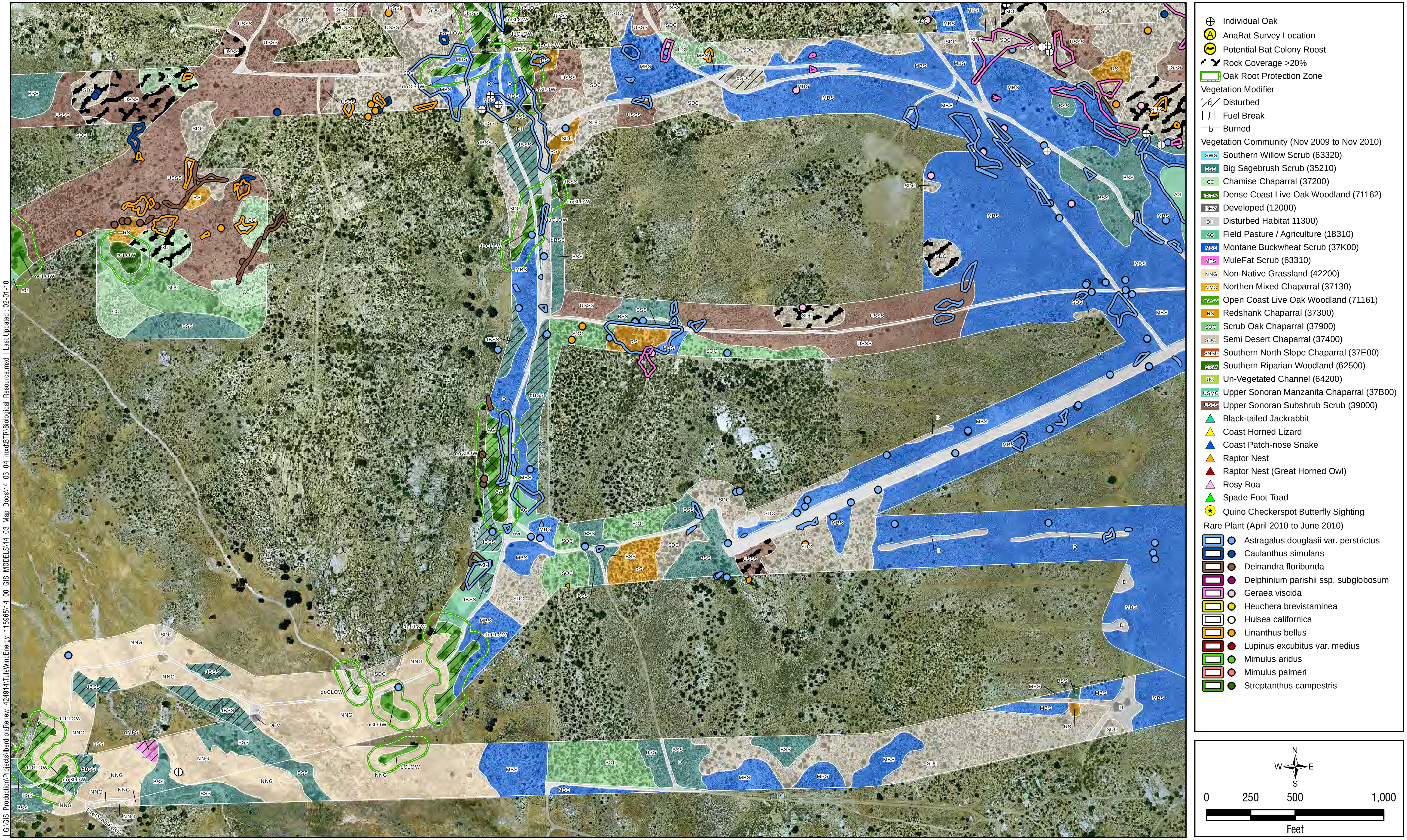
Appendix A: Biological Resources Maps (Index Map 6)

Figure 7

Tule, LLC | Tule Wind Project | BTA



Appendix A: Biological Resources Maps (Index Map 7)

Figure 8

Tule, LLC | Tule Wind Project | BTA

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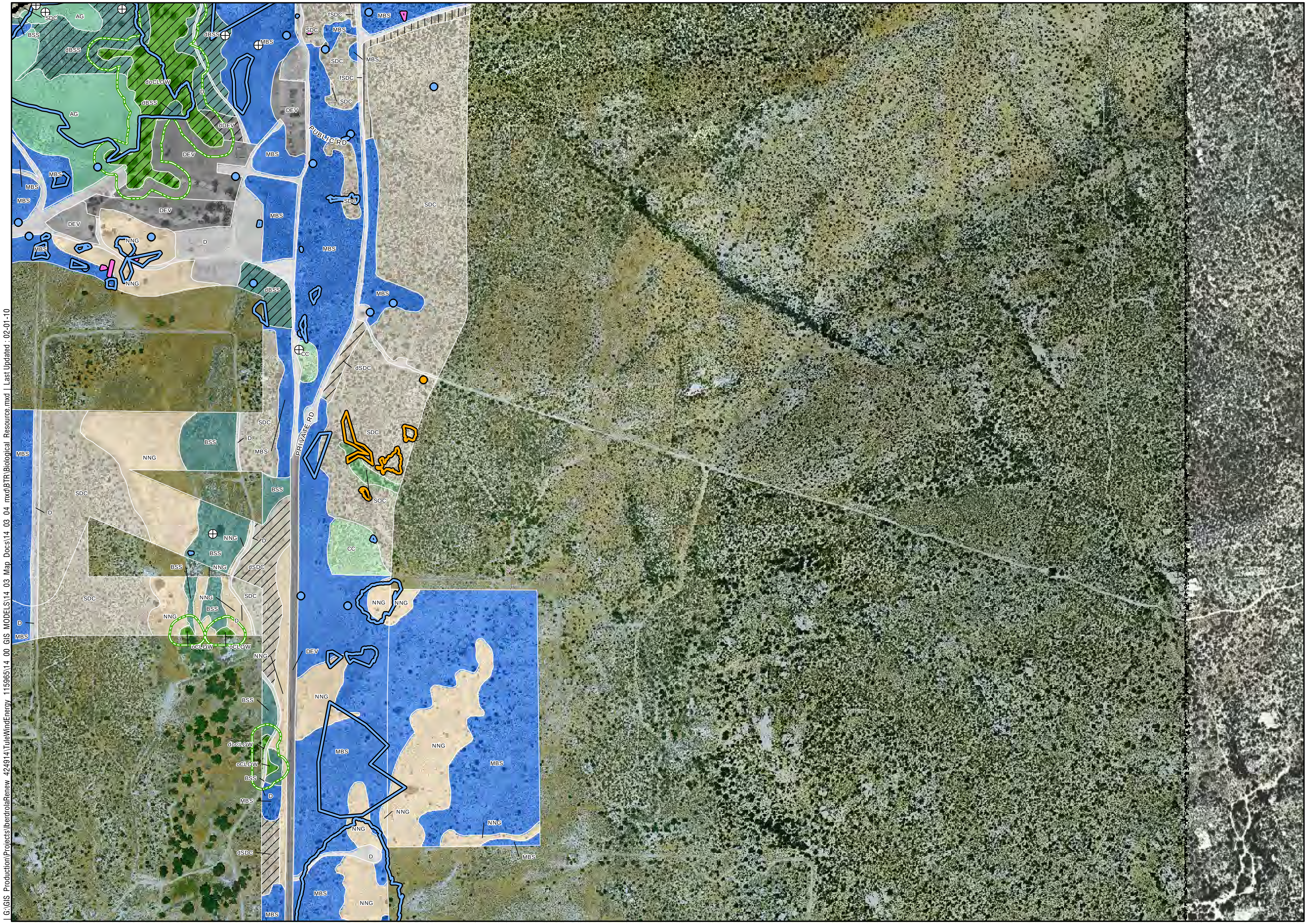
G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\BTR\Biological_Resource.mxd | Last Updated : 02-01-10



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone
Vegetation Modifier
Disturbed
Fuel Break
Burned
Vegetation Community (Nov 2009 to Nov 2010)
SWS Southern Willow Scrub (63320)
BSS Big Sagebrush Scrub (35210)
CC Chamise Chaparral (37200)
DCLW Dense Coast Live Oak Woodland (71162)
DEV Developed (12000)
DH Disturbed Habitat 11300)
AG Field Pasture / Agriculture (18310)
MBS Montane Buckwheat Scrub (37K00)
MFS MuleFat Scrub (63310)
NNG Non-Native Grassland (42200)
NMC Northen Mixed Chaparral (37130)
OCLW Open Coast Live Oak Woodland (71161)
RS Redshank Chaparral (37300)
SOC Scrub Oak Chaparral (37900)
SDC Semi Desert Chaparral (37400)
SNSC Southern North Slope Chaparral (37E00)
SRW Southern Riparian Woodland (62500)
UC Un-Vegetated Channel (64200)
USMC Upper Sonoran Manzanita Chaparral (37B00)
USSS Upper Sonoran Subshrub Scrub (39000)
Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting
Rare Plant (April 2010 to June 2010)
Astragalus douglasii var. perstrictus
Caulanthus simulans
Deinandra floribunda
Delphinium parishii ssp. subglobosum
Geraea viscida
Heuchera brevistaminea
Hulsea californica
Linanthus bellus
Lupinus excubitus var. medius
Mimulus aridus
Mimulus palmeri
Streptanthus campestris

N
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Appendix A: Biological Resources Maps (Index Map 8)

Figure 9

Tule, LLC | Tule Wind Project | BTA

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Appendix A: Biological Resources Maps (Index Map 9)

Figure 10

Tule, LLC | Tule Wind Project | BTA

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- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)

- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- dCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
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- MBS Montane Buckwheat Scrub (37K00)
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- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)

- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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Feet

Appendix A: Biological Resources Maps (Index Map 10)

Figure 11

Tule, LLC | Tule Wind Project | BTA

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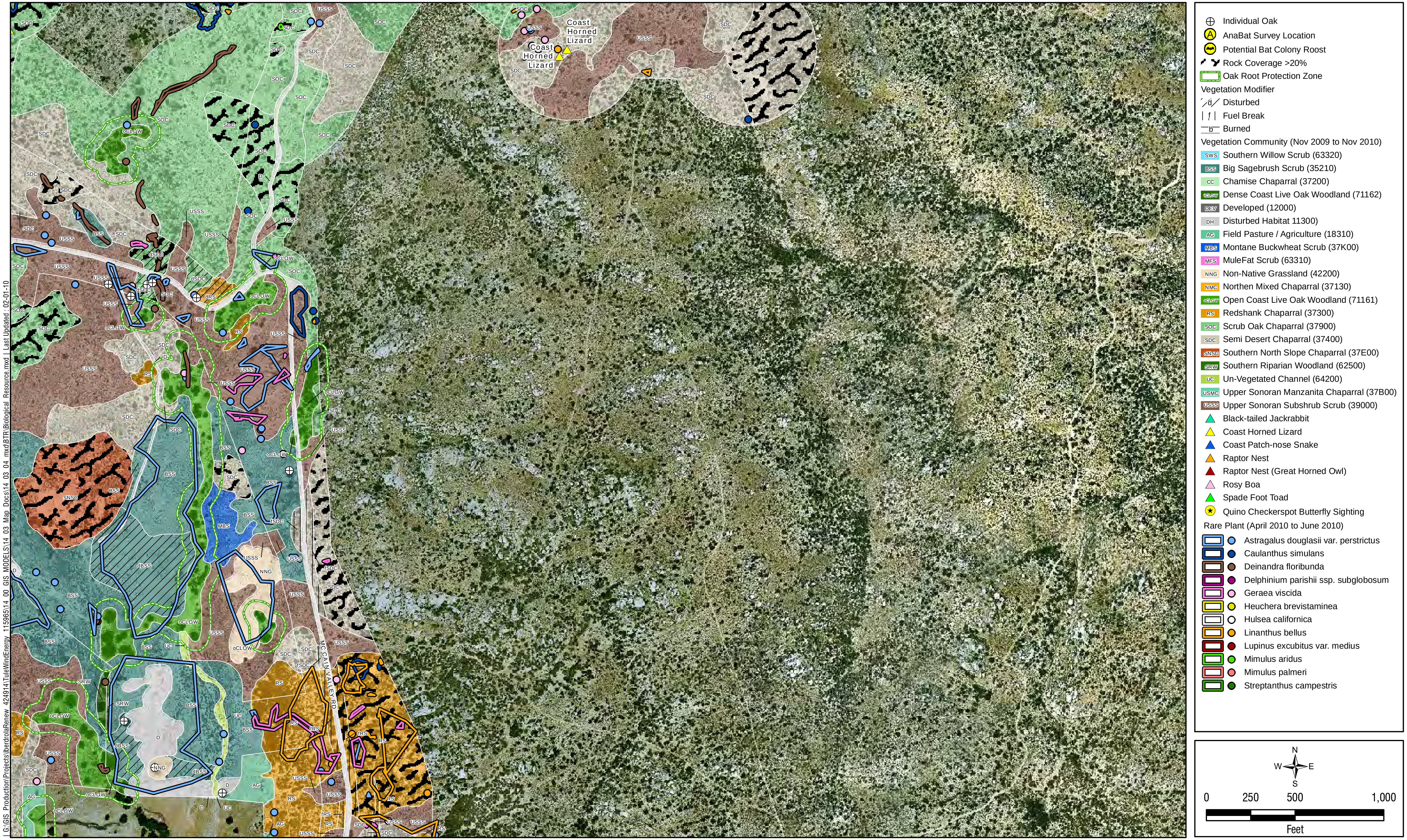
Appendix A: Biological Resources Maps (Index Map 11)

Figure 12

Tule, LLC | Tule Wind Project | BTA



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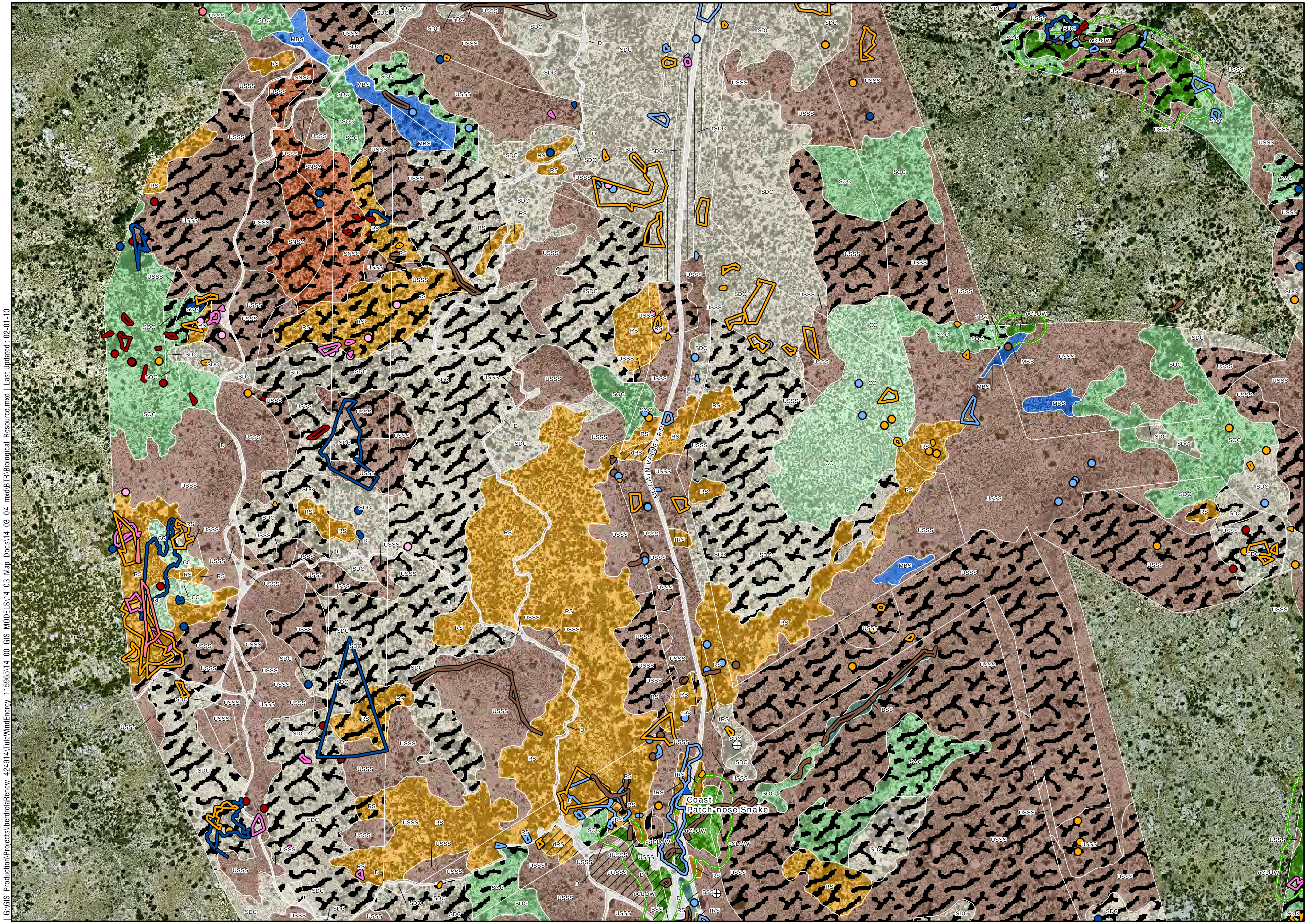
Appendix A: Biological Resources Maps (Index Map 12)

Figure 13

Tule, LLC | Tule Wind Project | BTA



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
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- DH Disturbed Habitat 11300)
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- MFS MuleFat Scrub (63310)
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- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

N W E S

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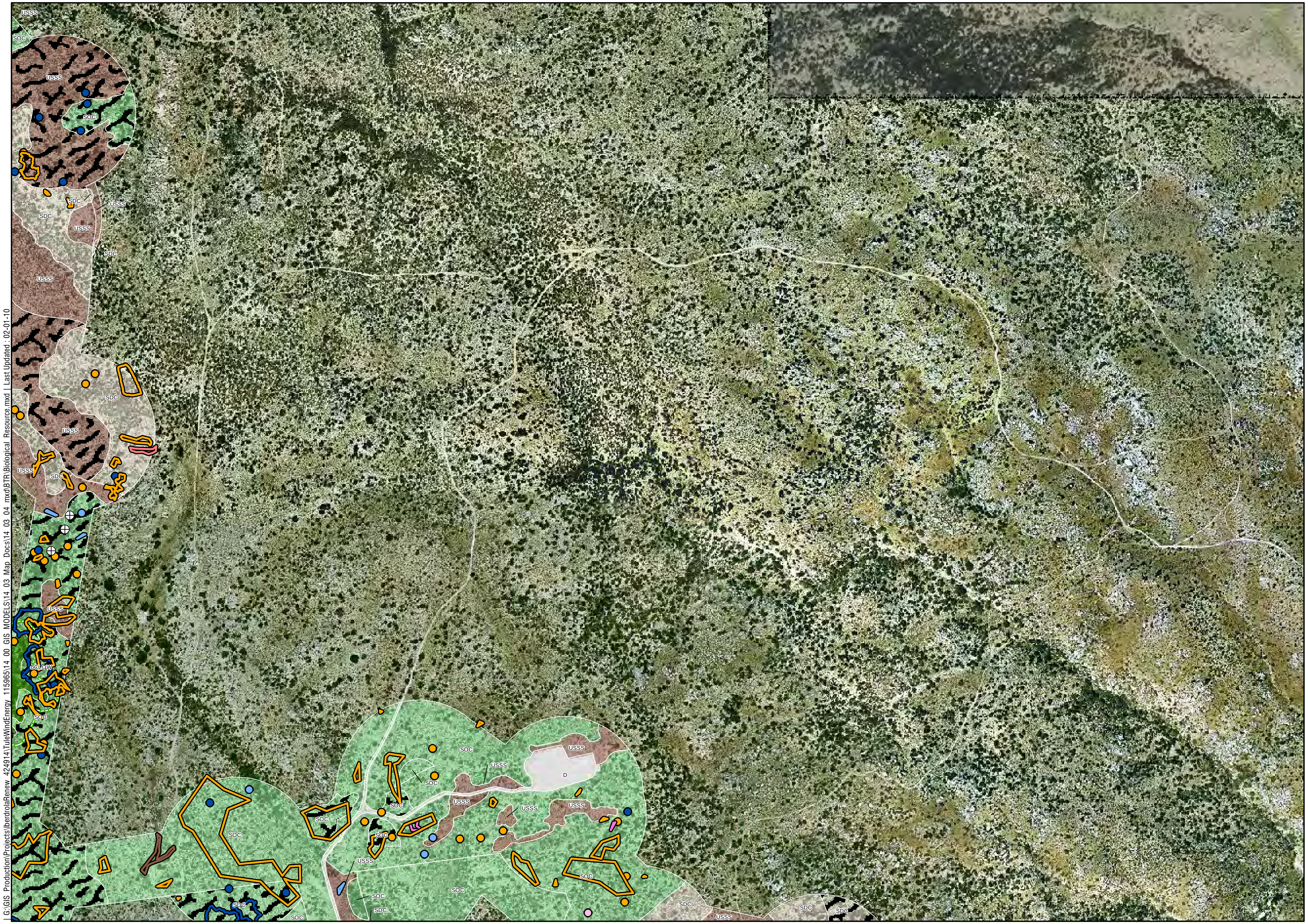
Appendix A: Biological Resources Maps (Index Map 13)

Figure 14

Tule, LLC | Tule Wind Project | BTA



- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
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- BSS Big Sagebrush Scrub (35210)
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- SNSC Southern North Slope Chaparral (37E00)
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- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)
- Black-tailed Jackrabbit
- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
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- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 14)

Figure 15

Tule, LLC | Tule Wind Project | BTA

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Appendix A: Biological Resources Maps (Index Map 15)

Figure 16

Tule, LLC | Tule Wind Project | BTA

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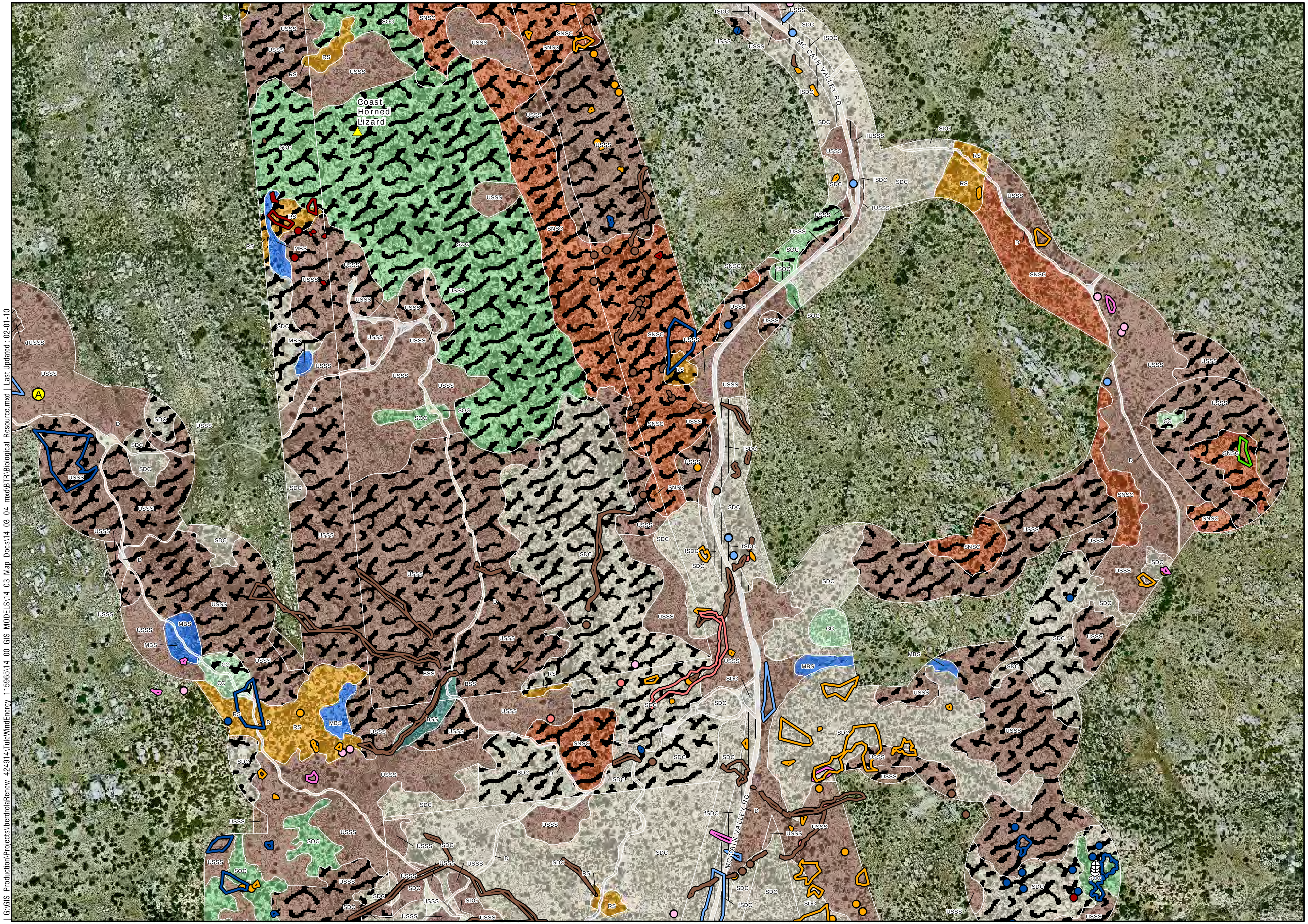

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLOW Dense Coast Live Oak Woodland (71162)
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- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
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- SDC Semi Desert Chaparral (37400)
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- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)

Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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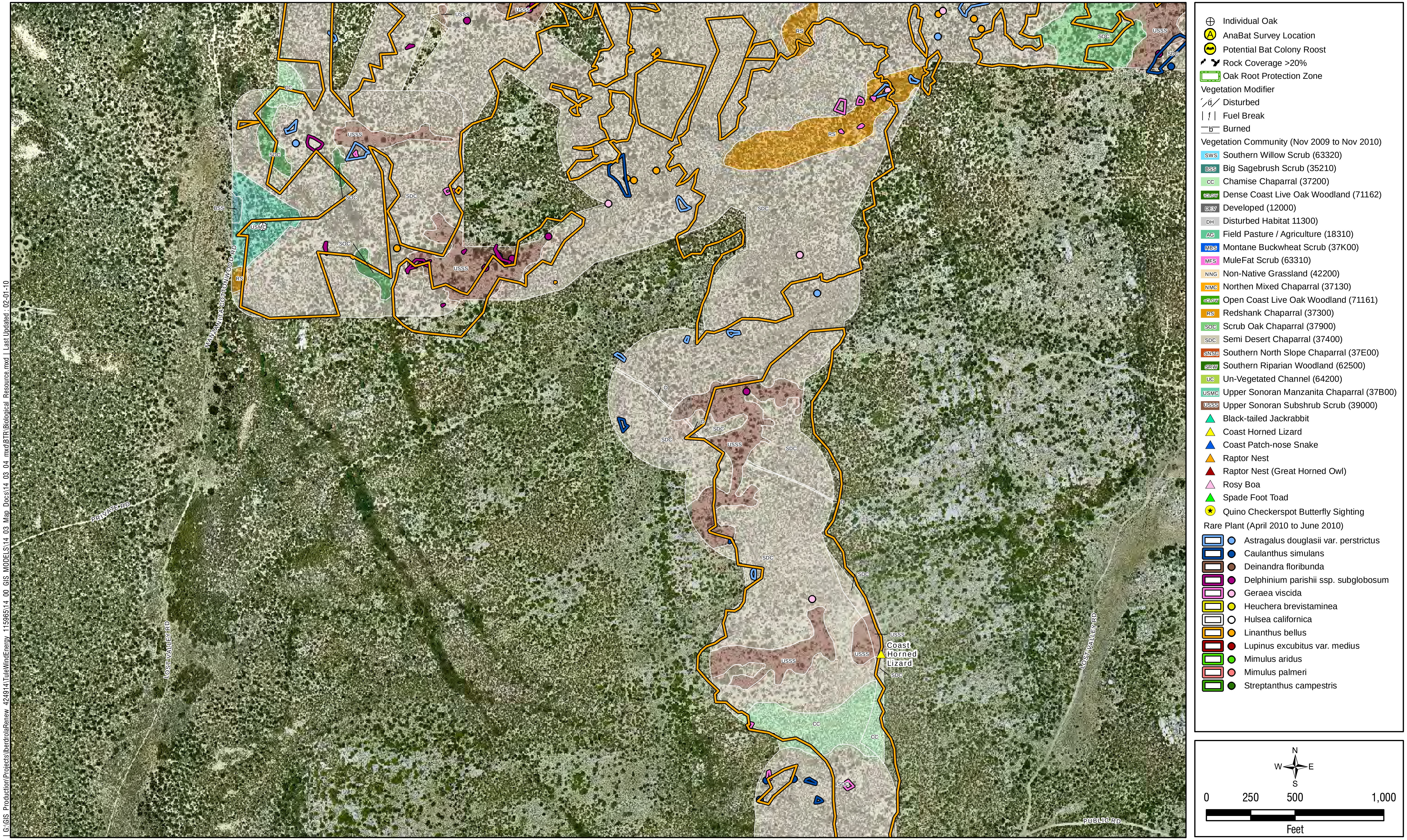
Appendix A: Biological Resources Maps (Index Map 16)

Figure 17

Tule, LLC | Tule Wind Project | BTA



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Appendix A: Biological Resources Maps (Index Map 17)

Figure 18

Tule, LLC | Tule Wind Project | BTA

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Appendix A: Biological Resources Maps (Index Map 18)

Figure 19

Tule, LLC | Tule Wind Project | BTA

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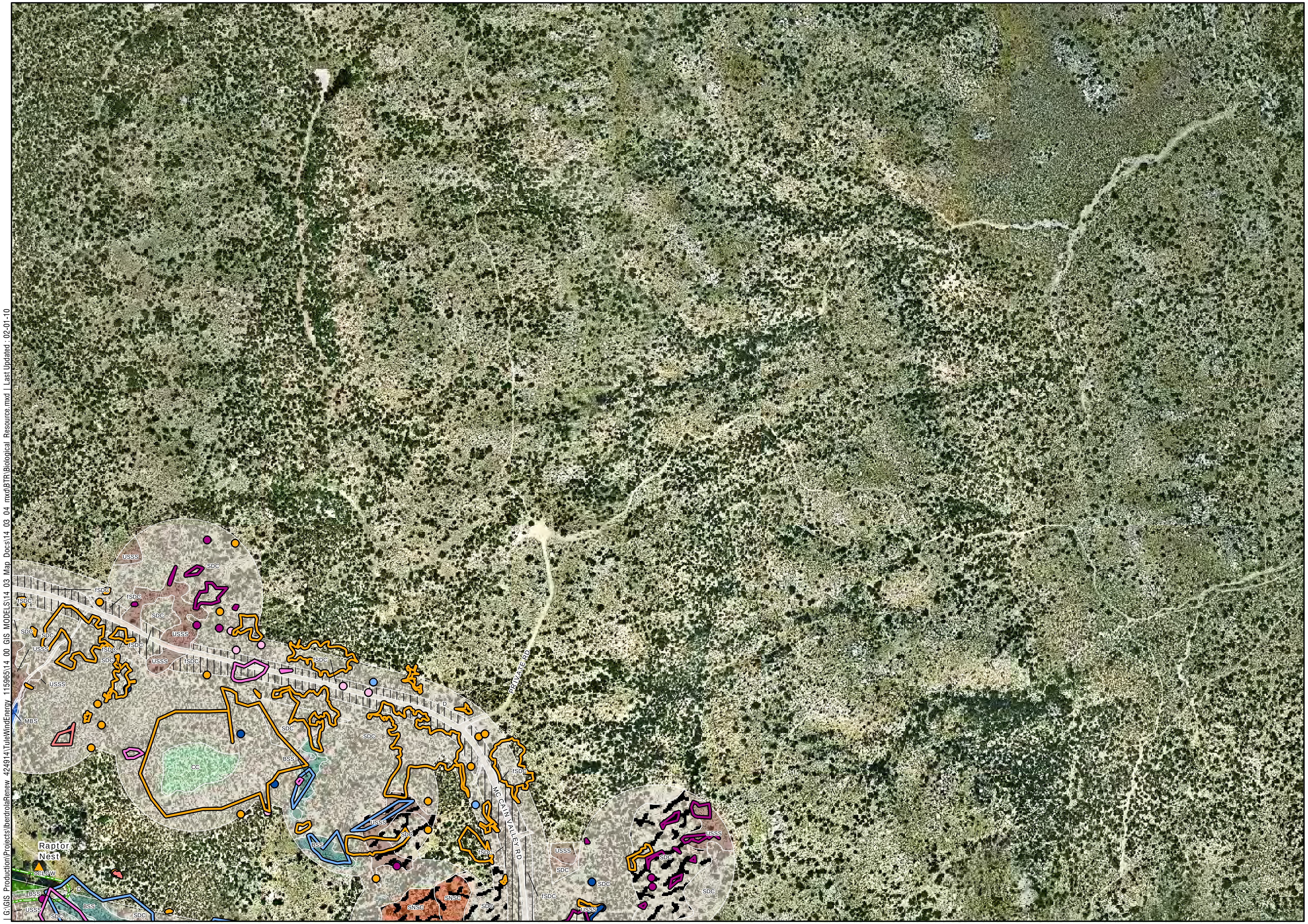

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
Disturbed
Fuel Break
Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
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- UC Un-Vegetated Channel (64200)
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- USSS Upper Sonoran Subshrub Scrub (39000)

Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 19)

Figure 20

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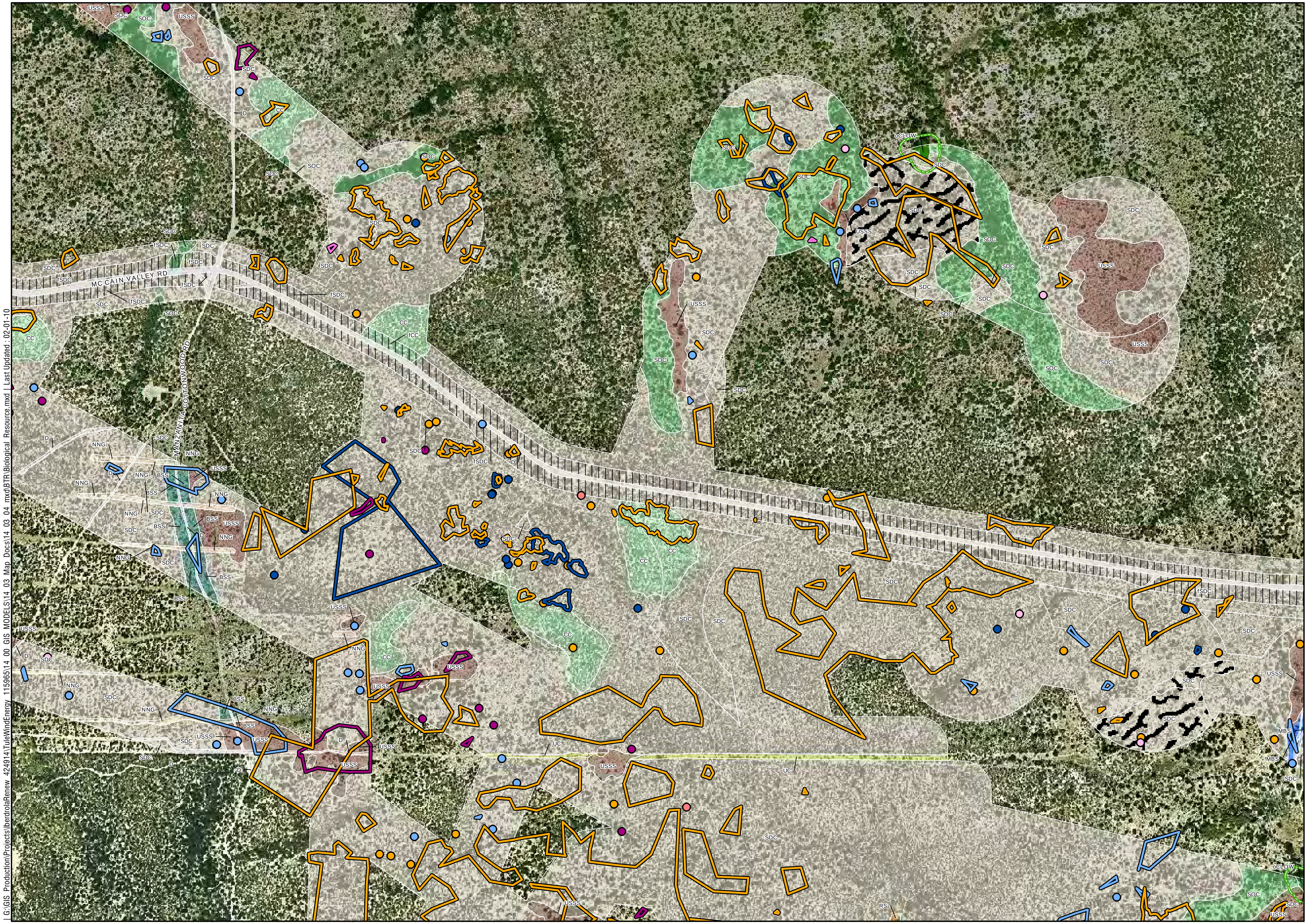

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier
- Disturbed
- Fuel Break
- Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
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- DCLOW Dense Coast Live Oak Woodland (71162)
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- Coast Horned Lizard
- Coast Patch-nose Snake
- Raptor Nest
- Raptor Nest (Great Horned Owl)
- Rosy Boa
- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
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- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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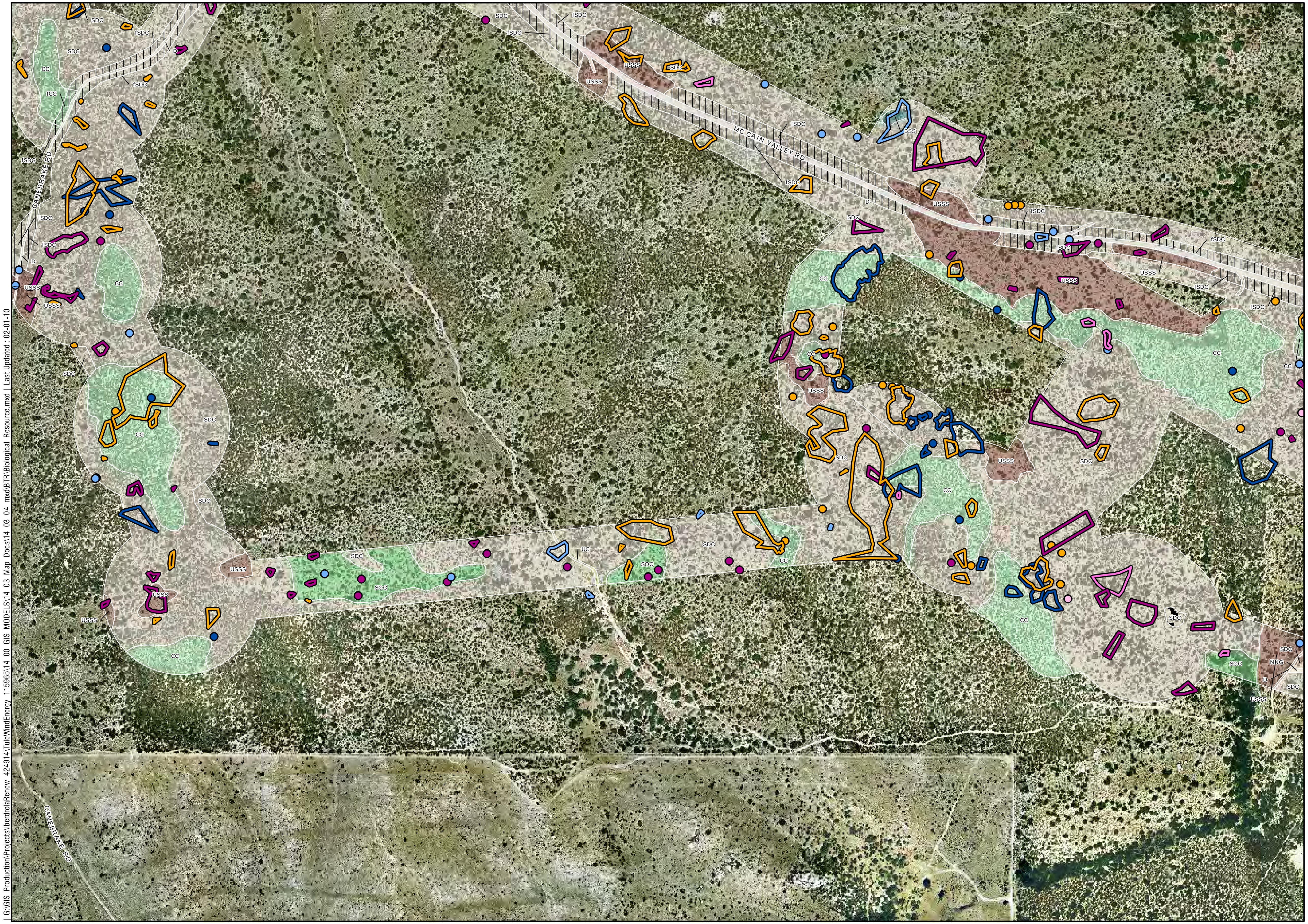
Appendix A: Biological Resources Maps (Index Map 20)

Figure 21

Tule, LLC | Tule Wind Project | BTA



Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone
Vegetation Modifier
Disturbed
Fuel Break
Burned
Vegetation Community (Nov 2009 to Nov 2010)
SWS Southern Willow Scrub (63320)
BSS Big Sagebrush Scrub (35210)
CC Chamise Chaparral (37200)
DCLOW Dense Coast Live Oak Woodland (71162)
DEV Developed (12000)
DH Disturbed Habitat 11300)
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MBS Montane Buckwheat Scrub (37K00)
MFS MuleFat Scrub (63310)
NNG Non-Native Grassland (42200)
NMC Northen Mixed Chaparral (37130)
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RS Redshank Chaparral (37300)
SOC Scrub Oak Chaparral (37900)
SDC Semi Desert Chaparral (37400)
SNSC Southern North Slope Chaparral (37E00)
SRW Southern Riparian Woodland (62500)
UC Un-Vegetated Channel (64200)
USMC Upper Sonoran Manzanita Chaparral (37B00)
USSS Upper Sonoran Subshrub Scrub (39000)
Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting
Rare Plant (April 2010 to June 2010)
Astragalus douglasii var. perstrictus
Caulanthus simulans
Deinandra floribunda
Delphinium parishii ssp. subglobosum
Geraea viscida
Heuchera brevistaminea
Hulsea californica
Linanthus bellus
Lupinus excubitus var. medius
Mimulus aridus
Mimulus palmeri
Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 21)

Figure 22

Tule, LLC | Tule Wind Project | BTA

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Appendix A: Biological Resources Maps (Index Map 22)

Figure 23

Tule, LLC | Tule Wind Project | BTA

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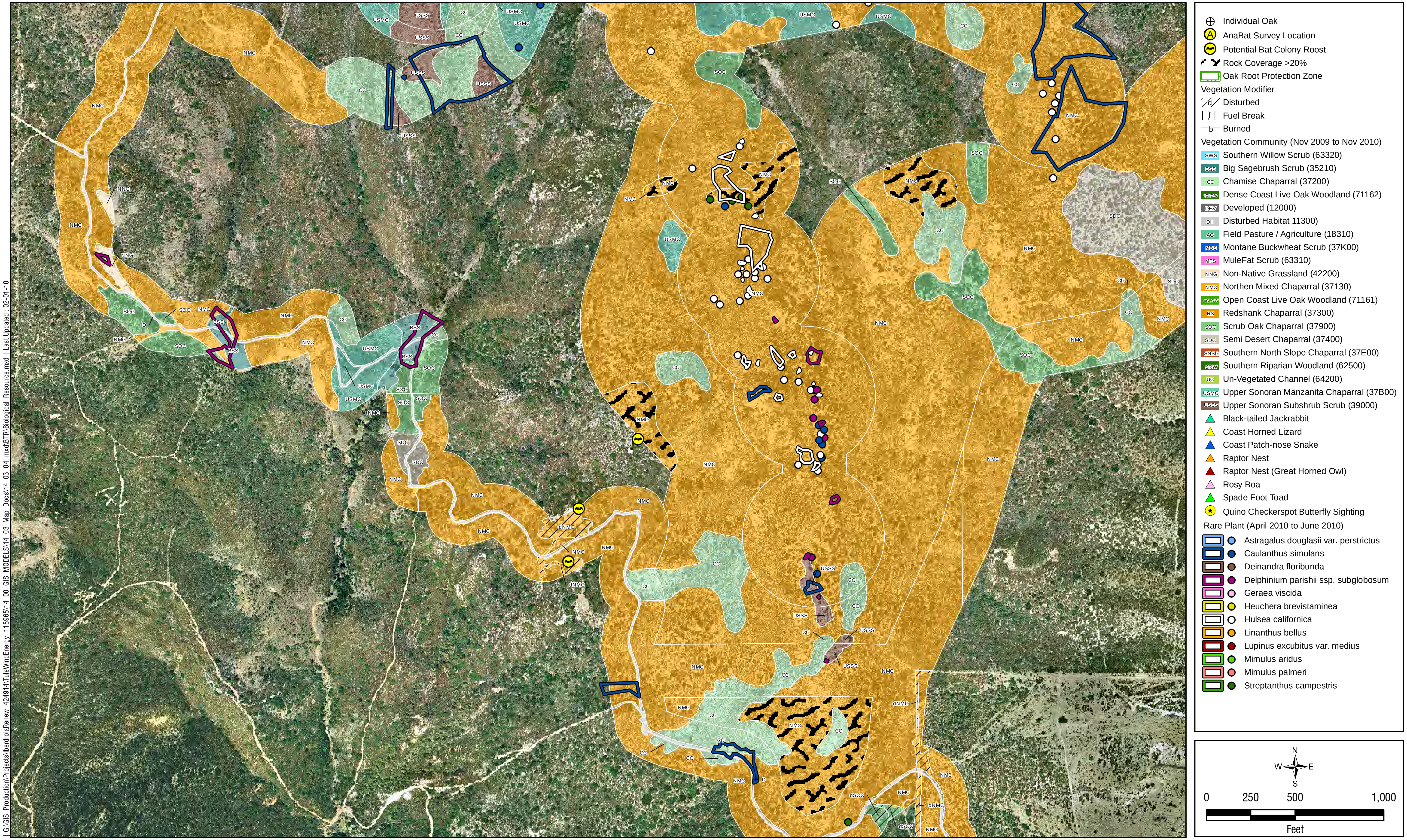
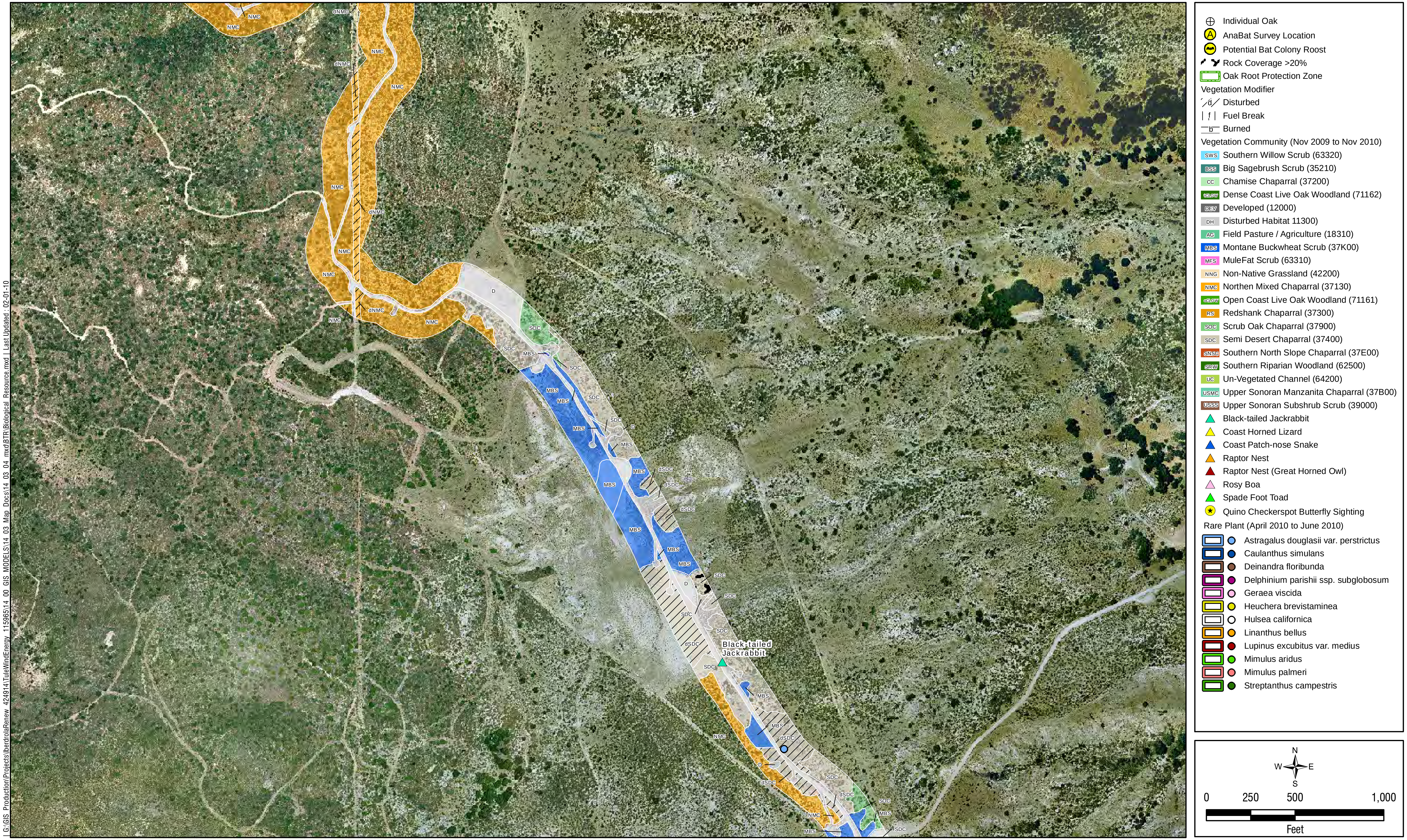


Appendix A: Biological Resources Maps (Index Map 23)

Figure 24

Tule, LLC | Tule Wind Project | BTA



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Appendix A: Biological Resources Maps (Index Map 24)

Figure 25

Tule, LLC | Tule Wind Project | BTA

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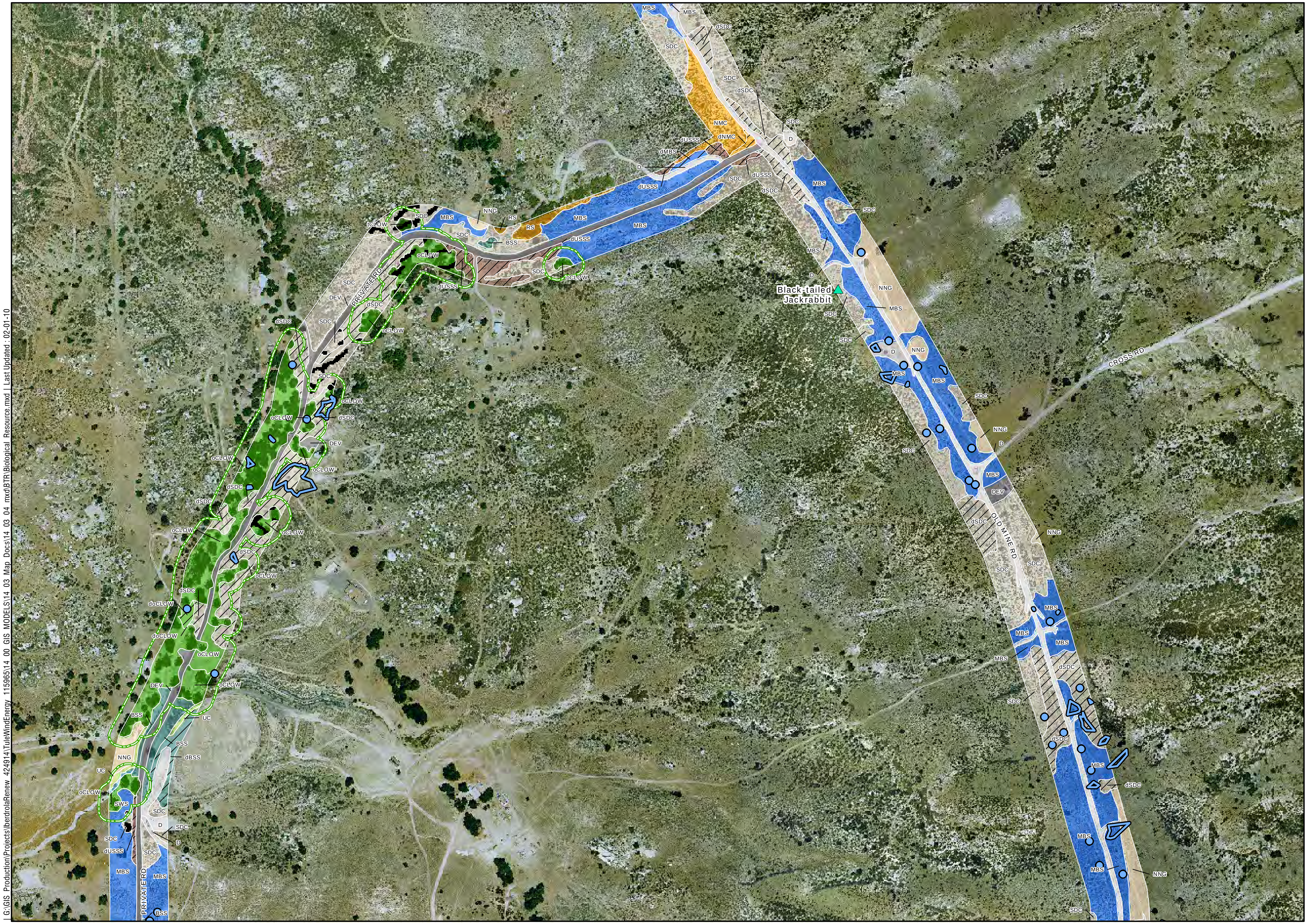

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Nov 2010)
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- SDC Semi Desert Chaparral (37400)
- SNSC Southern North Slope Chaparral (37E00)
- SRW Southern Riparian Woodland (62500)
- UC Un-Vegetated Channel (64200)
- USMC Upper Sonoran Manzanita Chaparral (37B00)
- USSS Upper Sonoran Subshrub Scrub (39000)

Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
- Astragalus douglasii var. perstrictus
- Caulanthus simulans
- Deinandra floribunda
- Delphinium parishii ssp. subglobosum
- Geraea viscida
- Heuchera brevistaminea
- Hulsea californica
- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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Feet

Appendix A: Biological Resources Maps (Index Map 25)

Figure 26

Tule, LLC | Tule Wind Project | BTA

HDR
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- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier
- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Nov 2010)
- SWS Southern Willow Scrub (63320)
- BSS Big Sagebrush Scrub (35210)
- CC Chamise Chaparral (37200)
- DCLOW Dense Coast Live Oak Woodland (71162)
- DEV Developed (12000)
- DH Disturbed Habitat 11300)
- AG Field Pasture / Agriculture (18310)
- MBS Montane Buckwheat Scrub (37K00)
- MFS MuleFat Scrub (63310)
- NNG Non-Native Grassland (42200)
- NMC Northen Mixed Chaparral (37130)
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- RS Redshank Chaparral (37300)
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- Raptor Nest
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- Spade Foot Toad
- Quino Checkerspot Butterfly Sighting

Rare Plant (April 2010 to June 2010)
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- Linanthus bellus
- Lupinus excubitus var. medius
- Mimulus aridus
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- Streptanthus campestris

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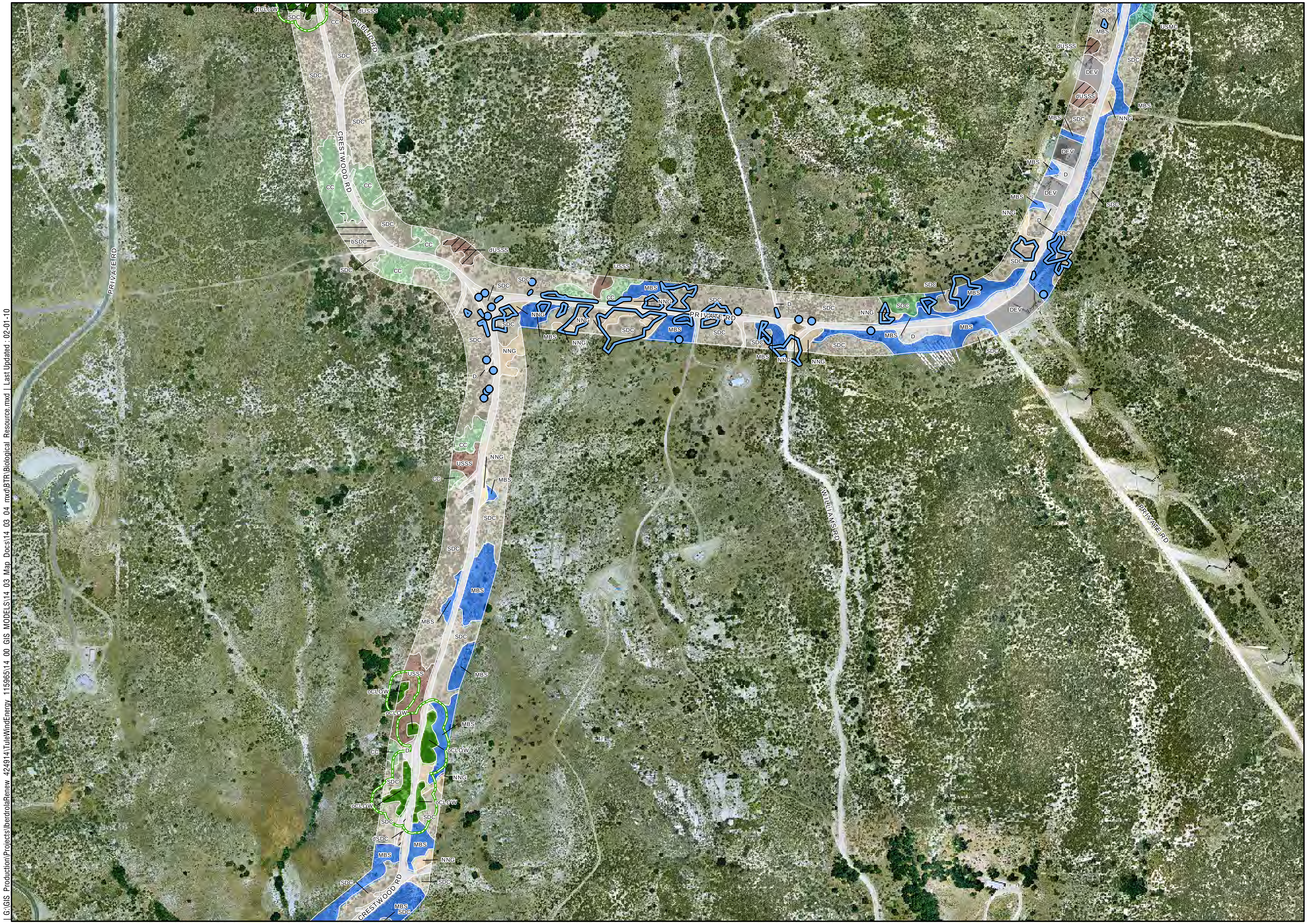
Appendix A: Biological Resources Maps (Index Map 26)

Figure 27

Tule, LLC | Tule Wind Project | BTA



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Oak Root Protection Zone

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- b Burned

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- Mimulus palmeri
- Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 27)

Figure 28

Tule, LLC | Tule Wind Project | BTA

HDR ONE COMPANY | *Many Solutions*™

- Individual Oak
- AnaBat Survey Location
- Potential Bat Colony Roost
- Rock Coverage >20%
- Oak Root Protection Zone

Vegetation Modifier

- d Disturbed
- f Fuel Break
- b Burned

Vegetation Community (Nov 2009 to Nov 2010)

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- Mimulus aridus
- Mimulus palmeri
- Streptanthus campestris

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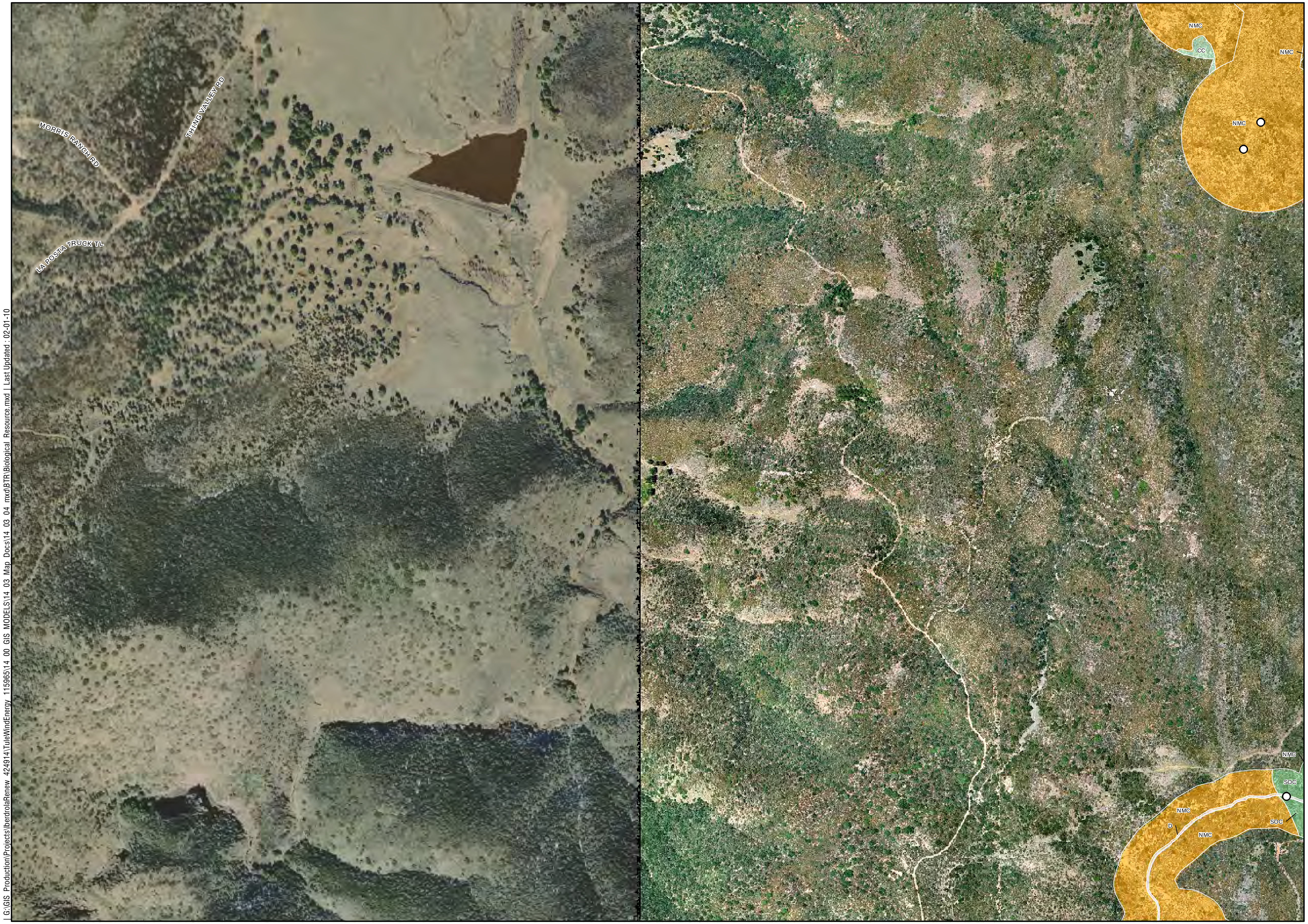
Appendix A: Biological Resources Maps (Index Map 28)

Figure 29

Tule, LLC | Tule Wind Project | BTA



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AnaBat Survey Location
Potential Bat Colony Roost
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Oak Root Protection Zone

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Fuel Break
Burned

Vegetation Community (Nov 2009 to Nov 2010)
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Hulsea californica
Linanthus bellus
Lupinus excubitus var. medius
Mimulus aridus
Mimulus palmeri
Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 29)

Figure 30

Tule, LLC | Tule Wind Project | BTA

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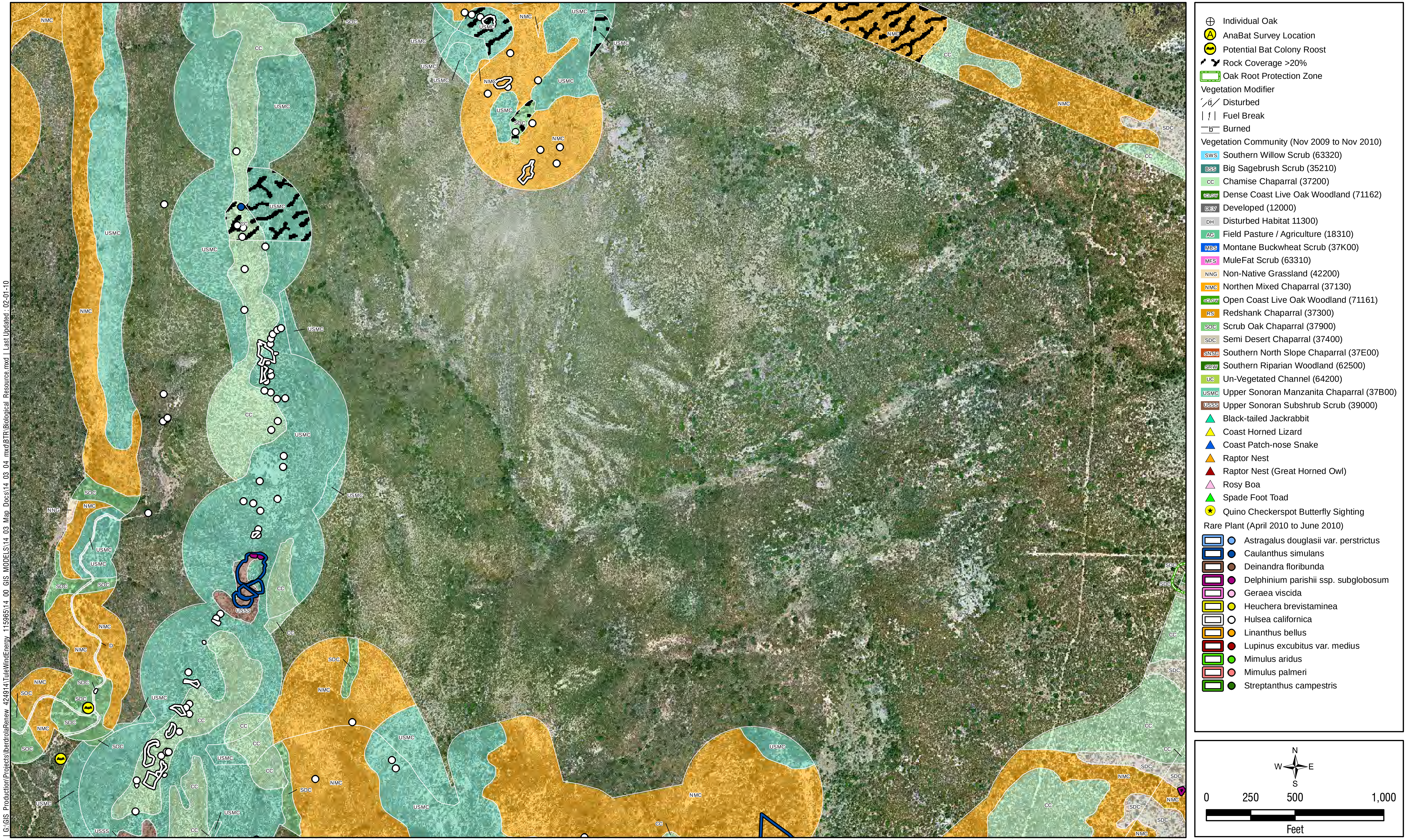

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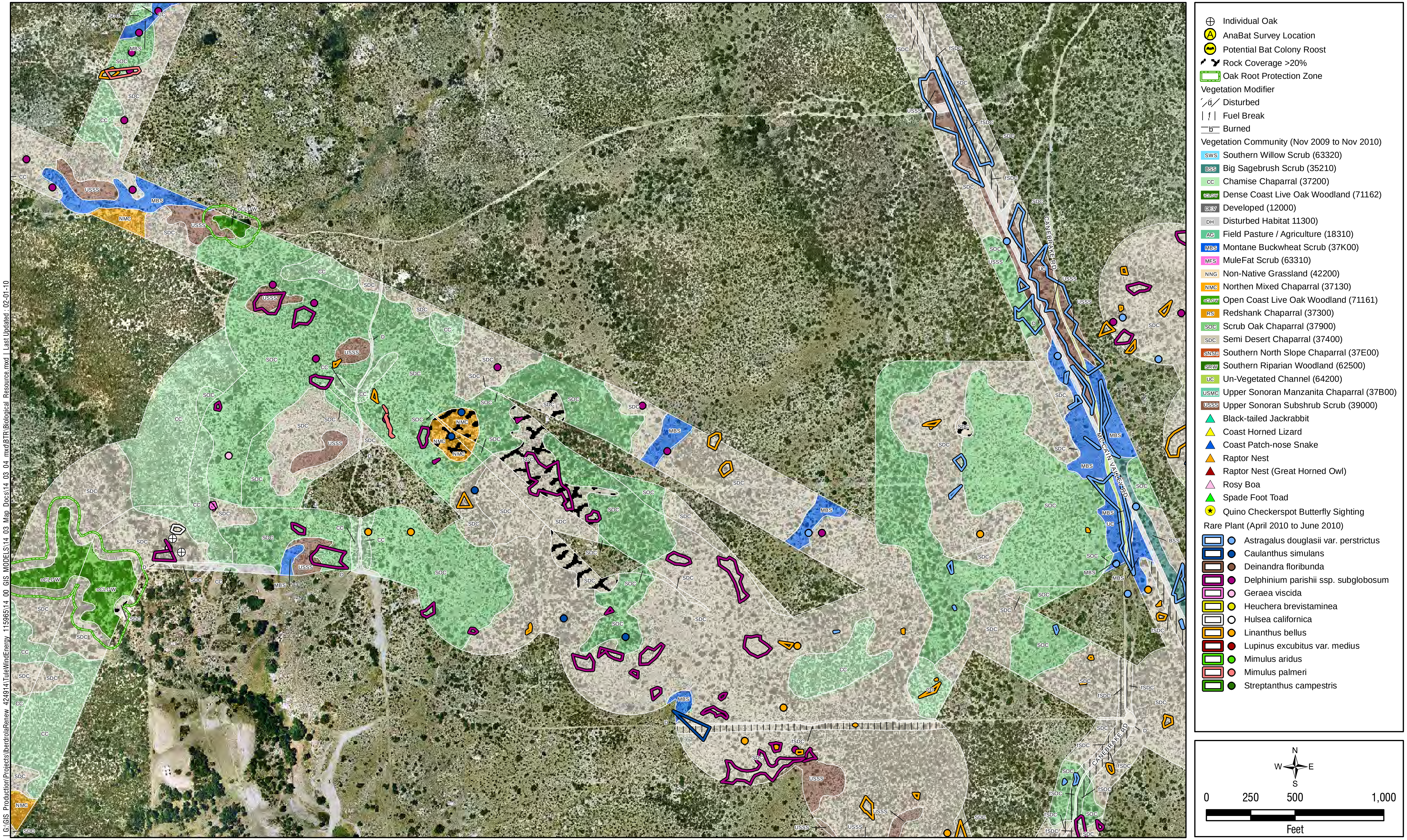
Appendix A: Biological Resources Maps (Index Map 30)

Figure 31

Tule, LLC | Tule Wind Project | BTA



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Appendix A: Biological Resources Maps (Index Map 31)

Figure 32

Tule, LLC | Tule Wind Project | BTA

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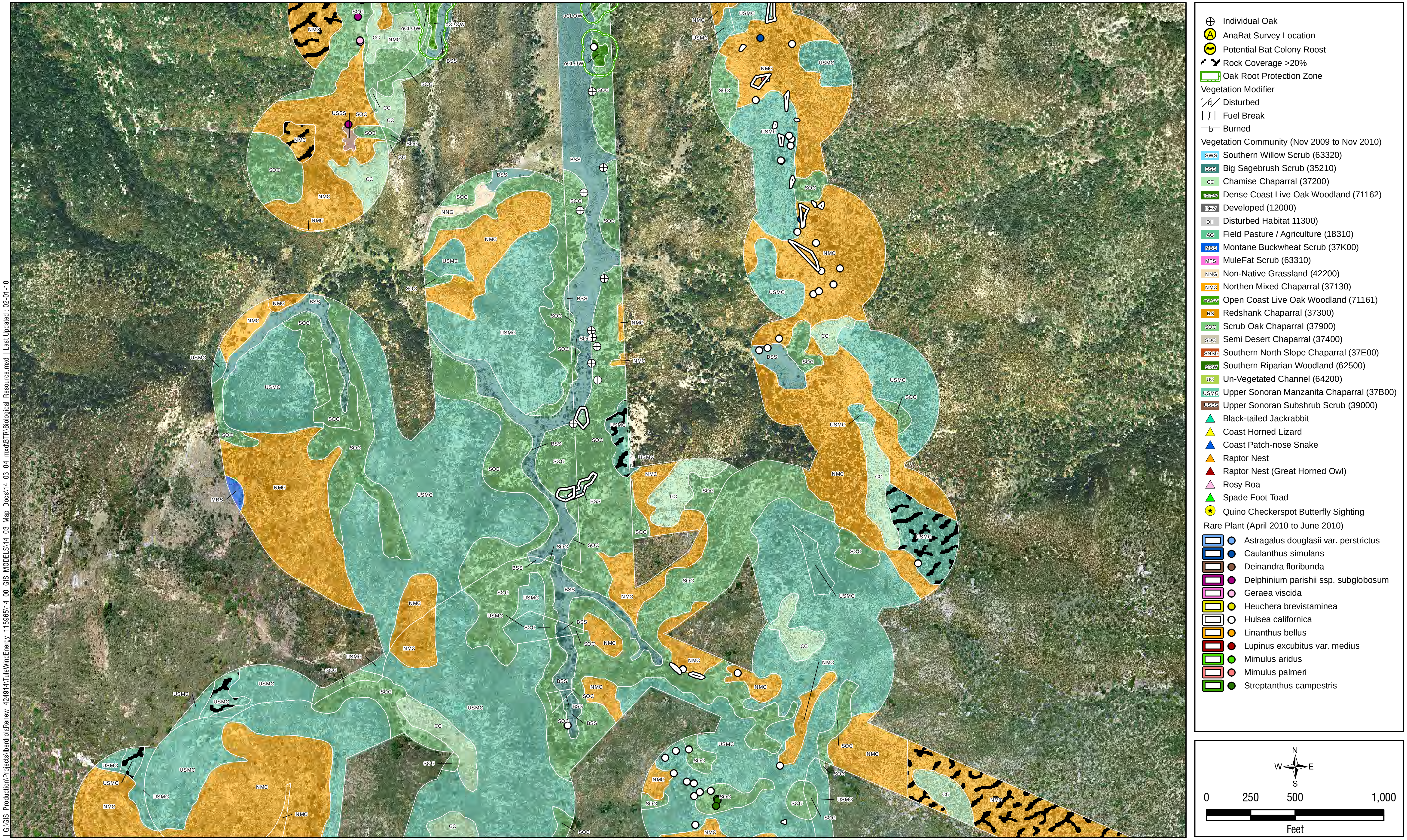
Appendix A: Biological Resources Maps (Index Map 32)

Figure 33

Tule, LLC | Tule Wind Project | BTA



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Appendix A: Biological Resources Maps (Index Map 33)

Figure 34

Tule, LLC | Tule Wind Project | BTA

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Appendix A: Biological Resources Maps (Index Map 34)

Figure 35

Tule, LLC | Tule Wind Project | BTA

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone
Vegetation Modifier
Disturbed
Fuel Break
Burned
Vegetation Community (Nov 2009 to Nov 2010)
SWS Southern Willow Scrub (63320)
BSS Big Sagebrush Scrub (35210)
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USMC Upper Sonoran Manzanita Chaparral (37B00)
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Black-tailed Jackrabbit
Coast Horned Lizard
Coast Patch-nose Snake
Raptor Nest
Raptor Nest (Great Horned Owl)
Rosy Boa
Spade Foot Toad
Quino Checkerspot Butterfly Sighting
Rare Plant (April 2010 to June 2010)
Astragalus douglasii var. perstrictus
Caulanthus simulans
Deinandra floribunda
Delphinium parishii ssp. subglobosum
Geraea viscida
Heuchera brevistaminea
Hulsea californica
Linanthus bellus
Lupinus excubitus var. medius
Mimulus aridus
Mimulus palmeri
Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 35)

Figure 36

Tule, LLC | Tule Wind Project | BTA

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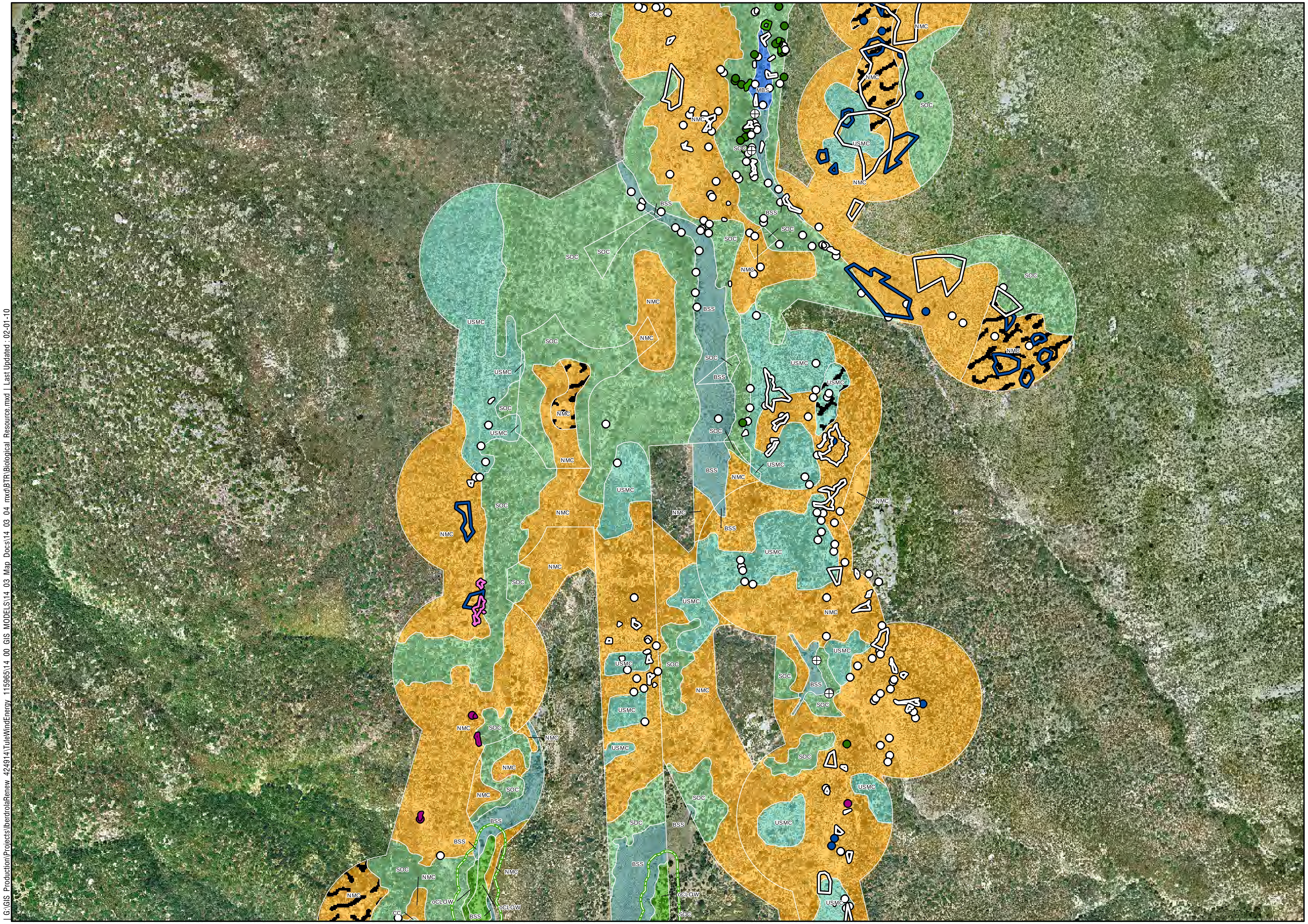

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone
Vegetation Modifier
Disturbed
Fuel Break
Burned
Vegetation Community (Nov 2009 to Nov 2010)
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BSS Big Sagebrush Scrub (35210)
CC Chamise Chaparral (37200)
DCLOW Dense Coast Live Oak Woodland (71162)
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DH Disturbed Habitat 11300)
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Mimulus aridus
Mimulus palmeri
Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 36)

Figure 37

Tule, LLC | Tule Wind Project | BTA

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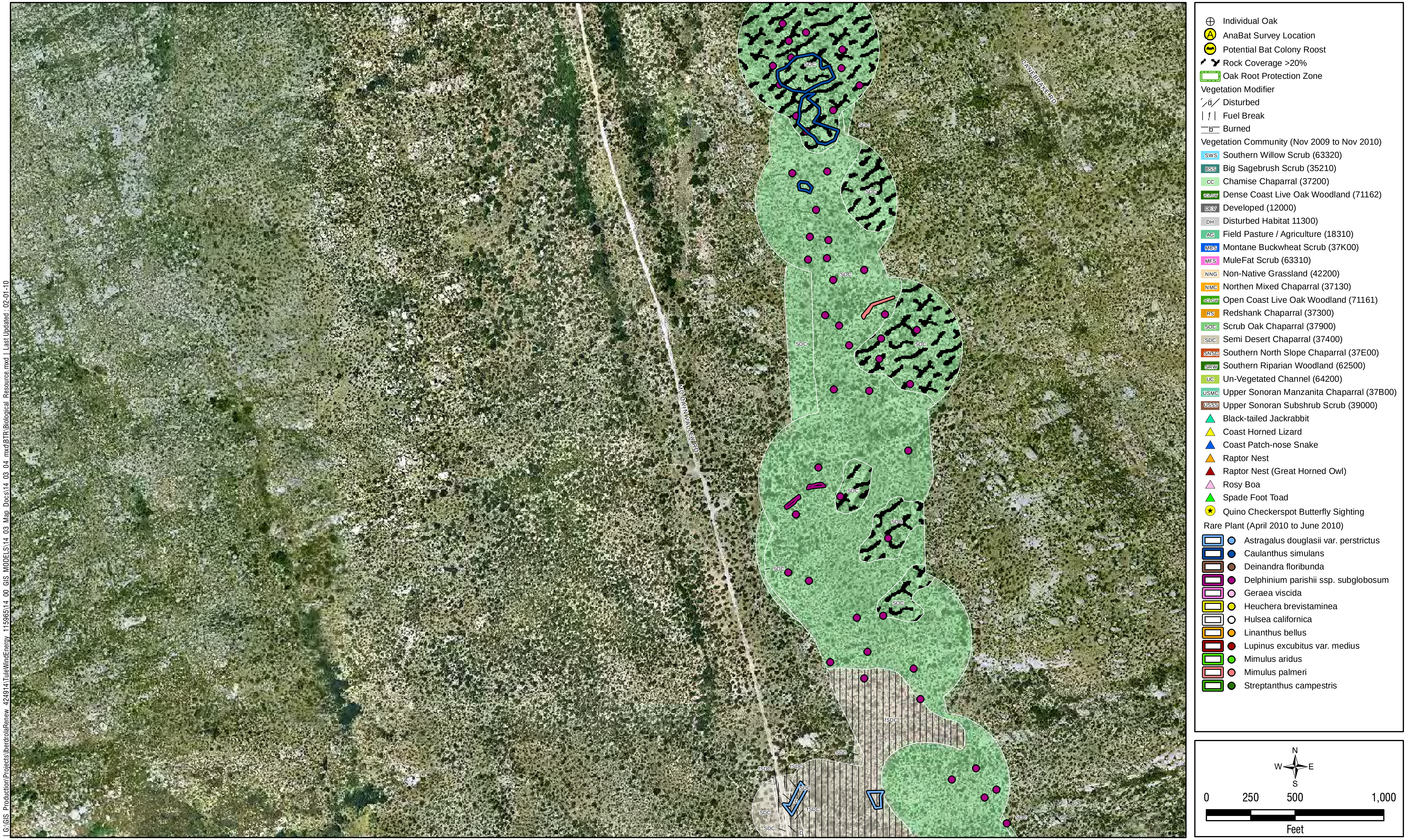

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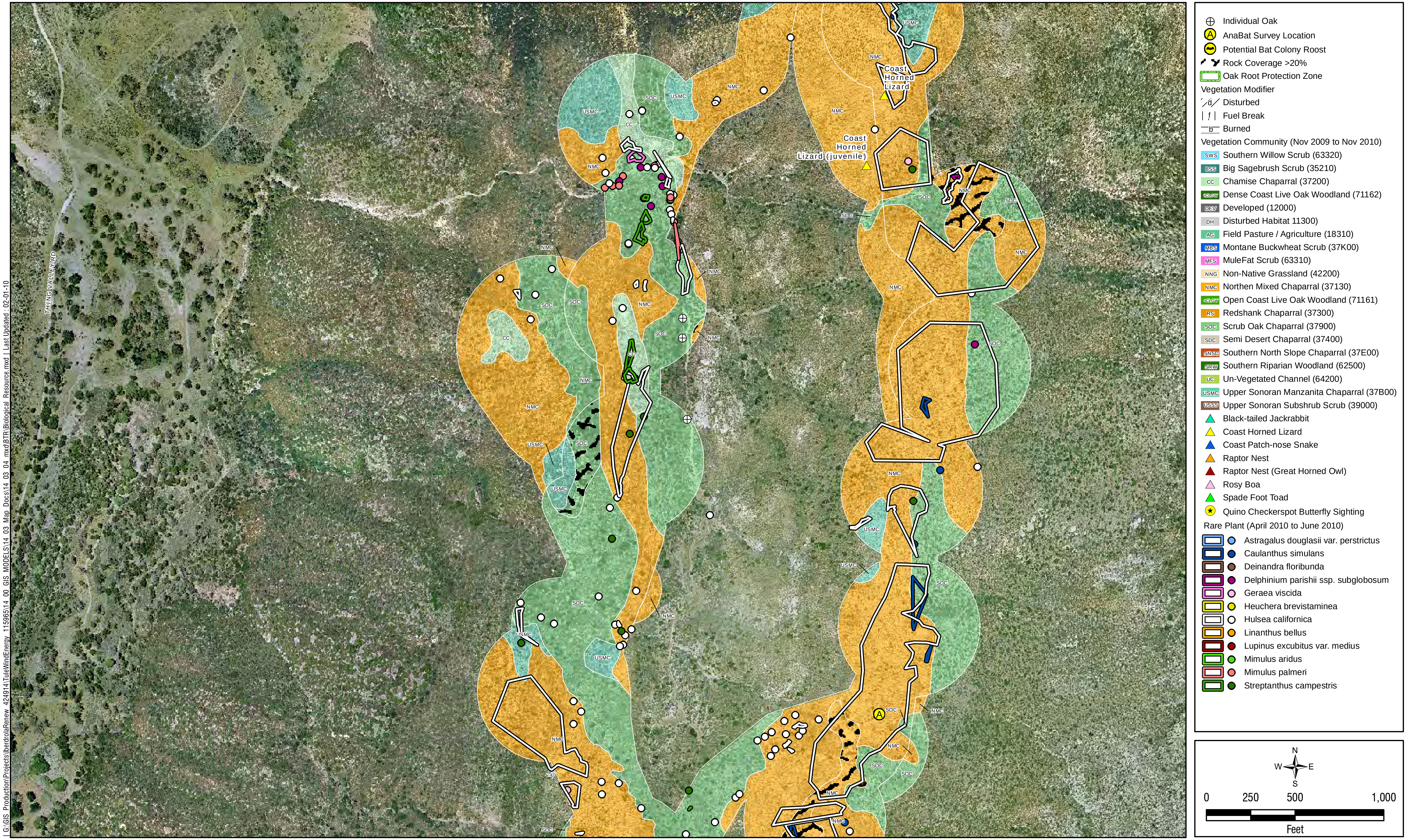
Appendix A: Biological Resources Maps (Index Map 37)

Figure 38

Tule, LLC | Tule Wind Project | BTA



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Appendix A: Biological Resources Maps (Index Map 38)

Figure 39

Tule, LLC | Tule Wind Project | BTA

Individual Oak
AnaBat Survey Location
Potential Bat Colony Roost
Rock Coverage >20%
Oak Root Protection Zone
Vegetation Modifier
Disturbed
Fuel Break
Burned
Vegetation Community (Nov 2009 to Nov 2010)
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Linanthus bellus
Lupinus excubitus var. medius
Mimulus aridus
Mimulus palmeri
Streptanthus campestris

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Appendix A: Biological Resources Maps (Index Map 39)

Figure 40

Tule, LLC | Tule Wind Project | BTA

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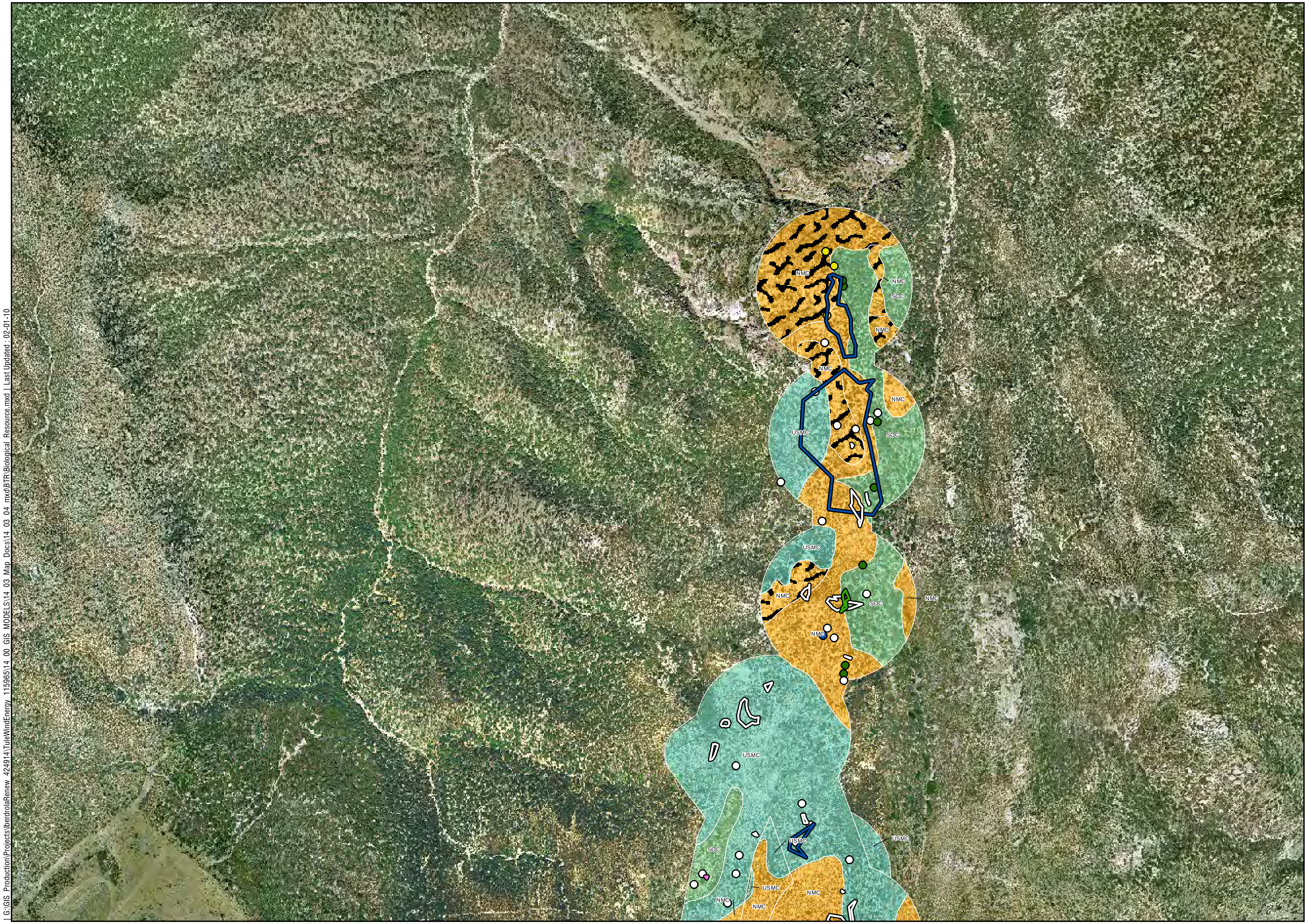

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- AnaBat Survey Location
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Appendix A: Biological Resources Maps (Index Map 40)

Figure 41

Tule, LLC | Tule Wind Project | BTA

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APPENDIX B

Groundwater Investigation Report,
Geo-Logic Associates
December 2010

GROUNDWATER INVESTIGATION REPORT

TULE WIND FARM
EAST SAN DIEGO COUNTY, CALIFORNIA

Project Proponent:
Jeffrey Durocher, Wind Permitting Manager
Iberdrola Resources
1125 NW Couch Street, Suite 700
Portland, Oregon 97209
Case No. 3300-09-019
ER No. 09-21-001

Prepared for:
HDR, Inc.
8690 Balboa Avenue, Suite 200
San Diego, CA 92123-1502

and

County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, CA 92123

Prepared By:

Sarah J. Battelle, CHG 619

Geo-Logic Associates
16885 W. Bernardo Drive, Suite 305
San Diego, CA 92127

JN:2010-0005

DECEMBER 2010

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FIGURES

APPENDIXES

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

af	Acre feet
APN	Assessor's Parcel Number
CIMIS	California Irrigation Management Information System
DWR	Department of Water Resources
ETo	Evapotranspiration
Ft	Feet
gpd	Gallons per day
gpm	gallons per minute
msl	mean sea level
SCS	Soil Conservation Survey
t/t'	Time since pumping started divided by time since pumping stopped

EXECUTIVE SUMMARY

A groundwater investigation was conducted to evaluate the groundwater resources within Thing Valley on the Ewiiaapaayp Reservation and Rough Acres Ranch in McCain Valley. The purpose of the investigation was to assess the availability of groundwater as a resource in support of the Tule Wind Farm construction project, which proposes to be extracted at these locations over a nine-month construction period. The groundwater investigation included long-term 72-hour constant rate pumping tests and subsequent analysis of the data to assess the hydraulic properties of the aquifer at each of these locations.

Results of the groundwater investigation suggest that both locations provide viable groundwater resources in support of project construction. Although groundwater resources on Tribal land are not within the jurisdiction of the County, pumping test results indicate that the Reservation well appears to be somewhat limited at the test pumping rate of 80 gallons per minute (gpm). Based on a boundary condition identified during the course of the aquifer pumping test, it is recommended that a reduced pumping rate and a reduced frequency be used at this well. However, pumping from other Reservation wells may be used to supplement pumping from the test well.

At the Rough Acres Ranch, pumping at 50 gpm showed no evidence of well interference, or significant depletion of the groundwater in storage within the pumping well. In fact, analysis of the data suggests that pumping could be doubled without any significant impact. Based on the results of the aquifer test, no significant impacts to this groundwater resource are anticipated associated with pumping at the Rough Acres Ranch test well.

1.0 INTRODUCTION

1.1 Purpose of the Report

This groundwater investigation report describes field conditions, and presents the results of field and analytical procedures used to evaluate groundwater resource availability within the Thing Valley area of the Ewiiaapaayp Reservation and the Rough Acres Ranch area of McCain Valley to support construction of the proposed Tule Wind Project. The Tule Wind Project will include the construction of 134 wind turbines, and associated service roads, transmission lines and ancillary structures over a period of approximately nine months during which time groundwater will be extracted from the underlying aquifers to support construction activities. This investigation also addresses the sustainability of groundwater withdrawal from the aquifers with respect to the existing and proposed future uses. Construction is slated to begin in the third quarter 2011, and the wind turbine facility is scheduled to come on line in the fourth quarter 2012.

Engineering estimates indicate that construction, and associated groundwater extraction, is expected to last approximately nine months. According to the project developer, groundwater demand for the project is expected to occur in four phases. Initially the project will require approximately 120,000 gallons of water per day (gpd) during road building (60 gallons per minute [gpm]), increasing to 250,000 gpd (equivalent to a constant rate of 124 gpm) while both road and turbine foundation construction and construction-related dust suppression. Water demand will then decrease to approximately 130,000 gpd (a constant rate of 65 gpm) following completion of the 72-day road construction portion of the project, while turbine foundation construction continues, and finally decrease to 100,000 gpd (50 gpm) for dust control during the remainder of the project. Subsequent site work is not expected to require additional groundwater supply. The total volume of extracted groundwater to support the project is anticipated to be approximately 65 to 125 acre-feet.

When the Tule Wind Project turbines become operational, only a limited quantity of water will be required, estimated at 2,500 gallons per day to supply the operations and maintenance building services and support staff.

1.2 Project Location and Description

The Tule Wind Farm will be developed on 15,350 acres in eastern San Diego County. The project area is located approximately one mile north in Interstate 8 (I-8), generally between La Posta Truck Trail on the west and McCain Valley Road on the east (Figure 1). Given the large size of the project area and the need for water throughout, two sites were identified for water production: Thing Valley and McCain Valley (Rough Acres Ranch). These areas are described in more detail in the following sections.

1.2.1 Thing Valley Water Production Area

The Thing Valley Water Production Area is located approximately 10 miles north of I-8 off La Posta Truck Trail/Thing Valley Road on the Ewiiaapaayp Reservation (Figure 2A). The reservation is located in an isolated, triangular-shaped, southeasterly-draining valley near the headwaters of La Posta Creek. Ground surface elevations range from 5000 to 5100 feet on the valley floor, but rise to over 6200 feet along the surrounding ridgelines. Reservation structures dot the valley floor, and include a fire station, an abandoned water bottling facility, and several abandoned, vacant, or partially-occupied residential structures. Two groundwater production wells ("north well" and "south well") were constructed in August 1980 near the center of the valley. The "south well" is connected to a series of solar panels that power an electric submersible pump. This well pumps water to a storage tank at the northwestern end of the valley, and the stored water supplies the Reservation. The "north well" is located approximately 60 feet northeast of the "south well". It is equipped with an electric submersible pump, but it is not currently used for water production. According to personal communications with the tribal representative and review of the tribal website, there are no permanent inhabitants within the valley, through tribal members visit the location periodically. The nearest residence is approximately 4 miles south of the subject valley in the larger Thing Valley. The "north well" and "south well" occupy Assessor's Parcel Number (APN) 4130800300, and the remainder of the valley spans APNs 4131503000, 4130800100, and 4130800200. The "far field" observation well is located within APN 4131503200.

1.2.2 Rough Acres Ranch Water Production Area

The Rough Acres Ranch Water Production Area is located approximately one mile north of I-8 between Ribbonwood Road on the west and McCain Valley Road on the east (Figure 2B). This site occupies the broad alluviated, southeasterly-draining McCain Valley that, within the project area, is bounded on the north and south by low-relief granitic hills. Ground surface elevations in the valley range from approximately 3600 feet above mean sea level at the northwestern corner of the project area and along the northern bounding hills to about 3450 feet above mean sea level at the southeastern corner of the project area. Within the project area, Rough Acres Ranch is surrounded by scattered residences on the west and south, a low-security detention facility and landing strip on the east, and open space on the north. The valley floor is used for livestock grazing. The Rough Acres Ranch property is crossed by a series of graded dirt roads, and contains a number of active and idle groundwater production wells that are used for domestic and agricultural supply. The area of the aquifer test spans APNs 6110600300, 6110700100, 6110900200, 6110900300, 6110900400, 6110901800, and 6111100100.

1.2.3 Project Description

The Tule Wind Farm project will include the construction of up to 134 wind turbines and associated roads, transmission lines and support facilities. Based on information provided by the project developer, IBR, the following water requirements have been estimated for the project construction (all work is anticipated to be performed over five-day work weeks):

1. Road Construction – Up to 120,000 gallons per work day will be required over a 72-day construction period. This translates to an average pumping rate of approximately 60 gpm assuming sufficient storage is available to allow for pumping seven days a week (83 gpm if the pumps are only active during work days).

2. Turbine Foundation Concrete Mixing – Turbine foundation construction is estimated to require 7,500 to 15,000 gallons of water per foundation. With 134 foundations to build, water demand will be approximately 15,000 and 30,000 gpd (assuming that two foundations are constructed each day in accordance with the 72-day work schedule). This much water use equals an average maximum pumping rate of approximately 15 gpm. The maximum continuous pumping rate (24-hours per day, seven days per week), required to support concrete mixing for three turbine foundations per day (45,000 gallons) is equivalent to 31 gpm.

3. Dust Control – During subsequent construction activities, approximately 50,000 to 100,000 gallons of water per working day will be required for dust control on project roads. The average continuous pumping rate required during these activities would be 50 gpm for an estimated nine-month construction period.

The pumping rates stipulated above are based on the assumption that there will be sufficient storage space to allow for groundwater extraction 24 hours per day, seven days per week. If there is insufficient water storage capacity to allow for continuous pump operation, higher incremental pumping rates would be required. Based on the aquifer testing performed for this report, the wells may not be able to pump at higher incremental pumping rates for peak demand.

1.3 Applicable Groundwater Regulations

Groundwater utilization for projects within the County of San Diego must address the requirements in the *County of San Diego Groundwater Ordinance No. 9826*, which stipulates that development and utilization of groundwater will not affect those who are dependent upon groundwater unless it can be demonstrated that there is an adequate supply to provide both the project and the existing users. In addition, since the project is proposing to use more than 20,000 gallons per day, it is considered a water intensive project according to the Groundwater Ordinance, and requires an evaluation of the cumulative groundwater impacts. The Ordinance provides for methods of analysis to determine potential impacts to the groundwater resource, and this investigation endeavors to address those potential impacts following the Ordinance-prescribed guidelines.

This project will result in groundwater extraction and utilization that may affect the local environment, a unique resource, and groundwater-dependent habitats. As a result, the California Environmental Quality Act (CEQA) requires an evaluation of environmental impacts associated with groundwater extraction, as well as other components of the project.

2.0 EXISTING CONDITIONS

This section of the water investigation report describes the existing conditions of the project areas, including topography, climate, geology and hydrogeology, surrounding land use, hydrology, and water quality.

2.1 Topographic Setting

2.1.1 Thing Valley Water Production Area

The Thing Valley Production area is situated in a triangular shaped valley near the headwaters of La Posta Creek. Ground surface elevations range from approximately 5100 feet above mean sea level (amsl) at the north end of the valley floor to about 5000 feet amsl at the south end of the valley floor (Figures 3A). Bounding ridgelines rise to over 6300 feet amsl. The watershed for the production area is approximately 2310 acres, draining the area to the northwest that includes the eastern flanks of the Laguna Mountains to the west and the southwestern flanks of the Sawtooth Mountains to the northeast.

2.1.2 Rough Acres Ranch Water Production Area

The Rough Acres Ranch Water Production Area is situated in McCain Valley, a broad south- to southeasterly trending valley that is generally bounded by the eastern flanks of the Laguna Mountains to the west and the In-Ko-Pah Mountains to the north and east. The valley is over 13 miles long, extending from the In-Ko-Pah Mountains to the north, and draining into Tule Canyon and Carrizo Gorge at the southeast. McCain Valley includes a large number of tributaries, including Tule Creek that passes through the Rough Acres Ranch study area as a dry wash at most times of the year. Because of the vast expanse of the drainage area, for purposes of this investigation and following guidance from the County Hydrogeologist, the watershed area is defined as an area of one-half mile radius surrounding the proposed production well (Figure 3B).

2.2 Climate

For purposes of this water supply study, the climate factors of most concern include precipitation and evapotranspiration. Data provided in this section comes from the County of San Diego Department of Planning and Land Use General Plan Update – Groundwater Study, State of California Department of Water Resources, and the California Irrigation Management System (CIMIS) databases.

2.2.1 Climate of the Thing Valley Water Production Area

At elevations of over 5000 feet, the Thing Valley WPA has a relatively mild climate. The site is located just east of the Laguna Mountains, and as a result, it sits in the rain shadow of these mountains. Historical climate data from the Campo area were used to conservatively represent conditions at this site. Based on information available from the California Department of Water Resources, the area receives an average of 15.6 inches of rainfall per year, with 80 percent of the rainfall occurring between November and March of each year. According to the State of California Reference Evapotranspiration Map developed by CIMIS, the site is located in Evapotranspiration Zone 16, with an average of 62.5 inches of evapotranspiration per year.

2.2.2 Climate of the Rough Acres Ranch Water Production Area

While 2000 feet lower in elevation, and about 10 miles east of the Thing Valley WPA, the Rough Acres Ranch WPA has similar values for rainfall and evapotranspiration. Using historical precipitation records from a monitoring station in Boulevard, California (approximately 2 miles south of the site), the average annual precipitation for the area is approximately 15.8 inches. The Rough Acres and Thing Valley WPAs are located in the same Evapotranspiration Zone, which indicates an average annual evapotranspiration of 62.5 inches.

2.3 Land Use

2.3.1 Land Use Surrounding the Thing Valley WPA

The Thing Valley WPA is located within the Ewiiaapaayp Reservation. According to the San Diego County General Plan, the site is located within the Mountain Area Community Planning Area with a land use designation as Indian Reservation. The highlands of the watershed area are located within the Cleveland National Forest, and the San Diego County General Plan identifies this area as the Central Mountain Community Planning Area, with an open space forest designation.

There are no full-time residents or industries within the Reservation limits, though the Reservation includes several abandoned structures and structures that are used periodically, as well as a fire station and a structure that was to be used as a water bottling plant. Aside from these structures, the surrounding land is undeveloped mountain and valley terrain. The nearest residents are located approximately 3 miles south of the WPA at Thing Valley Ranch.

2.3.2 Land Use Surrounding the Rough Acres Ranch WPA

The Rough Acres Ranch WPA is located in a sparsely populated region of the county. According to the San Diego County General Plan, the site is located within the Mountain Area Community Planning Area and has a land use designation as general agricultural. Properties surrounding the site are designated as general rural, and one parcel to the east is designated as National Forest/State Parks.

Consistent with the designated land uses, the Rough Acres Ranch is used for livestock grazing, and this property is surrounded by large lot residences to the west and south, a low-security detention center and rural air field to the east, and high desert open space to the north and east.

2.4 Water Demand

Because there are no residents or uses for groundwater within the Thing Valley WPA, and the County has no jurisdiction over groundwater use on tribal lands, there is no requirement to evaluate water demands in this area.

For the Rough Acres Ranch WPA, a conservative approach was used to ensure that the proposed project would not affect adjacent groundwater users. It is assumed that all groundwater for this project will be derived from the Rough Acres Ranch WPA even though the project will also utilize water from the Thing Valley WPA.

As recommended by the County Groundwater Geologist, the water production area was restricted to a one-half mile radius surrounding the production wells (the estimated maximum area of interference from the pumping well). However, to evaluate other groundwater uses, the evaluation radius was extended in some instances to about three quarters of a mile. Within this evaluation area, seven single family residences were identified, including one residence that operates an apparent poultry farm. In addition to the residences, the Rough Acres Ranch property is utilized for free-range livestock grazing, with an estimated head count of 100 animals. Using residential water demand values provided by the County's Guidelines for Determining Significance and published values for livestock water usage, the groundwater demand for the project is estimated in the following table:

Water Use	Demand (Acre-Feet per Year)	Demand (Acre-Feet per Month)
Proposed Project Construction (9 month duration)	60	6.7
Post-Project Maintenance	2.8	0.23
Residential Water Use (7 residential properties; 0.5 acre-feet per year per residence)	3.5	0.29
Livestock Grazing (100 head; 19 gallons per day per animal)	2.13	0.18
Poultry Raising (500 birds; 770 liters per 1000 birds per day)	0.11	0.01
Totals:	**65.74**	**7.18**

2.5 Geology and Soils

The Thing Valley and Rough Acres Ranch WPAs are situated within batholithic rocks of the Peninsular Ranges Geomorphic Province. Batholithic rocks were generally emplaced in the late Mesozoic to early Cenozoic eras. Post-emplacement uplift, weathering, and erosion has resulted in formation of surficial soils and alluvial deposits that mantle the crystalline bedrock. Due to the remote locations and paucity of mineral resources, neither site has been studied in detail, and most of the available geologic information comes from regional geologic studies, including the "Preliminary Geologic Map of the 30' x 60' El Cajon Quadrangle" (Todd, 2004) and "Mineral Resources of the Sawtooth Mountains and Carrizo Gorge/Eastern McCain Valley Wilderness Study Areas (Todd, et al., 1987). Soils information is provided by the United Sates Department of Agriculture - Soil Conservation Service and Forest Service. Geologic and soils conditions specific to each WPA and its watershed are described below.

2.5.1 Geology and Soils of the Thing Valley WPA

The Thing Valley WPA is flanked by the Laguna Mountains to the west and the Sawtooth Mountains to the north and east. Based on the available geologic information, in the vicinity of the WPA, the two mountain ranges are geologically similar, and are composed of the early Cretaceous-age Las Bancas Tonalite, an assemblage of lightly foliated tonalite, granodiorite, and quartz diorite. In addition, at the northernmost portion of the watershed, the Sawtooth Mountains are also underlain by a variety of Triassic and Jurassic-age metasedimentary rock units.

Along the valley floor, the crystalline bedrock is overlain by recent alluvium. Based on the logs of the groundwater production wells, the thickness of alluvium is estimated to be approximately 30 to 50 feet.

Based on maps prepared by the Soil Conservation Service (now Natural Resources Conservation Service), and presented on Figure 4A the following table presents the soil types and their properties within the Thing Valley WPA watershed area:

Soil Type	Moisture Holding Capacity (in)	Runoff Potential	Maximum Runoff Percentage	Area (acres)
Acid Igneous Rock Land (AcG)	0.10	Rapid	100%	250
Bancas Stony Loam (BbG)	3-5.5	Rapid to Very Rapid	81%	1000
Crouch Coarse Sandy Loam (CtE)	4.5-7	Medium	71%	50
Crouch Coarse Sandy Loam (CtF)	4-6	Rapid	74%	40
Crouch Rocky Coarse Sandy Loam (CuE)	3.5-5	Medium	78%	30
Crouch Rocky Coarse Sandy Loam (CuG)	3.5-5	Rapid to Very Rapid	78%	100
Mottsville Loamy Coarse Sand (MvC)	4-5	Slow to medium	74%	40
Mottsville Loamy Coarse Sand (MvD)	4-5	Medium	74%	30
Sheephead Rocky Fine Sandy Loam (SpG2)	2-3	Rapid to Very Rapid	87%	750
Steep Gullied Land (StG)	Not Available	Rapid	100%	10

2.5.2 Geology and Soils of the Rough Acres Ranch WPA

The Rough Acres Ranch WPA is located at the eastern edge of the Peninsular Ranges. Available geologic information in the vicinity of the WPA indicates that the area is underlain by the early to late Cretaceous era La Posta Tonalite, an assemblage of horneblende-biotite trondhjemite and granodiorite that is exposed on the low-relief highlands surrounding and within McCain Valley. Along the valley floor, the crystalline bedrock is overlain by recent alluvium. Based on the logs of the groundwater production wells in the valley, the thickness of alluvium is estimated to be 30 and 70 feet.

Based on maps prepared by the Soil Conservation Service (now Natural Resources Conservation Service), presented on Figure 4B, the following table presents the soil types and their properties within the Rough Acres Ranch WPA watershed area:

Soil Type	Moisture Holding Capacity (in)	Runoff Potential	Maximum Runoff Percentage	Area (acres)
Acid Igneous Rock Land (AcG)	0.1	Rapid	100%	10
Calpine Coarse Sandy Loam (CaC)	4.5-6.5	Slow to medium	72%	5
La Posta Loamy Coarse Sand (LaE2)	2-3	Medium	87%	60
La Posta Rocky Loamy Coarse Sand (LcE2)	1-2	Medium	94%	150
Loamy Alluvial Land (Lu)	6-9	Slow	62%	120
Mottsville Loamy Coarse Sand (MvC)	4-5	Slow to medium	75%	110
Tollhouse Rocky Coarse Sandy Loam (ToE2)	1-2	Medium to rapid	94%	50

2.6 Hydrogeologic Units

This section of the water investigation report describes the water-bearing units at each site and their general hydraulic properties.

2.6.1 Hydrogeologic Units of the Thing Valley WPA

The hydrogeologic units of the Thing Valley WPA include the recent alluvial soils and the underlying fractured Las Bancas Tonalite. The alluvium is restricted to the lowest portion of the valley floor; based on available geologic maps and Soil Conservation Service surveys, it underlies less than 10 percent of the watershed. In contrast, the Las Bancas Tonalite underlies the entire watershed area, either directly or beneath the alluvium.

A California State Department of Water Resources well completion report (no. 058539) is available for the "south" well that was used as the observation well for the aquifer testing in this study. Drilling logs for the "north" aquifer pumping test well and far-field observation wells were not available. Based on the log for the south well, the alluvium at this location is approximately 12 feet thick. Relatively weathered "granitic" bedrock extends from 12 to 50 feet below ground surface, and relatively unweathered "granitic" rock was encountered from 50 feet to the bottom of the hole at 400 feet. The geologic conditions at the north and far-field wells would be expected to be generally similar based on inspection of the surface geology.

A static water level was measured at each of the three test wells prior to the start of the step-drawdown test (Section 2.7). The static water levels in each well were sufficiently deep, and is likely below the base of alluvium. This suggests that alluvium groundwater is ephemeral, and does not contribute significantly to the available groundwater resource at this site.

The fractured Las Bancas Tonalite appears to be the most significant aquifer within the Thing Valley WPA. Using the recommendations from the County Groundwater

Geologist, a specific yield of 0.1 percent has been established for this unit. Figure 6 presents a conceptual hydrogeologic cross section through the Thing Valley WPA.

2.6.2 Hydrogeologic Units of the Rough Acres Ranch WPA

The hydrogeologic units of the Rough Acres Ranch WPA include the recent alluvial soils and the underlying weathered and fractured La Posta Tonalite. As shown on Figure 7, the alluvium covers the broad valley floor, and based on available geologic maps and Soil Conservation Service surveys (Figure 4B), it underlies approximately 50 to 60 percent of the watershed. The alluvium is directly underlain by the Las Bancas Tonalite, which is also exposed as outcroppings throughout the watershed. Figure 8 depicts a conceptual hydrogeologic cross section through this WPA.

While seven wells were used for the aquifer test in this study area, only the pumping well and two observation wells are within the prescribed one-half mile radius watershed. A California State Department of Water Resources well completion report (no. 1089956) is available for the pumping well. Geologic information suggests that the alluvium in the center of the valley is approximately 70 to 80 feet thick. Weathered bedrock extends to a depth of about 230 feet, and below that depth to the total depth of boring (420 feet), the crystalline rock is relatively unweathered. Static water levels measured in the pumping and observation well suggest that the lower 45 to 50 feet of alluvium is saturated. Little alluvium is noted on the logs for other observation wells in the test area, and well depths typically range from 400 to 900 feet, indicating that the fractured La Posta Tonalite is the primary source of groundwater for production wells in the area.

The fractured La Posta Tonalite appears to be the most significant aquifer within the Rough Acres Ranch WPA, with the alluvium providing at least seasonal recharge to the subjacent bedrock aquifer. Using the recommendations from the County Groundwater Geologist, a specific yield of 0.1 percent has been established for this bedrock aquifer. Published specific yield values for mixed sand and gravel aquifers (Driscoll, 1986) indicate a range of 10 to 25 percent.

2.7 Hydrologic Inventory and Groundwater Levels

2.7.1 Thing Valley WPA Hydrologic Inventory

As described in Section 2.6.1, two groundwater production wells are located within the Thing Valley WPA watershed. The wells are owned by the Ewiiaapaayp Tribe. The "south" well is currently used for as-needed water supply and pumps water to a storage tank. The "north" well was constructed to supply water to a proposed water bottling facility, but it is not currently used. Outside of the project watershed area, approximately one mile south of the north and south wells, is the "Thing Valley" observation well that is located near the confluence of La Posta Creek and an unnamed tributary. No other wells are known to exist within the watershed area. Well construction information and static water levels are provided in the following table.

Well Name	Total Depth (ft)	Seal Depth (ft)	Production Rate (gpm)	Water Level – August 2010 (feet below top of casing)
"North" Well	400	22	Idle	54.81
"South" Well	Unknown	Unknown	Up to 30 gpm	49.34
"Thing Valley" Well	Unknown	Unknown	Idle – No Pump	77.62

Locations for these wells are shown on Figure 5. The locations and elevations of these wells are not surveyed; however, using approximate ground surface elevations to establish an approximate groundwater elevation, a hydraulic gradient of 0.05 feet per foot is estimated. The approximated groundwater elevations suggest a southeasterly flow direction down Thing Valley.

According to a report provided by the Ewiiaapaayp Tribe, the "South" well has the potential to produce water at a rate of about 30 gpm. It is used to provide water to a storage tank that supplies water to tribal members at the residences and the fire station. Since there are no permanent residents in the reservation, the south well only pumps occasionally to maintain the water level in the tank.

The North well is capable of producing groundwater at up to 90 gpm, and a pumping test conducted on the well following its construction indicates a specific yield of 55 gpm. The North well was constructed to provide water to a commercial water bottling facility constructed adjacent to the tribal fire station, though the bottling facility never opened and the North well remains idle.

The Thing Valley well is located approximately one mile south of the north and south wells and is not equipped with a pump or power. The well has no cap, and is open to the atmosphere and needs to be secured to be in compliance with California State Well Standards (Bulletin 74-90).

Surface water bodies within the Thing Valley WPA watershed include the ephemeral La Posta Creek and its unnamed, ephemeral tributaries. La Posta Creek passes within approximately 400 feet to the west of the south well. There are no reservoirs or ponds within the watershed, and no springs have been mapped in the area.

2.7.2 Rough Acres Ranch WPA Hydrologic Inventory

While only two wells (Wells 6 and 6a) are located within the prescribed 502-acre watershed area, seven wells surrounding the project area were evaluated during this project. Of these, four are equipped with pumps and are actively used for municipal water supply or to provide water to livestock. The remaining three well are either equipped with pumps and are not currently used, or have not been equipped with pumps. Well construction, current estimated production, and static water levels are provided on the following table.

Well Name	Total Depth (ft)	Seal Depth (ft)	Production Rate (gpm)	Water Level – August 2010 (feet below top of casing)
Well No. 6a "North" Well	385	75	1	28.0
Well No. 6 "South" Well	Unknown	Unknown	1	27.80
Walker Residence Well	Unknown	Unknown	<0.5	54.78
Well No. 9 Livestock Supply Well	Unknown	Unknown	<0.5	29.45
Well No. 2	185	24	No Power	23.92
Well No. 4	185	91	No Pump	10.98
Well No. 8	970	50	Pump	17.95

Locations for these wells are shown on Figure 7. The locations and elevations of these wells are not surveyed; however, using approximate ground surface elevations to establish an approximate groundwater elevation, a hydraulic gradient of 0.01 feet per foot is estimated. The approximated groundwater elevations suggest convergent flow toward McCain Valley, with a general southeasterly flow within the valley.

Based on aquifer testing conducted as part of this investigation and well testing conducted during construction, Well No. 6 and No. 6a are capable of producing groundwater at 50 to 60 gpm. The well test conducted on well No. 6a after construction indicates a specific yield of 60 gpm. Currently these wells are principally used to supply water to grazing livestock, and are estimated to provide water at a rate of about 1500 gallons per day, or 1.05 gpm on average.

Well logs were not available for the Walker residence well, which provides potable water for a single-family residence. Using recommendations provided by the County Groundwater Geologist for a typical residential well, it is estimated that this well produces about one-half acre-foot per year, or about 0.5 gpm on average.

Well logs were also not available for the "Livestock" Well No. 9 located between the Walker residential well and Wells No. 6 and No. 6a. This well provides water for grazing livestock in troughs located throughout the ranch. It is estimated that this well produces water at a rate of about 500 gallons per day, or about one third of a gpm on average.

Well No. 2 is located approximately one mile northeast of Wells No. 6 and No. 6a. First groundwater was encountered at a depth of 70 feet below ground surface in "black and white rock" interpreted to be the La Posta tonalite. Well tests conducted during construction indicate a specific yield of 10 gpm over a three hour test period. Currently, the well is idle.

Well No. 4 is located approximately one mile north of Wells No. 6 and No. 6a. First groundwater was encountered at a depth of 35 feet in "decomposed granite". Well tests conducted during construction indicate a specific yield of 15 gpm over a one hour test period. There is no pump in this well.

Well No. 8 is located about 3 miles east of Wells No. 6 and No. 6a, just east of McCain Valley Road. First groundwater was encountered at a depth of 30 feet in "weathered granitic rock". A specific yield was not achieved during the post-construction well test, which pumped the well at 50 gpm for 8 hours and recorded 800 feet of drawdown.

In addition to the wells within the prescribed watershed and those used as observation wells during the aquifer testing conducted as part of this study, there are seven residences within three-quarters of a mile of the project site, and each has its own water supply well. It is estimated that each of the seven additional residences utilizes about one-half acre-foot of water per year, and one of the residences has a small poultry farm with an estimated 500 birds that utilizes an additional 0.11 acre-foot of water per year. In total, the additional water use in the vicinity of the site is estimated to be about 3.61 acre-feet per year, or about 2.25 gpm on average.

Surface water bodies within the Rough Acres Ranch WPA watershed include the ephemeral Tule Creek. Although the USGS topographic map of the area identifies a small reservoir near the northwestern portion of the watershed, that feature was not observed within the study area. Rough Acres Ranch discharges water from Wells No. 6 and No. 6a to a small livestock watering reservoir about 2000 feet north of these wells. The reservoir is not lined, and as a result, water infiltrates rapidly into the ground. A groundwater spring was observed on the canyon wall adjacent to Well No. 4. The estimated flow rate from the spring is less than 1 gpm. No other surface water bodies are present within the watershed or surrounding study area.

2.8 Water Quality

Because this water development project is intended to provide water for construction rather than for potable use, no water quality evaluation has been conducted.

3.0 WATER QUANTITY IMPACT ANALYSIS

Water quantity impact analyses were performed in accordance with the County of San Diego *Groundwater Ordinance*, the County's *Guidelines for Determining Significance and Report Format and Content Requirements – Groundwater Resources* and the approved Groundwater Investigation Workplan and Well Test Plan developed for the Tule Wind Project. Based on the County guidelines for determining significance and correspondence with the County, the water quantity analysis section must address well interference, and 50 percent reduction of groundwater in storage associated with groundwater extraction for construction. In addition, in accordance with the County's Groundwater Ordinance, because it is anticipated that groundwater extraction will exceed 20,000 gpd, which is considered a water intensive use, a cumulative groundwater evaluation is required.

This section provides an analysis of the groundwater conditions and a determination of significant impacts to the groundwater resources, based on CEQA guidelines. It should be noted however that the County does not have jurisdiction over water use on tribal lands, including the wells in Thing Valley on the Ewiiaapaayp Reservation. Aquifer testing on the Reservation was performed to assess available water for the project construction and a summary of these results is included herein.

Because the Thing Valley WPA is located within the Ewiiaapaayp Reservation, there is no regional authority governing the use of this water. As a result, the water quantity impact analysis has been limited to performance of a 72-hour aquifer pumping test from the North Well at a rate of 80 gpm followed by measurements of recovery back to static conditions. Over the test, the water level was drawn down approximately 80 feet in the pumping well, and about 17 feet in the nearest observation well, and less than one quarter of a foot in the Thing Valley observation well about one mile downgradient of the pumping well. Analysis of the test data as presented in Appendix A.

Thing Valley Water Quantity Impact Analysis. Thing Valley test data were recorded by Solinst Levelogger Gold pressure transducer data loggers placed in the pumping well and two observation wells. The aquifer transmissivity (the capacity of the well to transmit water) was calculated by a variety of methods using AquiferTest Pro, Version 3.5, numerical modeling software (Röhrich and Waterloo Hydrogeologic, 2002) and ranges from about 100 to 835 ft^2/day depending on the data (early, middle, late portions of the test) obtained during pumping and recovery; the average transmissivity was calculated to be 393 ft^2/day. A summary of the calculated transmissivity values and additional calculated values from the pumping test are provided in Appendix A.

A plot of time versus drawdown was developed from the aquifer pumping test data. Based on the data, a projected total drawdown in the pumping well of 190 feet is expected. A negative boundary condition occurs after 1700 minutes (about 28 hours) and pumping of 136,000 gallons of water. During the intial 1700 minutes of the pumping test, the drawdown cone around the pumping well was likely pulling water from the portion of the fractured rock within Thing Valley. As the cone developed further, the cone is interpreted to have intercepted less fractured bedrock (most likely along the canyon walls) resulting in diminished production (the negative boundary effect).

Considering that the pump has been inoperable for some time prior to the aquifer pumping test, it may be beneficial to remove the pump and conduct an inspection of the well casing and pump for corrosion damage and encrustation to ensure that the well(s) are optimally operable for the duration of the construction program.

3.1 Guidelines for Determination of Significance

For groundwater extraction projects in this fractured rock basin such as the Tule Wind Project, the County Guidelines state:

> "groundwater impacts will be considered significant if a soil moisture balance, or equivalent analysis, conducted using a minimum of 30 years of precipitation data, including drought periods, concludes that at any time groundwater in storage is reduced to a level of 50 percent or less as a result of groundwater extraction. Groundwater impacts are considered significant if a soil moisture balance or equivalent analysis conducted using a minimum of 30 years of precipitation data,

> including drought periods, concludes that at any time groundwater in storage is reduced to a level of 50 percent or less as a result of the project groundwater demands."

The Guidelines also state:

> "As an initial screening tool, offsite well interference will be considered a significant impact if after a five year projection of drawdown, the results indicate a decrease in water level of 20 feet or more in the offsite wells. If site-specific data indicates water bearing fractures exist which substantiate an interval of more than 400 feet between the static water level in each offsite well and the deepest major water bearing fracture in the well(s), a decrease in saturated thickness of 5% or more in the offsite wells would be considered a significant impact."

In addition, based on conversations with the County Groundwater Geologist, a basin-wide cumulative analysis is not required because the project's groundwater extraction period is limited to approximately 9 months. For purposes of the cumulative analysis, with the approval of the County Groundwater Geologist, the Rough Acres Ranch Water Production Area boundary has been defined as an area with a one-half mile radius surrounding the projected ranch groundwater extraction well No. 6a.

3.2 Methodology

In accordance with the approved well test plan for the Tule Wind Project, a step test followed by a 72-hour constant rate aquifer pumping test was conducted at Well No. 6a at the Rough Acres Ranch to evaluate hydraulic characteristics in this proposed construction supply well. Prior to initiating the pumping test, area residents were contacted to request their participation in the test. In order to participate, the resident was asked to discontinue pumping and allow measurement of changes in water levels in their supply well over the testing period. The following residents listed with their Assessor's Parcel Number (APN) were contacted:

Resident	APN	Response
Dave and Linda Shannon	611-091-14	No domestic water storage on site
Dennis and Celeste Wilson	611-091-15	No domestic water storage on site
York Heimerdinger	611-091-02	Has storage but refused the test
Jeff and Peggy Garber	611-090-15	Has storage but refused the test
Lynn Wilson	611-050-24	No domestic water storage on site
Wayne and Frankie Thibodeau	611-091-07	No return call

As presented in this table, none of the surrounding residents agreed to participate in the test. However, because the well pumping test was being performed on the Rough Acres Ranch, most of the available wells on the ranch were made available for monitoring. In addition, the Ranch Manager, Mr. Walker, made his residential supply well available for the duration of the test. A Solinst Levelogger Gold data logger was placed in each of the available ranch wells prior to the long-term constant rate pumping test. These well locations are presented on Figure 7.

The 72-hour aquifer pumping test was conducted between August 24, and 27, 2010, followed by measurement of well recovery to static conditions. Direct water level measurements could not be performed in 4-inch diameter cased pumping well No. 6a, because of limited access through the well head, with only sufficient room to place the levelogger pressure transducer into the well to a depth of 114 feet below the water level for measurements of the water level in this well. Because of limited access through the wellhead at Well No. 6, located approximately 36 feet from the pumping well, water levels in this observation well were measured manually with an electric water level meter. Flow from the pumping well (at about 50 gpm) was measured with an in-line flow meter and water was discharged to a stock pond location approximately 2000 feet northeast of the pumping well. In addition, barometric pressure was measured with the Solinst Barologger Gold transducer, placed in the pumping well pump house adjacent to the pumping well. The pumping well static water level at the start of the test was about 28 feet below ground surface (bgs) and the pump depth was reportedly positioned at an estimated depth of 350 feet, though the pump depth could not be verified. During the pumping test, the maximum drawdown in the pumping well was 77.5 feet. In the nearest observation Well No. 6, the water level was drawn down a maximum of 3.7 feet. An estimated 216,000 gallons of water was pumped to the stock pond.

Results of the pumping and recover tests were plotted on semilog plots to evaluate the data. County Guidelines were reviewed and incorporated into the analysis. In addition, the long-term aquifer test data were analyzed using AquiferTest Pro, Version 3.5, numerical modeling software (Röhrich and Waterloo Hydrogeologic, 2002) to calculate aquifer hydraulic properties.

3.3 Well Test Results

As required by the County Guidelines, a plot of the pumping test time versus drawdown curve in the pumping well was used to estimate the drawdown in the pumping well after five years (2,600,000 minutes) of pumping at an average of 50 gpm as performed during the pumping test. From the graphed pumping data, the projected draw down is 87 feet after five years (Figure 3; Appendix B). Recognizing the project water requirements are needed over an estimated 9-month construction period, 84 feet of drawdown is predicted. In the event that during the construction, a higher pumping rate is needed, using proportions, doubling the pumping rate to 100 gpm would produce a drawdown of 174 feet after five years.

Using the plot of the drawdown plotted against time presented logarithmically since pumping started (Figure 3; Appendix B), aquifer transmissivity can be calculated using the Cooper-Jacobs approximation to the Theis equation:

$$T = \frac{2.3Q}{4\pi\Delta s}$$

where,

T = transmissivity in square feet per day
Q = average pumping rate in ft^3 / day (e.g., 50 gpm multiplied by 193 = 9650 ft^3 / day)
π = 3.14
Δs = change in drawdown over one logarithm of time (3.13 ft. from Appendix B, Figure 3)

Based on this equation, a transmissivity of 563 square feet per day is calculated from the pumping data. Using Aquifer Test Pro numerical modeling software, curve matching methods were used on the time versus drawdown plots to calculate transmissivity, hydraulic conductivity, and storativity by different methods. The transmissivity values obtained from the pumping well ranged from between 26.9 and 630 square feet per day. The analytical results show higher transmissivity (and hydraulic conductivity values) for curves matched to the observation well No. 6 and range from 0.375 to 3750 square feet per day. It is believed that the relatively thick alluvial section in this area of McCain Valley acts as a reservoir recharging the underlying fractured bedrock system. If the fractures in the bedrock are limited, the actual volume of groundwater available may be controlled by these thicker sections of alluvium and the more highly fractured bedrock. A summary of the calculated hydraulic properties from the aquifer tests, are presented in Table 1 included in Appendix B.

The recovery data were evaluated to assess long-term affects on the groundwater aquifer. The plot of residual drawdown versus t/t' (the ratio of time to time since pumping stopped) plotted on a logarithmic scale was used to evaluate aquifer storage. At t/t' equal to 1, a residual drawdown would indicate permanent dewatering of the aquifer and greater than 2 feet of residual drawdown would indicate a failed pumping test. As shown on Figure 4 in Appendix B, when the resultant recovery curve is projected back to t/t' equals 1, a residual drawdown of 0.33 feet is obtained indicating a successful test.

Based on the lack of significant drawdown (3.7 feet) in the nearest observation well 36 feet away, and no evidence of an effect in more distal observation wells suggests that the there is significant water within this water production area. Interference with the nearest off-site wells approximately one half mile from the pumping well are not anticipated from the level of pumping proposed during project construction.

3.4 Cumulative Impacts Analysis

Because the project water needs exceed 20,000 gallons of water per day, a cumulative basin analysis is required. To address these cumulative requires, GLA worked directly with the County's Groundwater Geologist, Mr. Jim Bennett, to develop a reasonable approach. Because the McCain Valley is an extensive groundwater basin and pumping is proposed from a limited area of the basin, it was agreed that the cumulative analysis would be limited to a ½ mile radius about the pumping Well No. 6A. The cumulative analysis was performed using spreadsheets and calculations initially developed by Mr. Bennett.

Initially, project groundwater extraction at 50 gpm (72,000 gpd) and area residential and operational water demands were evaluated against monthly groundwater recharge during a drought condition to determine if project extraction will exceed 50 percent of the total storage capacity within an effective area of McCain Valley defined as approximately within one half mile of the proposed pumping Well No. 6a. A second analysis was performed with double the pumping (100 gpm) to further evaluate increased water utilization at this well. Using drought year precipitation data from the Boulevard gauging station (July 1998 through June 2005), when groundwater recharge is minimal and water is extracted from storage, a conservative assessment of possible groundwater impacts was developed.

3.4.1 Groundwater Recharge

In the spreadsheet, groundwater recharge was estimated from available precipitation data for the Boulevard gauging station over a seven year drought period from July 1998 through June 2005, provided by the County Groundwater Geologist. The recharge area was considered to be an area encompassing the ½-mile radius surrounding the pumping well, equivalent to 502 acres. The groundwater recharge also accounts for evapotranspiration based on an average of 62.5 inches per month as established by California Reference CIMIS ETo map, Zone 16.

3.4.2 Groundwater Demand

For the groundwater demand, the project water needs were incorporated with standard assumptions of water needs for other known potential groundwater users including residents, livestock, and other users identified within approximately ½ of the pumping well. To be conservative some land uses within ¾ mile of the pumping well were included into the overall area groundwater demand calculations. The groundwater demand calculation assumed that there were seven residents using 0.5 acre feet of water per year in accordance with County Guidelines. From literature (The Ohio State University Extension, 2002), an estimated 100 head of cattle graze on the Rough Acres Ranch, would require an estimated daily intake of 19 gallons per animal per day (the maximum estimated daily water intake required for a bull in 90 degree temperatures), equivalent to 2.13 acre feet of water. It should be noted that slightly lower water consumption values (up to 15 gallons per day) are estimated for various classes of horses that may also be grazing on the Ranch lands. A poultry farm, estimated to include 500 poultry, is located to the south of Rough Acres Ranch and based on available literature from Pennsylvania State University (2002), a conservative estimate of 100 gallons per day or 0.11 acre feet of water consumption each year is assumed to support these animals.

These water quantities in combination with the estimated 9-month construction schedule of water demand from the pumping well on Rough Acres Ranch of 50 gpm resulted in an overall groundwater demand of 7.18 acre-feet per month, or 65.74 acre-feet per year. The groundwater demand would increase to 13.88 acre-feet per month and 125.74 acre-feet per year with a corresponding doubling of the production from the pumping well to 100 gpm.

3.4.3 <u>Groundwater in Storage</u>

The groundwater storage capacity was calculated using conservative estimated of the saturated thickness of each of the hydrogeologic units underlying the water production area as observed in boring logs within the McCain Valley. For this analysis, it is assumed that the saturated thicknesses include 20 feet of alluvium, 10 feet of residuum, and 500 feet of fractured bedrock. Assuming that these materials are continuous over the 502 acre water production area, conservative estimates of the specific yield for each unit was obtained from the County. As summarized in Table 1 in Appendix C, the greatest specific yield is associated with the alluvium at 10%, the specific yield for the residuum is 5%, and because the fractured bedrock yields water only within the fractures, the specific yield for this unit is 0.10%.

By multiplying the 502 acres by the specific yield and by the saturated thickness for each hydrogeologic unit, the total groundwater in storage within the ½-mile water production area is 1002 acre feet of water.

3.4.4 <u>Long-Term Groundwater Availability</u>

Based on the proposed 9-month construction period and the project groundwater demand along with adjacent water users, subtracted from the existing groundwater in storage, in combination with the anticipated groundwater recharge generated over a seven year drought cycle, there will be no long-term groundwater requirements in support of the project. As shown on Table 2 in Appendix C, the maximum drawdown within the subject area is about 66 acre-feet, well above the 50% basin depletion level of 500 acre-feet. Even if project pumping were to be increased to 100 gpm, a maximum of 136 acre-feet of drawdown is calculated within the basin (Table 3; Appendix C). In fact, until pumping is increased by eight times to 54 acre-feet per month or nearly 486 acre-feet per year would the basin approach the 50% depletion level of 500 acre-feet (Table 4; Appendix C).

Based on these analyses, the long-term result of pumping at 50 gpm reduces the groundwater in storage to 94% and a maximum reduction to 92% of the total groundwater in storage during the 7-year drought period. Under an increased (100 gpm) pumping scenario, the groundwater in storage is reduced to 86% of the total with an average of 89%.

Following the project construction phase, the estimated water demand for the project site is estimated to be 2500 gallons per business day or about 2 acre-feet per year, associated with the operations and maintenance facility for the wind turbines. Based on the calculations of groundwater availability this level of use would have no significant impact on the groundwater in storage within McCain Valley.

3.5 Significance of Impacts Prior to Mitigation

Based on the results of the aquifer pumping test at the Rough Acres Ranch well No. 6a, the criteria for well interference and 50% depletion of groundwater in storage associated with the proposed project will not be met. No significant impacts to groundwater are anticipated associated with the project.

3.6 Mitigation Measures and Design Considerations

Based on the lack of significant impacts to groundwater associated with the proposed project, no groundwater mitigation measures are proposed for the project.

3.7 Conclusions

Based upon the analyses performed, well interference is not anticipated to be a significant impact for the Tule Wind Farm construction project. During the pumping test, a maximum of 3.7 feet of drawdown was observed in the nearest observation well 36 feet away from the pumping well. No observed drawdown was identified in wells located within one third and one half mile of the pumping well.

The potential for depletion of groundwater in storage within the McCain Valley is not anticipated. Results of the groundwater demand during a drought period indicate that eight times the anticipated groundwater pumping would be required to drawn groundwater to the 50% depletion level.

4.0 SUMMARY OF PROJECT IMPACTS AND MITIGATION

Based on the results of pumping tests and analysis of the data, there is sufficient groundwater to meet the project demands. Review of cumulative analyses performed within a ½ mile radial area of McCain Valley about the aquifer pumping test well indicates based on the available groundwater storage within McCain Valley, it is possible to increase pumping at the Rough Acres Ranch aquifer test well significantly without well interference or significant groundwater depletion.

Although there are no requirements for analysis of groundwater use on tribal lands, the aquifer pumping test and analyses indicate that there is sufficient storage for use of groundwater within Thing Valley and no significant impacts to groundwater storage are anticipated. However, the pumping test data and the noted boundary condition identified during the test after 1700 minutes suggests that to support the project water needs, it may be necessary to pump at a lesser rate or lesser frequency at the aquifer pumping test well, and supplement the water from this well with water from another well within Thing Valley such as the observation well. In addition, because the well has been inoperable for some time, it is recommended that this well and pump be inspected and rehabilitated as necessary to ensure that the well operates optimally for the duration of the construction project.

5.0 CLOSURE

This report was prepared in general accordance with acceptable professional geotechnical and hydrogeologic principles and practices. This report makes no other warranties, either expressed or implied as to the professional advice or information included herein. Although the groundwater investigation performed included constant rate pumping over a 72-hour period, it is not possible to fully anticipate an aquifer's behavior over the proposed 9-month construction period. It is understood that the project intends to obtain will serve letters to purchase water from off-site vendors if it is needed. The use of off-site water suppliers is recommended in the event that groundwater supplies are not fully supportive of the project. Our firm should be notified of any pertinent change in the project, or if conditions are found to differ from those described herein, because this may require a reevaluation of the conclusions. This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

6.0 REFERENCES

California Department of Water Resources (DWR), California Irrigation Management Information System (CIMIS) Reference Evapotraspiration, 1999.

Cooper, H.H., Jr. and Jacob, C.E., 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, *Transactions, American Geophysical Union*, Vol. 27, No. 4.

County of San Diego, DPLU, Groundwater Ordinance No. 9826.

County of San Diego, DPLU, Guidelines of Determining Significance and Report Format and Content Requirements, Groundwater, March 19, 2007.

Driscoll, D.G., 1986, <u>Groundwater and Wells</u>, Johnson Filtration Systems Inc., St. Paul, Minnesota.

Moench, S.P., 1993, Combining the Neuman and Boulton Models for Flow to a Well in an Unconfined Aquifer, *Ground Water*, Vol. 33, No. 3.

Neuman S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, *Water Resources Research*, Vol. 11, No. 2, pp. 329-342.

Ohio State University Extension, Fact Sheet, Water Effects on Livestock Performance, prepared by Mark Landefeld and Jeff Bettinger, 2002.

Papadopulos, I.S. and Cooper, H.H., Jr., 1967, Drawdown in a well of large diameter, *Water Resources Research*, vol. 3, pp 241-244.

Pennsylvania State University, Cooperative Extension in the Capital Region, Fact Sheet, Water Needs for Poutry – Are you Prepared?, 2002.

Schafer, D.C., 1978, Casing Storage Can Affect Pumping Test Data, *Johnson Drillers' Journal*, Jan/Feb, Johnson Division, UOP Inc., St. Paul, Minnesota.

Soil Conservation Service (SCS), Soil. Survey, San Diego Area, California, December 1973.

Theis, C.V., 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, *American Geophysical Union Transactions*, Vol. 16, pp. 519-524.

United States Geological Survey, Preliminary Geologic Map of the El Cajon 30' x 60' Quadrangle, Southern California, compiled by Victoria R. Todd, 2004.

United States Geological Survey, 7.5 Minute Series (topographic) Mount Laguna (1997) and Sombrero Peak (1975), California Quadrangles.

United States Geological Survey, 7.5 Minute Series (topographic) Live Oak Springs (1975), California Quadrangle.

Waterloo Hydrogeologic (co-developed with Thomas Roerich), 2002, AquiferTest version 3.5, Advanced Pumping Test and Slug Test Analytical Software.

7.0 LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

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John M. Hower, CEG 2142
Supervising Geologist, Geo-Logic Associates

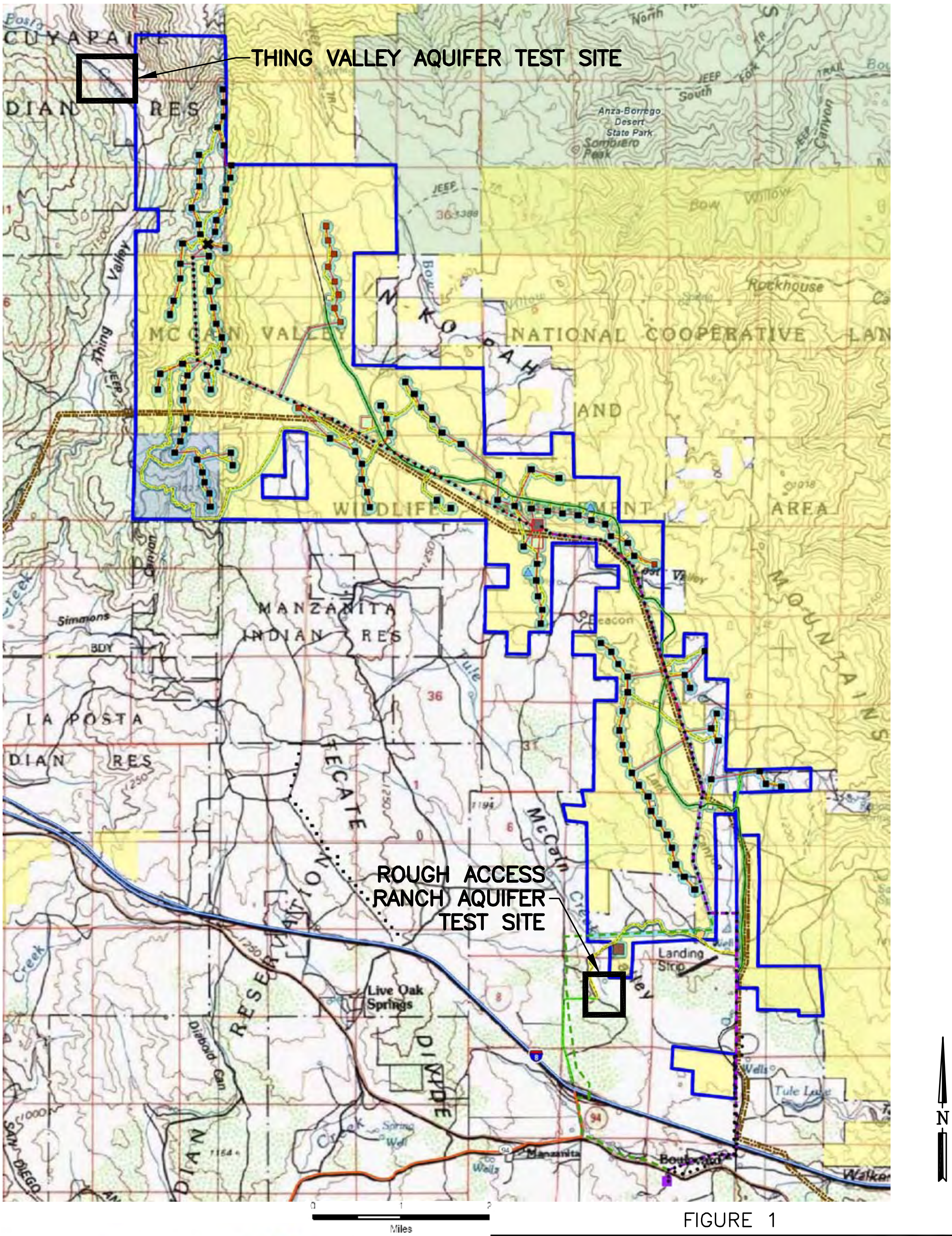
Mark W. Vincent, CHG 865
Senior Geologist, Geo-Logic Associates

Eric White, CHG 881
Project Geologist, Geo-Logic Associates

Mr. Robert Walker
Rough Acres Ranch Manager

Desi Vela
Field Technician, Ewiiaapaayp Band of Kumeyaay Indian

FIGURES



Legend

- Proposed Turbine
- Alternate Turbine
- Proposed Met Tower
- Proposed Junction Box
- Proposed Overhead Structure
- Preferred 138-kV Transmission Line
- Alternate 138-kV Transmission Line
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Existing Road - Improvements Needed
- Proposed New Access Road
- Freeway
- Highway
- Major Road
- McCain Valley Road
- Proposed 10-acre Parking Area
- Proposed 2-acre Lay Down Area
- Proposed Batch Plant
- Preferred O&M and Substation
- Alternate O&M and Substation
- Existing Substation
- Proposed Sunrise Powerlink Transmission ROW
- Development Corridor
- Project Area
- CA State Lands Commission
- BLM Land

REFERENCE:
IBERDROLA RENEWABLES, 2009

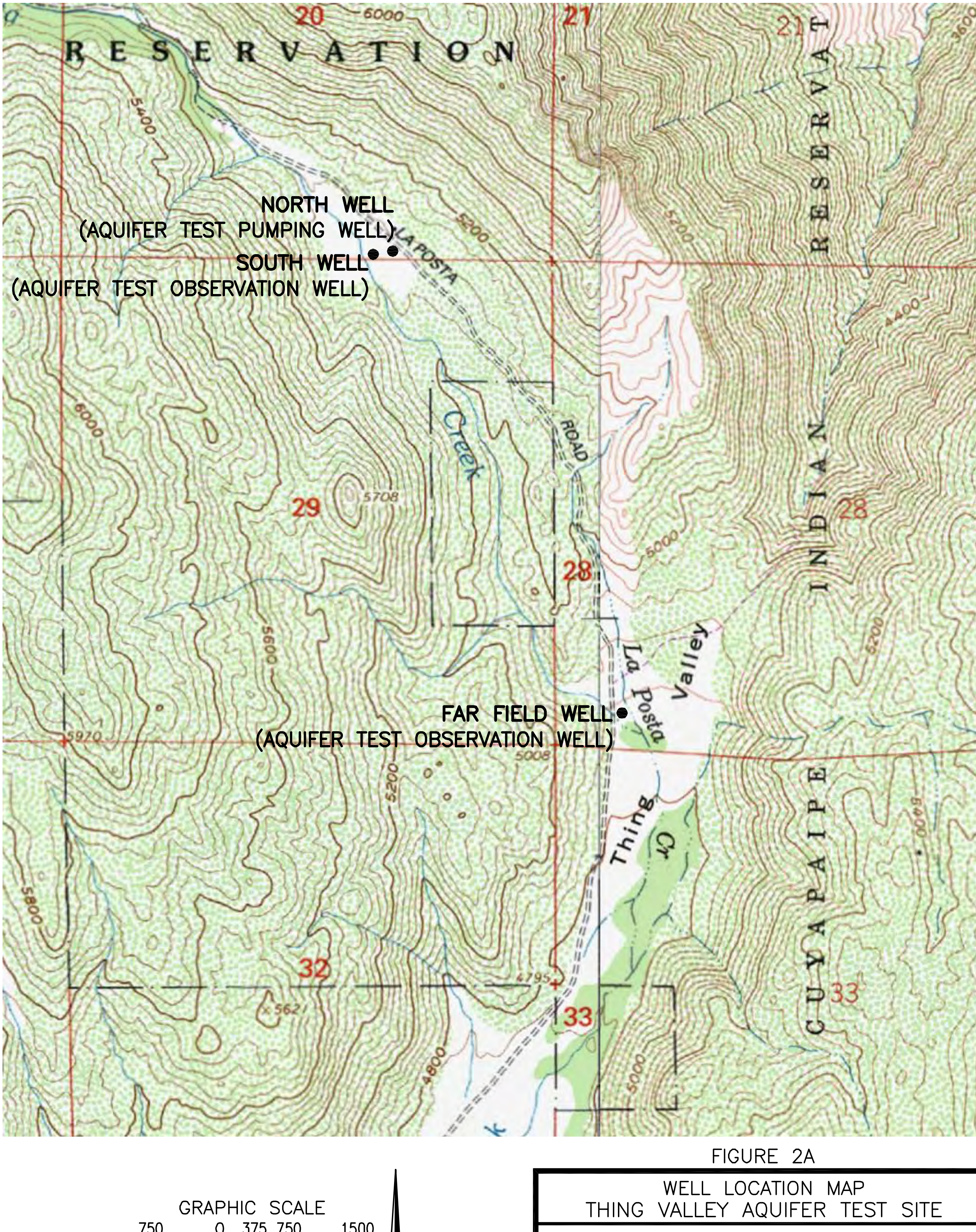
FIGURE 1

PROJECT LOCATION MAP

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic
ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) MOUNT LAGUNA (1997) AND SOMBRERO PEAK (1975) CALIFORNIA QUADRANGLES

FIGURE 2A

WELL LOCATION MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

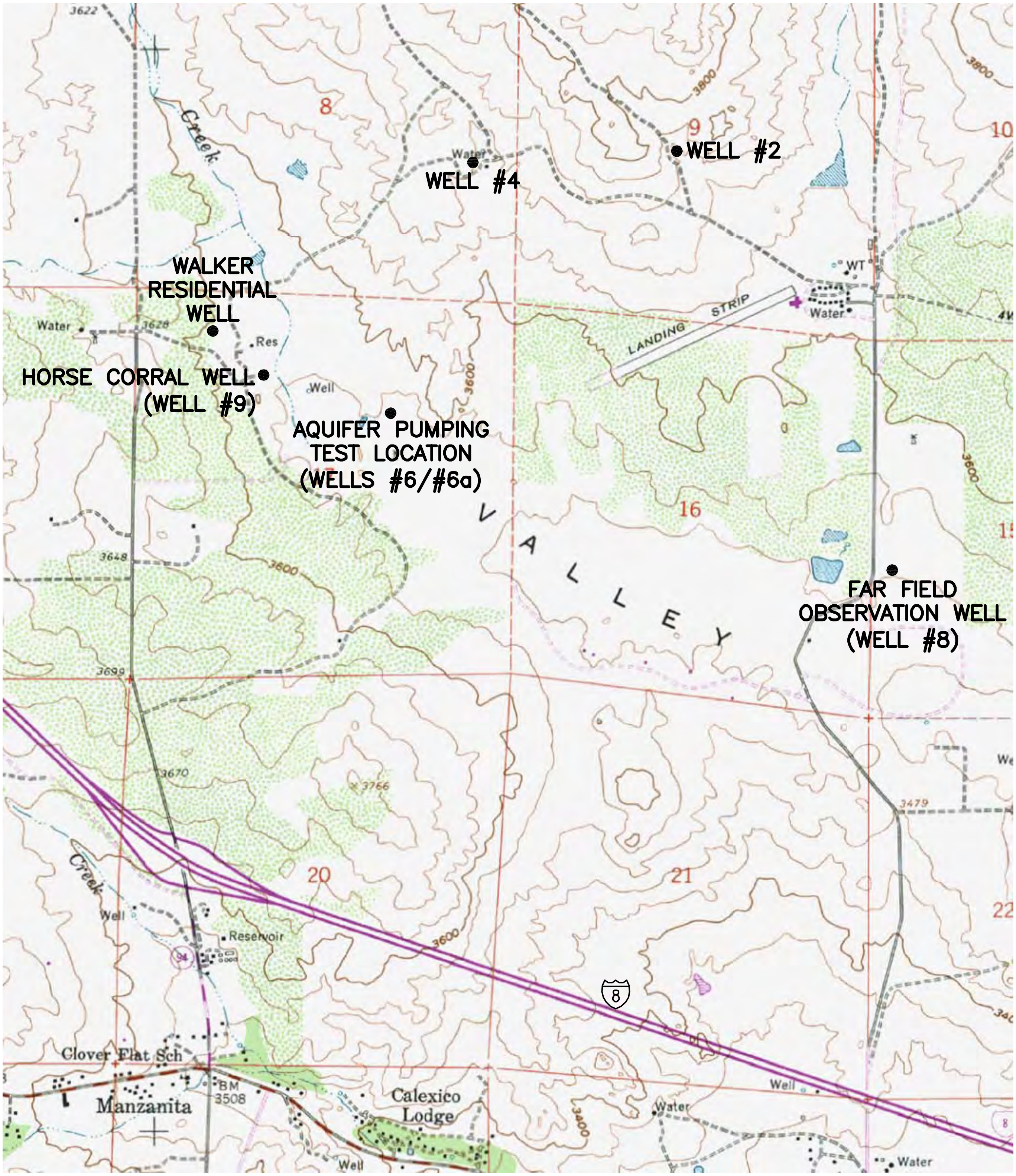


FIGURE 2B

GRAPHIC SCALE
1000 0 500 1000 2000
(in feet)
1 inch = 2000 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) LIVE OAK SPRINGS (1975) CALIFORNIA QUADRANGLE

WELL LOCATION MAP ROUGH ACRES RANCH AQUIFER TEST SITE		
TULE WIND PROJECT SAN DIEGO COUNTY, CA		
Geo-Logic ASSOCIATES		
DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

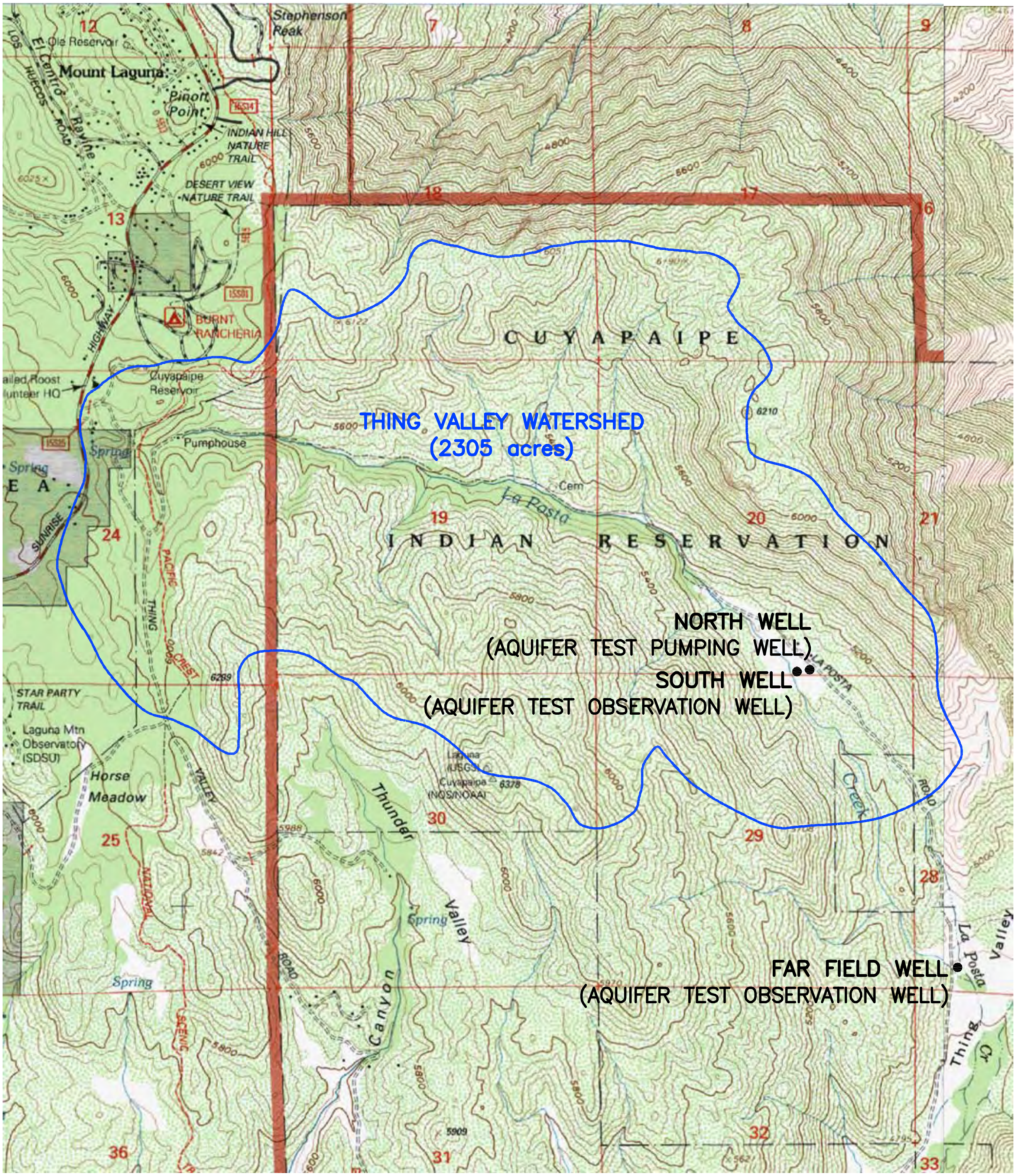


FIGURE 3A

GRAPHIC SCALE

1200 0 600 1200 2400

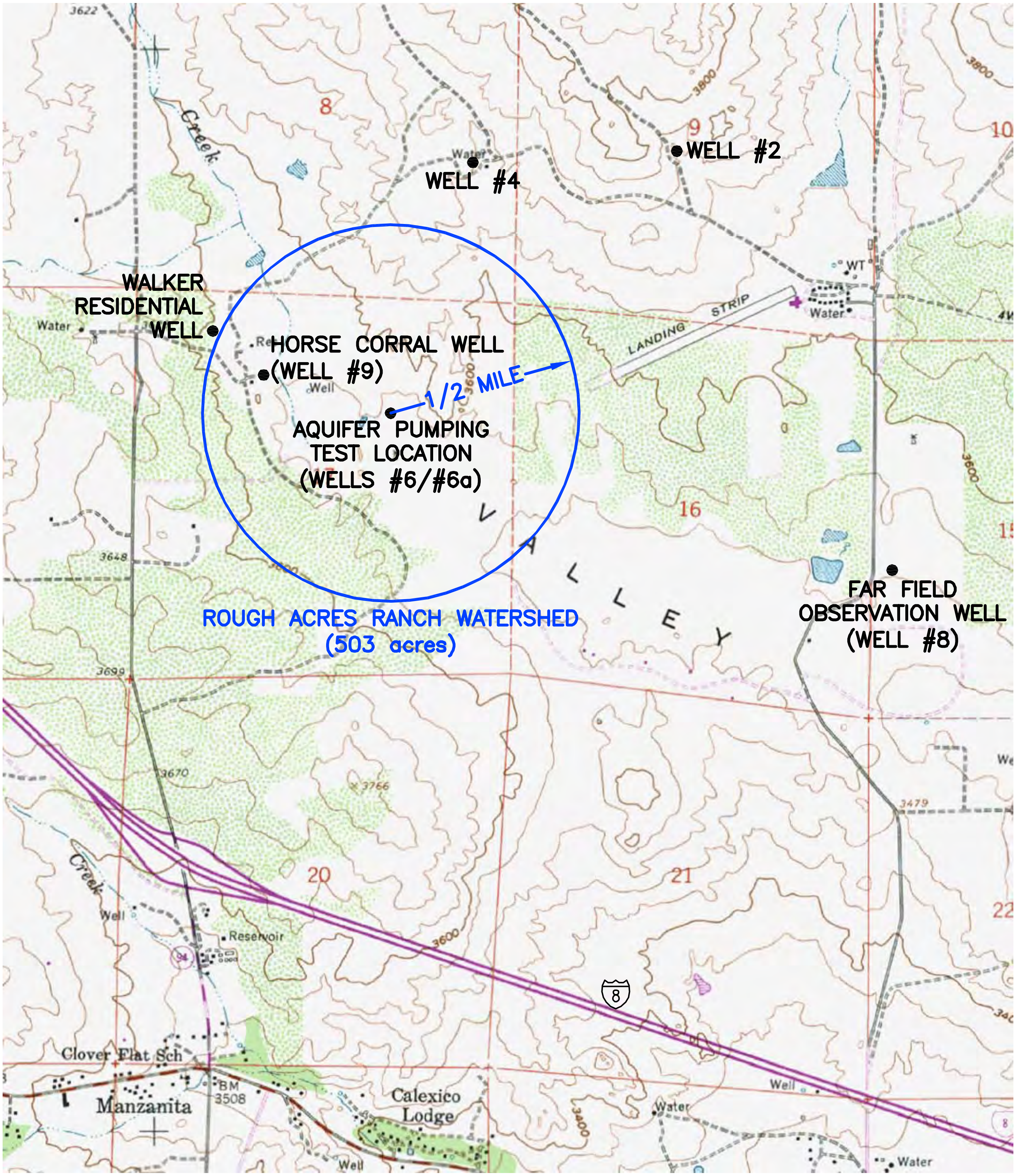
(in feet)

1 inch = 2400 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) MOUNT LAGUNA (1997) AND SOMBRERO PEAK (1975) CALIFORNIA QUADRANGLES

WATERSHED MAP THING VALLEY AQUIFER TEST SITE	
TULE WIND PROJECT SAN DIEGO COUNTY, CA	
Geo-Logic ASSOCIATES	
DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) LIVE OAK SPRINGS (1975) CALIFORNIA QUADRANGLE

FIGURE 3B

WATERSHED MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

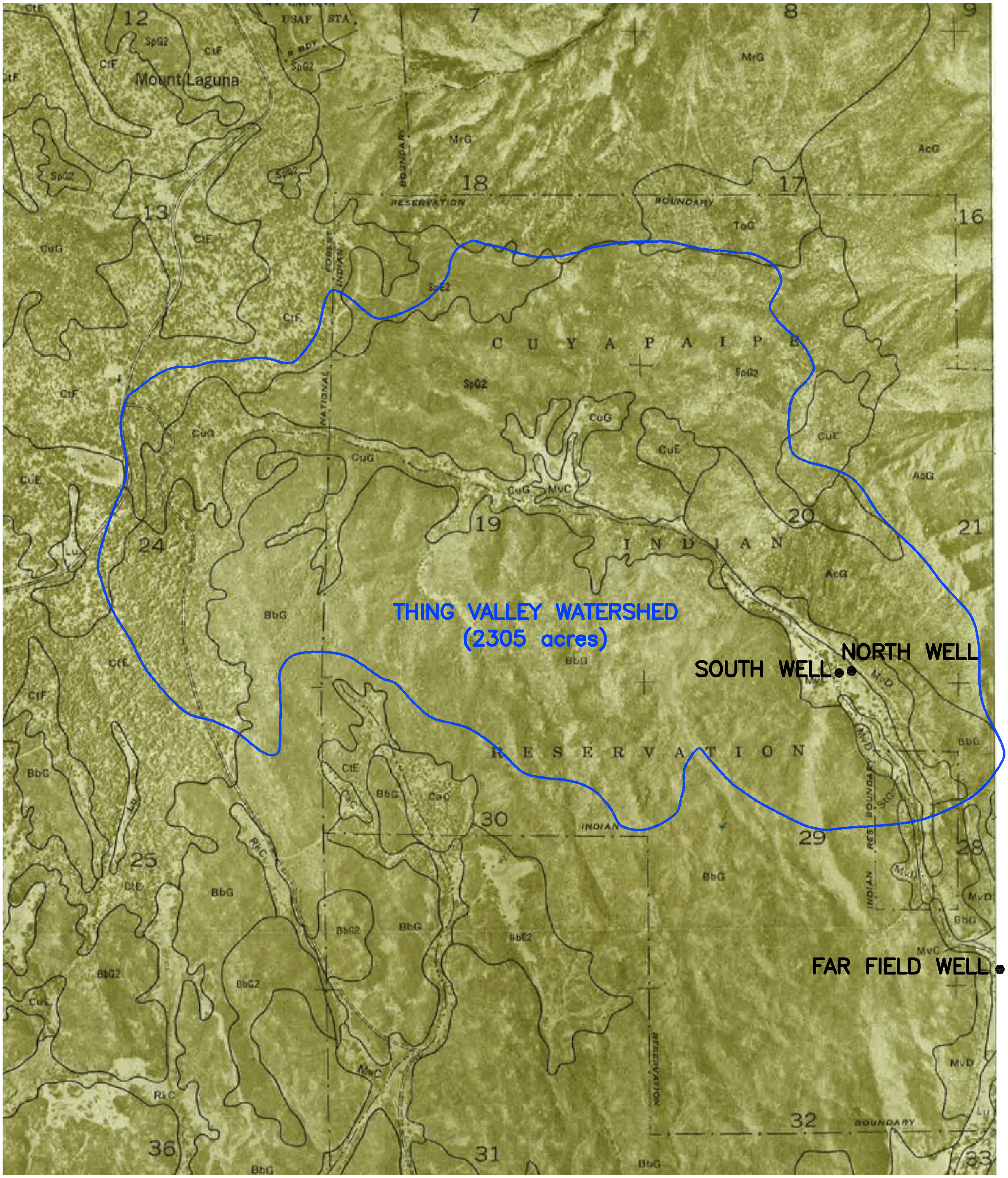


FIGURE 4A

SOILS MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

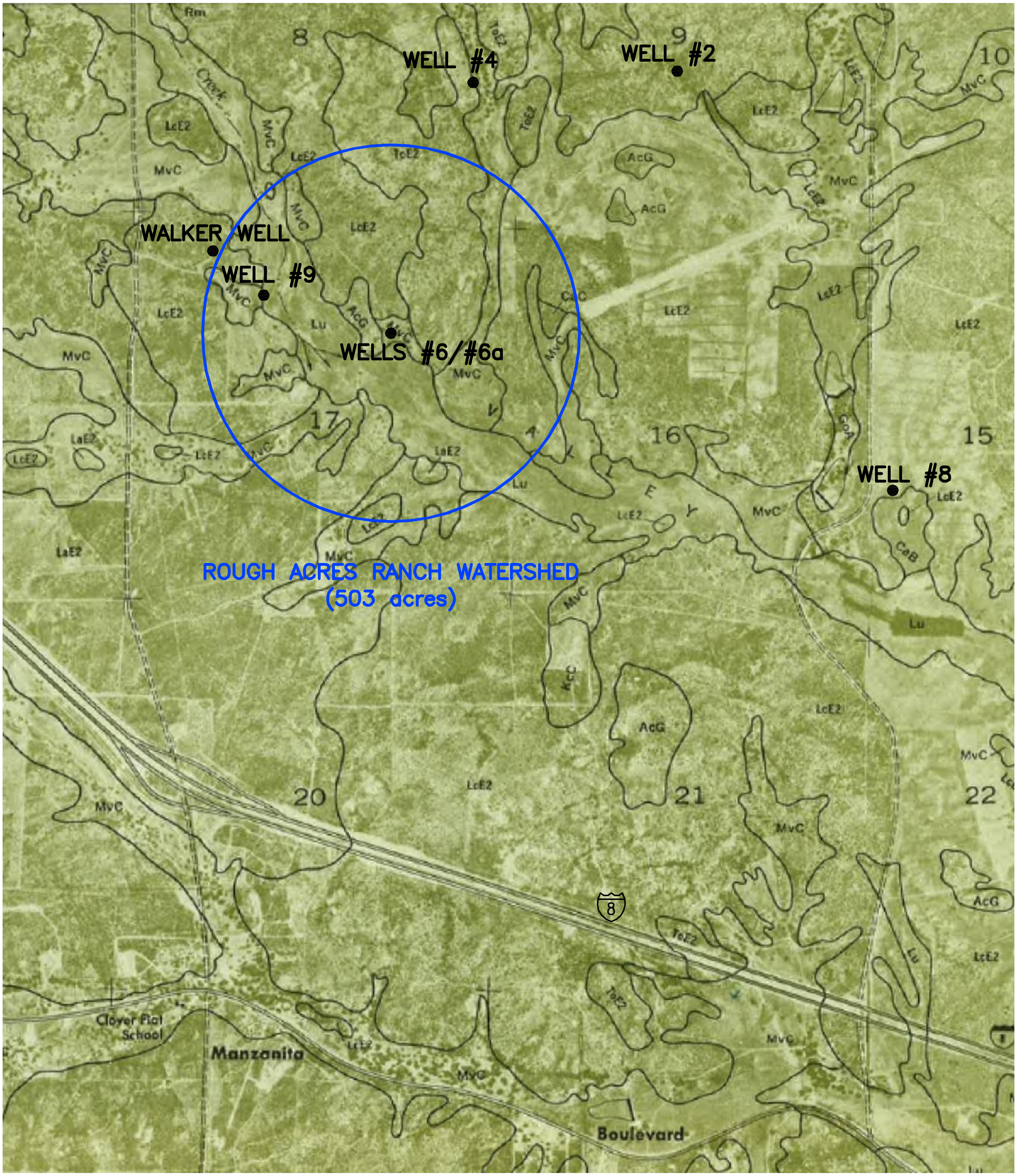
Geo-Logic
ASSOCIATES

GRAPHIC SCALE
1200 0 600 1200 2400
(in feet)
1 inch = 2400 ft.

N

REFERENCE: SOIL SURVEY, SAN DIEGO AREA SOIL CONSERVATION SERVICE, 1973 (SEE TEXT SECTION 2.5 FOR EXPLANATION)

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: SOIL SURVEY, SAN DIEGO AREA SOIL CONSERVATION SERVICE, 1973 (SEE TEXT SECTION 2.5 FOR EXPLANATION)

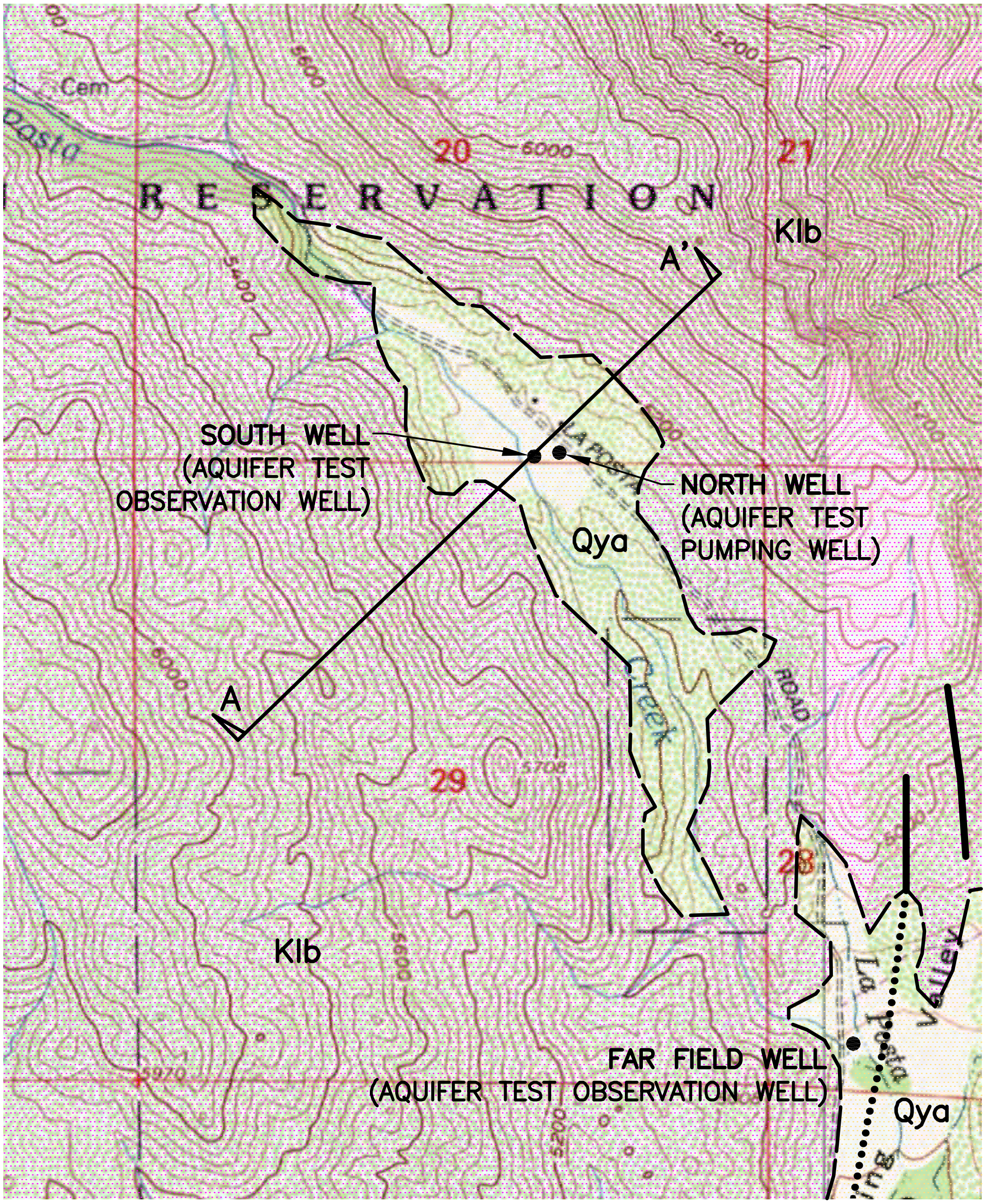
FIGURE 4B

SOILS MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic
ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



EXPLANATION:

Qya YOUNG ALLUVIUM (HOLOCENE)

Klb TONALITE OF LAS BANCAS (EARLY CRETACEOUS)

APPROXIMATE GEOLOGIC CONTACT

FAULT, DOTTED WHERE CONCEALED

A A' CROSS–SECTION LOCATION

GRAPHIC SCALE

750 0 375 750 1500

(in feet)

1 inch = 1500 ft.

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

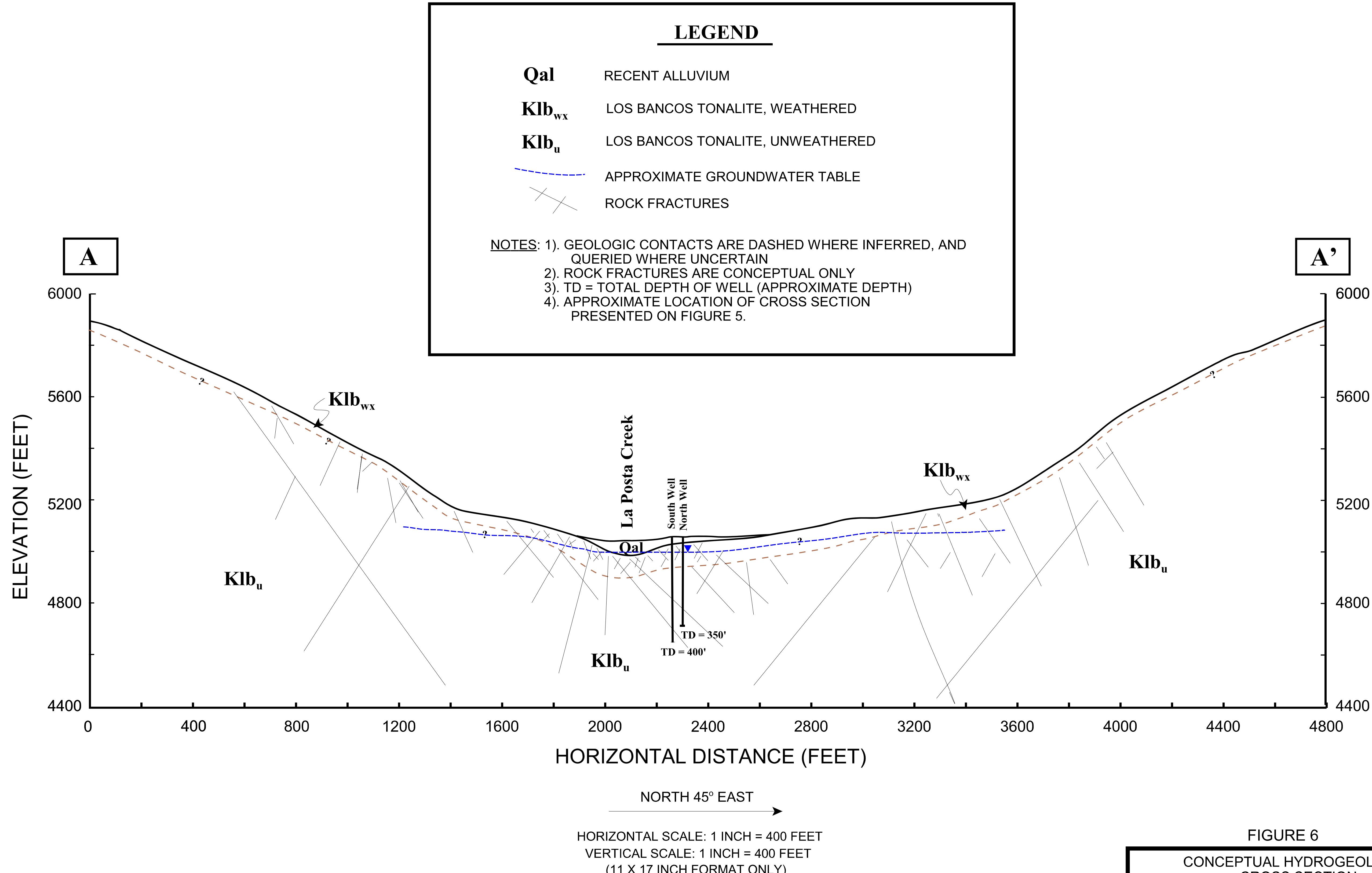
FIGURE 5

GEOLOGIC MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010–005



References: USGS, 1997, 7.5' Mount Laguna and USGS, 1975, 7.5' Sombrero Peak, CA Quadrangles.

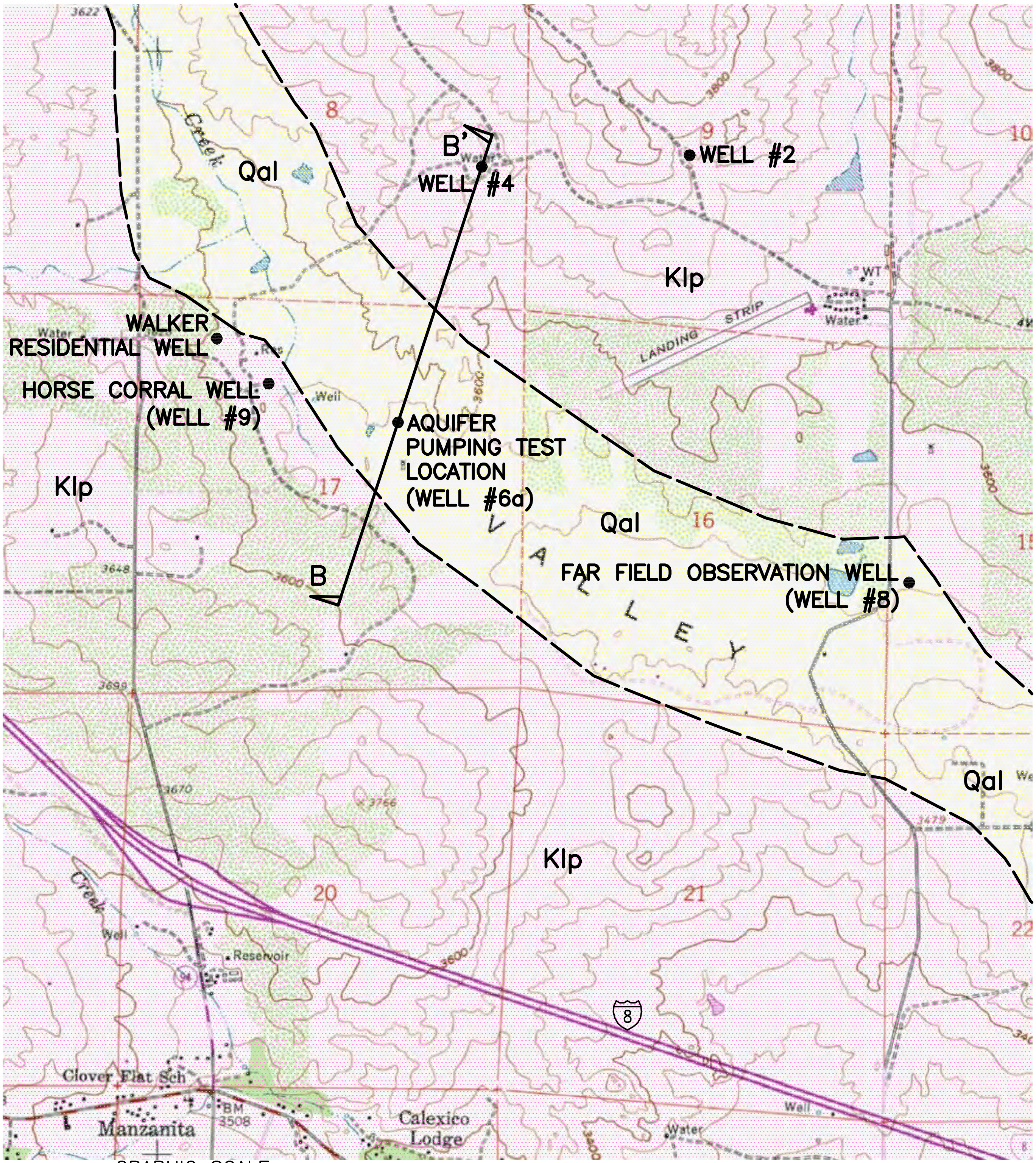
FIGURE 6

CONCEPTUAL HYDROGEOLOGIC CROSS SECTION

THING VALLEY STUDY AREA
SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES

Draft	Date	Project No.
JGF	OCT 2010	2010-0005



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

EXPLANATION:

Qal	ALLUVIUM
Klp	TONALITE OF LA POSTA (EARLY AND LATE CRETACEOUS)
— — —	APPROXIMATE GEOLOGIC CONTACT
B B'	CROSS-SECTION LOCATION

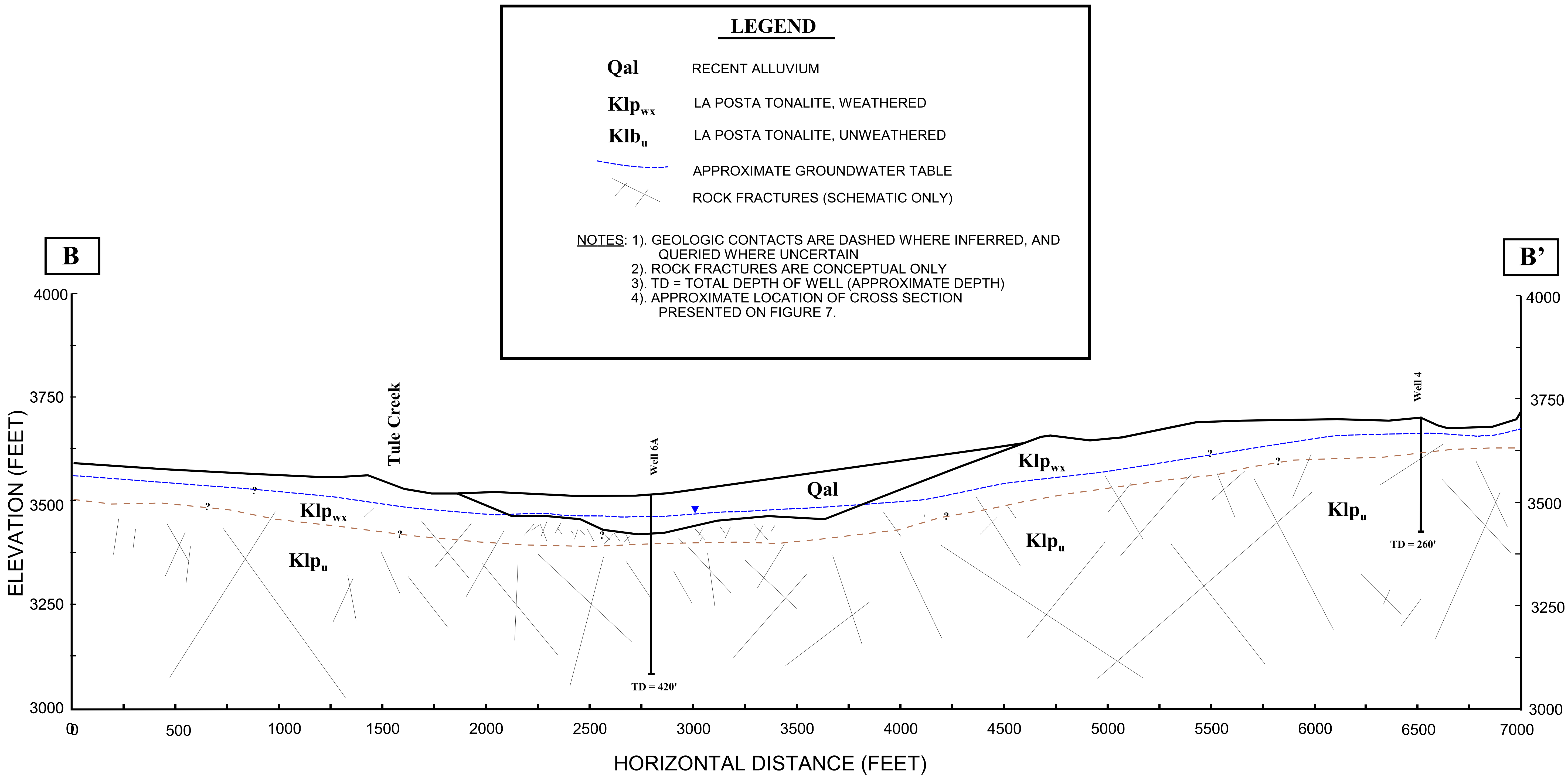
FIGURE 7

GEOLOGIC MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



NORTH 18° EAST

HORIZONTAL SCALE: 1 INCH = 500 FEET
VERTICAL SCALE: 1 INCH = 250 FEET
2x VERTICAL EXAGGERATION
(11 X 17 INCH FORMAT ONLY)

FIGURE 8

CONCEPTUAL HYDROGEOLOGIC CROSS SECTION		
ROUGH ACRES STUDY AREA SAN DIEGO COUNTY, CALIFORNIA		
Geo-Logic ASSOCIATES		
Draft JGF	Date OCT 2010	Project No. 2010-0005

References: USGS, 1975, 7.5' Live Oak Springs, CA Quadrangle.

APPENDIX A

OBSERVATIONS AND ANALYSIS OF AQUIFER CHARACERISTICS

EWIIAAPAAYP RESERVATION

THING VALLEY, EAST SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic
ASSOCIATES
Geologists, Hydrogeologists and Engineers

Date: November 8, 2010
Project No.: 2010-0005

To: John Hower, CEG
Sarah Battelle, CHG

From: Mark Vincent, CHG

Regarding: **Observations and Analyses of Aquifer Characteristics**
Thing Valley, San Diego County, California

INTRODUCTION

This memo presents a summary of observations and analyses made following a stepped and a constant rate aquifer pumping and recovery test in wells located in Thing Valley located approximately 10 miles north of I-8 off La Posta Truck Trail/Thing Valley Road in the Ewiiaapaayp Reservation, in eastern San Diego County, California. The tests were performed to determine whether sufficient volumes of water are available for the Tule Wind Farm construction projects. Analyses performed included calculation of transmissivity, hydraulic conductivity, and storativity for a pumping well and observation wells.

WELL AND AQUIFER CONDITIONS

A well labeled as South Well was used as the pumping well for this test. Another well labeled as North Well is located 61.5 feet to the west of the pumping well and was monitored and analyzed as an observation well. A third well identified as Thing Valley Well is located approximately 5,517 feet south-southeast of the pumping well and was also used as an observation well (Figure 1).

Records for drilling and construction of the wells used for these pumping tests are incomplete or nonexistent. A well identified on Department of Water Resources (DWR) records as the "Cuyapaipe Community Well" (identified as Form No. 058539) is believed to be the log for South Well. No records are available for North Well or Thing Valley Well.

Although DWR records indicate that slotted well casing was installed to a depth of 122 feet, they do not indicate whether or not casing exists below that depth or if the casing was installed prior to drilling the well to a total depth of 400 feet. The North and South Wells used in this pumping test have existing electric submersible pumps installed in them. Based on the production rates achieved during the tests performed, the wells are likely to be outfitted with four-inch diameter electric submersible pumps. Based on the depth and pressure head on the transducers installed in the wells for the test, it was assumed that all of the boreholes are 400 feet deep and are 10-inches in diameter. It was further assumed that the wells were constructed with 6-inch diameter well casing and that they are perforated or screened over the entire saturated thickness. Details of well construction could not be verified in the field because of the presence of pumps, discharge pipes, electrical wires, and surface sanitary seals.

The area immediately around North Well and South Well is underlain by alluvium comprised of poorly sorted sand, gravel, and silt derived from the crystalline basement rock exposed on the adjacent canyon sidewalls. The crystalline basement rocks are classified as tonalite and yield groundwater from fractures. The well log reportedly recorded for South Well indicates that there are about 12 to 15 feet of alluvium overlying the tonalite. An alternative interpretation of the log is that some of the materials described in the log to a depth of 50 feet could also be coarse-grained alluvium locally derived from the surrounding tonalite. Groundwater was measured at a depth of 54.81 feet below the top of sanitary seal on North Well (approximately 8-inches above ground surface) and was measured at a depth of 49.34 feet below the sanitary seal in South Well (also about 8-inches above ground surface). Groundwater was measure at a depth of 77.62 feet below the top of the conductor casing on Thing Valley Well (the conductor casing extends approximately 6-inches above ground surface).

TEST METHODS

Observations of groundwater elevation were recorded in a pumping well and two observation wells in Thing Valley. Data was collected using pressure transducers connected to data loggers. Barometric pressure changes were recorded during the test and corrections were made to the pressure head data collected during the tests.

A stepped aquifer pumping test was performed using North Well to determine the optimum pumping rate for a longer duration test. The pressure transducers were deployed and began recording data on August 12, 2010 to perform the stepped pumping test. The stepped pumping test was performed at pumping rates of 72 gallons per minute (gpm), 88 gpm, and 90 gpm. The pump could not be throttled down below 72 gpm without water exiting a by-pass / check valve and had a maximum yield of 90 gpm. A semi-logarithmic plot of elapsed time versus drawdown for the stepped pumping test is shown on Figure 2.

The constant rate pumping and recovery test was performed from August 16 through 19, 2010. The pump was powered-down on August 19, 2010 and allowed to recover until August 23, 2010 when the pressure transducers were removed from the wells. South Well was initially pumped at an average rate of 88 gpm and was corrected to 80 gpm during a period from about 1 to 2 hours into the test. Recovery tests were performed by turning off the pumps and recording the increasing head levels over time.

DATA ANALYSIS

Changes in groundwater level data recorded during this test were corrected for barometric pressure changes and used to generate a file containing tabulated time and changes in pressure head. The data was used to generate time-drawdown graphs for the pumping and observation wells and imported into computer software used to calculate the transmissivity and storativity of the fractured tonalite.

The stepped pump test analysis consists of plotting the drawdown versus time for each pumping rate on a time versus drawdown plot with time plotted on a logarithmic scale. Forward projections of each segment representing a different pumping rate can be used to predict the likely drawdown for the pumping well during for the selected duration of the test. A pumping rate of 80 gpm was selected as the target pumping rate because it would allow for ample drawdown without the well running dry during the test.

The method of Schafer (1978) was employed to determine how much of the data set for North Well was impacted by casing storage effects. The method is a simplification of the method first developed by Papadopulos and Cooper (1967) but does not require prior knowledge of the transmissivity or well efficiency. The point at which casing storage effects are overcome was calculated to occur approximately 12 to 14 minutes into the test based on the assumptions about well construction practices, pumping rates, and drawdown. Very early pumping data was ignored in the analyses described below due to casing storage effects and the non-uniform drawdown curve caused by the change in the pumping rate from 88 to 80 gpm.

Time versus drawdown plots were prepared for the pumping and observation wells for the pumping and recovery portions of the test. The plots are shown with the time axis plotted on a logarithmic scale and drawdown on a linear scale.

Figure 3 shows the time-drawdown plot for North Well during pumping. The first 12 to 14 minutes of the test show the effects of attempting to establish a constant pumping rate and casing storage effects. A slight recovery in the drawdown is noted from around 14 minutes to approximately 33 minutes due to a reduction in the pumping rate from 88 to 80 gpm. The North Well drawdown plots as a straight line on the time-drawdown chart representing constant aquifer properties during that portion of the drawdown cone development. A sudden change in the drawdown curve starts at approximately 1,700 minutes and changes again at approximately 3,000 minutes. The steepening of the time drawdown curve noted at approximately 1,700 and 3,000 minutes likely indicates a negative boundary effect.

A residual drawdown plot for the North Well is shown on Figure 4. The plot shows the change in drawdown versus the ratio of the time since the pump test started divided by the time since the recovery portion of the test started (t/t`). An inflection point is noted at approximately t/t`=100 possibly due to some type of boundary effect. The residual drawdown at a t/t` ratio of 1 extends through the origin and there is no discernable change in storage noted in the pumping well over the course of the pumping and recovery portions of the aquifer stress test.

A time-drawdown plot of South Well located 61.5 feet away from the pumping well shows a sharp decrease in drawdown from approximately 51 minutes to approximately 65 minutes which is considered to be the result of the decrease in pumping rate from 88 to 80 gpm (Figure 5). The South Well plot shows a slight increasing slope to the semi-logarithmic plot but shows a very strong inflection point at approximately 1,700 minutes into the test. This is interpreted to be the result of a negative boundary effect similar to that observed on the time-drawdown plot from North Well (compare Figures 3 and 5).

The South Well recovery portion of the test is plotted as the residual drawdown versus t/t` shows a concave upwards curvature to the semi-logarithmic plot (Figure 6) indicative of changing aquifer conditions from a t/t` ratio of about 10 to 200 into the recovery test period. The line segment from a t/t` ratio of 200 the end of the test is a straight line plot indicative of constant aquifer conditions. The residual drawdown value measured for a t/t' ratio of 1 is about -3.5 feet. Though this value is not within about one half of a foot as would be expected from a successful test, it may not be especially significant for an observation well when the pumping well shows no changes in storage effect.

The Thing Valley Well located approximately 5,517 feet south of the pumping well was monitored for changes in head. A possible cumulative drawdown of approximately 0.25 feet was observed from approximately 400 minutes until the end of the test (Figure 7). The recovery portion of the well is shown on Figure 8 and is shows a large sudden change in measured head near the end of the monitoring period. This is interpreted as a slippage of the transducer cable and is probably not a valid recovery curve.

Water level drawdown data were evaluated using the computer software program AquiferTest version 3.5 (Waterloo Hydrogeologic, 2002). The program performs curve matching of the time drawdown data to calculate transmissivity, hydraulic conductivity, and storativity using different methods. The methods employed included Cooper-Jacob (1946), Moench (1993), Neuman (1975), and Theis (1935).

DISCUSSION

As shown on Table 1, the calculated hydraulic conductivity values for all of the analytical methods employed ranged from a low of 0.285 feet/day for data collected from North Well using Neuman's method for the data collected from the end of the data set to a high of 2.39 feet/day for the early time recovery phase of South Well using the Theis Recovery method. An average conductivity of 1.122 feet/day was calculated from all methods from both South Well and North Well. The Storativity values range from a low of 3.33E-09 for North Well middle to late time data and a high of 4.19E+01 for a match to the very late time data recorded in South Well.

All of the analytical results show a higher transmissivity and hydraulic conductivity value for matches to the early time drawdown data and show lower values for matches to late time drawdown data. This is most likely the result of a higher degree of fracturing in the rock around the wells. North Well and South Well are located in a portion of Thing Valley which is entirely covered in up to 50 feet of alluvium (Figure 9). Inspection of aerial photographs from Google Earth show the local canyons and drainages are controlled by large scale joint sets. Areas of maximum fracturing will have higher transmissivity and hydraulic conductivity associated with them and also will be more prone to erosion.

During the pumping test, a cone of depression developed radially around the well until the cone intercepted lower transmissivity/less fractured rock at the canyon side walls (the negative boundary effect observed approximately 1,700 minutes into the test). After that time, the majority of the water entering the wells is coming from directly up and down canyon. A later stage negative boundary effect near the 3,000 minute mark observed in North Well may be a secondary negative boundary effect associated with translation of the cone of depression outside the portions of the canyon overlain by alluvium. Although the alluvium was not thought to be saturated during the test it is likely to act like a sponge slowing the downgradient flow of groundwater.

Because the fractures in the bedrock appear to be of aerially limited extent, the actual volume of groundwater available may be limited with larger volumes of groundwater available within the canyon areas where fracturing may be most prevalent.

CLOSURE

This summary of observations and analyses has been prepared in general accordance with accepted professional geotechnical and hydrogeologic principles and practices. This report makes no other warranties, either expressed or implied as to the professional advice or information included in it. Our firm should be notified of any pertinent change in the project, or if conditions are found to differ from those described herein, because this may require a reevaluation of the conclusions. This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

Geo-**L**ogic **A**ssociates

Mark W Vincent

Mark W. Vincent, PG 5767, CEG 1873, CHg 865
Senior Geologist

Attachments: Table 1 - Aquifer Stress Test Results
Figure 1 - Well Location Plan
Figure 2 - Step Test Time Drawdown Plot
Figure 3 - North Well Time Drawdown Plot Pumping
Figure 4 - North Well Time Drawdown Plot Recovery
Figure 5 - South Well Time Drawdown Plot Pumping
Figure 6 - South Well Time Drawdown Plot Recovery
Figure 7 - Thing Valley Well Time Drawdown Pumping
Figure 8 - Thing Valley Well Time Drawdown Recovery
Figure 9 - Geologic Map
Appendix A - Analytical Results from Aquifer Test Program

REFERENCES

Cooper, H.H., Jr. and Jacob, C.E., 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, *Transactions, American Geophysical Union*, Vol. 27, No. 4.

Driscoll, D.G., 1986, Groundwater and Wells, Johnson Filtration Systems Inc., St. Paul, Minnesota.

Moench, S.P., 1993, Combining the Neuman and Boulton Models for Flow to a Well in an Unconfined Aquifer, *Ground Water*, Vol. 33, No. 3.

Neuman S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, *Water Resources Research*, Vol. 11, No. 2, pp. 329-342.

Papadopulos, I.S. and Cooper, H.H., Jr., 1967, Drawdown in a well of large diameter, *Water Resources Research*, vol. 3, pp 241-244.

Schafer, D.C., 1978, Casing Storage Can Affect Pumping Test Data, *Johnson Drillers' Journal*, Jan/Feb, Johnson Division, UOP Inc., St. Paul, Minnesota.

Theis, C.V., 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, *American Geophysical Union Transactions*, Vol. 16, pp. 519-524.

Waterloo Hydrogeologic (co-developed with Thomas Roerich), 2002, AquiferTest version 3.5, Advanced Pumping Test and Slug Test Analytical Software.

Table 1
Aquifer Stress Test Results
Thing Valley

Well Designation	Condition	Distance From Pumping Well (feet)	Groundwater Depth from TOC (feet)	Groundwater Depth from Ground Surface (feet)	Assumed Aquifer Thickness (feet)	Average Pumping Rate (gpm)	Analytical Method	Transmissivity (feet^2/day)	Conductivity (feet/day)	Storativity	Comments
North Well	Pumping	1	54.81	54.14	350	81	Cooper-Jacob	488	1.390	3.33E-09	Match to mid-late data.
North Well	Pumping	1	54.81	54.14	350	81	Cooper-Jacob	176	0.502	3.05E-02	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Moench	261	0.741	4.45E-04	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Neuman	**99.8 Minimum**	**0.285 Minimum**	3.82E-04	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Theis	256	0.733	3.57E-04	Match to late data.
North Well	Pumping	1	54.81	54.14	350	81	Walton	115	0.327	2.41E-02	Match to late data.
North Well	Recovery	1	54.81	54.14	350	81	Theis Recovery	669	1.910	NA	Match to early data.
North Well	Recovery	1	54.81	54.14	350	81	Theis Recovery	473	1.350	NA	Match to middle data.
North Well	Recovery	1	54.81	54.14	350	81	Theis Recovery	337	0.963	NA	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Cooper-Jacob	513	1.470	8.29E+00	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Cooper-Jacob	294	0.841	4.19E+01	Match to very late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Moench	467	1.330	1.35E-05	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Neuman	469	1.340	9.12E-04	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Theis	477	1.360	2.10E-03	Match to late data.
South Well	Pumping	61.5	49.34	48.67	350	81	Walton	477	1.360	8.76E+00	Match to late data.
South Well	Recovery	61.5	49.34	48.67	350	81	Theis Recovery	**835 Maximum**	**2.39 Maximum**	NA	Match to early data.
South Well	Recovery	61.5	49.34	48.67	350	81	Theis Recovery	508	1.450	NA	Match to middle data.
South Well	Recovery	61.5	49.34	48.67	350	81	Theis Recovery	311	0.888	NA	Match to late data.
							Average Values	**393**	**1.122**	**3.88E-03**	

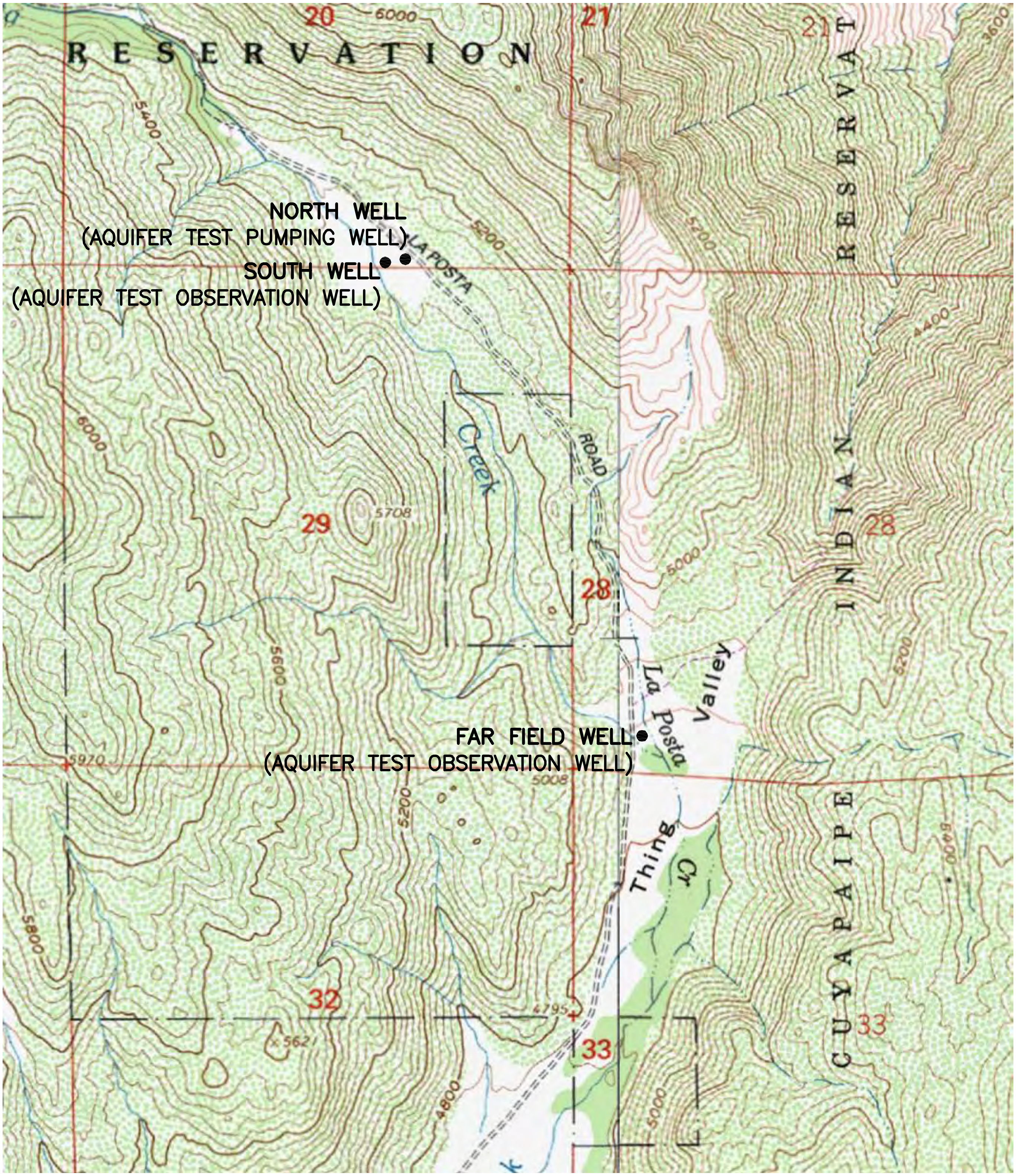


FIGURE 1

WELL LOCATION MAP
THING VALLEY AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

GRAPHIC SCALE
750 0 375 750 1500
(in feet)
1 inch = 1500 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) MOUNT LAGUNA (1997) AND SOMBRERO PEAK (1975) CALIFORNIA QUADRANGLES

Geo-Logic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	NOVEMBER 2010	2010-005

Figure 2
North Well
(Pumping Well)
Time Drawdown Plot for Stepped Pump Test

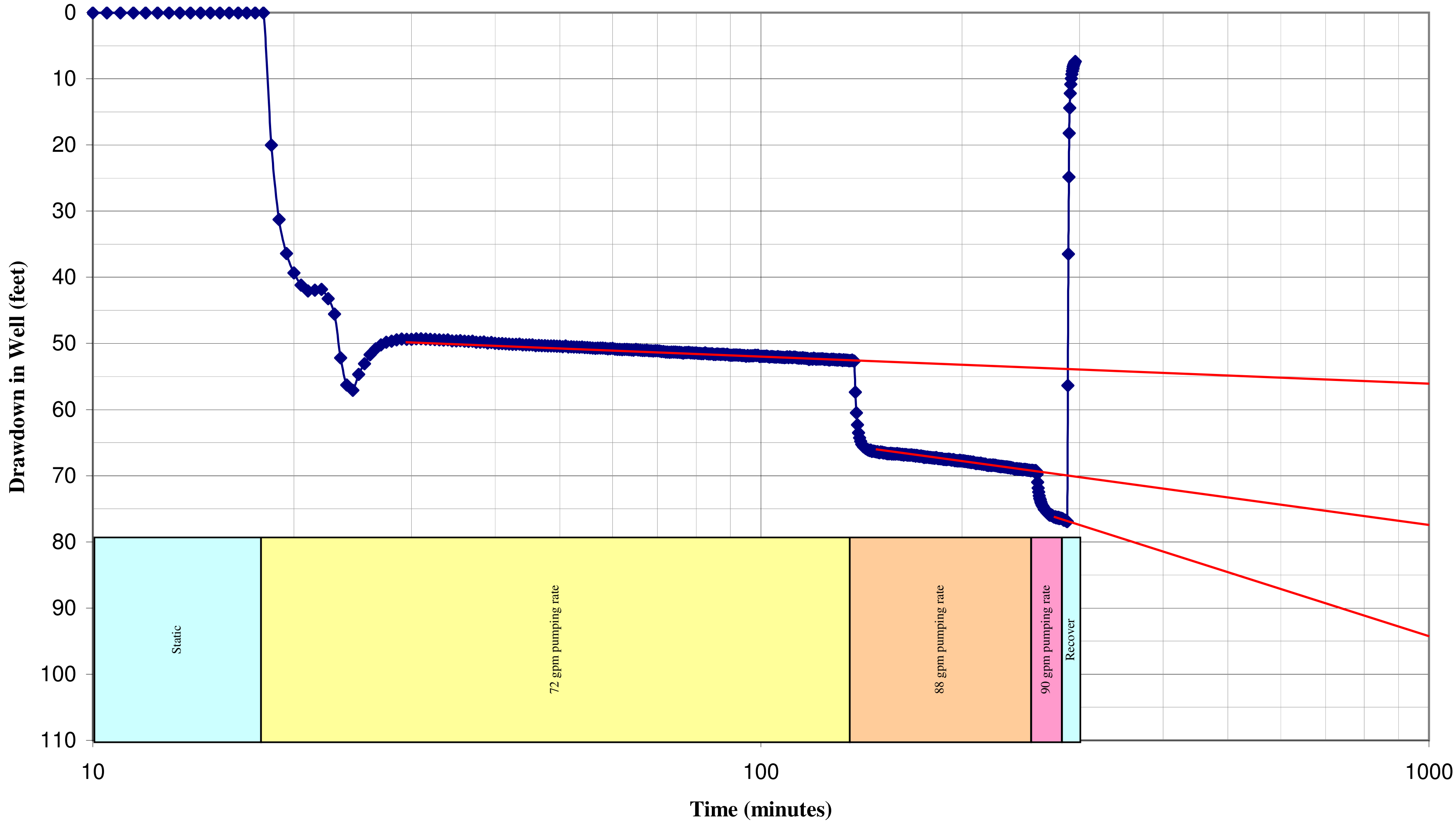


Figure 3
North Well
(Pumping Well)
Time-Drawdown Plot

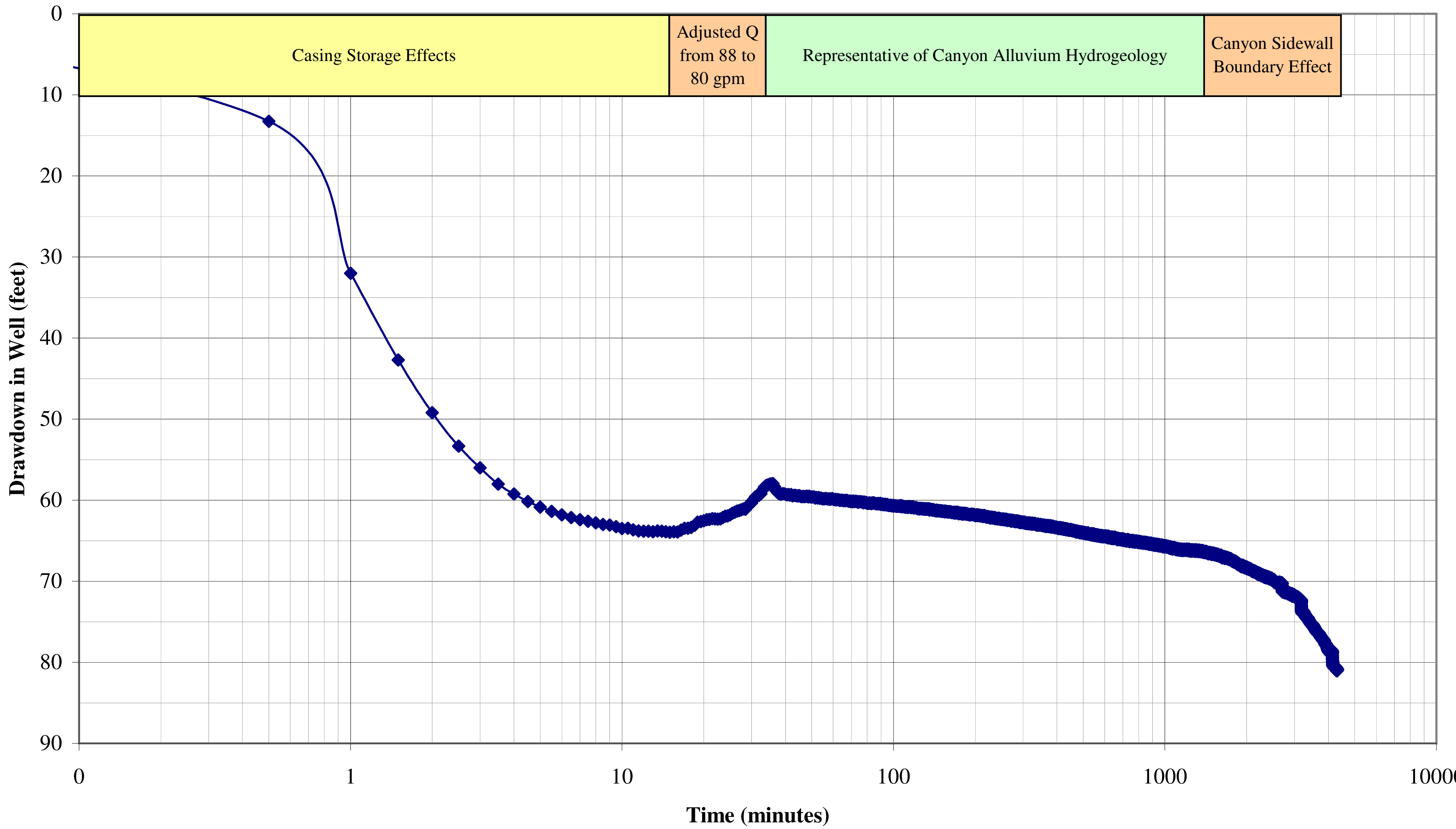


Figure 4
North Well
Recovery
Time-Drawdown Plot

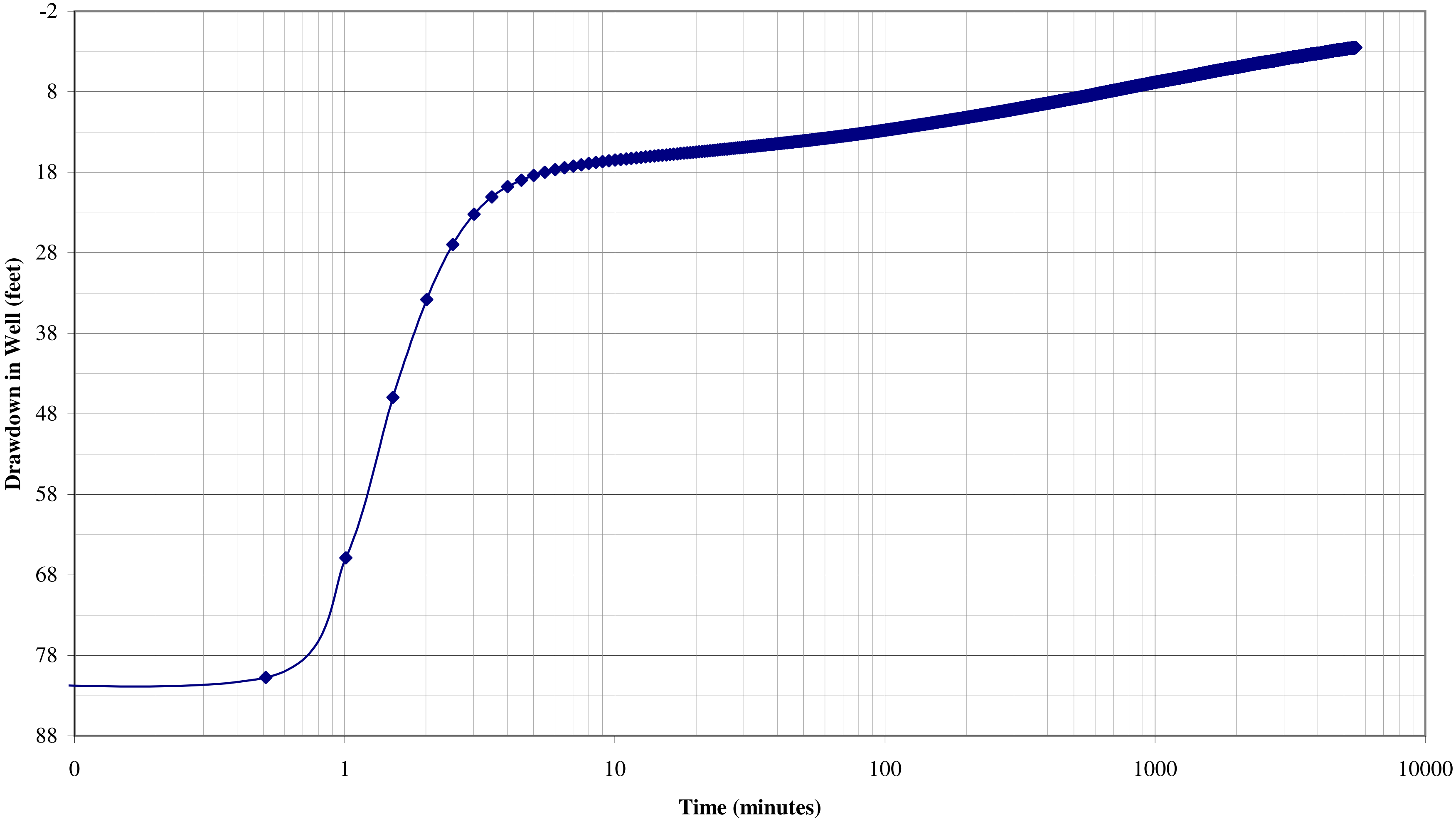


Figure 5
South Well
(Observation Well)
Time-Drawdown Plot

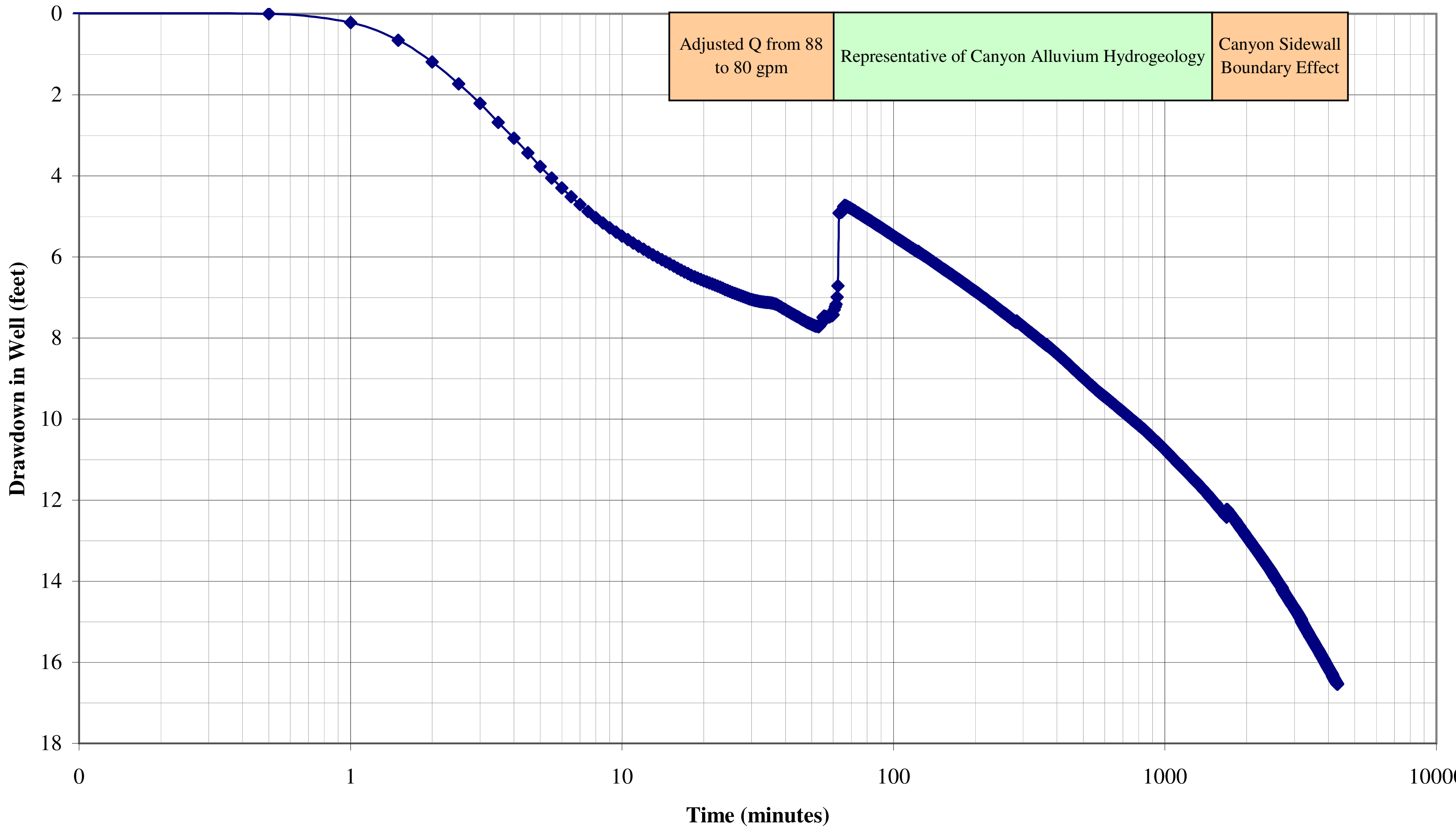


Figure 6
South Well
(Observation Well)
Recovery Time-Drawdown Plot

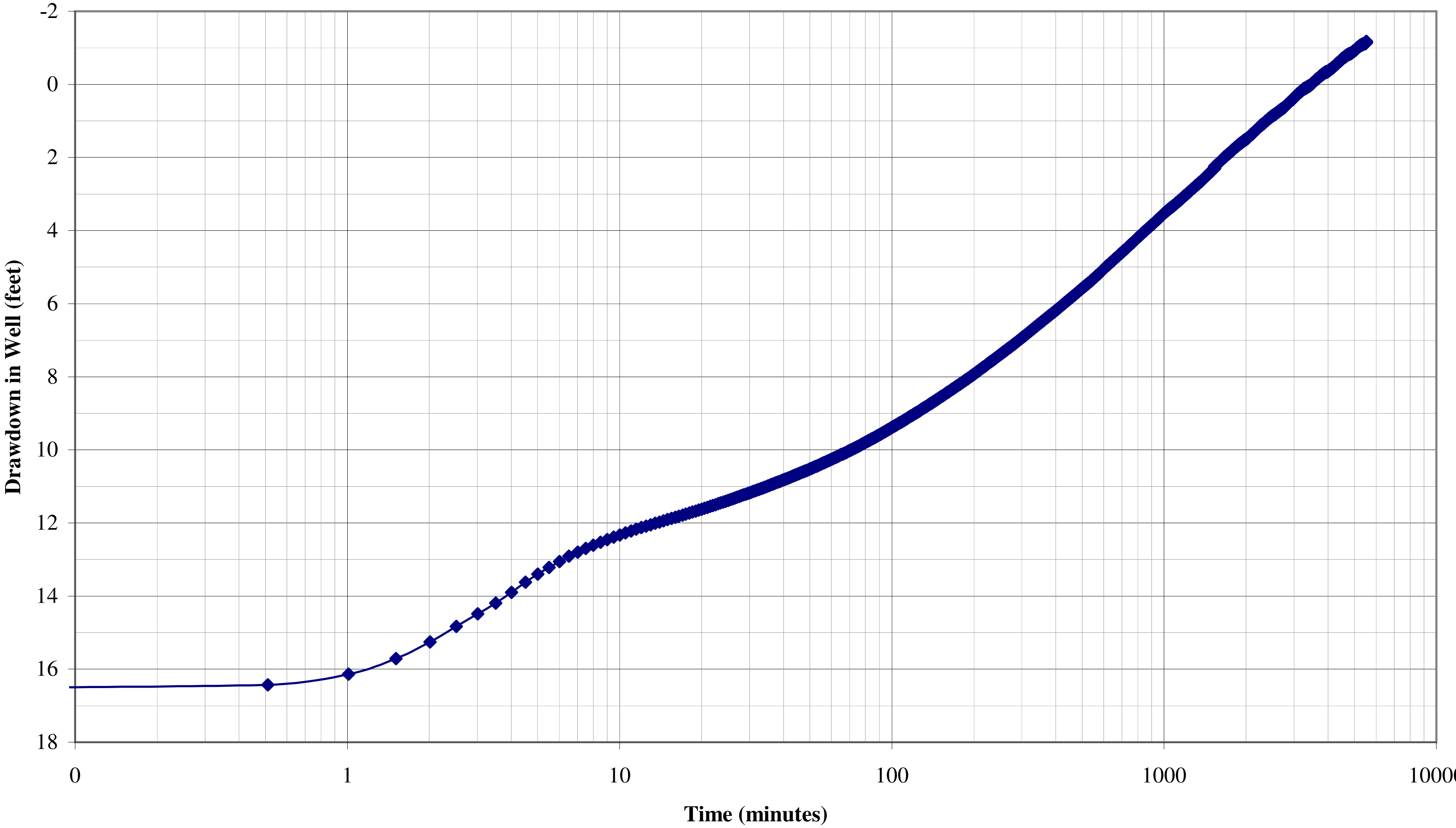


Figure 7
Thing Valley Well
(Observation Well)
Time-Drawdown Plot

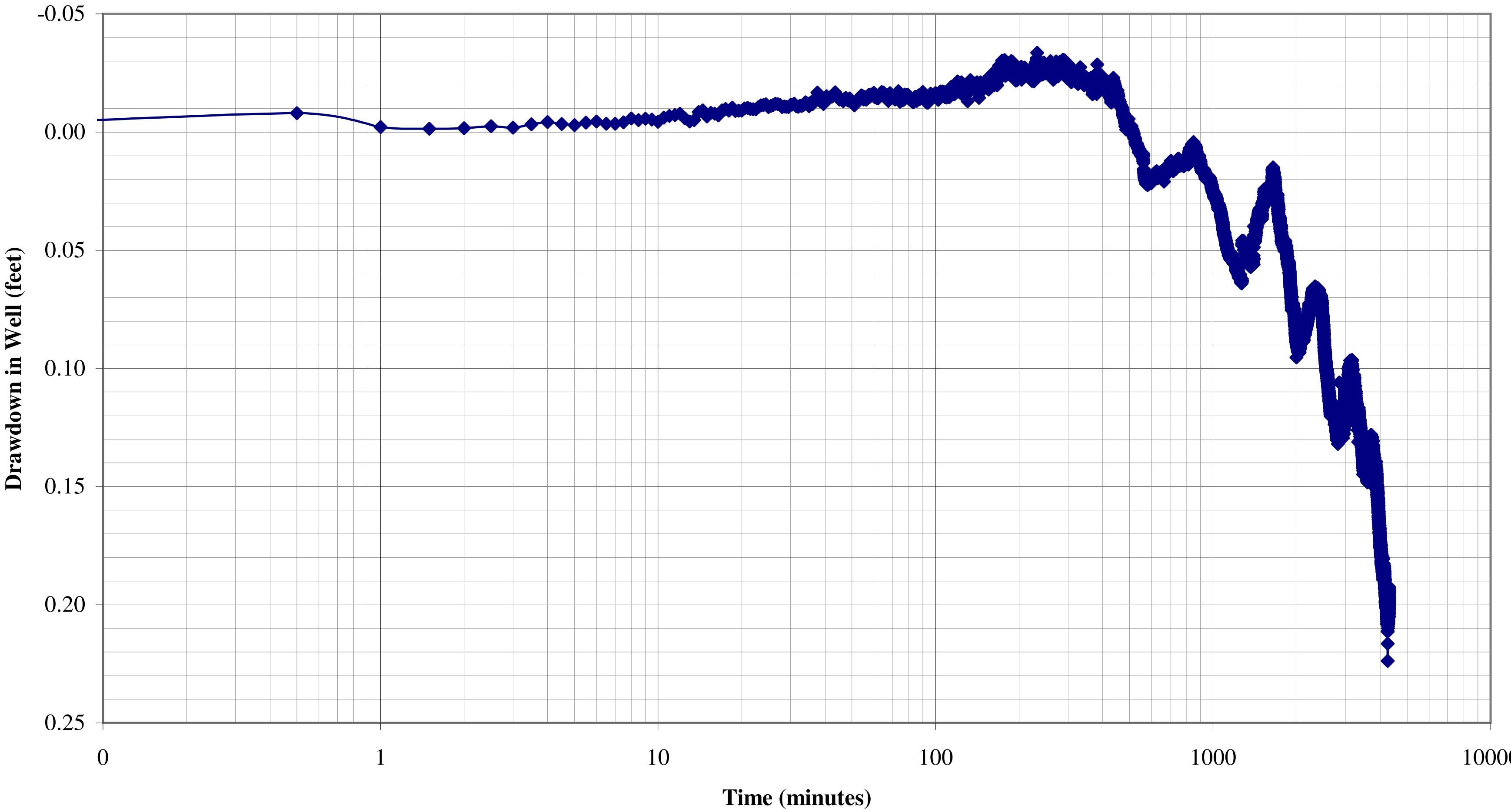
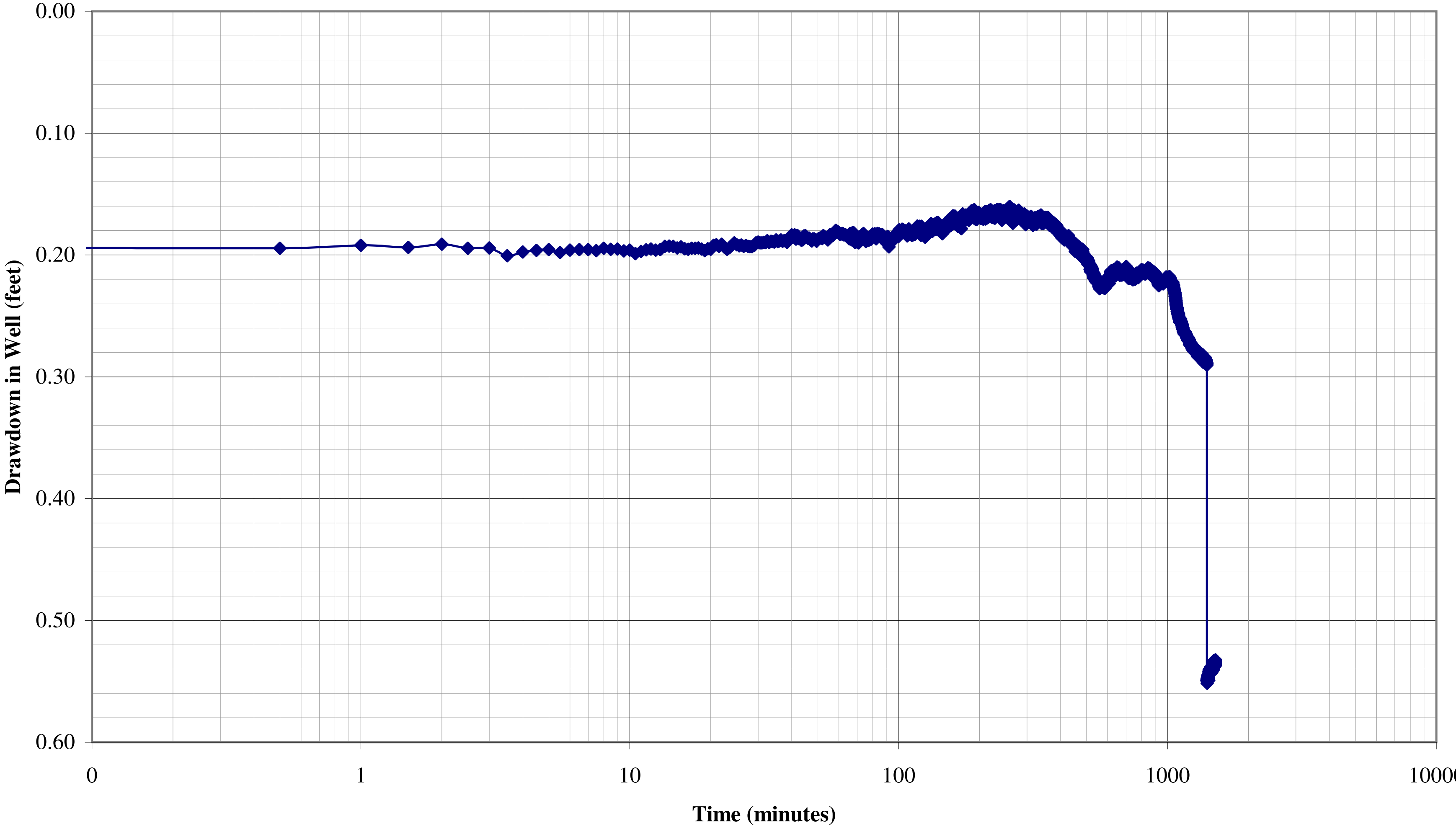
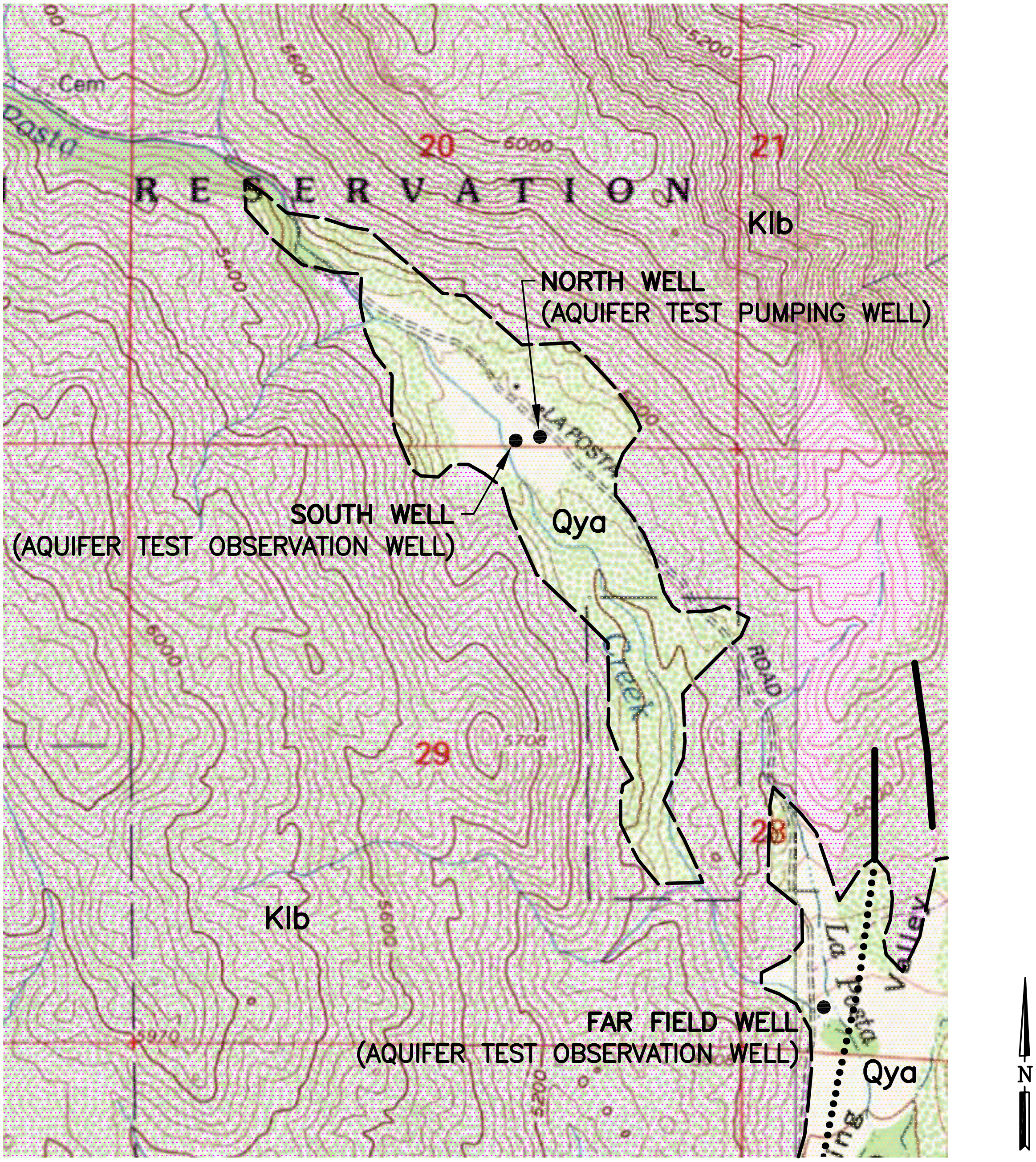


Figure 8
Thing Valley Well
Recovery
Time-Drawdown Plot





EXPLANATION:

Qya	YOUNG ALLUVIUM (HOLOCENE)
Klb	TONALITE OF LAS BANCAS (EARLY CRETACEOUS)
— — — —	APPROXIMATE GEOLOGIC CONTACT
━━━━ ••••	FAULT, DOTTED WHERE CONCEALED

GRAPHIC SCALE

750 0 375 750 1500

(in feet)

1 inch = 1500 ft.

FIGURE 9

GEOLOGIC MAP
THING VALLEY AQUIFER TEST SITE

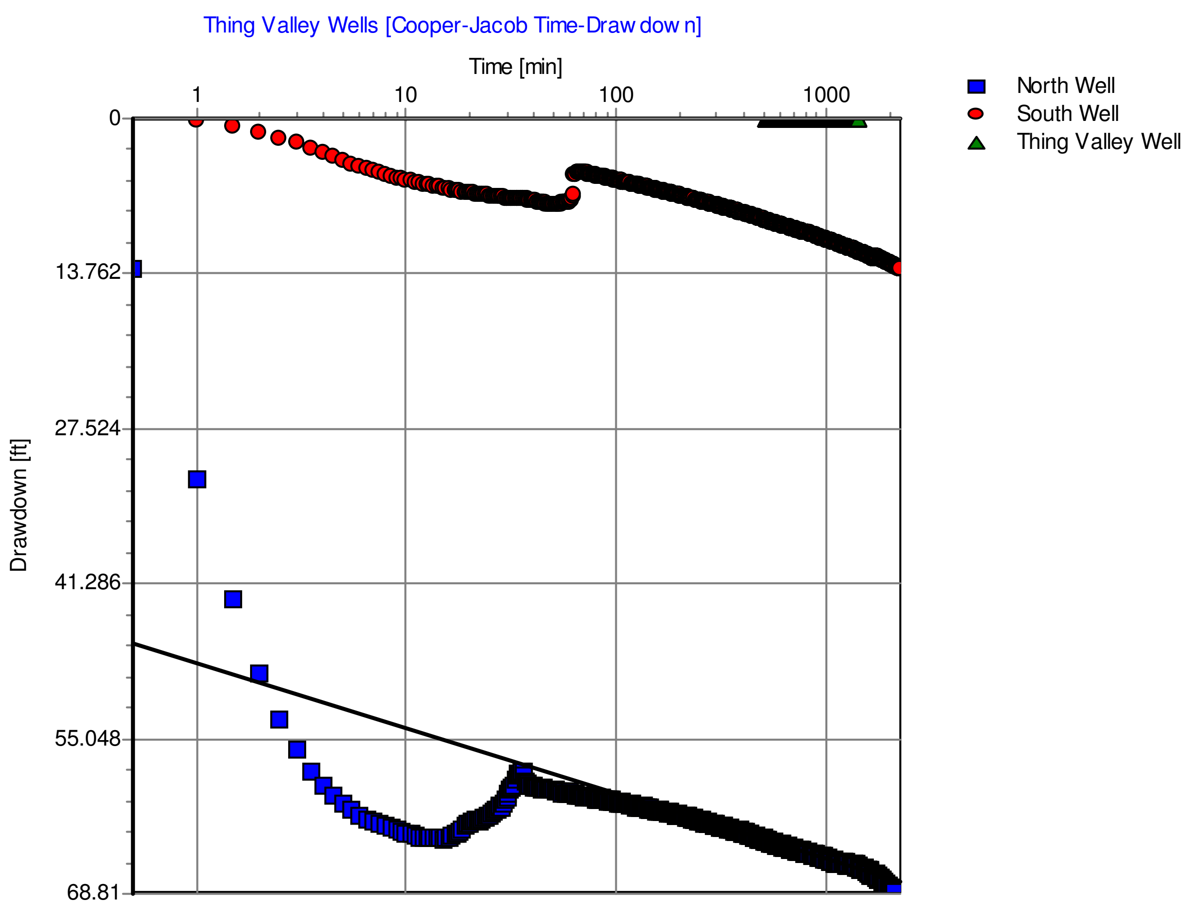
TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	NOVEMBER 2010	2010-005

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

Waterloo Hydrogeologic, Inc.	Pumping Test Analysis Report
460 Philip Street - Suite 101	Project: Thing Valley
Waterloo, Ontario, Canada	Number: 2010-0005
Phone: +1 519 746 1798	Client:



Pumping Test:	**Thing Valley Wells**			
Analysis Method:	**Cooper-Jacob Time-Drawdown**			
Analysis Results:	Transmissivity:	4.88E+2 [ft²/d]	Conductivity:	1.39E+0 [ft/d]
	Storativity:	3.33E-9		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
Comments:	North Well Match to mid-late data.			

Evaluated by: MWV

Evaluation Date: 10/29/2010

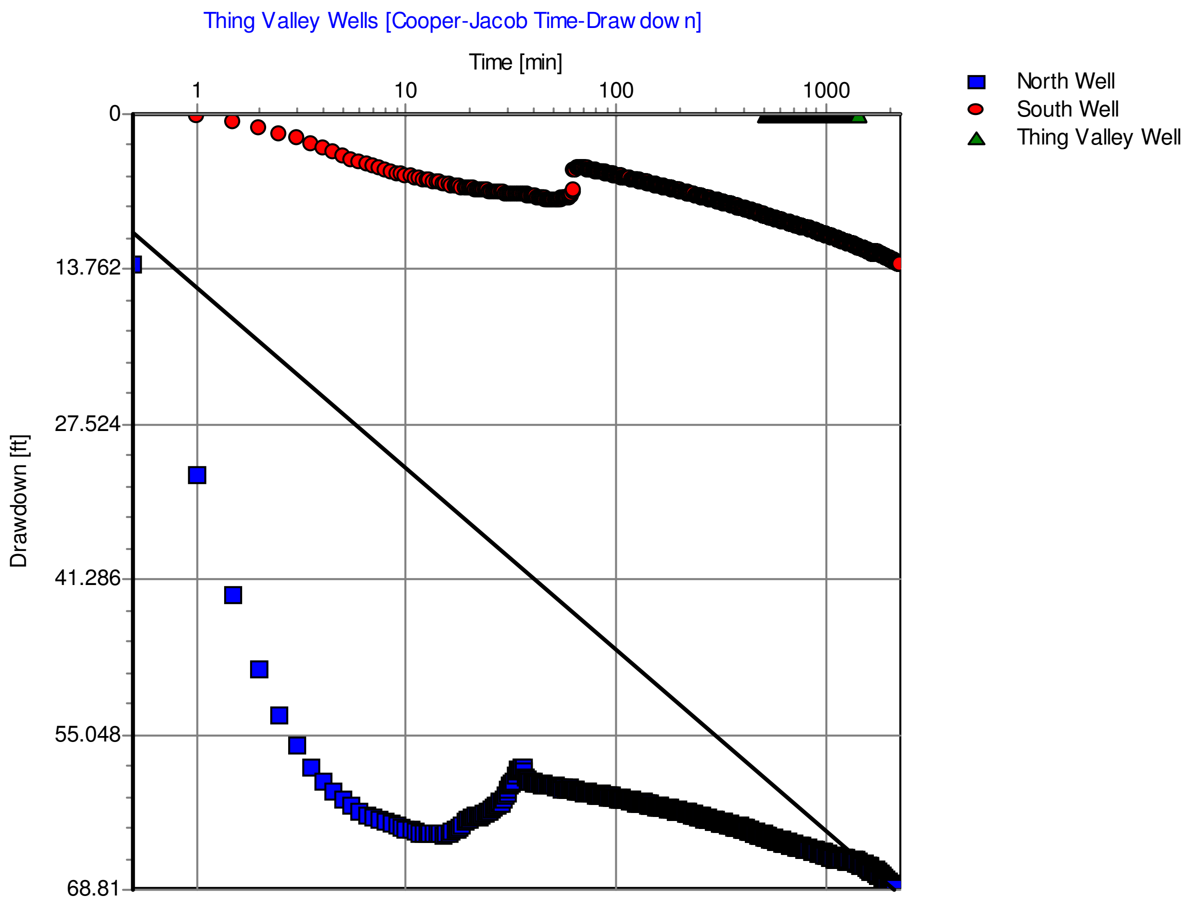
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	1.76E+2 [ft²/d]	Conductivity:	5.02E-1 [ft/d]
	Storativity:	3.05E-2		

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: North Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

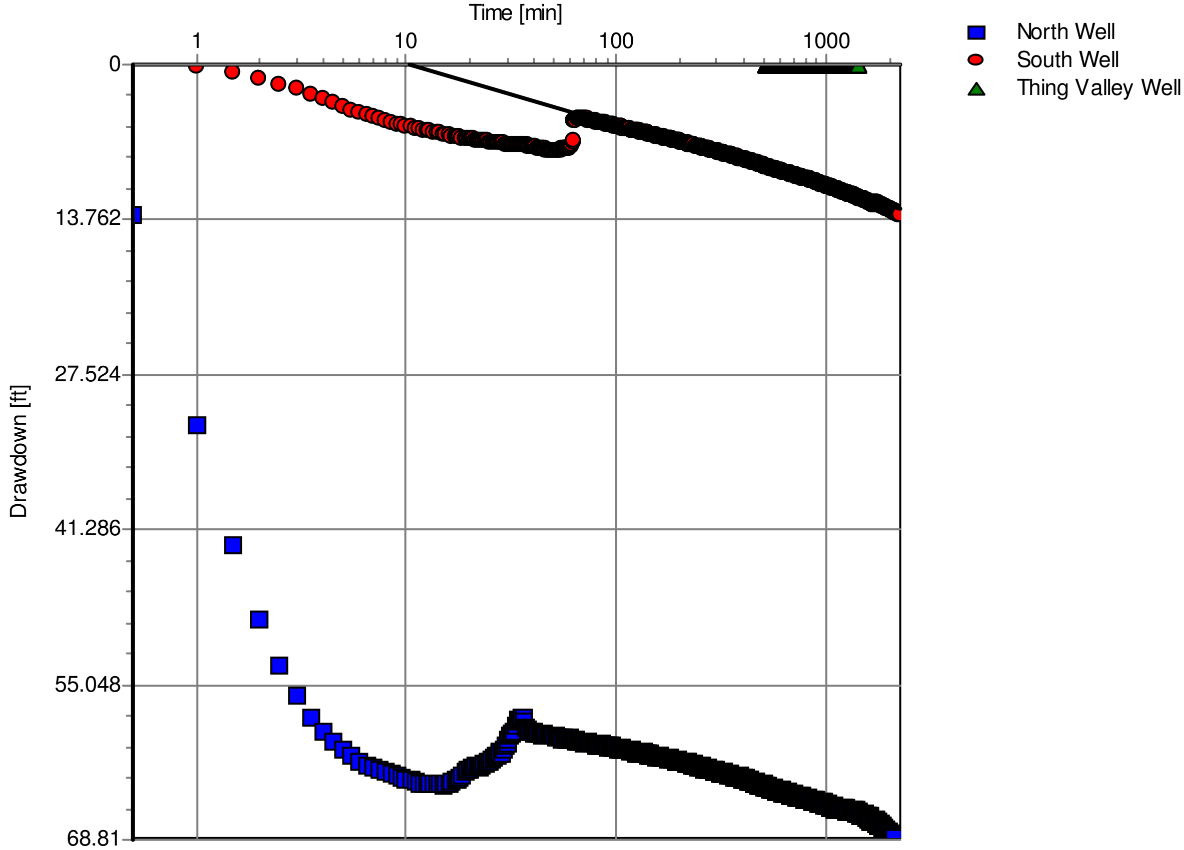
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

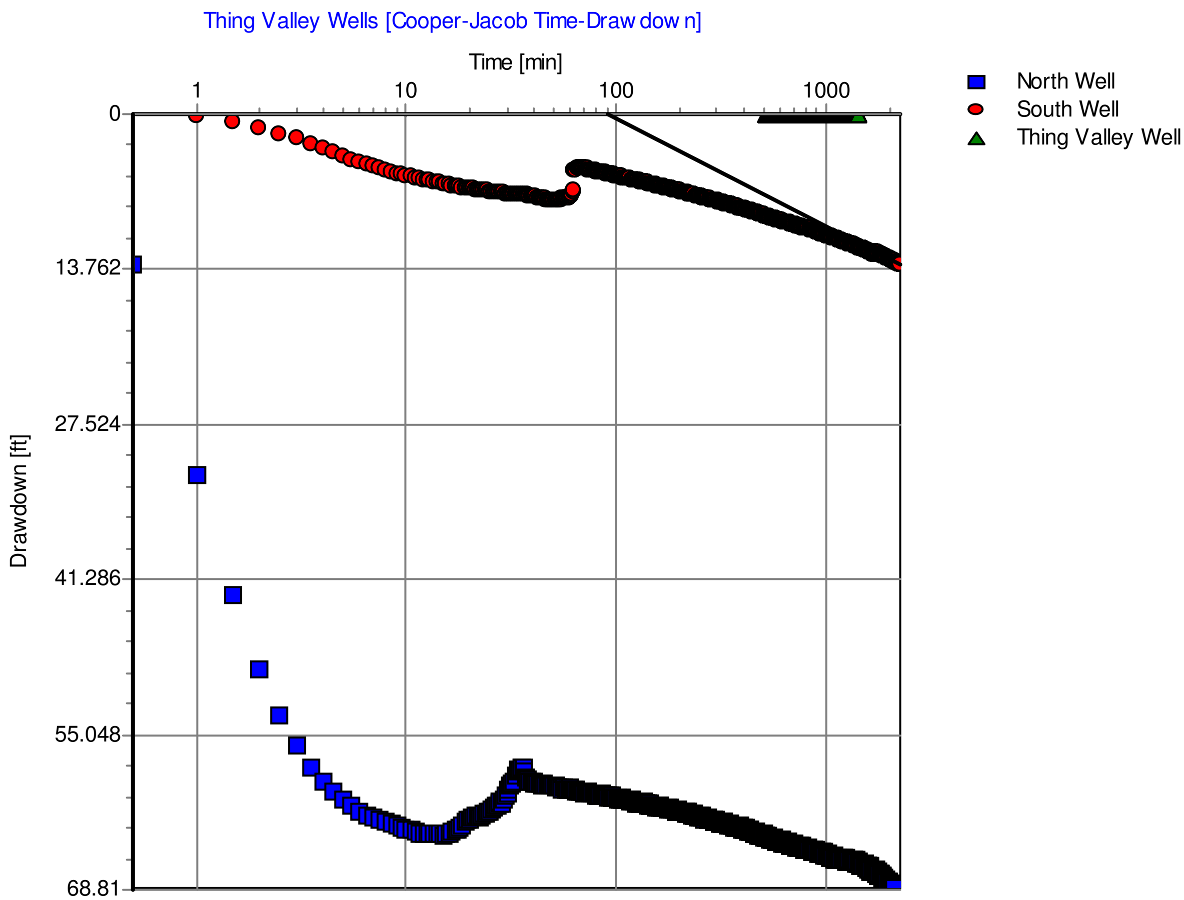
Analysis Results:	Transmissivity:	5.13E+2 [ft²/d]	Conductivity:	1.47E+0 [ft/d]
	Storativity:	8.29E+0		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: South Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc.	Pumping Test Analysis Report
460 Philip Street - Suite 101	Project: Thing Valley
Waterloo, Ontario, Canada	Number: 2010-0005
Phone: +1 519 746 1798	Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	2.94E+2 [ft²/d]	Conductivity:	8.41E-1 [ft/d]
	Storativity:	4.19E+1		

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

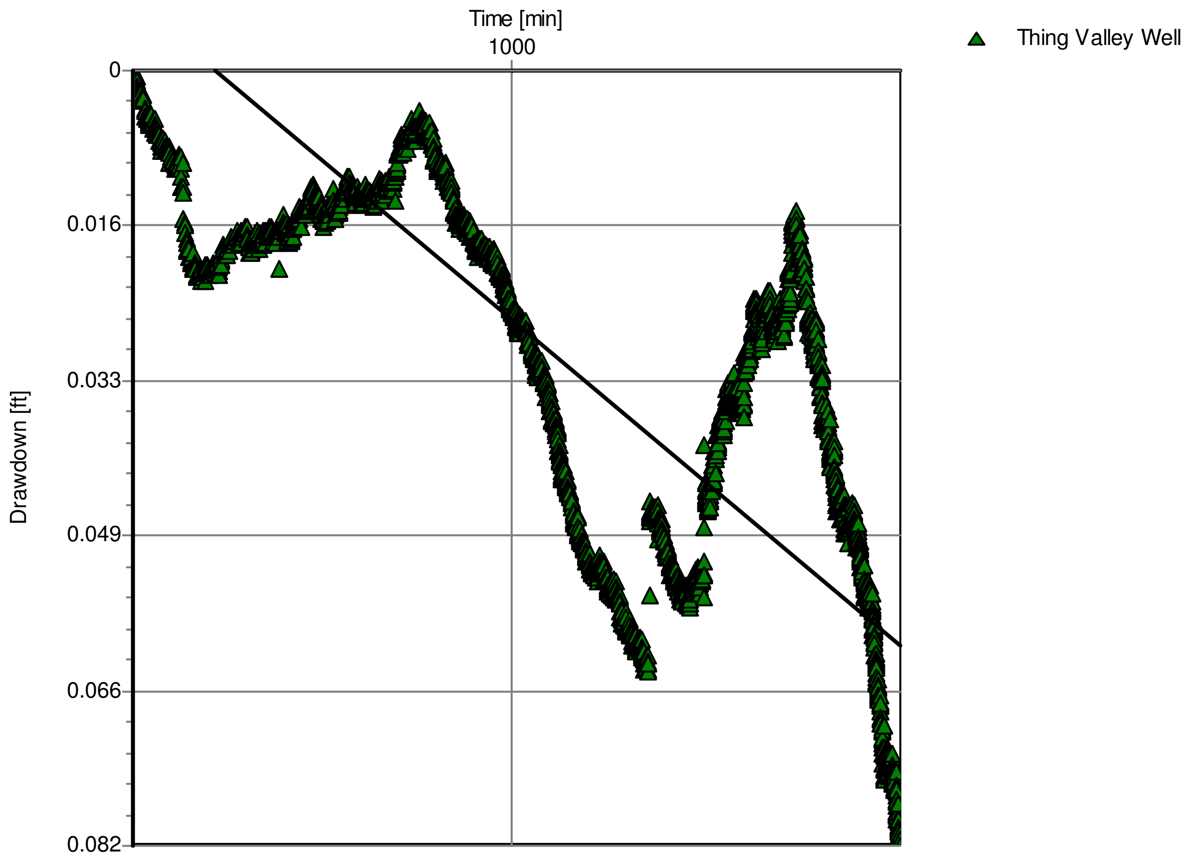
Comments: South Well match to very late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc.	Pumping Test Analysis Report
460 Philip Street - Suite 101	Project: Thing Valley
Waterloo, Ontario, Canada	Number: 2010-0005
Phone: +1 519 746 1798	Client:

Thing Valley Wells [Cooper-Jacob Time-Draw dow n]



Pumping Test: **Thing Valley Wells**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	2.41E+4 [ft²/d]	Conductivity:	6.88E+1 [ft/d]
	Storativity:	7.34E-4		

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

Comments: Thing Valley program best fit match.

Evaluated by: MWV

Evaluation Date: 11/4/2010

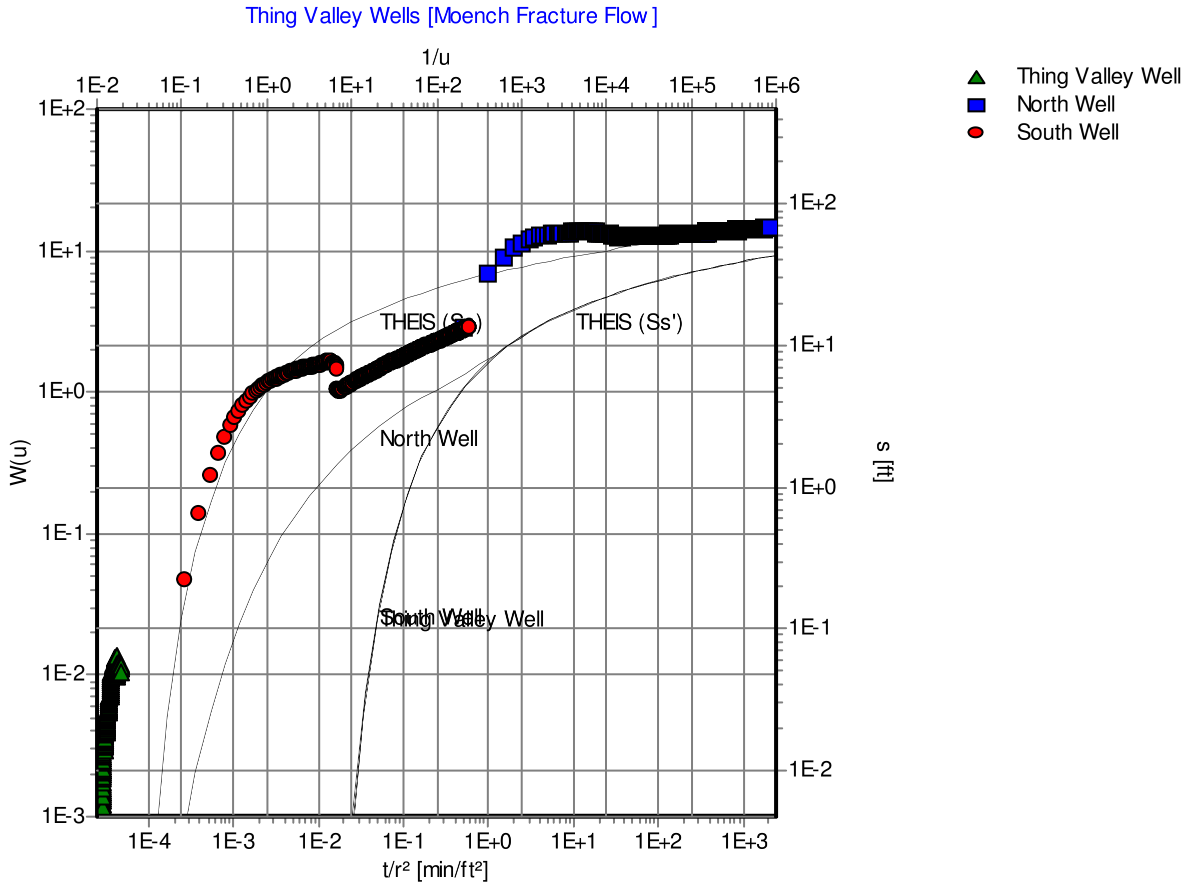
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Moench Fracture Flow**

Analysis Results:	Transmissivity:	2.61E+2 [ft²/d]	Conductivity:	7.47E-1 [ft/d]
	Storativity:	4.45E-4		

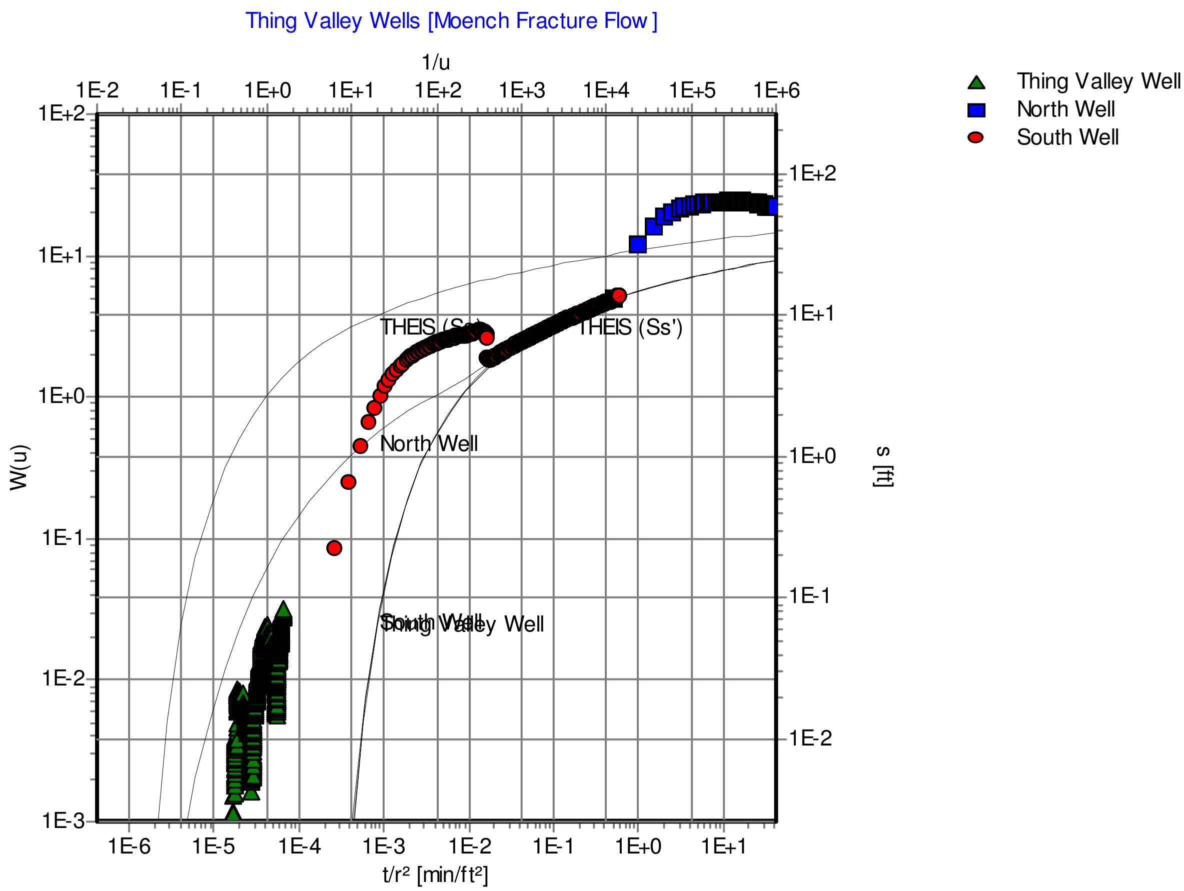
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	b:	350 [ft]
	Screen length:	350 [ft]	Kv/Kh:	0.1
	Boring radius:	0.42 [ft]	C:	0.554
	Discharge Rate:	80.111574 [U.S. gal/mi	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

Comments: North Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:

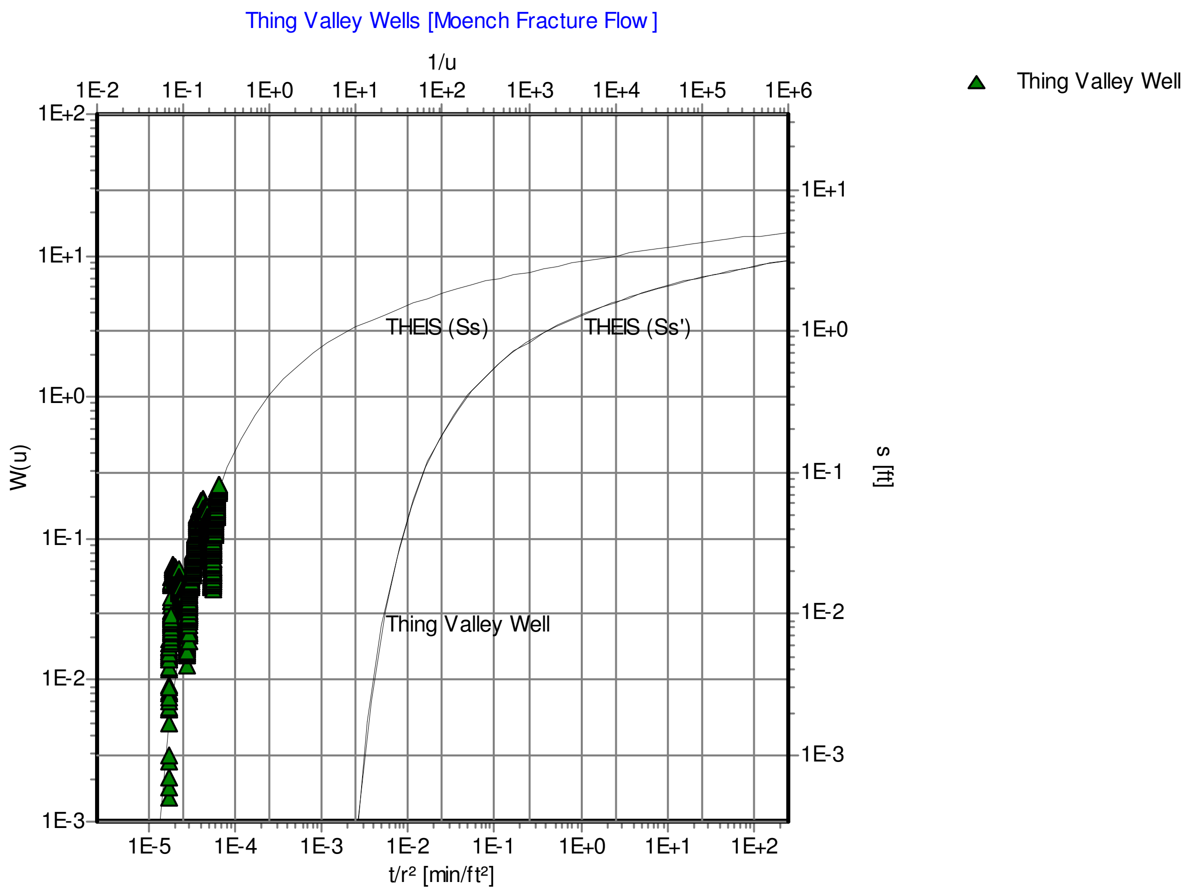


Pumping Test:	**Thing Valley Wells**			
Analysis Method:	**Moench Fracture Flow**			
Analysis Results:	Transmissivity:	4.67E+2 [ft²/d]	Conductivity:	1.33E+0 [ft/d]
	Storativity:	1.35E-5		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	b:	350 [ft]
	Screen length:	350 [ft]	Kv/Kh:	0.1
	Boring radius:	0.42 [ft]	C:	0.554
	Discharge Rate:	80.111574 [U.S. gal/mi	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1
Comments:	South Well match to late data.			

Evaluated by: MWV

Evaluation Date: 11/1/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Moench Fracture Flow**

Analysis Results:	Transmissivity:	3.61E+3 [ft²/d]	Conductivity:	1.03E+1 [ft/d]
	Storativity:	6.28E-4		

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	b:	350 [ft]
	Screen length:	350 [ft]	Kv/Kh:	0.1
	Boring radius:	0.42 [ft]	C:	0.554
	Discharge Rate:	80.111574 [U.S. gal/mi	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

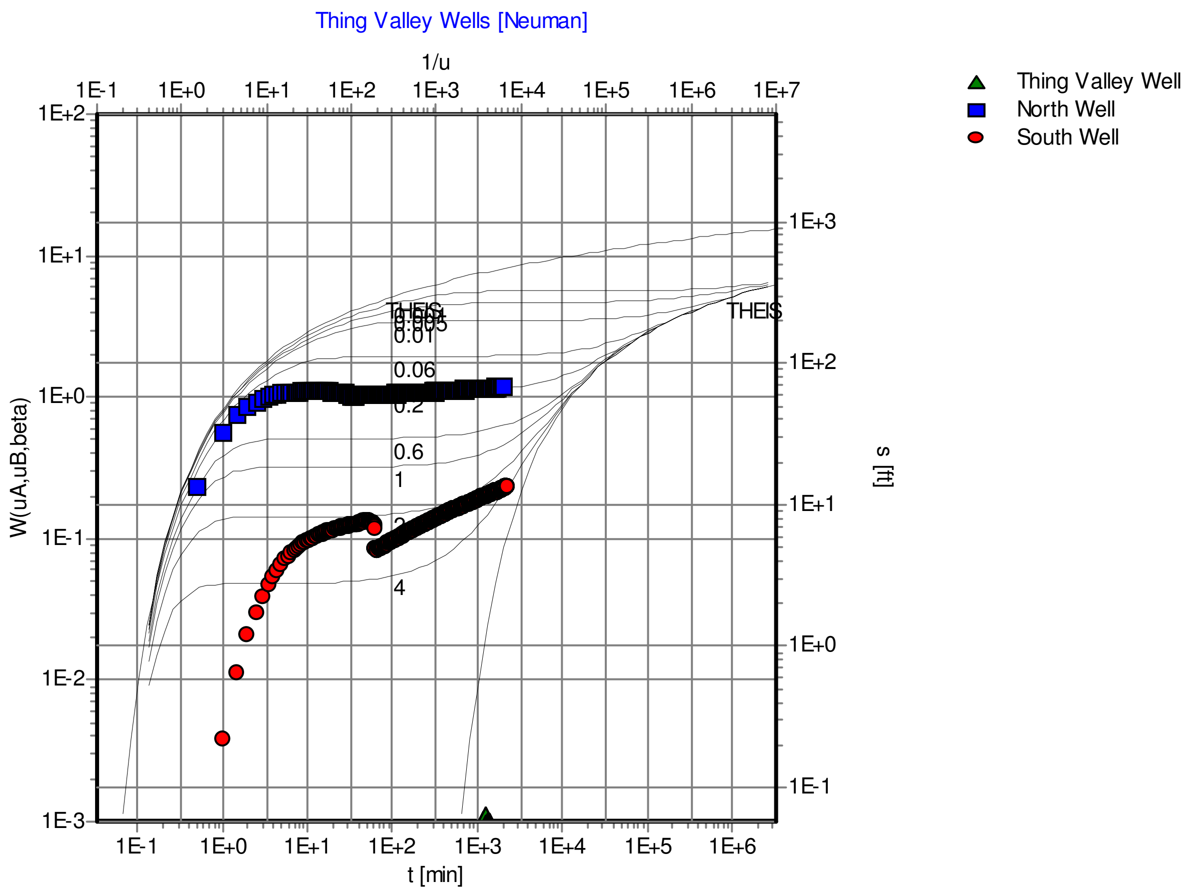
Comments: Moench match to Thing Valley Well data.

Evaluated by: MWV

Evaluation Date: 11/4/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report
Project: Thing Valley
Number: 2010-0005
Client:



<u>Pumping Test:</u> **Thing Valley Wells**

<u>Analysis Method:</u> **Neuman**

<u>Analysis Results:</u>	Transmissivity:	2.13E+1 [ft²/d]	Conductivity:	6.09E-2 [ft/d]
	Storativity:	1.96E-2	Specific Yield:	1.96E+2

<u>Test parameters:</u>	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

<u>Comments:</u> North Well match to all data.

Evaluated by: MWV
Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc.

460 Philip Street - Suite 101

Waterloo, Ontario, Canada

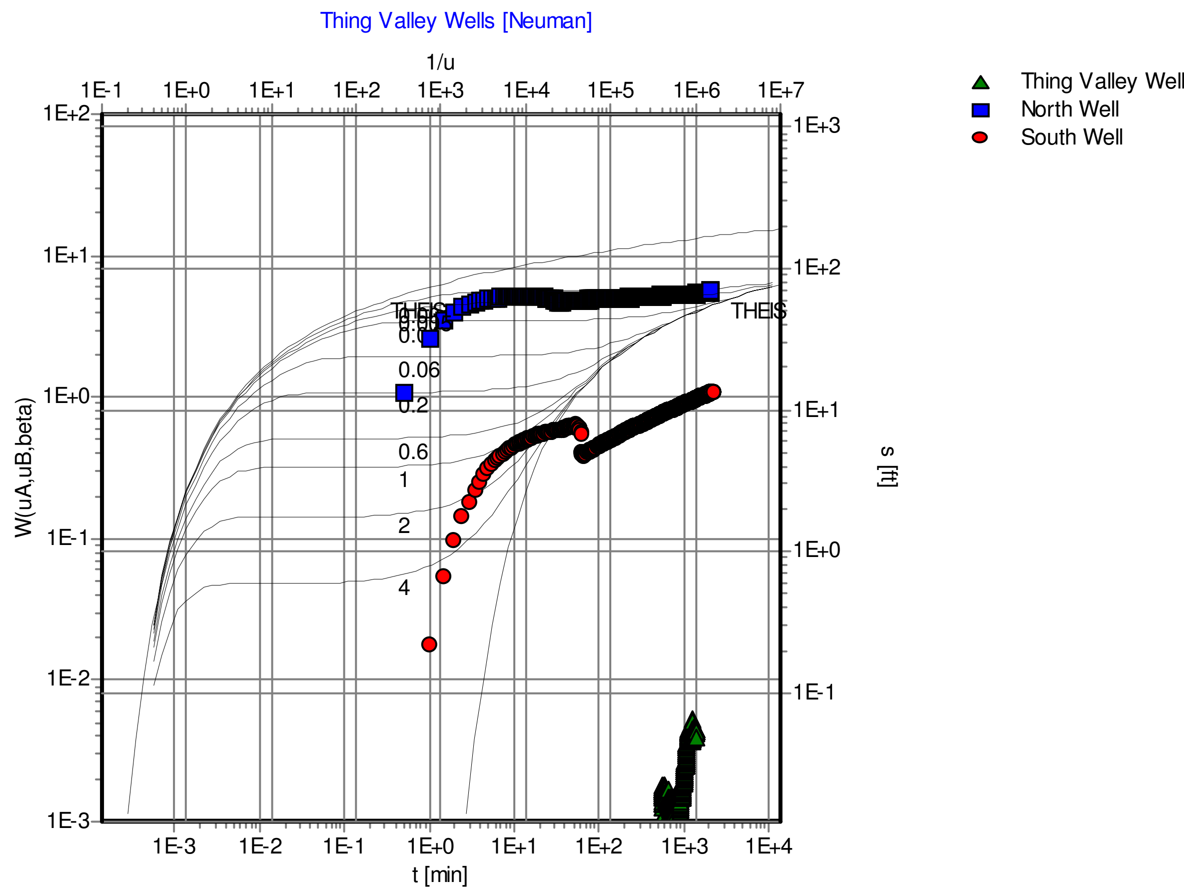
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test:	**Thing Valley Wells**			
Analysis Method:	**Neuman**			
Analysis Results:	Transmissivity:	9.98E+1 [ft²/d]	Conductivity:	2.85E-1 [ft/d]
	Storativity:	3.82E-4	Specific Yield:	3.82E+0
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		
Comments:	North Well match to late data.			

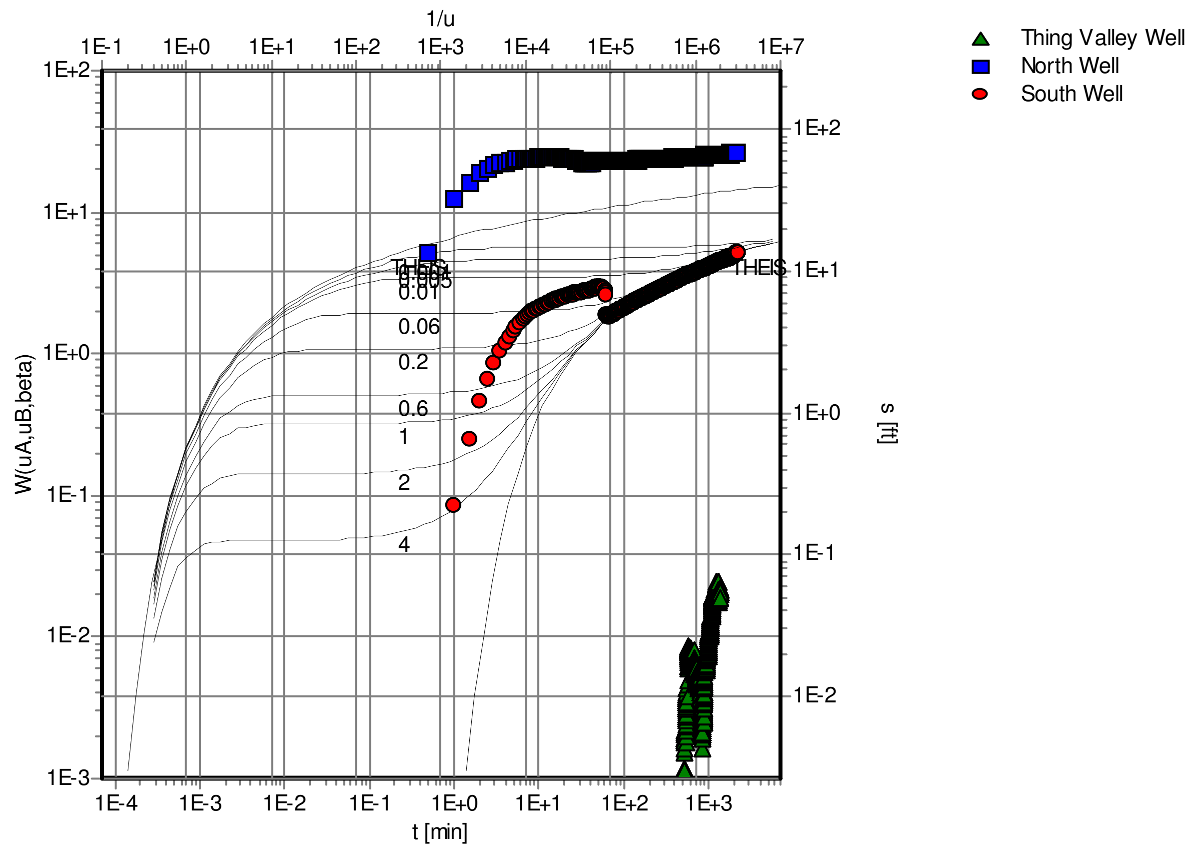
Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report	
Project:	Thing Valley
Number:	2010-0005
Client:	

Thing Valley Wells [Neuman]



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	4.69E+2 [ft²/d]	Conductivity:	1.34E+0 [ft/d]
	Storativity:	9.12E-4	Specific Yield:	9.12E+0

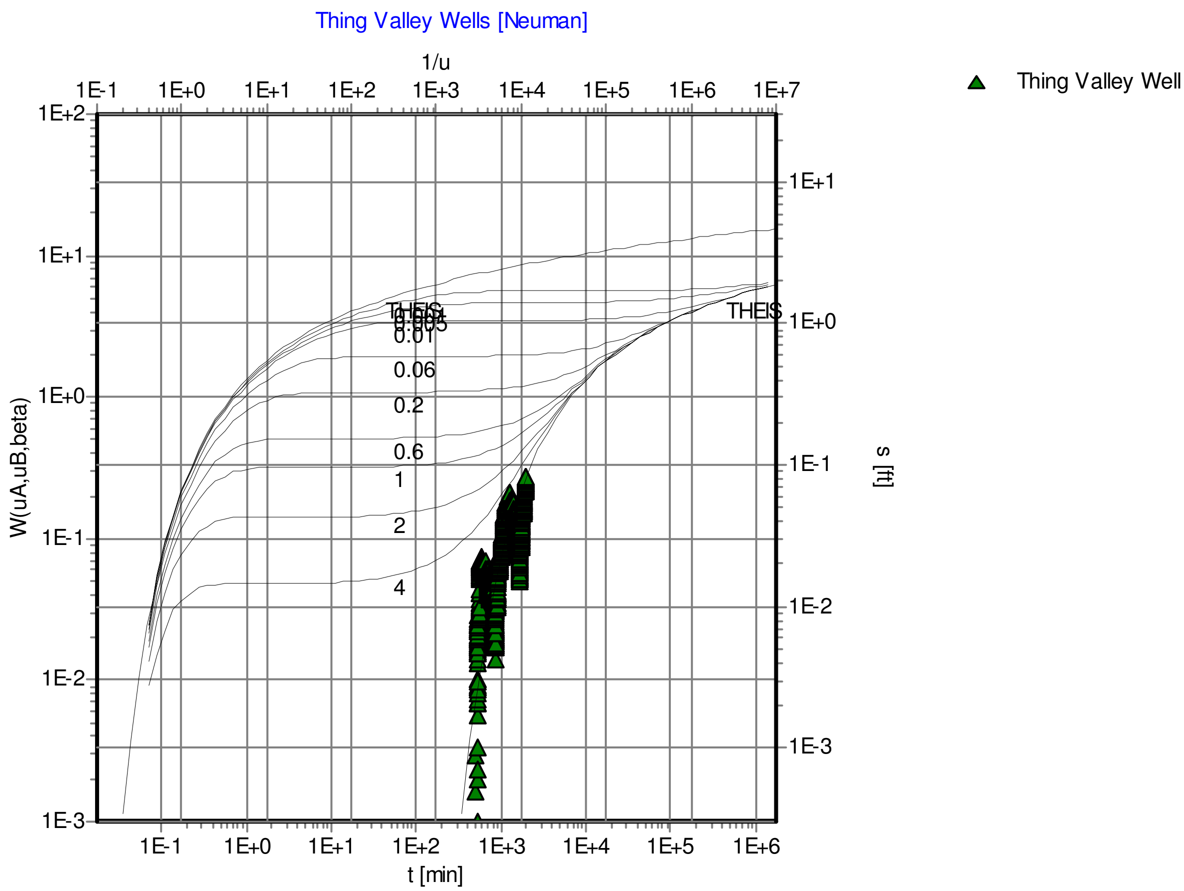
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: South Well match to late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	4.06E+3 [ft²/d]	Conductivity:	1.16E+1 [ft/d]
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

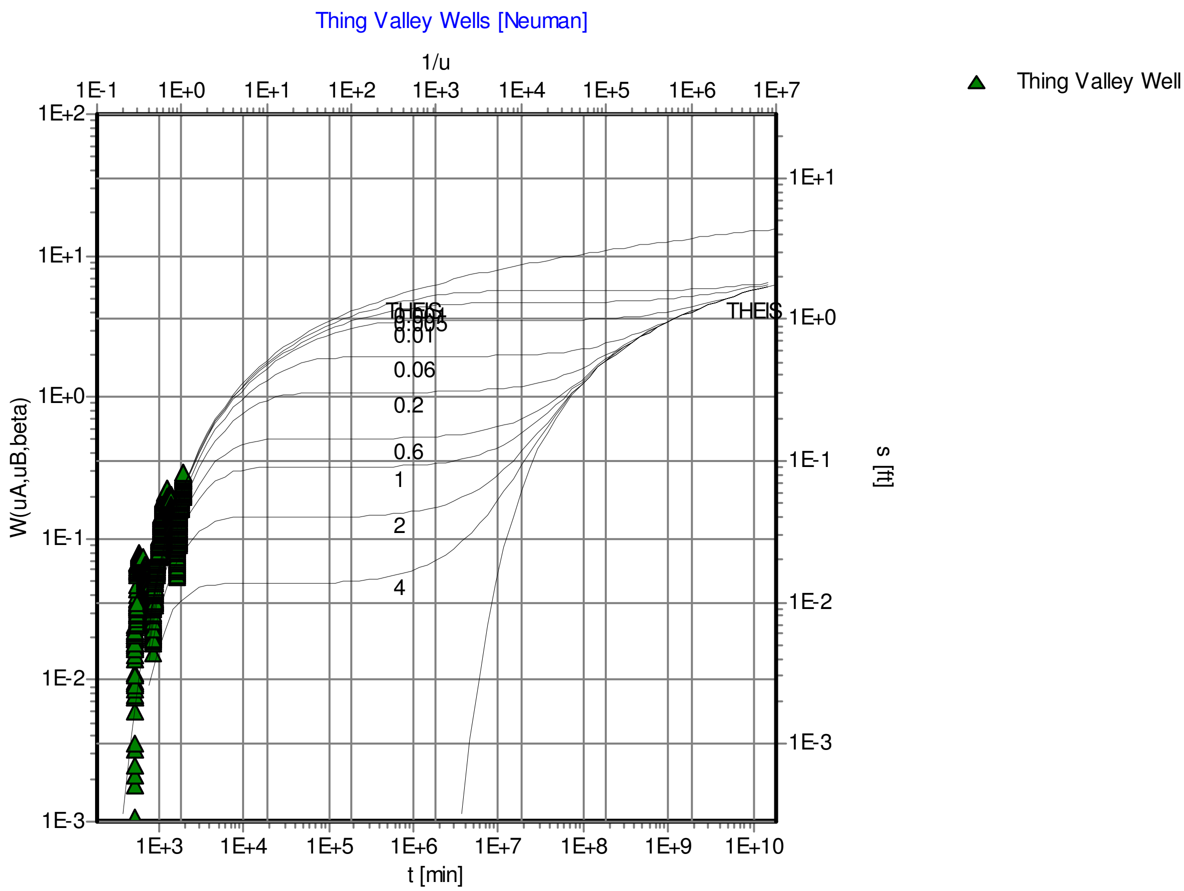
Comments: Thing Valley data

Evaluated by: MWV

Evaluation Date: 11/4/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report
Project: Thing Valley
Number: 2010-0005
Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Neuman**

Analysis Results: Transmissivity: 4.35E+3 [ft²/d] Conductivity: 1.24E+1 [ft/d]

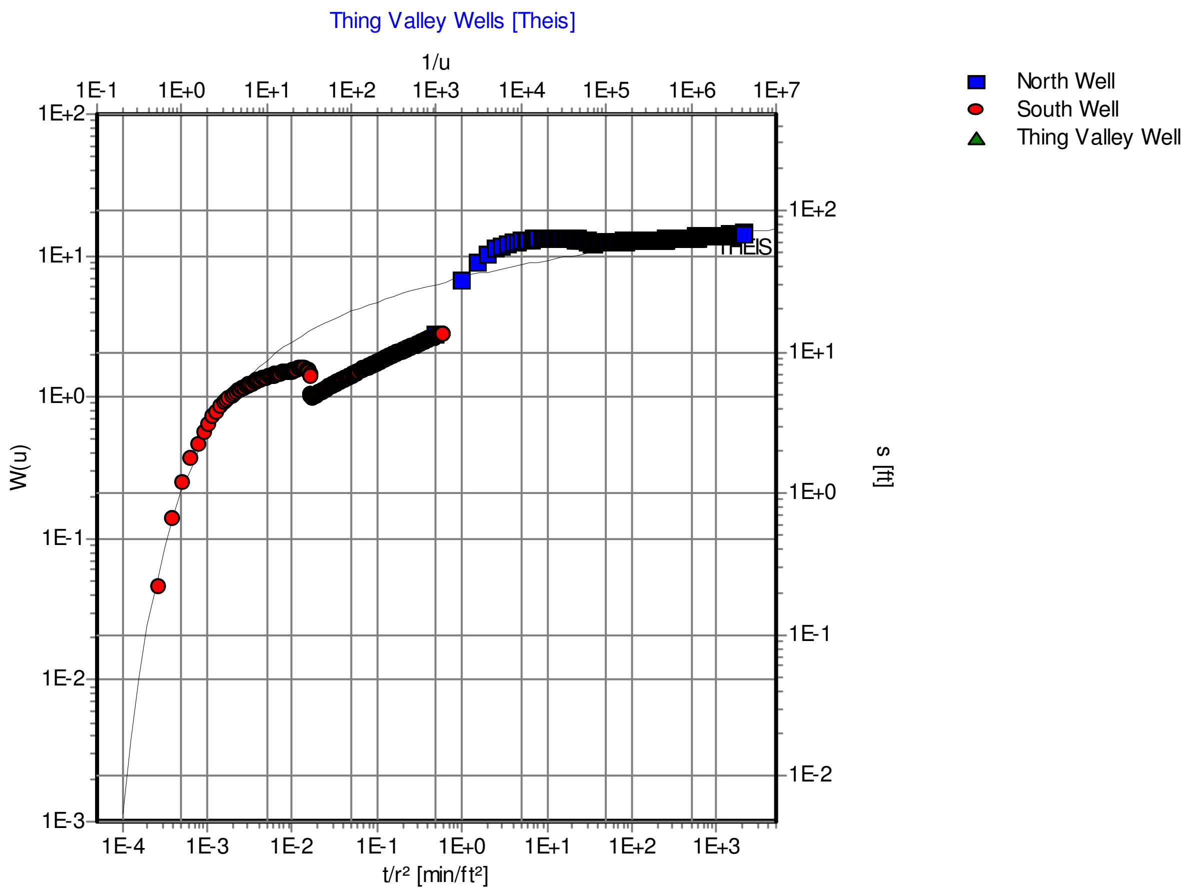
Test parameters:				
	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Beta:	0.005
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
	LOG(Sy/S):	4		

Comments: Thing Valley data

Evaluated by: MWV

Evaluation Date: 11/4/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test:	**Thing Valley Wells**			
Analysis Method:	**Theis**			
Analysis Results:	Transmissivity:	2.56E+2 [ft²/d]	Conductivity:	7.33E-1 [ft/d]
	Storativity:	3.57E-4		
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		
Comments:	North Well match to late data. South Well match to early data.			

Evaluated by: MWV

Evaluation Date: 10/29/2010

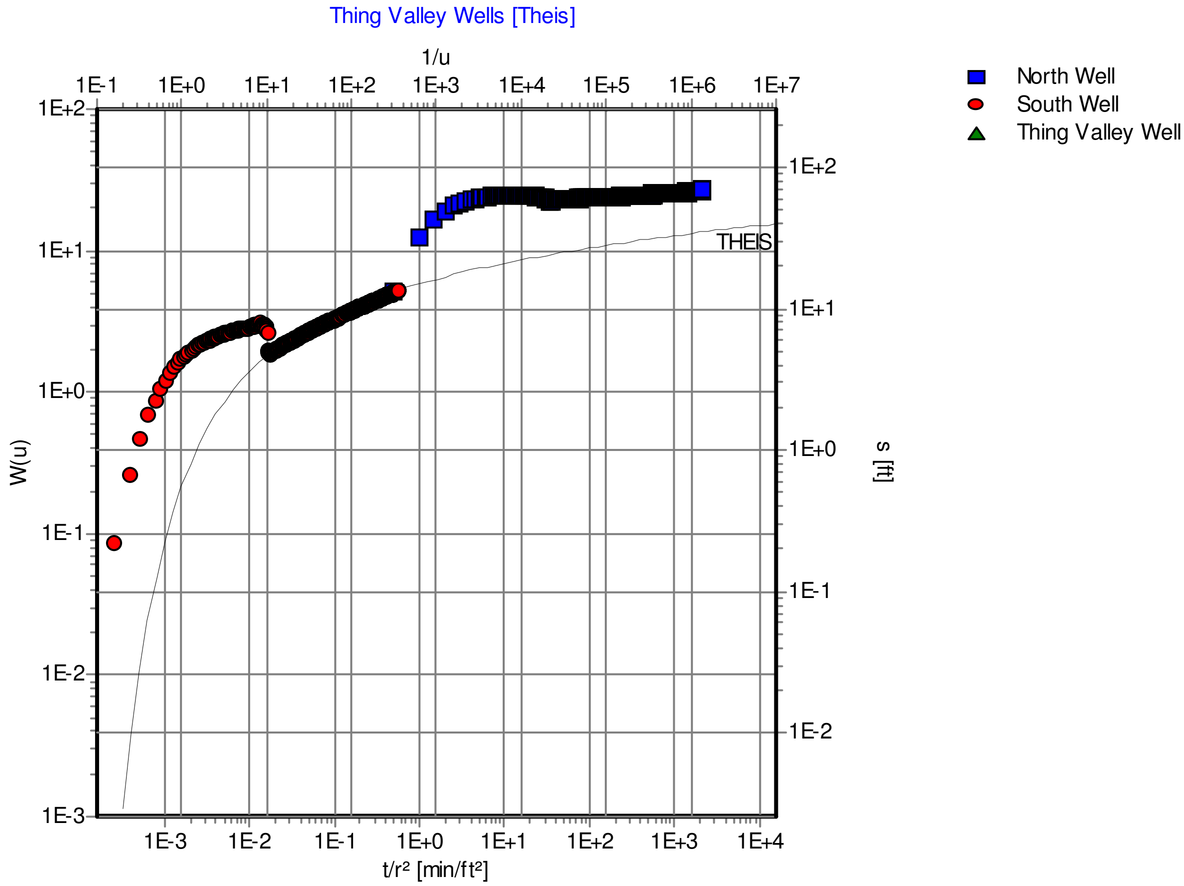
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Thing Valley Wells**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	4.77E+2 [ft²/d]	Conductivity:	1.36E+0 [ft/d]
	Storativity:	2.10E-3		

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	80.111574 [U.S. gal/min]		

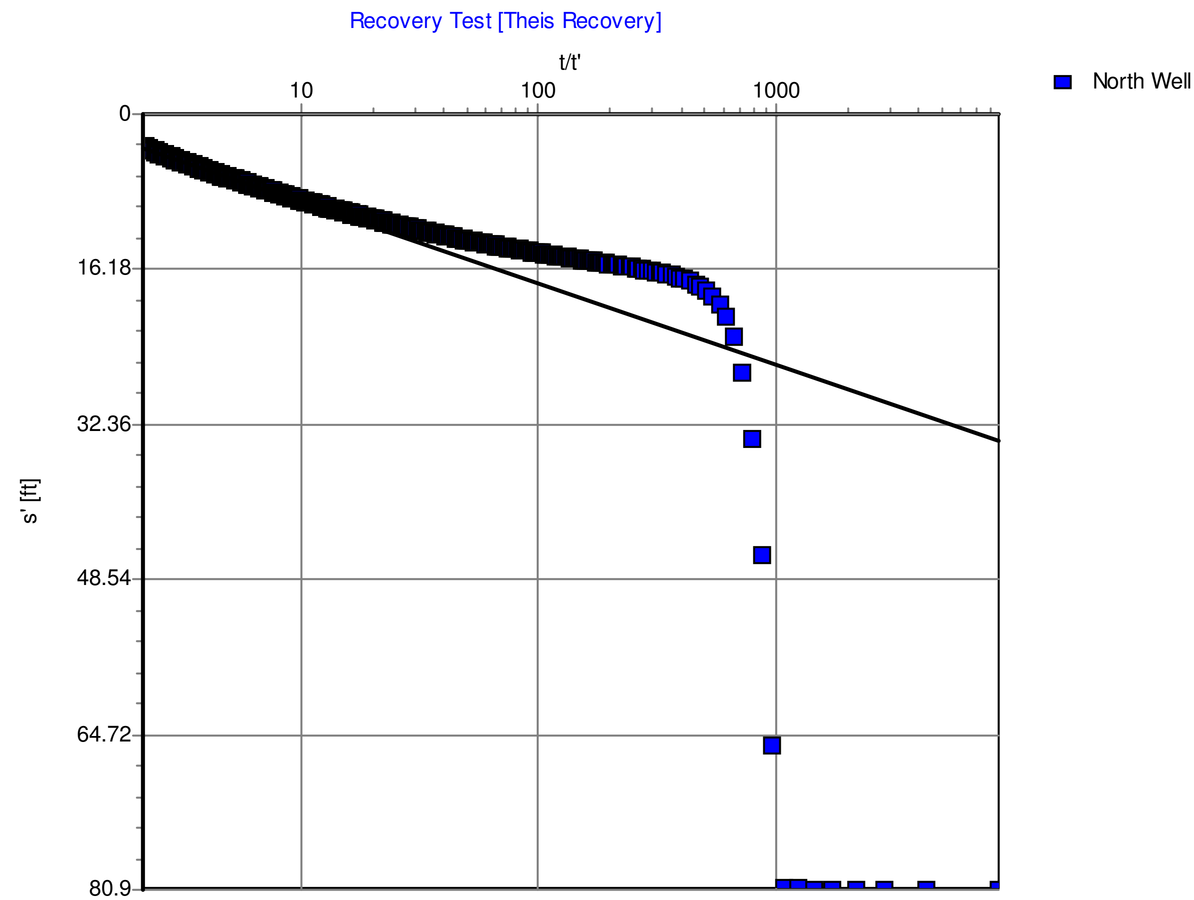
Comments: Match to South Well late data.

Evaluated by: MWV

Evaluation Date: 10/29/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report
Project: Thing Valley
Number: 2010-0005
Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results: Transmissivity: 3.37E+2 [ft²/d] Conductivity: 9.63E-1 [ft/d]

Test parameters:				
	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments: North Well recovery match to late data.

Evaluated by: MWV

Evaluation Date: 11/2/2010

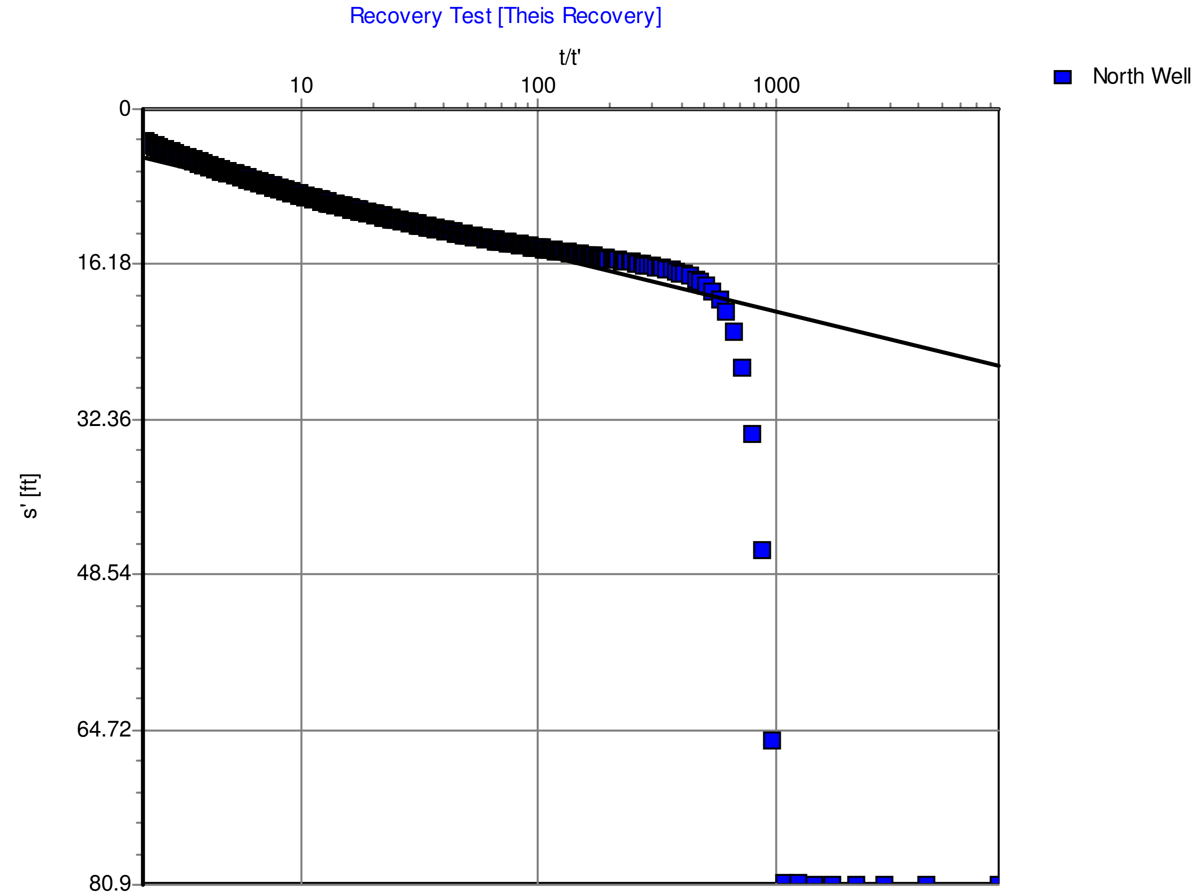
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	4.73E+2 [ft²/d]	Conductivity:	1.35E+0 [ft/d]
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments:

Evaluated by:

Evaluation Date: 11/2/2010

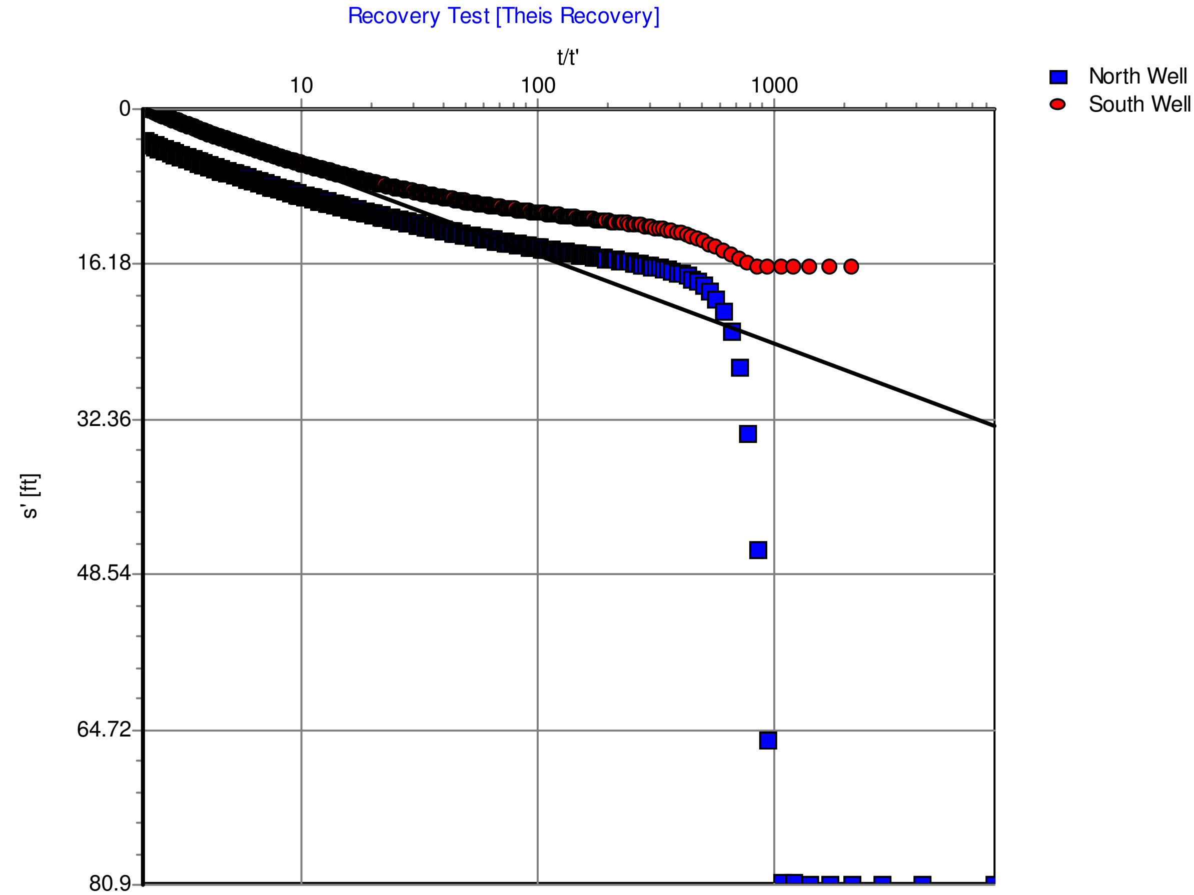
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Thing Valley

Number: 2010-0005

Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

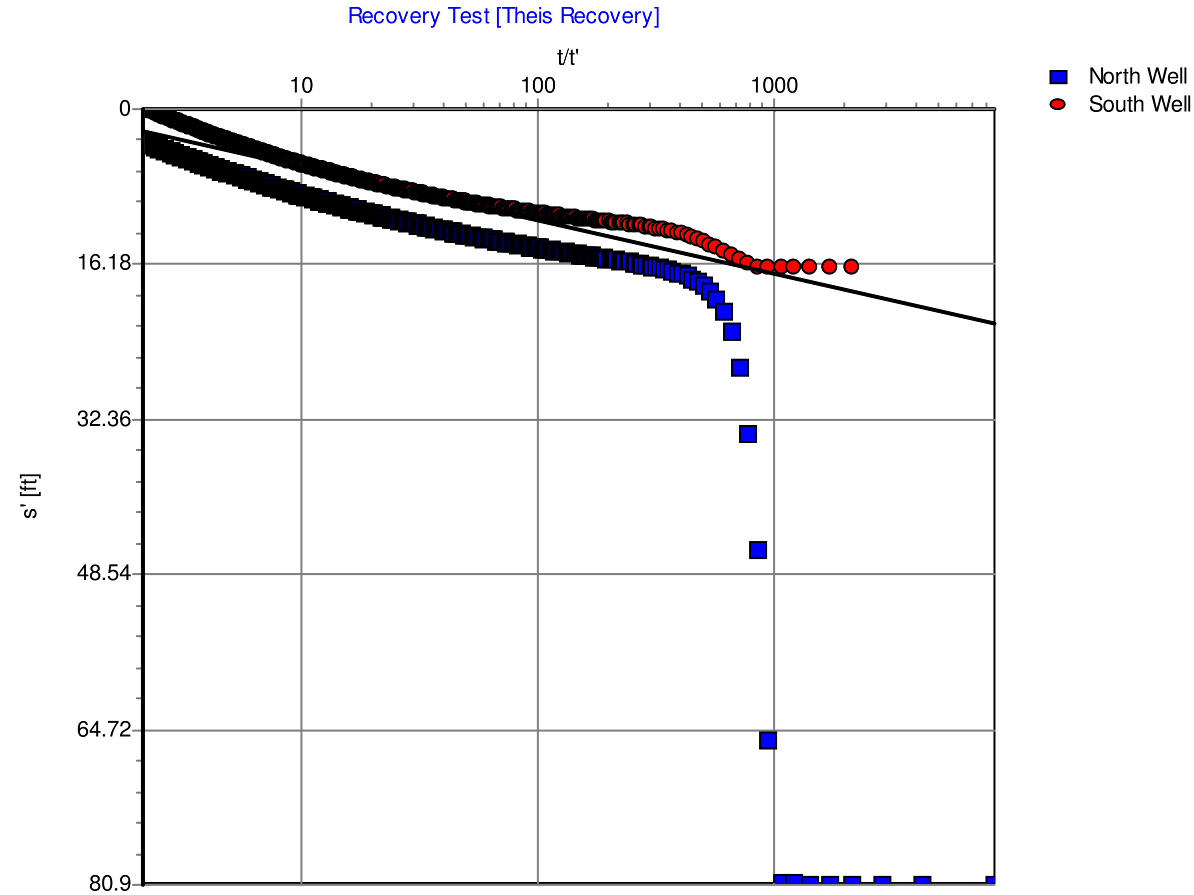
Analysis Results:	Transmissivity:	3.11E+2 [ft²/d]	Conductivity:	8.88E-1 [ft/d]
Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments: South Well Recovery match to late data.

Evaluated by: MWV

Evaluation Date: 11/2/2010

	Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Thing Valley Number: 2010-0005 Client:



Pumping Test: **Recovery Test**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	5.08E+2 [ft²/d]	Conductivity:	1.45E+0 [ft/d]

Test parameters:	Pumping Well:	Pumping Well	Aquifer Thickness:	350 [ft]
	Casing radius:	0.25 [ft]	Confined Aquifer	
	Screen length:	350 [ft]		
	Boring radius:	0.42 [ft]		
	Discharge Rate:	81 [U.S. gal/min]		
	Pumping Time	4320 [min]		

Comments: South Well Recovery match to middle data.

Evaluated by: MWV

Evaluation Date: 11/2/2010

1

ABANDONED/DESTROYED

Too close to
Septic tank

2

Pump in well
NO power

pumped this w/
generator worked
fine

Just East of
water Storage
tank

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

WELL #2

INVOICE

ERMIT TYPE & NUMBER: LWEL 16225 — INVOICE DATE: 16 SEP 2004

ERMIT OWNER: — CONTACT:
IANOS DRILLING & PUMP
6052 LAWSON VALLEY RD.

AMUL CA 91935

APN: ~~611-070-03-00~~ 611-060-03 611-070-01

APPLICANT:
FADEM ROBERT S&MARY O TRUST B1

ITE ADDRESS: ~~2750~~ MCCAIN VALLEY RD

OCATION DESCRIPTION: ~~2750~~ MCCAIN VALLEY RD ~~JACUMBA 92036~~ BOULEVARD 91905 --

ROJECT DESCRIPTION/SCOPE
lumber of Wells on Permit Application: 1
Description of Work: well drilling
Type of Use for Each Well: domestic

EE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			TOTAL AMOUNT DUE	$390.00

1-11
R 75
Sec 9

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel #2 120 acres

DEH USE ONLY
PERMIT # W 16225
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: 440-7424
1000 Pioneer Way (Mailing Address) El Cajon (City) 92020 (Zip)

2. Well Location - Assessors Parcel Number ~~611-070-03~~ 611-060-03 611-070-01
McCain Hy (Site Address) ~~[illegible]~~ BOULEVARD (City) (Zip)

3. Well Contractor - Well Driller Jim Mann Company Name: Jim Mann Drilling
[illegible] (Mailing Address) Jamul (City) 91935 (Zip)

Phone#: 445 1926 C-57#: 340732 ☒ Cash Deposit ☐ Bond Posted

4. Use: ☐ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other ______

5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd

6. Type of Equipment: Air Rotary

7. Depth of Well: Proposed: 300 Existing: 0

8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	From: ___ To: ___
Depth: 150'	Depth: ___ ft.	From: ___ To: ___	From: ___ To: ___
Diameter 7 in.	Diameter ___ in.	Type: ___	From: ___ To: ___
Wall/Gauge: 188	Wall/Gauge: ___	Wall/Gauge: ___	

9. Annular Seal: Depth: 50 ft. Sealing Material: Cement
Borehole diameter: 11 in. Conductor diameter: ___ in. Annular Thickness 2 in.

10. Date of Work: Start: [illegible] Complete: [illegible]

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: Jim Mann Date: 9-16-04

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: Larry O'Call Date: 9/16/04

No public water to site

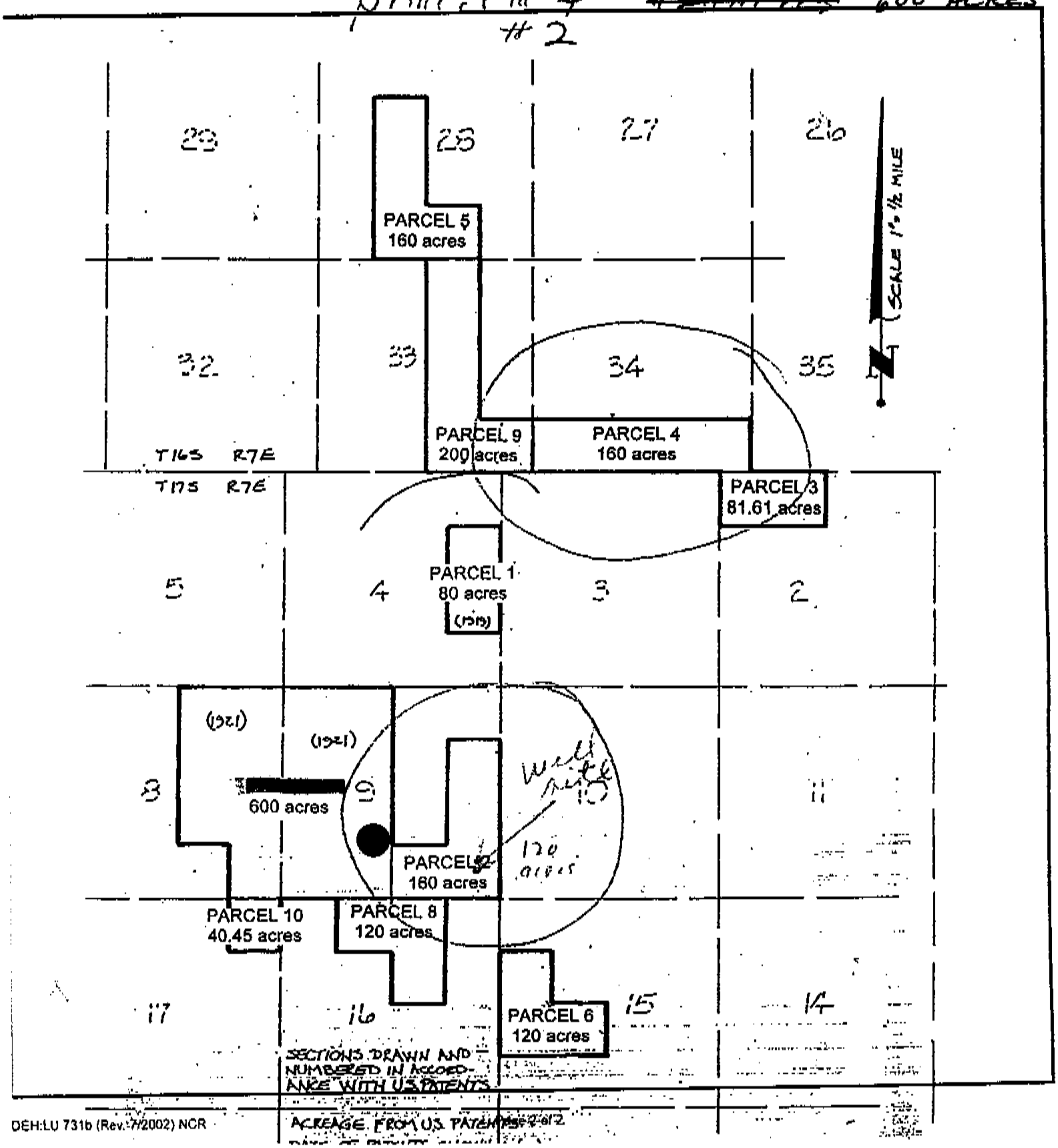
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16225
Assessor's Parcel Number: ~~611-070-03~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel #4 #2 600 ACRES



County Mail Station – A-21

FIRST CARBON COPY , 1/2070

PUMP 160'

ASSESSORS PARCEL NUMBER: ______ ______ ______

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name John Gibson #6
Address ______
City ______ Zip ______

(2) LOCATION OF WELL (See instructions):
County ______ Owner's Well Number ______
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______

DEPARTMENT USE ONLY
Completed Well Construction:
Date ______
Date Inspected ______
Comments ______
Water Sample Taken? ______
Sanitarian's Approval: ______
6/4

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack: MESAS
Yes ☐ No ☒ Size ______
Diameter of above ______
Packed from ______ to ______ ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	24'	7"	156			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ______ ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing BENTONITE-CEMENT

(10) WATER LEVELS:
Depth of first water, if known 70' ft.
Standing level after well completion 45' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test – ft. At end of test – ft.
Discharge 10 gal/min after 3 hours Water temperature COOL
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 600 ft. Depth of completed well 185? ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-2 – LOOSE SOIL
2-15 – D.G. GRAY
15-70 – BLACK' WHITE ROCK
70-71 – SOFTER (2 GPM)
71-90 – BLACK' WHITE ROCK
90-92 – SOFTER, ORANGE (2 GPM)
92-168 – BLACK' WHITE ROCK, SOME SOFTER AREAS
168-178 – VERY SOFTER (6 GPM)

Work Started 19 Completed 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED [signature]
(Well Driller)

NAME ______
(Person, firm, or Corporation) (Type or Print)

ADDRESS ______

CITY ______ ZIP ______

LICENSE NO. ______ DATE THIS REPORT ______

DHS:EHP-732 (83) CONFIDENTIAL – NOT FOR PUBLIC USE – WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909404

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE — LONGITUDE
APN/TRS/OTHER

Page 1 of 1
Owner's Well No. 2
Date Work Began 10-1-04, Ended 10-4-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16225 Permit Date 9-16-04

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0 - 2	loose soil
2 - 15	dg, gray
15 - 70	black & white rock
70 - 71	softer
71 - 90	black & white rock
90 - 92	softer, orange
92 - 168	black & white rock
	some softer areas
168 - 178	very soft

TOTAL DEPTH OF BORING 600 (Feet)
TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER

Name Amann Companies
Mailing Address 1000 Pioneer Way
El Cajon, Ca 92020
CITY STATE ZIP

WELL LOCATION

Address McCain Valley
City Jacumba
County San Diego
APN Book 611 Page 070 Parcel 02
Township 17 Range 7E Section 9
Lat ___ DEG. MIN. SEC. N Long ___ DEG. MIN. SEC. W

LOCATION SKETCH

NORTH
WEST
See Manos
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

x NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)
WATER SUPPLY
x Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 70 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 45 (Ft.) & DATE MEASURED 10-4-04
ESTIMATED YIELD * 10 (GPM) & TEST TYPE airlift
TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN — (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 - 24	11	x				steel	6 5/8	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 - 24	x	x		

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
✓ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed Jim Manos 3-1-06 360733
C-57 LICENSED WATER WELL CONTRACTOR — DATE SIGNED — C-57 LICENSE NUMBER

#3

NO PUMP
NO POWER

WELL IS CAPPED

LOW GPM

COUNTY OF SAN DIEGO

DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

#3

INVOICE

PERMIT TYPE & NUMBER: LWEL 16223 **INVOICE DATE:** 16 SEP 2004

PERMIT OWNER: **CONTACT:**
MANOS DRILLING & PUMP
16052 LAWSON VALLEY RD.

JAMUL CA 91935

APN: ~~529-150-01-00~~ 611-060-03 611-070-01

APPLICANT:
FADEM ROBERT S&MARY O TRUST B1

SITE ADDRESS: ~~8057~~ MCCAIN VALLEY RD BOULEVARD 91905

LOCATION DESCRIPTION: ~~3057~~ MCCAIN VALLEY RD. ~~EL CAJON 92020~~

PROJECT DESCRIPTION/SCOPE

Number of Wells on Permit Application: 1
Description of Work: well drilling
Type of Use for Each Well: domestic

FEE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:28 9773 773 429E0 CHECK	
			TOTAL AMOUNT DUE	$390.00

T-16S
R 7E
Sec. 34

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel 1 & 4 600 ACRES ~~160 acres~~

DEH USE ONLY
PERMIT # WEL16223
WELL COMPUTER #:
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: 440-7424
1000 Pioneer Way — El Cajon — 92020
Mailing Address / City / Zip

2. Well Location - Assessors Parcel Number ~~S 39-150-31~~ 611-060-03, 611-070-01
McCain Valley — ~~Jacumba~~ BOULEVARD 91905
Site Address / City / Zip

3. Well Contractor - Well Driller Van Mauris Company Name: Van Mauris Drilling
11052 Cannon Way — Jamul — 91935
Mailing Address / City / Zip

Phone#: 445-1926 C-57#: 360722 ☒ Cash Deposit ☐ Bond Posted

4. Use: ☒ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other

5. Type of Work: ☒ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd

6. Type of Equipment: Air Rotary

7. Depth of Well: Proposed: 300 Existing: ∅

8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	
Depth: 20	Depth: ft.	From: To:	From: To:
Diameter 7 in.	Diameter in.	Type:	From: To:
Wall/Gauge: .188	Wall/Gauge:	Wall/Gauge:	From: To:

9. Annular Seal: Depth: 20 ft. Sealing Material: Bentonite Cement
Borehole diameter: 11 in. Conductor diameter: in. Annular Thickness 2 in.

10. Date of Work: Start: 9-27-04 Complete: 9-30-04

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [signature] Date: 9-16-04

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: Danny O'Calle Date: 9/16/04

No public water to site

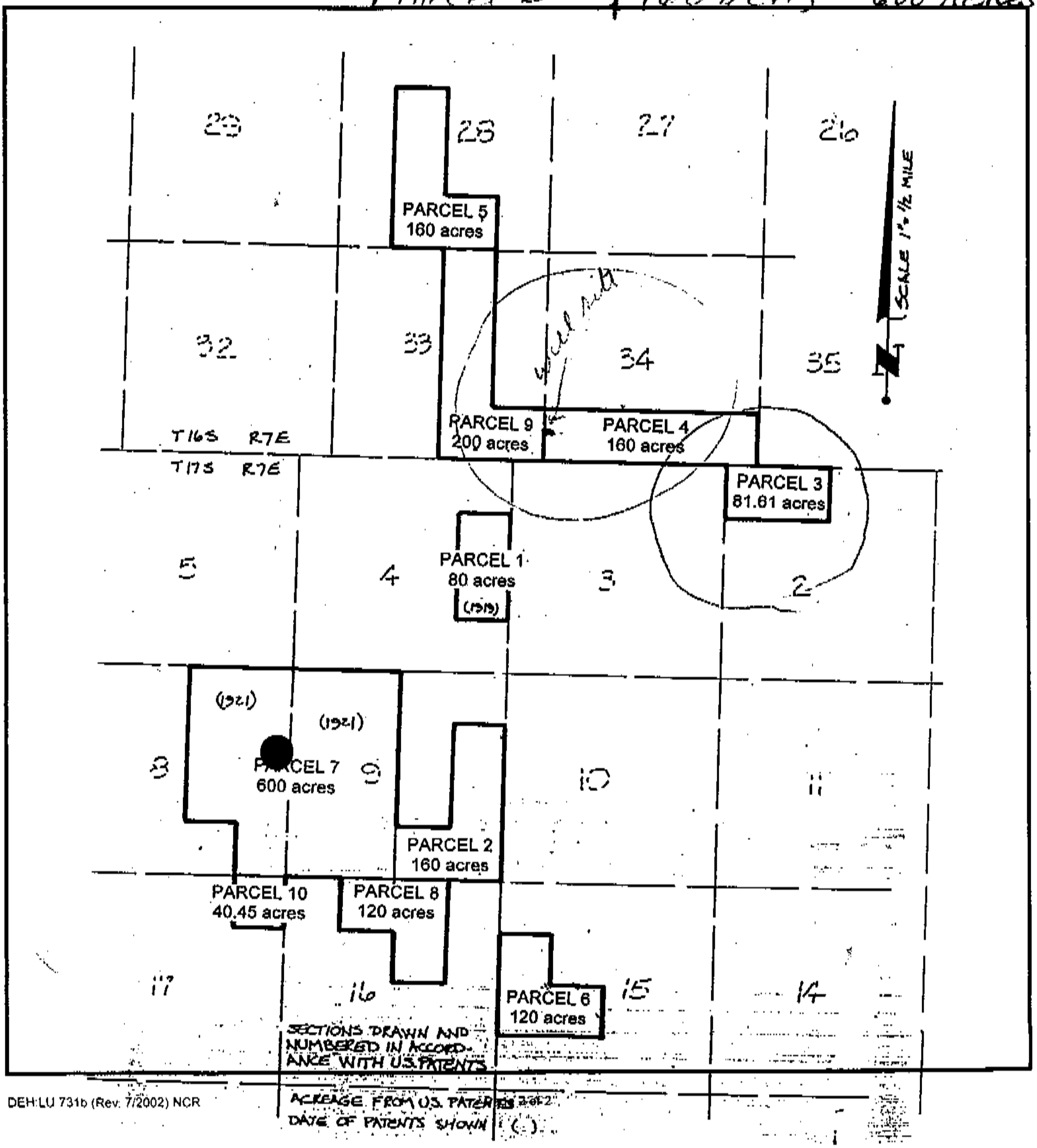
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16223
Assessor's Parcel Number: ~~529-150-~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # ~~4 160 acres~~ 600 Acres



→ 3

County Mail Station —A-21

ASSESSORS PARCEL NUMBER: ______ ______ ______

FIRST CARBON COPY

COUNTY OF SAN DIEGO

DEPARTMENT OF HEALTH SERVICES

1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

(b

WATER WELL DRILLERS REPORT

(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. ______

Local Permit No. or Date ______

State Well No. ______

Other Well No. ______

(1) OWNER: Name John Gibson #5

Address McLAIN VALLEY

City ______ Zip ______

(2) LOCATION OF WELL (See instructions):

County ______ Owner's Well Number ______

Well address if different from above ______

Township ______ Range ______ Section ______

Distance from cities, roads, railroads, fences, etc. ______

DEPARTMENT USE ONLY

Completed Well Construction:

Date ______

Date Inspected ______

Comments ______

Water Sample Taken? ______

Sanitarian's Approval:

5 3/4

(3) TYPE OF WORK:

New Well ☒ Deepening ☐

Reconstruction ☐

Reconditioning ☐

Horizontal Well ☐

Destruction ☐ (Describe destruction materials and procedures in Item (12)

(4) PROPOSED USE:

Domestic ☒

Irrigation ☒

Industrial ☐

Test Well ☐

Stock ☐

Municipal ☐

Other ☐

(5) Equipment:

Rotary ☒ Reverse ☐

Cable ☐ Air ☒

Other ☐ Bucket ☐

(6) Gravel Pack: NEEDS

Yes ☐ No ☒ Size ______

Diameter of above ______

Packed from ______ to ______ ft.

(7) Casing Installed:

Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	209	6 5/8	.188			

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ______ ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.

Method of sealing BENTONITE - CEMENT

(10) WATER LEVELS:

Depth of first water, if known 50' ft.

Standing level after well completion 35' ft.

(11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER

Type of test Pump ☐ Bailer ☐ Air lift ☒

Depth to water at start of test — ft. At end of test — ft.

Discharge 2 gal/min after 2 hours Water temperature COOL

Chemical analysis made? Yes ☐ No ☒ If yes, by whom?

Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 900 ft. Depth of completed well 900 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

0-2 - SANDY TOPSOIL

2-102 - BLACK, WHITE, ORANGE, WEATHERED AREAS, LOOSE ROCKS, SAND (DRIP)

102-110 - BLACK, WHITE ROCK

110-112 - SOFTER (1 GPM) SAND

112-348 - BLACK, WHITE ROCK

348-349 - SOFTER (1½ GPM)

349-900 - BLACK, WHITE ROCK, SOME SOFTER AREAS

Work Started ______ 19 ____ Completed ______ 19 ____

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED ______ (Well Driller)

NAME ______ (Person, firm, or Corporation) (Type or Print)

ADDRESS ______

CITY ______ ZIP ______

LICENSE NO. ______ DATE THIS REPORT ______

DHS:EHP-732 (83) CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 0909443

DWR USE ONLY — DO NOT FILL IN		
STATE WELL NO./STATION NO.		
LATITUDE		LONGITUDE
APN/TRS/OTHER		

Page 1 of 1
Owner's Well No. 3
Date Work Began 9-27-04, Ended 9-30-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16223 Permit Date 9-16-04

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 - 2	sandy topsoil
2 - 102	black, white, orange, very soft areas, loose rocks & sand
102 - 110	black & white rock
110 - 112	softer
112 - 348	black & white rock
348 - 349	soft
349 - 900	black & white rock, some softer areas

TOTAL DEPTH OF BORING 900 (Feet)
TOTAL DEPTH OF COMPLETED WELL 900 (Feet)

WELL OWNER

Name Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon, Ca 92020
CITY STATE ZIP

WELL LOCATION

Address 1057 McCain Valley Rd
City Jacumba
County San Diego
APN Book 529 Page 150 Parcel 01
Township 16 Range 7E Section 34
Lat ___ DEG. MIN. SEC. N Long ___ DEG. MIN. SEC. W

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

See Map

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

x NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY
x Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 50 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 35 (Ft.) & DATE MEASURED 9-30-04
ESTIMATED YIELD * 2 (GPM) & TEST TYPE airlift
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN - (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 - 209	11	x				steel	6 5/8	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 - 209	x	x		

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
✓ Soil/Water Chemical Analyses
✓ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR
3-6-06 DATE SIGNED
360722 C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#4

Power at well

NO pump

Across road from
Bathrooms in
West Canyon

water was Discolored
& hence quit using

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

#4

INVOICE

ERMIT TYPE & NUMBER: LWEL 16226 **INVOICE DATE:** 16 SEP 2004

ERMIT OWNER: **CONTACT:**

ADEM ROBERT S&MARY O TRUST B1
553 OCEAN ST

92008

611-060-03 **APPLICANT:**

PN: ~~611-110-01-00~~ 611-070-01 FADEM ROBERT S&MARY O TRUST B1

ITE ADDRESS: ~~2533~~ MCCAIN VALLEY RD

OCATION DESCRIPTION: ~~2533~~ MCCAIN VALLEY RD,

ROJECT DESCRIPTION/SCOPE

umber of Wells on Permit Application:1
escription of Work:new
ype of Use for Each Well:private

EE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:30 9773 773 429E01 CHECK	[illegible]
			TOTAL AMOUNT DUE	$390.00

275
.15

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel # ~~67~~ 600 ~~Degrees~~

DEH USE ONLY
PERMIT # W [illegible]
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: [illegible]-7424
   1000 [illegible] (Mailing Address) [illegible] (City) [illegible] (Zip)
2. Well Location - Assessors Parcel Number ~~611-110-07~~ 611-060-03 611-070-01
   [illegible] (Site Address) ~~[illegible]~~ BOULEVARD (City) 91905 (Zip)
3. Well Contractor - Well Driller Jim Mayes Company Name: [illegible] Drilling
   [illegible] (Mailing Address) [illegible] (City) [illegible] (Zip)

   Phone#: [illegible]-1926 C-57#: [illegible] ☐ Cash Deposit ☐ Bond Posted
4. Use: ☒ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other ______
5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: Air Rotary
7. Depth of Well: Proposed: [illegible] Existing: [illegible]
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	From: ____ To: ____
Depth: [illegible]	Depth: ____ ft.	From: ____ To: ____	From: ____ To: ____
Diameter 7 in.	Diameter ____ in.	Type: ____	From: ____ To: ____
Wall/Gauge: [illegible]	Wall/Gauge: ____	Wall/Gauge: ____	

9. Annular Seal: Depth: [illegible] ft. Sealing Material: [illegible] Borehole diameter: ____ in. Conductor diameter: ____ in. Annular Thickness ____ in.
10. Date of Work: Start: [illegible] Complete: 9-27-04

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: Jim Mayes Date: [illegible]

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies.

Specialist: [signature] Date: 9/16/04

DEH-LU-731a (Rev. 4/02) NCR

[illegible]

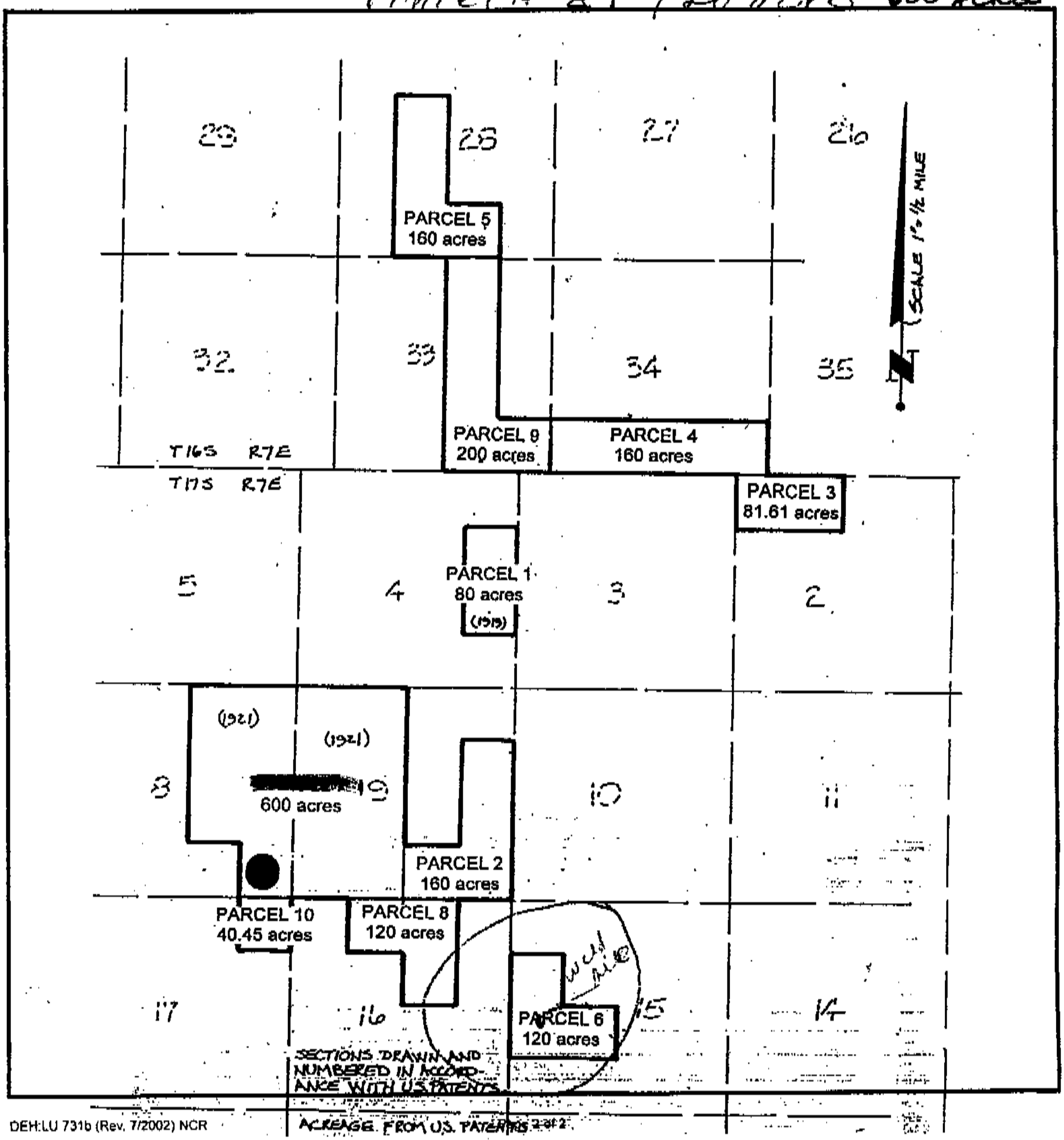
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWCL 16226
Assessor's Parcel Number: ~~611-110-07~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # ~~8~~ ~~[illegible]~~ 600 ACRES



County Mail Station – A-21

FIRST CARBON COPY

ASSESSORS PARCEL NUMBER: ______ ______ ______

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name JOHN WELL NO 2
Address ROXY ACRES
City ______ Zip ______

(2) LOCATION OF WELL (See instructions):
County ______ Owner's Well Number ______
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______

(12) WELL LOG: Total depth 260 ft. Depth of completed well 185 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-91 – SANDY, D.G.
91-130 – SOFT, ORANGE, WHITE & BROWN
130-133 – GRAY SOFT (5 GPM)
133-185 – SOFT ORANGE, WHITE, BLACK
185-190 – LOOSE ROCKS (20 GPM)
190-260 – SOFT & HARD

DEPARTMENT USE ONLY
Completed Well Construction:
Date ______
Date Inspected ______
Comments ______
Water Sample Taken? ______
Sanitarian's Approval: ______

Jettey #8

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack:
Yes ☒ No ☐ Size 3/8ths
Diameter of above 4"
Packed from 0 to 185 ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	91	6 5/8	188	0	185	3/32nds

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 91' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing BENTONITE – CEMENT

(10) WATER LEVELS:
Depth of first water, if known 130' ft.
Standing level after well completion 35 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Driller
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test — ft. At end of test — ft.
Discharge 15 gal/min after 1 hours Water temperature COOL
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

Work Started 19 Completed 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED [signature]
(Well Driller)

NAME ______
(Person, firm, or Corporation) (Type or Print)

ADDRESS ______

CITY ______ ZIP ______

LICENSE NO. ______ DATE THIS REPORT ______

DHS:EHP-732 (83) CONFIDENTIAL – NOT FOR PUBLIC USE – WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

Page 1 of 1

Owner's Well No. # 4

Date Work Began 9-25-04, Ended 9-27-04

Local Permit Agency San Diego E.H.S.

Permit No. LWEL16226 Permit Date 9-16-04

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 0909442

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 – 91	sandy, dg
91 – 130	soft, orange, white & brown
130 – 133	very soft
133 – 185	soft, orange, white & black
185 – 190	loose rocks
190 – 260	soft & hard

TOTAL DEPTH OF BORING 260 (Feet)

TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER

Name Hamann Companies

Mailing Address 1000 Pioneer Way

El Cajon, Ca 92020

CITY STATE ZIP

WELL LOCATION

Address McCain Valley Rd

City Jacumba

County San Diego

APN Book 611 Page 110 Parcel 01

Township 17 Range 7E Section 15

Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST

See Attached

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

x NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)

WATER SUPPLY
x Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 130 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 35 (Ft.) & DATE MEASURED 9-27-04

ESTIMATED YIELD * 15 (GPM) & TEST TYPE airlift

TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN -- (Ft.)

** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 – 91	11	x				steel	6 5/8	.188	
0 – 185	6½		x			pvc	4	sch 40	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 – 91	x	x		
0 – 185			x	5/16 pea gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] 3-6-06 360722
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03

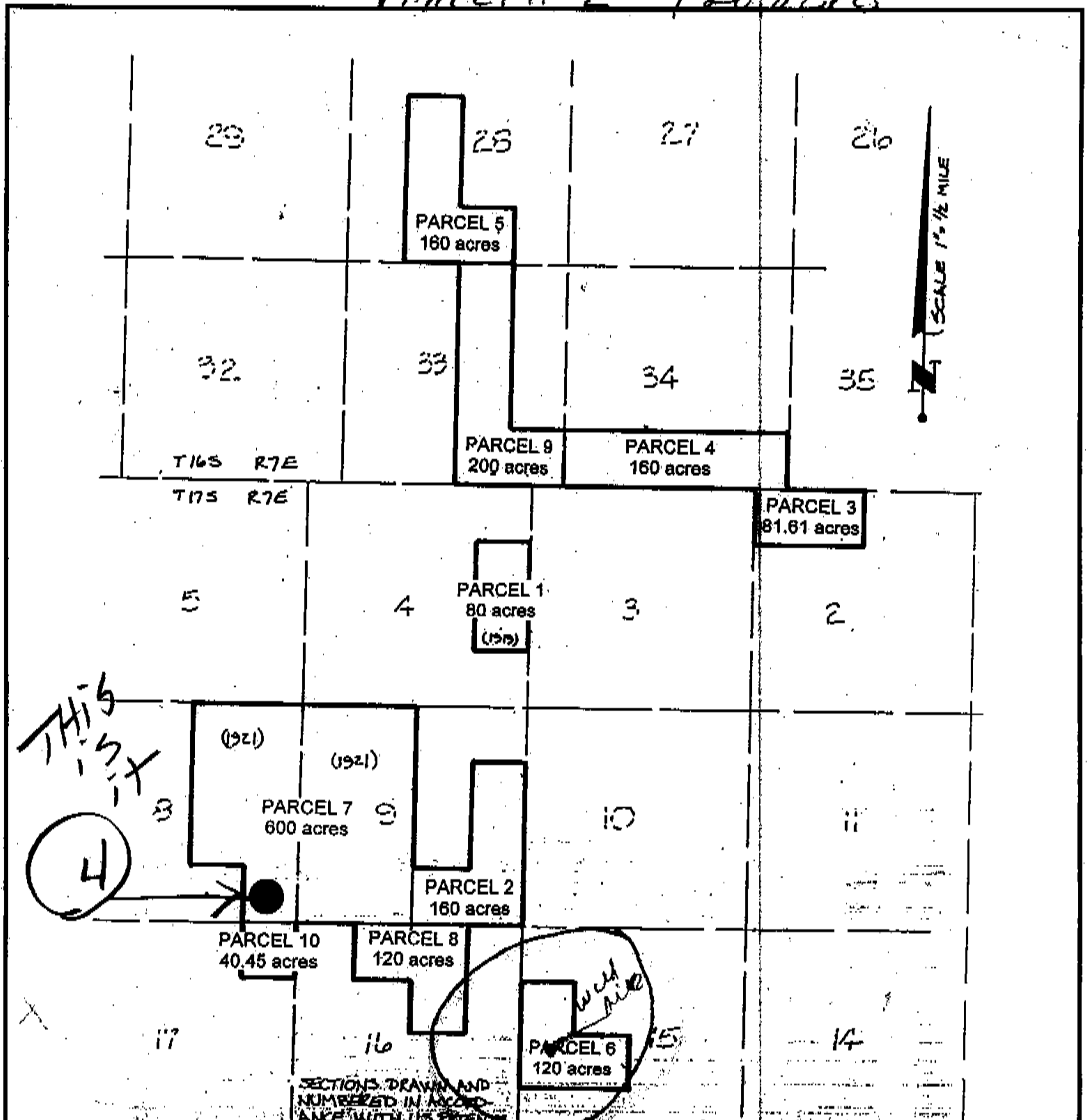
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Control #: LWCL 16226
Assessor's Parcel Number: 611-110-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 6 120 acres



ACREAGE FROM US PATENTS
DATE OF PATENTS SHOWN ( )

5

Pump & power
to well

Have never
used this well

COUNTY OF SAN DIEGO

DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

H5

INVOICE

PERMIT TYPE & NUMBER: LWEL 16224 **INVOICE DATE:** 16 SEP 2004

PERMIT OWNER: **CONTACT:**
MANOS DRILLING & PUMP
16052 LAWSON VALLEY RD.

JAMUL CA 91935

APPLICANT:
HAMANN ROBERT D FAMILY TRUST 04

APN: 611-030-01-00

SITE ADDRESS: 3041 MCCAIN VALLEY RD

LOCATION DESCRIPTION: 3041 MCCAIN VALLEY RD. JACUMBA 91935

PROJECT DESCRIPTION/SCOPE

Number of Wells on Permit Application: 1
Description of Work: well drilling
Type of Use for Each Well: domestic

FEE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:32 9773 773 429E01 CHECK	#390.
			TOTAL AMOUNT DUE	$390.00

R-4
Sec 4

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel #1 80 Acres

DEH USE ONLY
PERMIT # WEL 16224
WELL COMPUTER #
FEE: ______
WATER DIST: ______

1. Property Owner: Hamann Companies Phone: [illegible] 7424
1000 Pioneer Way | El Cajon | 92020
Mailing Address | City | Zip

2. Well Location - Assessors Parcel Number 611-030-0[illegible]
McCain Valley | [illegible] | ______
Site Address | City | Zip

3. Well Contractor - Well Driller Jim Manos Company Name: [illegible] Drilling
______ | ______ | ______
Mailing Address | City | Zip

Phone#: 445-1926 C-57#: 362722 ☒ Cash Deposit ☐ Bond Posted

4. Use: ☐ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other ______
5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd
6. Type of Equipment: [illegible]
7. Depth of Well: Proposed: [illegible] Existing: [illegible]
8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	From: ______ To: ______
Depth: [illegible]	Depth: ______ ft.	From: ______ To: ______	From: ______ To: ______
Diameter ______ in.	Diameter ______ in.	Type: ______	From: ______ To: ______
Wall/Gauge: [illegible]	Wall/Gauge: ______	Wall/Gauge: ______	

9. Annular Seal: Depth: ______ ft. Sealing Material: [illegible]
Borehole diameter: ______ in. Conductor diameter: ______ in. Annular Thickness ______ in.

10. Date of Work: Start: [illegible] Complete: [illegible]

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [illegible signature] Date: [illegible]-16-04

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies. ______

Specialist: [illegible signature] Date: 9/16/04

[illegible]

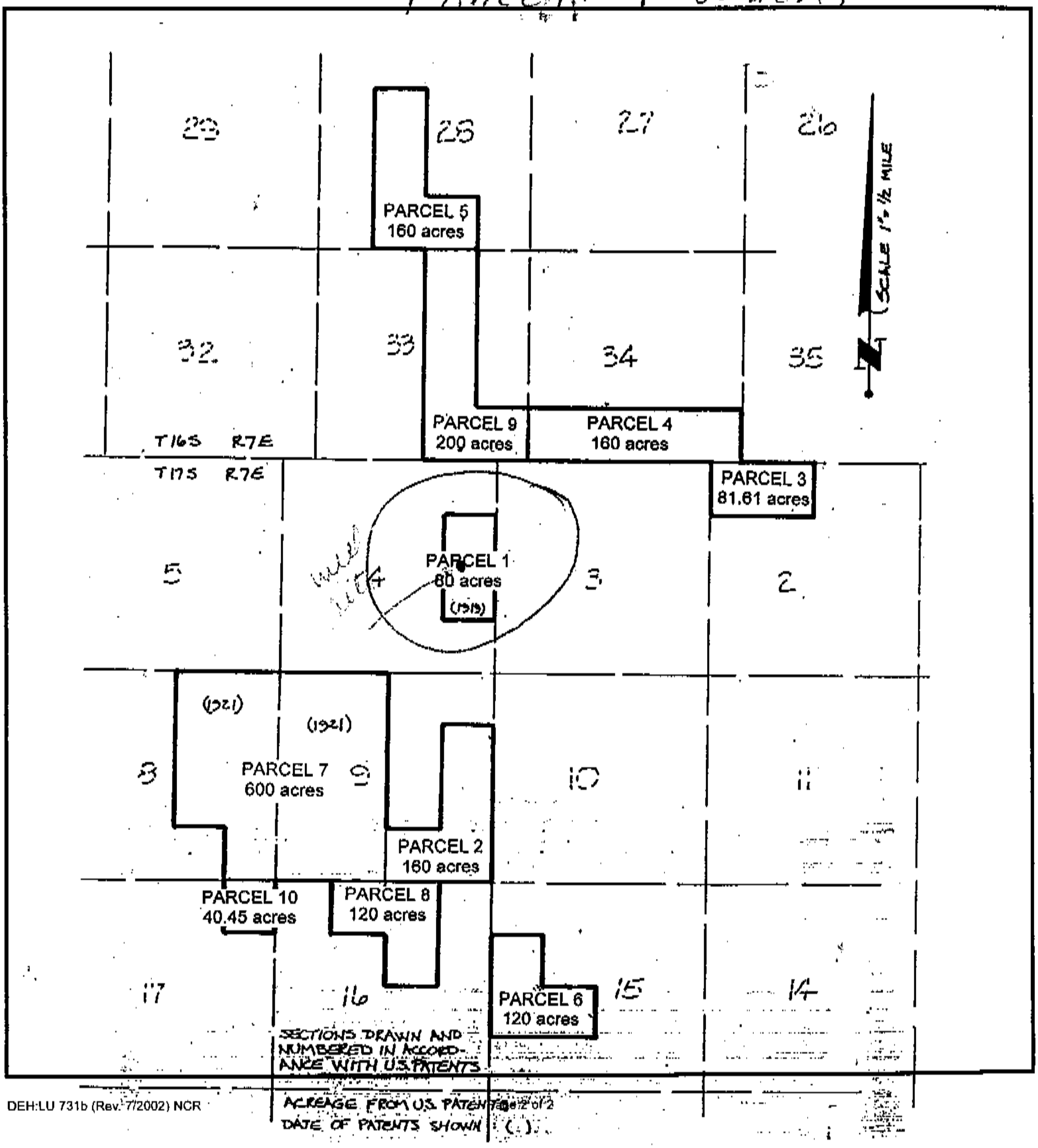
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16274
Assessor's Parcel Number: 611-030-08

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel #1 80 acres



County Mail Station — A-21

FIRST CARBON COPY

ASSESSORS PARCEL NUMBER:

#5

O.K. well

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name JOHN WELL #3
Address ______
City ______ Zip ______

(2) LOCATION OF WELL (See instructions):
County ______ Owner's Well Number ______
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______

DEPARTMENT USE ONLY
Completed Well Construction:
Date ______
Date Inspected ______
Comments ______
Water Sample Taken? ______
Sanitarian's Approval:

6/A

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack:
Yes ☐ No ☒ Size ______
Diameter of above ______
Packed from ______ to ______ ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	21	7"	.188			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing BENTONITE - CEMENT

(10) WATER LEVELS:
Depth of first water, if known 50' ft.
Standing level after well completion 45' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test — ft. At end of test ______ ft.
Discharge 7 gal/min after 1 hours Water temperature COOL
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 800 ft. Depth of completed well 800 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0 - 15 TOPSOIL
15 - 50 - BLACK/WHITE ROCK
50 - 51 - (5 GPM)
51 - 110 - BLACK/WHITE ROCK
110 - 112 - SOFTER, ORANGE (1 GPM)
112 - 726 - BLACK/WHITE ROCK
726 - 727 - (5½ GPM)
727 - 800 - BLACK/WHITE ROCK

Work Started 19 Completed 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED ______ (Well Driller)

NAME ______
(Person, firm, or Corporation) (Type or Print)

ADDRESS ______

CITY ______ ZIP ______

LICENSE NO. ______ DATE THIS REPORT ______

CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

DUPLICATE
Driller's Copy
Page 1 of 1
Owner's Well No. 5
Date Work Began 9-21-04, Ended 9-25-04
Local Permit Agency San Diego E.H.S.
Permit No. LWEL16224 Permit Date 9-16-04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909441

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG
ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0 – 1½	topsoil
1½ – 50	black & white rock
50 – 51	crack
51 – 110	black & white rock
110 – 112	softer, orange
112 – 726	black & white rock
726 – 727	crack
727 – 800	black & white rock

TOTAL DEPTH OF BORING 800 (Feet)
TOTAL DEPTH OF COMPLETED WELL 800 (Feet)

WELL OWNER
Name Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon, Ca 92020
CITY STATE ZIP

WELL LOCATION
Address 3041 McCain Valley Rd
City Jacumba
County San Diego
APN Book 611 Page 030 Parcel 01
Township 17 Range 7E Section 4
Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH
NORTH
WEST EAST
Sec attached
SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
x NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)
WATER SUPPLY
x Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 50 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 45 (Ft.) & DATE MEASURED 9-25-04
ESTIMATED YIELD * 7 (GPM) & TEST TYPE airlift
TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN - (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 – 21	11	x				steel	6 5/8	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 – 21	x	x		

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
✓ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP
Signed Jim Manos 3-6-05 360722
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

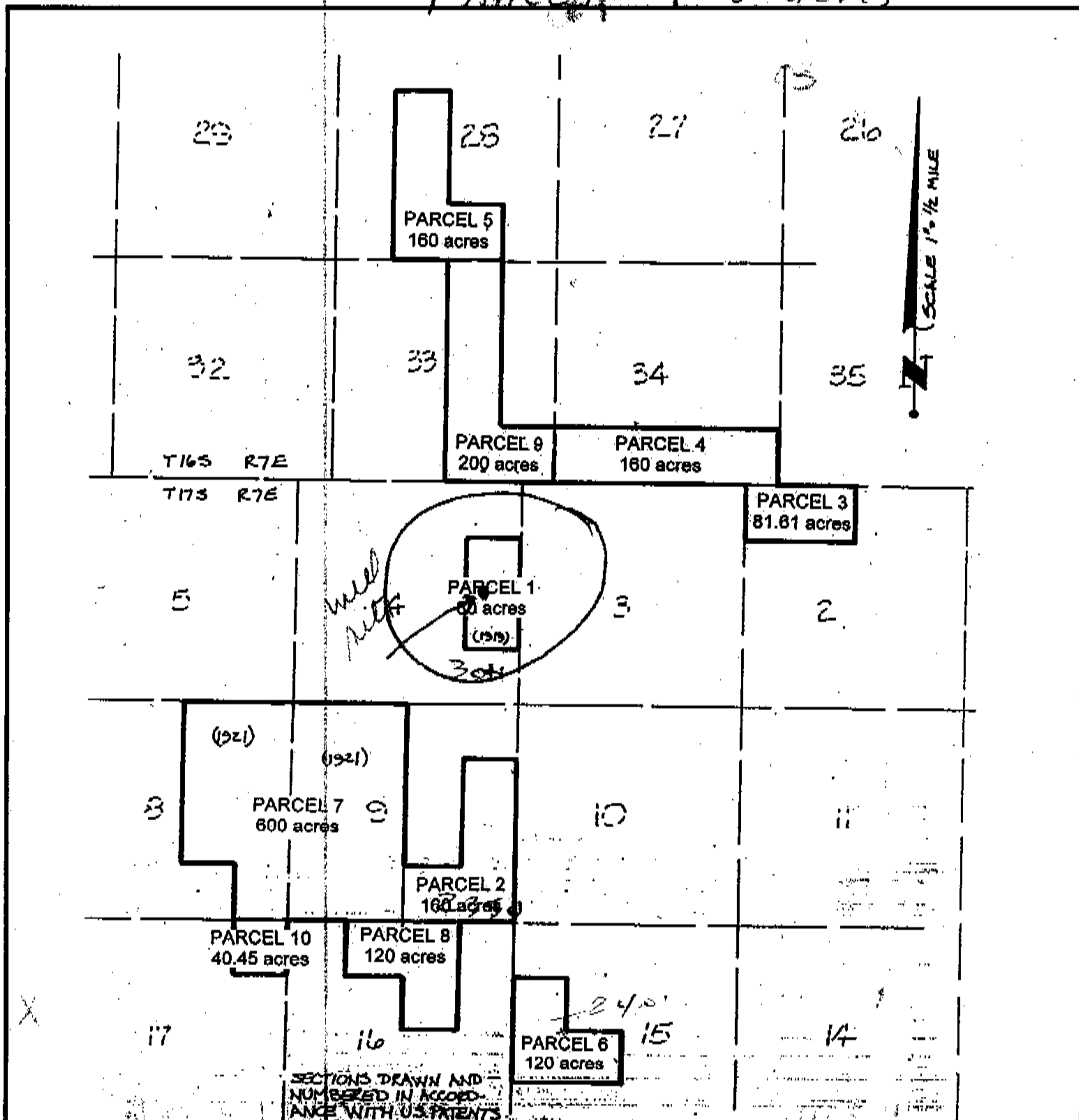
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWEL 16224
Assessor's Parcel Number: 611-030-03

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 1 80 acres



Fully operational

#6 NO Logs
Available
origional
well on
Ranch

6A New Public Well

Fully operational

QUADRUPLICATE FEB 09 2010
For Local Requirements

Page 1 of 1

Owner's Well No. 1

County of San Diego
Dept. of Environmental Health
Land & Water Quality Div.

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 1089956

Date Work Began ~~11-4-09~~, Ended ~~11-10-09~~

Local Permit Agency ~~San Diego C.H.S.~~

Permit No. ~~LWE620420~~ Permit Date ~~11-13-09~~

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SECTION

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ~~ROTARY~~ FLUID ~~AIR~~

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
~~0~~	~~10~~	~~sandy-rocks~~
~~10~~	~~30~~	~~sandy-slightly firm~~
~~30~~	~~32~~	~~soft~~
~~32~~	~~70~~	~~sandy~~
~~70~~	~~85~~	~~harder~~
~~85~~	~~87~~	~~cracks~~
~~87~~	~~230~~	~~black & white rock, softer areas~~
~~230~~	~~233~~	~~softer, orange~~
~~233~~	~~330~~	~~black/white & orange~~
~~330~~	~~332~~	~~softer, orange~~
~~332~~	~~395~~	~~black & white rock, softer areas~~
~~395~~	~~395~~	~~sand~~
~~395~~	~~420~~	~~black & white rock~~

Completed Well Construction

Date 2/9/10

Date inspected

Comments KIVA entered on this date.

Water Sample Taken? (N)

TOTAL DEPTH OF BORING 420 (Feet)

TOTAL DEPTH OF COMPLETED WELL [illegible] (Feet)

WELL OWNER

Name ~~Harmony Grove Partners~~

Mailing Address ~~1000 Pioneer Way~~

~~El Cajon, Ca 92020~~
CITY STATE ZIP

WELL LOCATION

Address ~~Mc Ga[illegible] Valley Road~~

City ~~Jamul, Ca~~

County ~~San Diego~~

APN Book 511 Page 000 Parcel 04

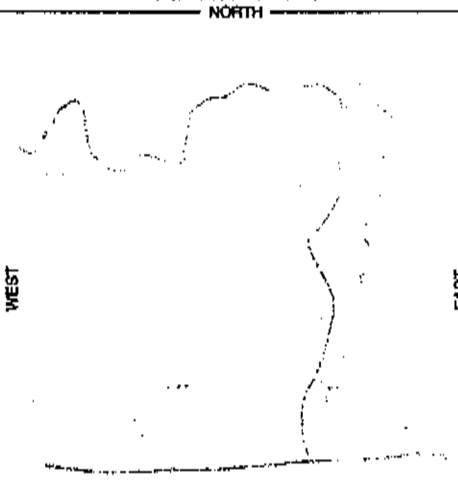
Township 17 S Range [illegible] Section 17

Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST



EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

x NEW WELL

MODIFICATION/REPAIR
- ___ Deepen
- ___ Other (Specify)

___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY
- ___ Domestic ___ Public
- ___ Irrigation x Industrial

- MONITORING ___
- TEST WELL ___
- CATHODIC PROTECTION ___
- HEAT EXCHANGE ___
- DIRECT PUSH ___
- INJECTION ___
- VAPOR EXTRACTION ___
- SPARGING ___
- REMEDIATION ___
- OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 30 (Ft.) & DATE MEASURED ~~11-10-09~~

ESTIMATED YIELD * 60 (GPM) & TEST TYPE airlift

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN -- (Ft.)

** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
~~0~~	~~56~~	~~12~~	~~x~~				~~steel~~		~~.188~~	
~~0~~	~~75~~		~~x~~				~~steel~~	~~6 5/8~~	~~.188~~	
~~0~~	~~385~~	~~6½~~		~~x~~			~~pvc~~	~~4~~	~~CL200~~	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
~~0~~	~~56~~	~~x~~	~~(cement was pumped)~~		
~~0~~	~~75~~		~~x~~		
~~0~~	~~385~~			~~x~~	~~5/16 pea gravel~~

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analyses
- ___ Other [illegible]

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME ~~JIM MANOS DRILLING & PUMP~~
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VALLEY ROAD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] 1/1/10 3602
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE

DWR 188 REV. 05-03 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#7 unstable hole
NOT much
WATER
well Destroyed

Fain Drilling & Pump Co. Inc.
12029 Old Castle Rd.
Valley Center, CA 92082
Phone (760) 749-0701
Fax (760) 749-6380

Bad hole Destroyed

Invoice

Date	Invoice #
2/15/2005	8049

#7

Bill To
HAMANN COMPANIES 1000 PIONEER WAY EL CAJON, CA 92020

P.O. No.	Terms	Project
	Due on receipt	

Description	Qty	Rate	Amount
WELL DRILLING (TEST HOLE) APN 611 090 03			
PARCEL # 10 40.45 ACRES			
MOVE IN AND SET UP 1ST. TIME	1	500.00	500.00
DRILLING 6.5" DIA HOLE	400	12.00	4,800.00
BACKFILL TEST HOLE AND CEMENT TOP	1	400.00	400.00
MOVE BACK TO TEST HOLE AND SET UP 2ND TIME	1	500.00	500.00
DRILL OUT AND CLEAN OUT EXISTING 400 FT.	1	400.00	400.00
DRILLING FROM 400-850 FT. 6.5" DIA HOLE	450	14.00	6,300.00
BACKFILL AND DESTROY TEST HOLE	1	400.00	400.00
WELL PERMIT AND FILING FEES	1	490.00	490.00

Total	$13,790.00
Payments/Credits	$0.00
Balance Due	$13,790.00

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. Test Well Par 10
Date Work Began 2/4/05, Ended 2/14/05
Local Permit Agency DEH
Permit No. 16457 Permit Date 2/7/05

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 0909548

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	6	Slope wash - sand and silt brown color
6	62	Weathered, decomposed rock
62		1st water - seepage
62	112	quartz diorite
112	114	Fracture - seepage of water
114	274	Quartz diorite, soft weathered
274		Fracture - water
275	654	Quartz diorite, soft weathered
654		Fracture - seepage of water
654	720	Quartz diorite
720		Seepage of water
720	850	Quartz diorite
		Backfill and destroy bore hole

TOTAL DEPTH OF BORING 850 (Feet)
TOTAL DEPTH OF COMPLETED WELL 0 (Feet)

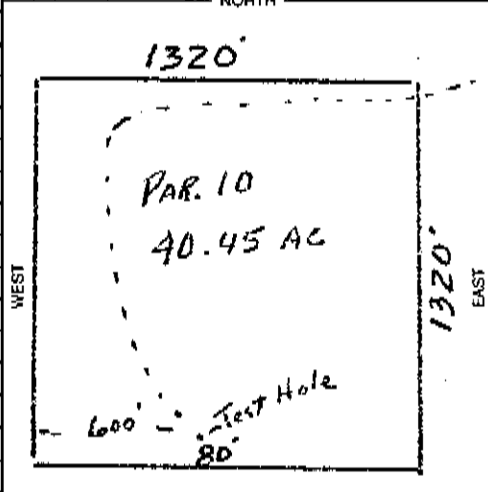
WELL OWNER

Name Hamann Companies
Mailing Address 1000 Pioneer Way
CITY El Cajon, STATE Ca ZIP 92020

WELL LOCATION

Address Mc Cain Valley Rd.
City Boulevard
County San Diego
APN Book 611 Page 090 Parcel 03
Township 17 S Range 7 E Section 17
Lat 32° 17' 41.735" N (DEG. MIN. SEC.) Long 116° 06' 613" W (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

___ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ✓
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 62 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 28 (Ft.) & DATE MEASURED 2/14/05
ESTIMATED YIELD * 10 (GPM) & TEST TYPE [illegible]
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN 500 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
NONE										

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	5			X	
5	25	X			
25	850			X	

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
✓ Other Site MAP
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Fain Drilling & Pump Co Inc
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12029 Old Castle Rd. Valley Center, Ca 92082
ADDRESS CITY STATE ZIP

Signed [signature] 2-14-05 328287
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

8

This WELL HAS
NO pump or power
NEEDS to be
relocated East
outside of
transmission line
power easement

Fain Drilling & Pump Co. Inc.
12029 Old Castle Rd.
Valley Center, CA 92082
Phone (760) 749-0701
Fax (760) 749-6380

Invoice

#8

Date	Invoice #
2/11/2005	8048

Bill To
THE HAMANN COMPANIES 1000 PIONEER WAY EL CAJON, CA 92020

P.O. No.	Terms	Project
	Due on receipt	

Description	Qty	Rate	Amount
DRILLING 970 FT DEEP WELL APN 611 110 01			
PARCEL 6 120 AC			
EQUIPMENT SET UP	1	500.00	500.00
DRILLING 6.5" DIA HOLE	400	12.00	4,800.00
DRILLING 400-800' 6.5" DIA HOLE	400	14.00	5,600.00
DRILLING 800 - 970' 6.5" DIA HOLE	170	16.00	2,720.00
REAMING 6" TO 10" DIA HOLE	226	12.00	2,712.00
FURNISH AND INSTALL 6" WELL CASING	228	13.00	2,964.00
INSTALL 50 FT. SURFACE SEAL	1	1,500.00	1,500.00
WELL PERMIT AND FILING FEES	1	490.00	490.00

Total	$21,286.00
Payments/Credits	$0.00
Balance Due	$21,286.00

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. Par. 6 -120
Date Work Began 2/1/05 , Ended 2/9/05
Local Permit Agency DEH
Permit No. 16456 Permit Date 2/1/05

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 0909549

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	12	Slope wash - sandy decomposed granite - brown color
12	212	Weathered Granitic Rock
212	226	Broken Rock
226	310	Weathered granitic rock mostly white quartz
310		Water 8 gpm
310	961	Granitic rock large crystals of white quartz
961		Water 40+ gpm
961	970	Fractured granitic rock large quartz crystals

TOTAL DEPTH OF BORING 970 (Feet)
TOTAL DEPTH OF COMPLETED WELL 970 (Feet)

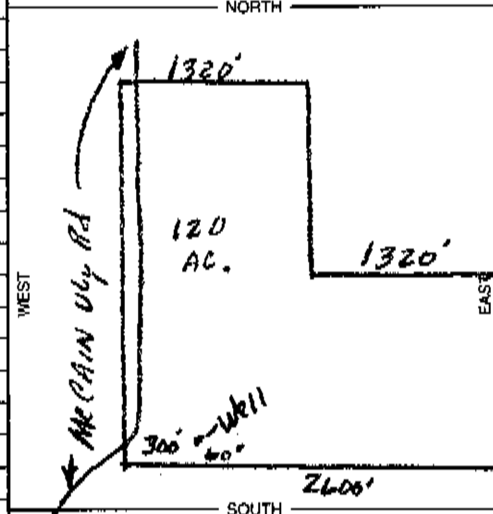
WELL OWNER

Name The Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon Ca 92020
CITY STATE ZIP

WELL LOCATION

Address Rough Acres Ranch McCain Valley Rd.
City Boulevard
County San Diego
APN Book 611 Page 110 Parcel 01
Township 17S Range 7E Section 15
Lat 36 16 772 N Long 115 69 465 W
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)
WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED
ESTIMATED YIELD * 50 (GPM) & TEST TYPE airlift
TEST LENGTH 3 (Hrs.) TOTAL DRAWDOWN 800 (Ft.)
* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	226	10	X				Steel	6	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			
50	226			X	

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Fain Drilling & Pump Co. Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

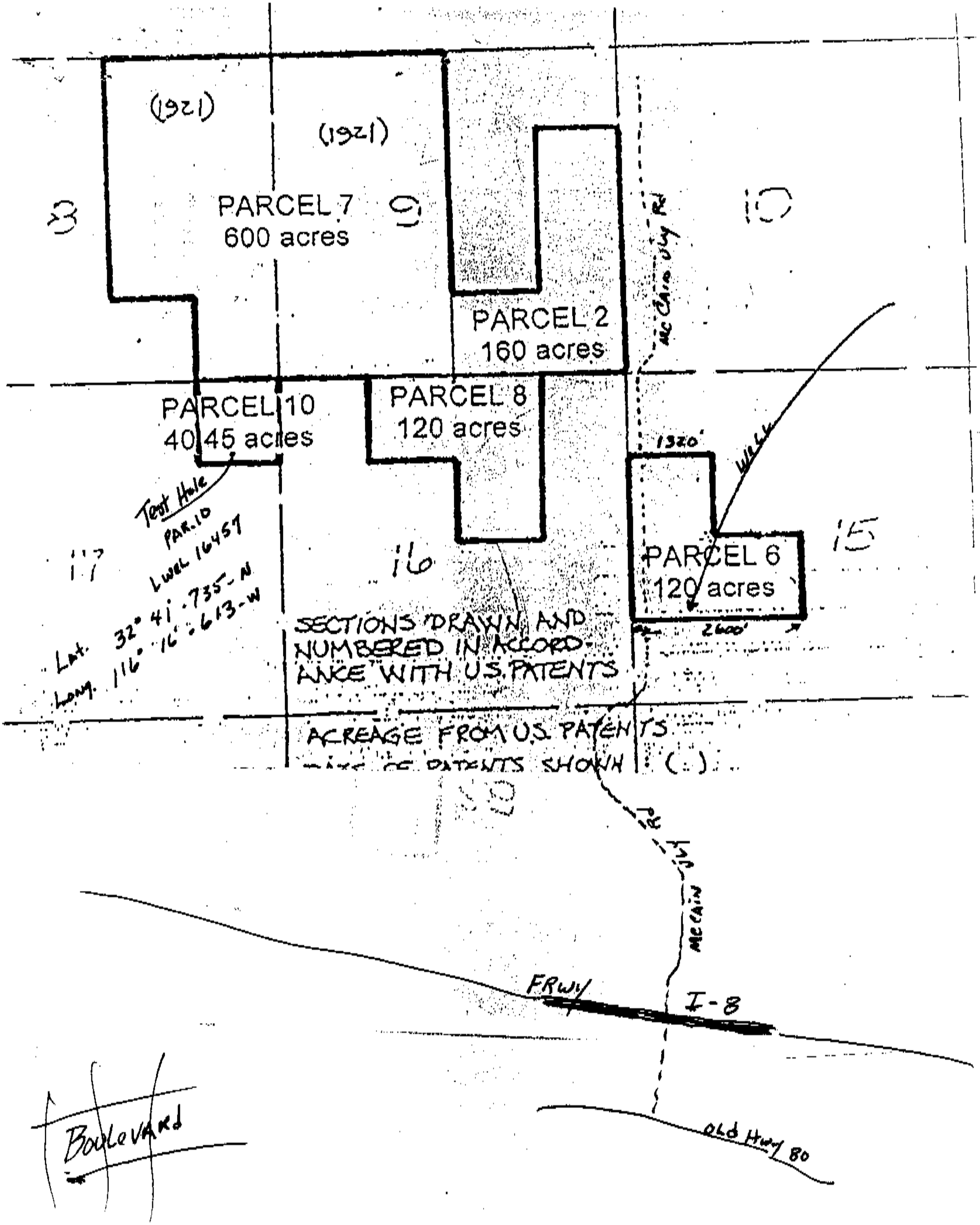
ADDRESS 12029 Old Castle Rd. Valley Center, Ca 92082
CITY STATE ZIP

Signed Joe R. Fain
C-57 LICENSED WATER WELL CONTRACTOR

DATE SIGNED 2/11/05
C-57 LICENSE NUMBER 328287

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM


(1921)
(1921)
8
PARCEL 7
600 acres
9
10
McCain Vly Rd
PARCEL 2
160 acres
PARCEL 10
40 45 acres
PARCEL 8
120 acres
1320'
WELL
Test Hole
PAR. 10
LWEL 16457
17
16
15
PARCEL 6
120 acres
2600'
Lat. 32° 41'.735' N
Long. 116° 16'.613' W
SECTIONS DRAWN AND NUMBERED IN ACCORDANCE WITH U.S. PATENTS
ACREAGE FROM U.S. PATENTS
McCain Vly Rd
FRWY
I-8
Boulevard
Old Hwy 80

9

Fully operational
old well
No info
probably 5-10 GPM
& shallow

APPENDIX B

OBSERVATIONS AND ANALYSIS OF AQUIFER CHARACERISTICS

ROUGH ACRES RANCH

MCCAIN VALLEY, EAST SAN DIEGO COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES
Geologists, Hydrogeologists and Engineers

Date: December 1, 2010
Project No.: 2010-0005

To: John Hower, CEG
Sarah Battelle, CHG

From: Mark Vincent, CHG

Regarding: **Observations and Analyses of Aquifer Characteristics Rough Acres Ranch, San Diego County, California**

INTRODUCTION

This memo presents a summary of observations and analyses made following a stepped and a constant rate aquifer pumping and recovery test in wells located at Rough Acres Ranch located approximately in McCain Valley in eastern San Diego County, California. The tests were performed to determine whether sufficient volumes of water are available for the Tule Wind Farm construction projects. Analyses performed included calculation of transmissivity, hydraulic conductivity, and storativity for a pumping well and observation wells.

WELL AND AQUIFER CONDITIONS

A well labeled as Well #6a was used as the pumping well for this test. Another well labeled as Well #6 (also referred to as South Well) is located 36 feet away from the pumping well and was monitored and analyzed as an observation well. More distant observation wells were monitored including Well #9 (Horse Corral Well), Walker Residence Well, Well #4 (RV Well), Well #2, and Well #8 (Far Field Well) (Figure 1).

Records for drilling and construction of the wells used for these pumping tests are incomplete or nonexistent. A well identified on Department of Water Resources (DWR) records as being owned by Harmony Grove Partners (identified as Form No. 1089956) is believed to be the log for Well #6a. Logs for Well #4 (RV Well) and Well #8 (Far Field Well) were also obtained. No records are available for Well #6 (South Well), The Walker Residence Well, Well #9 (Horse Corral Well), or Well #2.

Although DWR records indicate the borehole for Well #6a was drilled to a total depth of 420 feet, the bottom of the well is recorded to be at a depth of 385 feet below ground surface. Records are incomplete but it was assumed that the well screen extends from a depth of 75 to 385 feet below ground surface. A cement sanitary seal is reported to extend from ground surface to a depth of 56 feet. Wells #6 and #6a used in this pumping test have existing electric submersible pumps installed in them. Based on the production rates achieved during the tests performed, the wells are likely to be outfitted with four-inch diameter electric submersible pumps. Based on the depth and pressure head on the transducers installed in the wells for the test, it was assumed that both of the boreholes are 385 feet deep and are 6.5-inches in diameter. It was further assumed that the wells were constructed with 4-inch diameter well casing and that they are perforated or screened from a depth of 75 feet below ground surface. Details of well construction could not be verified in the field because of the presence of pumps, discharge pipes, electrical wires, and surface sanitary seals. Available well logs are included at the back of this document.

The area immediately around Well #6 and #6a is underlain by alluvium comprised of poorly sorted sand, gravel, and silt derived from the crystalline basement rock exposed on the adjacent canyon sidewalls. The crystalline basement rocks are classified as tonalite and yield groundwater from fractures. The well log reportedly recorded for Well #6a indicates that there is about 70 to 85 feet of alluvium overlying the tonalite. Groundwater was measured at a depth of 27.81 feet below the top of sanitary seal on Well #6a.

TEST METHODS

Observations of groundwater elevation were recorded in a pumping well and six observation wells in McCain Valley. Data was collected using pressure transducers connected to data loggers. Barometric pressure changes were recorded during the test and corrections were made to the pressure head data collected during the tests.

A stepped aquifer pumping test was performed using Well #6a to determine the optimum pumping rate for a longer duration test. The pressure transducers were deployed and began recording data on August 20, 2010 to perform the stepped pumping test. The stepped pumping test was performed at pumping rates of 28 gallons per minute (gpm), 38 gpm, 55 gpm and 60 gpm. A semi-logarithmic plot of elapsed time versus drawdown for the stepped pumping test is shown on Figure 2.

The constant rate pumping and recovery test was performed from August 24 through 27, 2010. The pump was powered-down on August 27, 2010 and allowed to recover for 10 hours when the pressure transducers were removed from the wells. A recovery test was performed by turning off the pumps and recording the increasing head levels over time.

DATA ANALYSIS

Changes in groundwater level data recorded during this test were corrected for barometric pressure changes and used to generate a file containing tabulated time and changes in pressure head. The data was used to generate time-drawdown graphs for the pumping and observation wells and imported into computer software used to calculate the transmissivity and storativity of the fractured tonalite.

The stepped pump test analysis consists of plotting the drawdown versus time for each pumping rate on a time versus drawdown plot with time plotted on a logarithmic scale. Forward projections of each segment representing a different pumping rate can be used to predict the likely drawdown for the pumping well during for the selected duration of the test. A pumping rate of 50 gpm was selected as the target pumping rate because it would allow for ample drawdown without the well running dry during the test.

The method of Schafer (1978) was employed to determine how much of the data set for Well #6a was impacted by casing storage effects. The method is a simplification of the method first developed by Papadopulos and Cooper (1967) but does not require prior knowledge of the transmissivity or well efficiency. The point at which casing storage effects are overcome was calculated to occur approximately 23 to 25 minutes into the test based on the assumptions about well construction practices, pumping rates, and drawdown. Very early pumping data was ignored in the analyses described below due to casing storage effects.

Time versus drawdown plots were prepared for the pumping and observation wells for the pumping and recovery portions of the test. The plots are shown with the time axis plotted on a logarithmic scale and drawdown on a linear scale.

Figure 3 shows the time-drawdown plot for Well #6a during pumping. The first 23 to 25 minutes of the test show the casing storage effects. Well #6a drawdown plots as a straight line on the time-drawdown chart representing constant aquifer properties during that portion of the drawdown cone development. A sudden change in the drawdown curve starts at approximately 11 or 12 minutes; which may reflect leakage from the alluvium above the fractured bedrock.

A residual drawdown plot for Well #6a is shown on Figure 4. The plot shows the change in drawdown versus the ratio of the time since the pump test started divided by the time since the recovery portion of the test started (t/t`). The residual drawdown at a t/t` ratio of 1 is shown to be about 0.33 feet (a less than significant change in storage noted in the pumping well over the course of the pumping and recovery portions of the aquifer stress test).

A time-drawdown plot of Well #6 (the observation well also referred to as South Well) located 36 feet away from the pumping well shows a decrease in drawdown from approximately 30 minutes to approximately 400 minutes which may result from leakage from the alluvium above the fractured bedrock (Figure 5). The Well #6 plot shows even less drawdown versus time after 400 minutes possibly reflecting the fractured bedrock aquifer.

The Well #6 recovery portion of the test is plotted as the residual drawdown versus t/t` shows a flat line on the semi-logarithmic plot (Figure 6) indicative of uniform aquifer conditions from a t/t` ratio of about 8 to 110 into the recovery test period. The residual drawdown value measured for a t/t' ratio of 1 is about -0.22 feet. It is not regarded to be significant compared to the County standard maximum change of 0.5 feet.

The Well #9 (Horse Corral Well) was monitored and the time-drawdown plot reflects that the well pump cycled on and off five times during the test (Figure 7). No analyses were performed for this well because the changes in drawdown versus time due to the pump activating are far greater than any drawdown likely to be induced by the pumping test at Well #6a.

Well #2 (Pond Well) and Well #9 (Far Field Well) were monitored for changes in head during the pumping test. Figure 8 and 9 show the time-drawdown plots for Wells #2 and #9. Both plots show similar small, cyclic, barometric changes in head but are not likely to have resulted from the pumping test. No analyses were performed using the data from these wells.

Water level drawdown data were evaluated using the computer software program AquiferTest version 3.5 (Waterloo Hydrogeologic, 2002). The program performs curve matching of the time drawdown data to calculate transmissivity, hydraulic conductivity, and storativity using different methods. The methods employed included Cooper-Jacob (1946), Moench (1993), Neuman (1975), and Theis (1935).

DISCUSSION

As shown on Table 1, the calculated hydraulic conductivity values for all of the analytical methods employed ranged from a low of 7.50E-04 feet/day for data collected from Well #6 (South Well) using the Theis method for the data collected from the end of the recovery test to a high of 7.50E+00 feet/day using the Cooper Jacob method with late time data for Well #6 (South Well). An average conductivity of 1.85 feet/day was calculated from all methods from both Well #6 and #6a. The Storativity values range from a low of 4.48E-06 for Well #6 late time data calculated using the Moench Fracture Flow method and a high of 7.87E-01 for a match to the late time data recorded in Well #6 using the Moench method with the vertical hydraulic conductivity set at one-tenth the horizontal hydraulic conductivity.

All of the analytical results show a higher transmissivity and hydraulic conductivity value for matches to the observation Well #6. The pumping well and observation well used for these analyses are located in a portion of McCain Valley which is entirely covered in up to 75 to 80 feet of alluvium (Figure 10). Based on the measured depth to groundwater in Well #6 and #6a, approximately 47 to 52 of saturated alluvium overlies the fractured bedrock at the test site (Figure 11). The saturated alluvium is likely to act like a reservoir recharging the fractures in the bedrock. The aerial extent of the fractured bedrock aquifer and the amount of storage in the fractures is likely controlled in part by the presence of the alluvial aquifer. Because the fractures in the bedrock appear to be of aerially limited extent, the actual volume of groundwater available may be limited with larger volumes of groundwater available within the canyon areas where fracturing may be most prevalent and alluvium is saturated.

CLOSURE

This summary of observations and analyses has been prepared in general accordance with accepted professional geotechnical and hydrogeologic principles and practices. This report makes no other warranties, either expressed or implied as to the professional advice or information included in it. Our firm should be notified of any pertinent change in the project, or if conditions are found to differ from those described herein, because this may require a reevaluation of the conclusions. This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

Geo-**L**ogic **A**ssociates

Mark W Vincent

Mark W. Vincent, PG 5767, CEG 1873, CHg 865
Senior Geologist

Attachments: Table 1 - Aquifer Stress Test Results
Figure 1 - Well Location Plan
Figure 2 - Step Test Time Drawdown Plot
Figure 3 - North Well Time Drawdown Plot Pumping
Figure 4 - North Well Time Drawdown Plot Recovery
Figure 5 - South Well Time Drawdown Plot Pumping
Figure 6 - South Well Time Drawdown Plot Recovery
Figure 7 - Thing Valley Well Time Drawdown Pumping
Figure 8 - Thing Valley Well Time Drawdown Recovery
Figure 9 - Geologic Map
Appendix A - Analytical Results from Aquifer Test Program
Appendix B - Department of Water Resources Well Completion Reports

REFERENCES

Cooper, H.H., Jr. and Jacob, C.E., 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, *Transactions, American Geophysical Union*, Vol. 27, No. 4.

Driscoll, D.G., 1986, Groundwater and Wells, Johnson Filtration Systems Inc., St. Paul, Minnesota.

Moench, S.P., 1993, Combining the Neuman and Boulton Models for Flow to a Well in an Unconfined Aquifer, *Ground Water*, Vol. 33, No. 3.

Neuman S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, *Water Resources Research*, Vol. 11, No. 2, pp. 329-342.

Papadopulos, I.S. and Cooper, H.H., Jr., 1967, Drawdown in a well of large diameter, *Water Resources Research*, vol. 3, pp 241-244.

Schafer, D.C., 1978, Casing Storage Can Affect Pumping Test Data, *Johnson Drillers' Journal*, Jan/Feb, Johnson Division, UOP Inc., St. Paul, Minnesota.

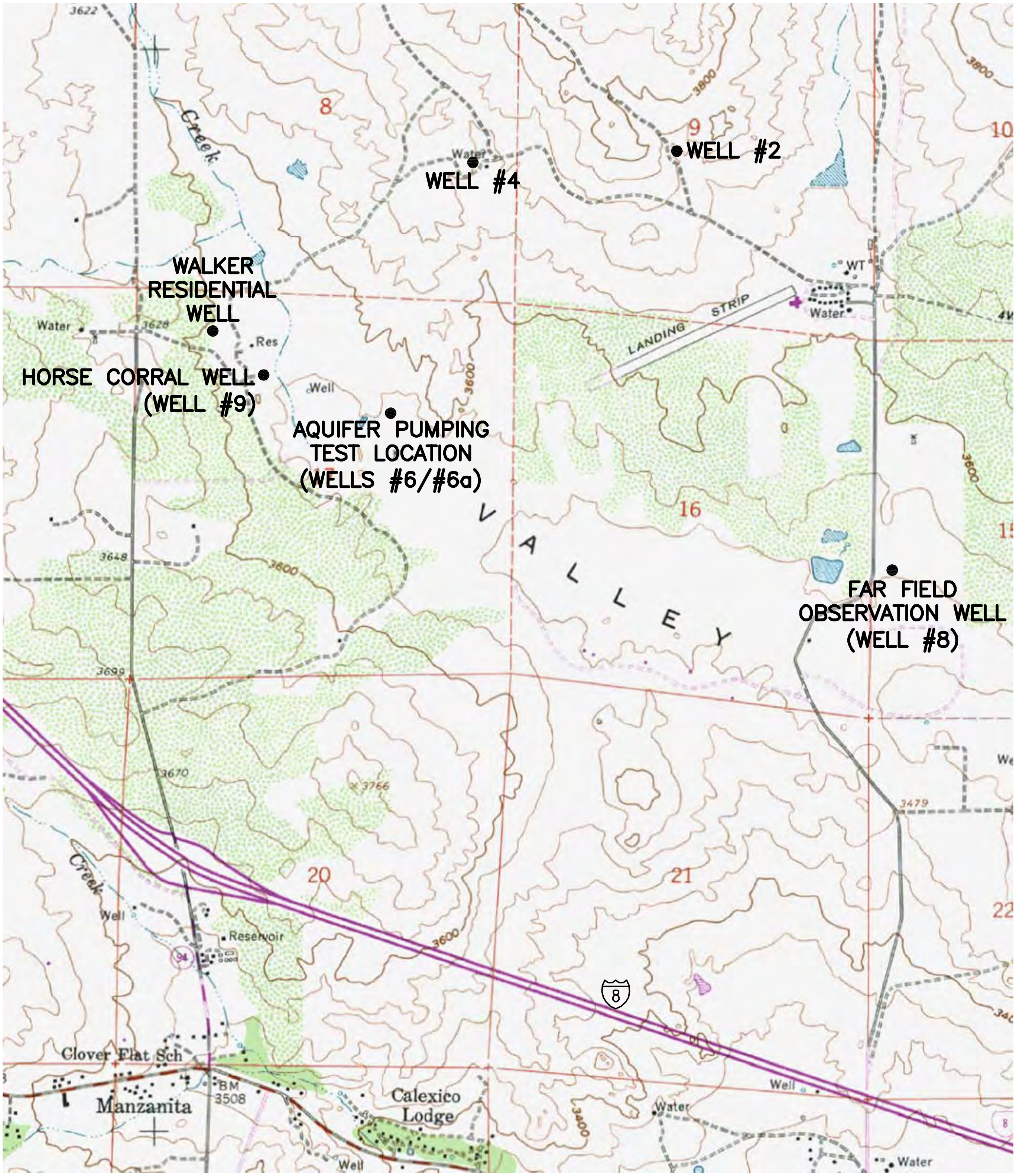
Theis, C.V., 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, *American Geophysical Union Transactions*, Vol. 16, pp. 519-524.

Waterloo Hydrogeologic (co-developed with Thomas Roerich), 2002, AquiferTest version 3.5, Advanced Pumping Test and Slug Test Analytical Software.

Table 1

Aquifer Stress Test Results
Rough Acres Ranch - McCain Valley

Well Designation	Condition	Distance From Pumping Well (feet)	Groundwater Depth from Ground Surface (feet)	Assumed Aquifer Thickness (feet)	Average Pumping Rate (gpm)	Analytical Method	Transmissivity (feet^2/day)	Conductivity (feet/day)	Storativity	Comments
Well #6a	Pumping	1	28	500	50	Cooper-Jacob	6.30E+02	1.26E+00	NA	Match to late data.
Well #6a	Pumping	1	28	500	50	Moench Fracture Flow	1.12E+02	2.25E-01	2.70E-04	Match to late data.
Well #6a	Pumping	1	28	500	50	Moench	1.21E+02	2.43E-01	1.72E-01	Match to late data.
Well #6a	Pumping	1	28	500	50	Neuman	5.69E+01	1.14E-01	1.62E-02	Spec Yld. = 1.62E+02
Well #6a	Pumping	1	28	500	50	Theis	2.69E+01	5.39E-02	1.64E-01	Match to early data.
Well #6a	Pumping	1	28	500	50	Theis	1.51E+02	3.03E-01	3.19E-05	Match to late data.
Well #6a	Pumping	1	28	500	50	Walton	1.11E+02	2.21E-01	7.08E-04	Match to late data.
Well #6a	Recovery	1	28	500	0	Theis Recovery	2.17E-02	4.35E-05	NA	Match to early data.
Well #6a	Recovery	1	28	500	0	Theis Recovery	7.27E+00	1.45E-02	NA	Match to late data.
South Well #6	Pumping	36	27.81	500	50	Cooper-Jacob	2.14E+03	4.28E+00	NA	Match to middle data.
South Well #6	Pumping	36	27.81	500	50	Cooper-Jacob	3.75E+03	7.50E+00	NA	Match to late data.
South Well #7	Pumping	36	27.81	500	50	Moench Fracture Flow	2.95E+03	5.91E+00	4.48E-06	Match to late data.
South Well #6	Pumping	36	27.81	500	50	Moench	1.30E+03	2.60E+00	7.87E-01	Kv=1/10 Kh
South Well #6	Pumping	36	27.81	500	50	Neuman	9.67E+02	1.93E+00	NA	Match to all data.
South Well #6	Pumping	36	27.81	500	50	Theis	3.18E+03	6.36E+00	3.29E-06	Match to late data.
South Well #6	Pumping	36	27.81	500	50	Walton	1.13E+03	2.26E+00	1.47E-03	Match to early data.
South Well #6	Recovery	36	27.81	500	0	Theis Recovery	3.75E-01	7.50E-04	NA	Match to early data.
South Well #6	Recovery	36	27.81	500	0	Theis Recovery	2.23E+00	4.47E-03	NA	Match to late data.
						Average Values	**9.24E+02**	**1.85E+00**	**1.14E-01**	



GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: 7.5 MINUTE SERIES (TOPOGRAPHIC) LIVE OAK SPRINGS (1975) CALIFORNIA QUADRANGLE

WELL LOCATION MAP ROUGH ACRES RANCH AQUIFER TEST SITE		
TULE WIND PROJECT SAN DIEGO COUNTY, CA		
Geo-Logic ASSOCIATES		
DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005

Figure 2
Step Drawdown Test
Well #6a - Pumping Well
Rough Acres Ranch, McCain Valley

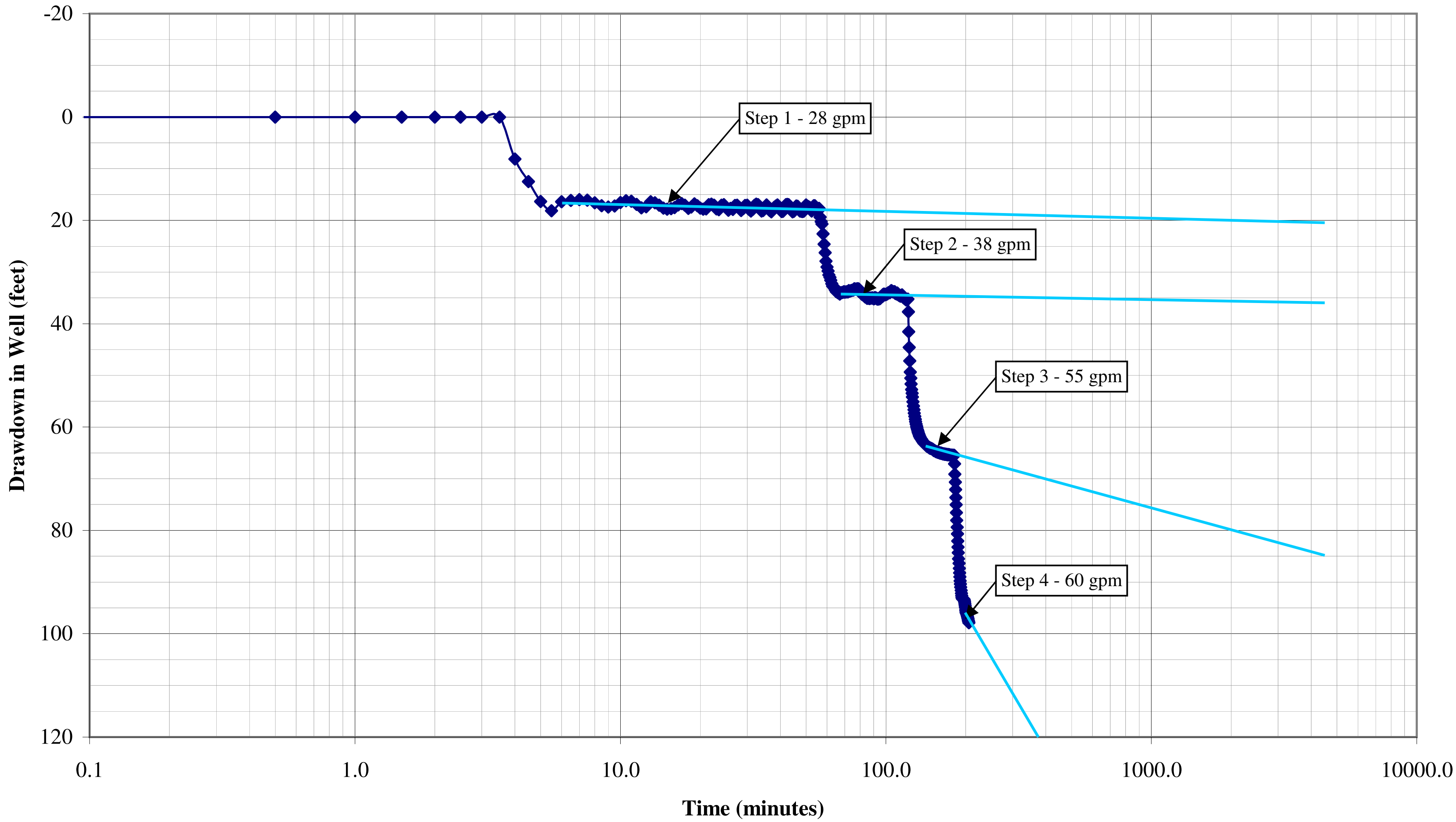
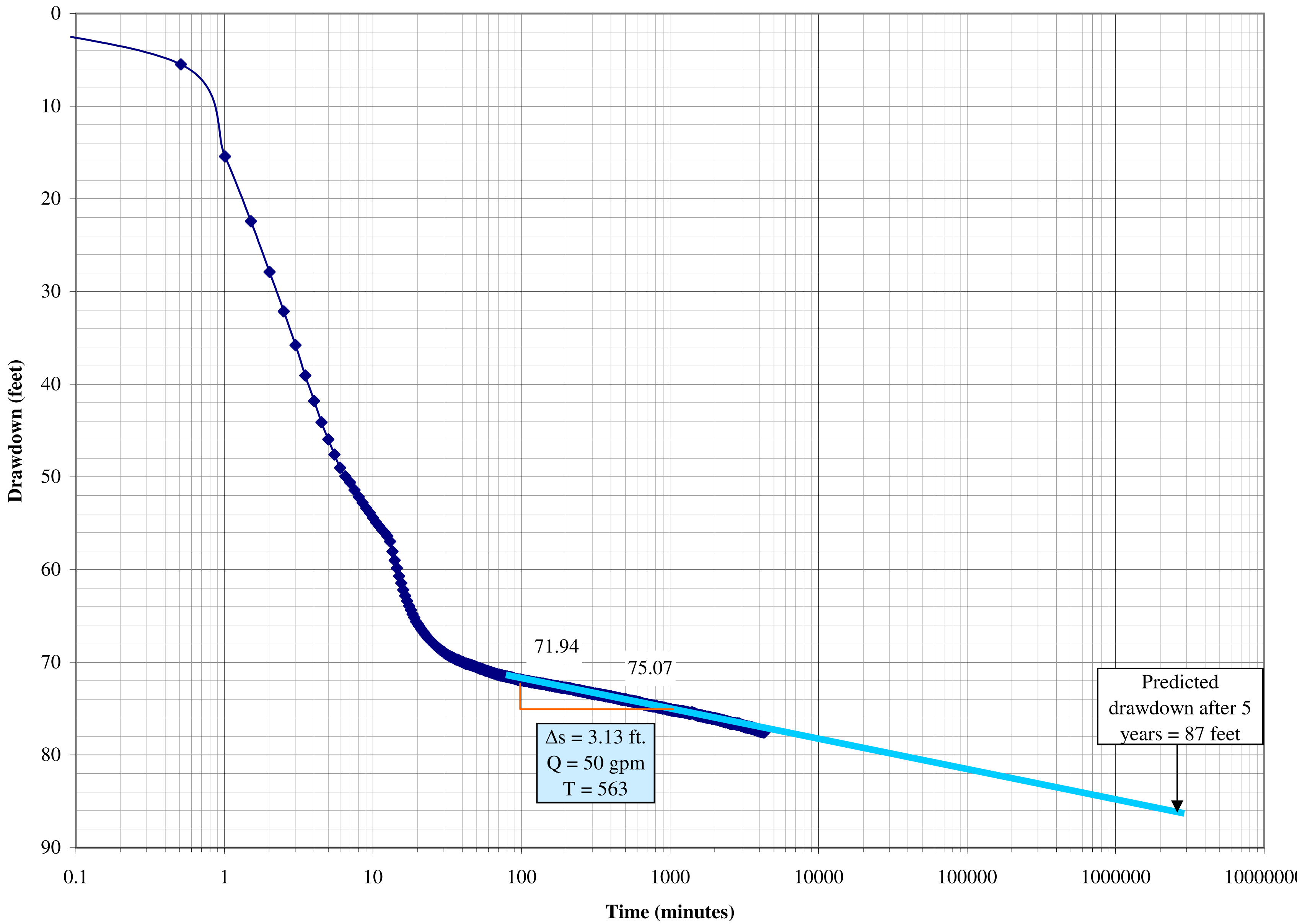


Figure 3
Drawdown in Pumping Well during 72-hour Pumping Test at 50 gpm
North Well at Rough Acres Ranch



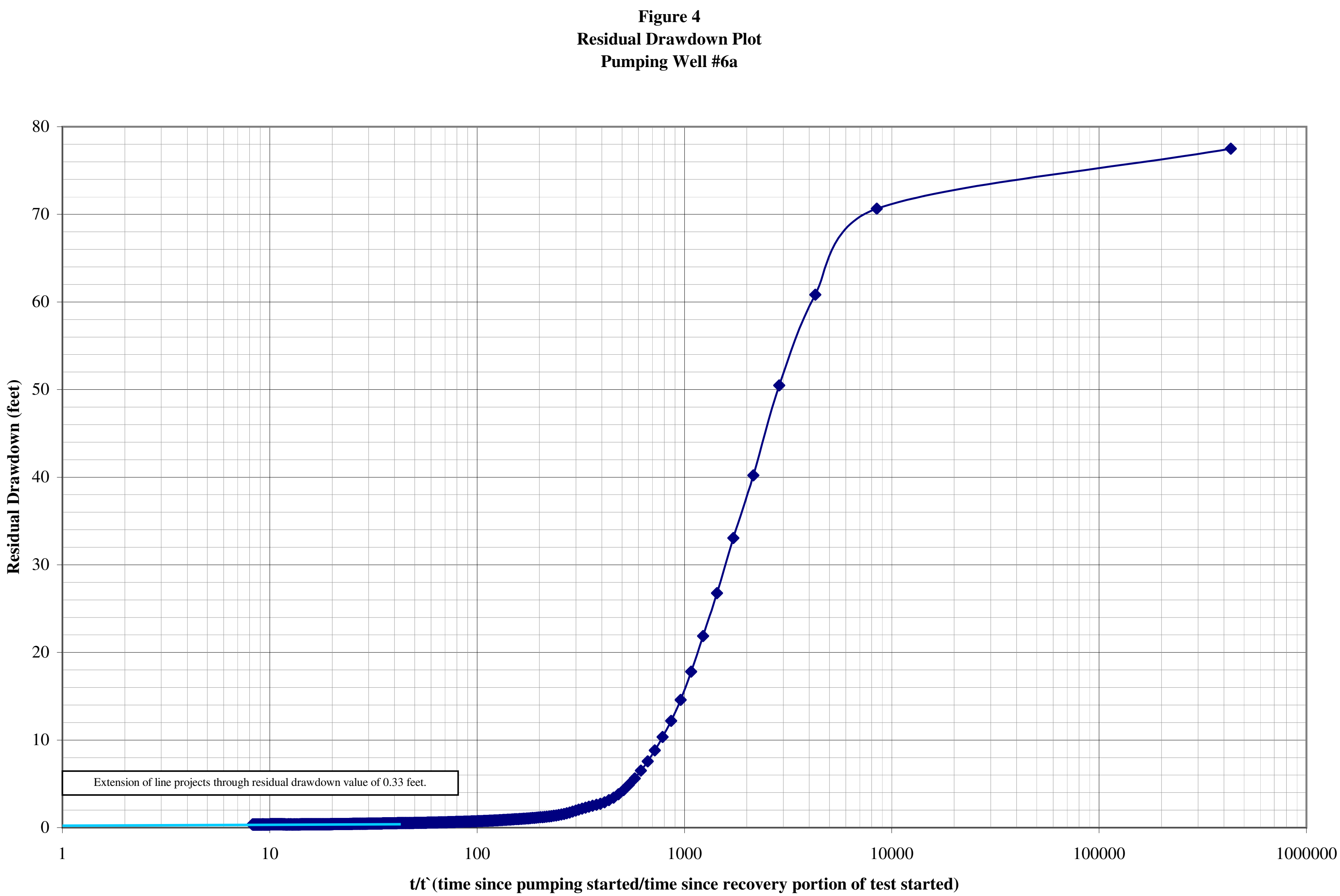


Figure 4
Residual Drawdown Plot
Pumping Well #6a
Residual Drawdown (feet)
80
70
60
50
40
30
20
10
0
Extension of line projects through residual drawdown value of 0.33 feet.
1
10
100
1000
10000
100000
1000000
t/t`(time since pumping started/time since recovery portion of test started)

Figure 5
Well #6 - Observation Well
Time-Drawdown Plot
Rough Acres Ranch

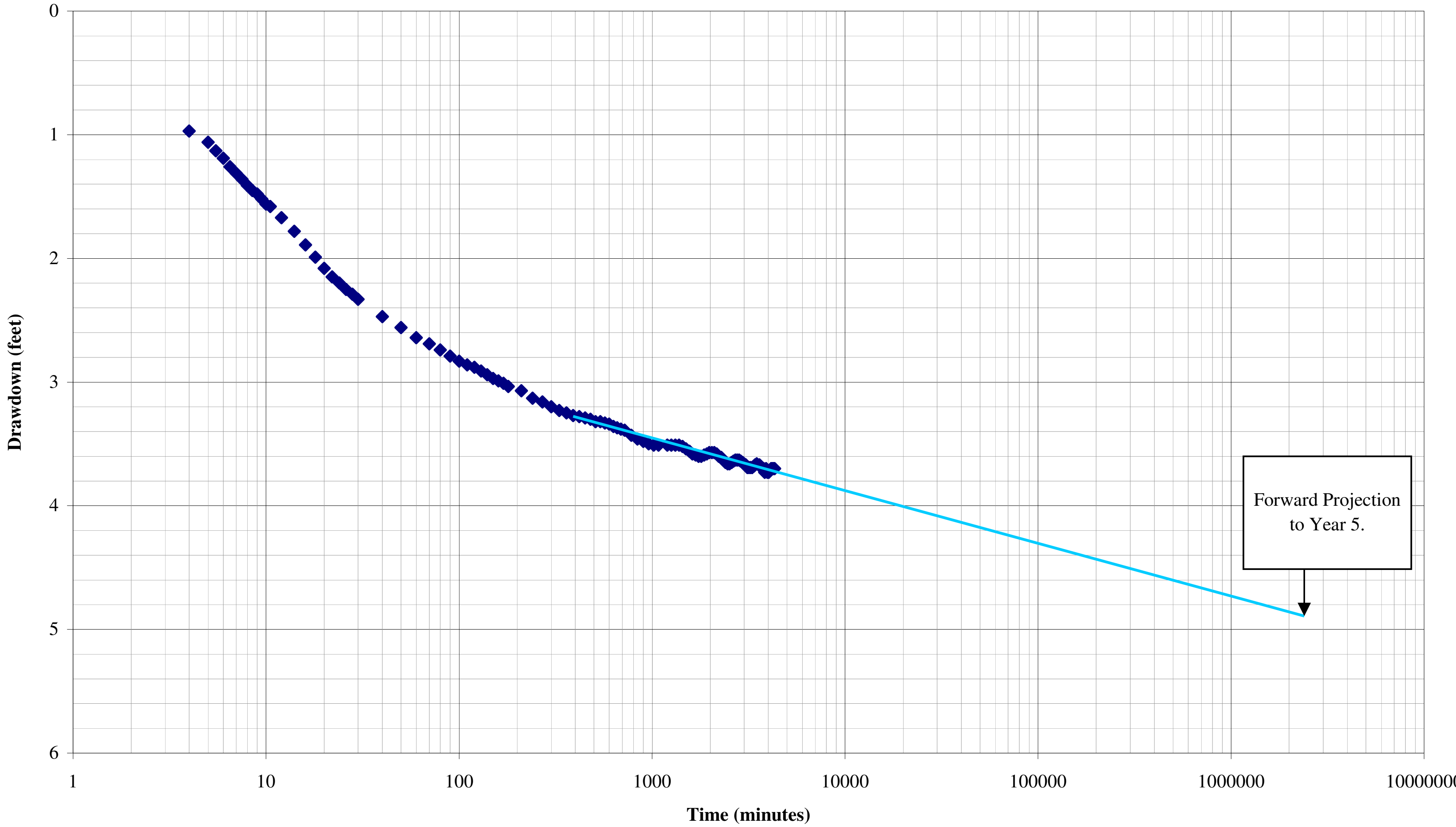


Figure 6
South Well - Observation Well
Residual Drawdown Plot
Rough Acres Ranch

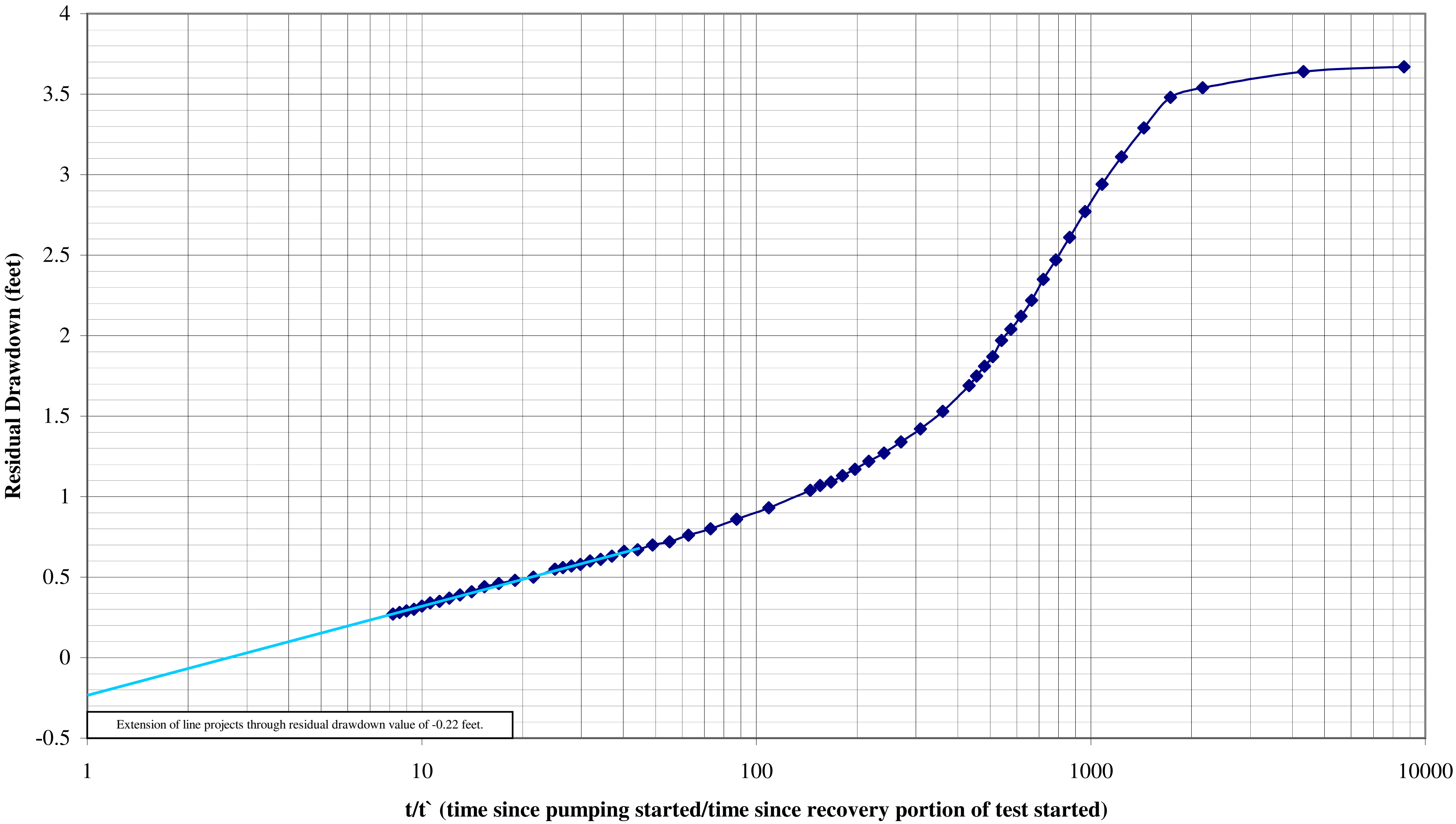


Figure 7
Horse Corral Well
(Observation Well)
Time-Drawdown Plot

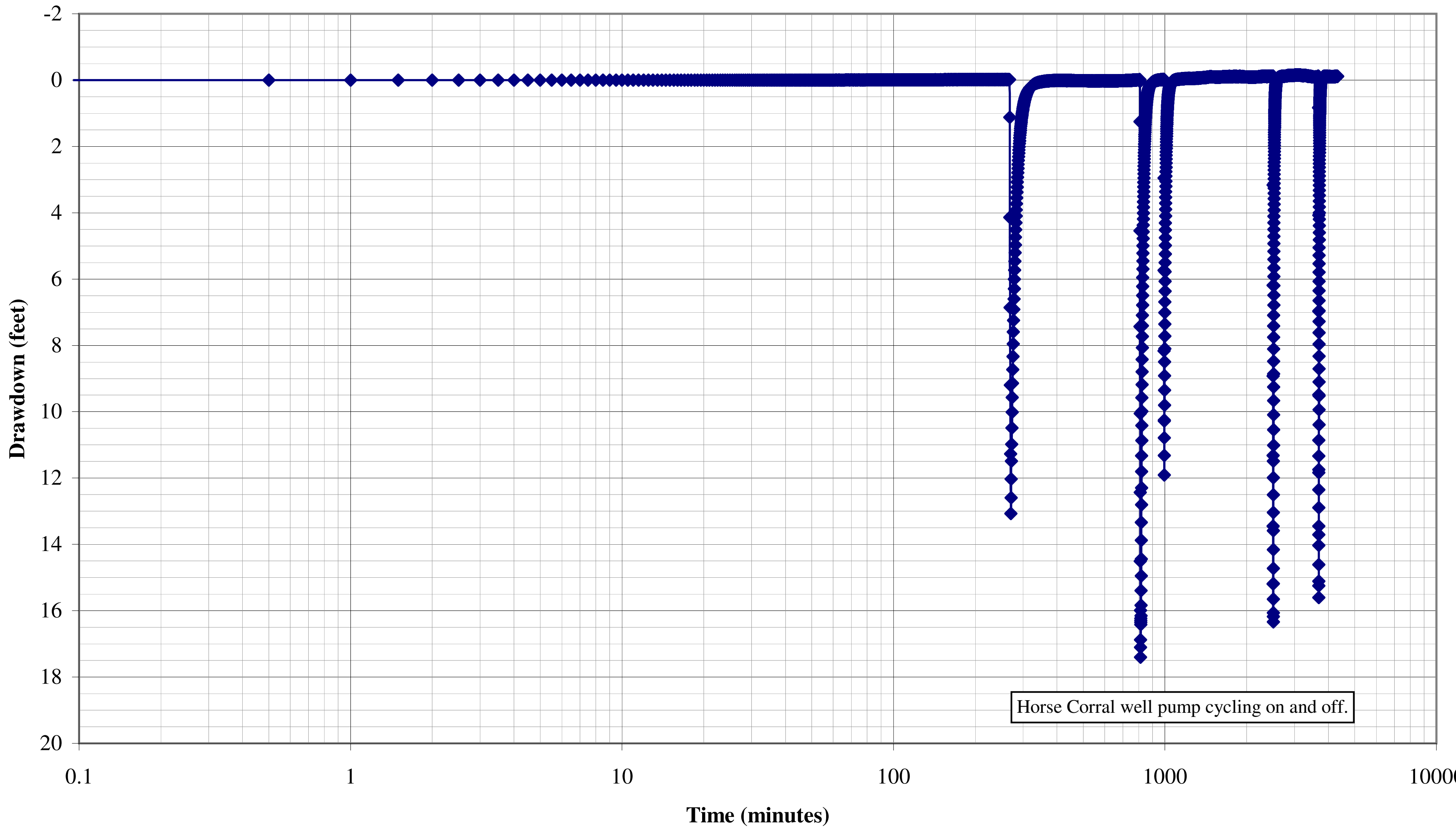


Figure 8
Well #2 - Observation Well
Distance-Drawdown Plot
Rough Acres Ranch

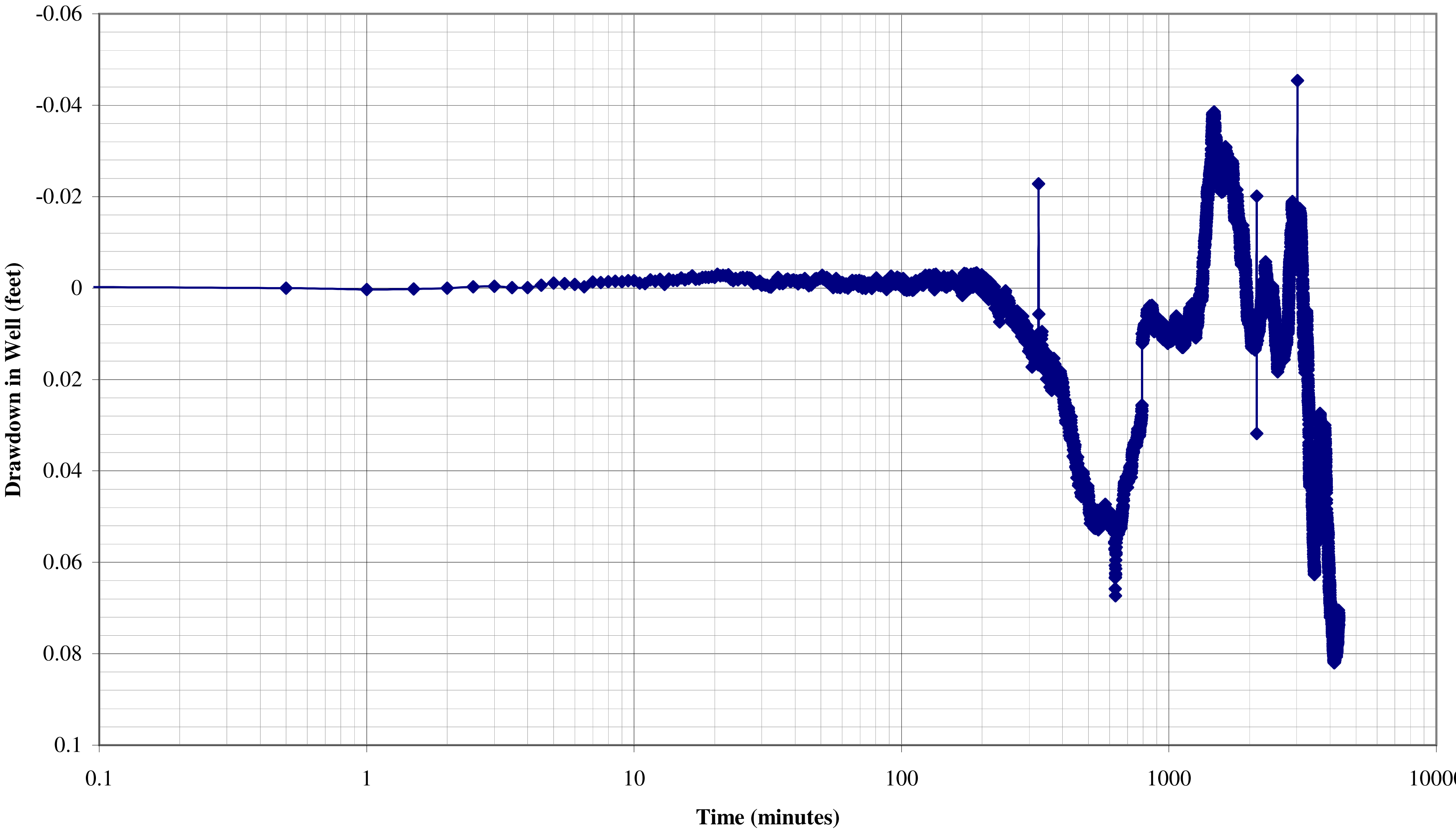
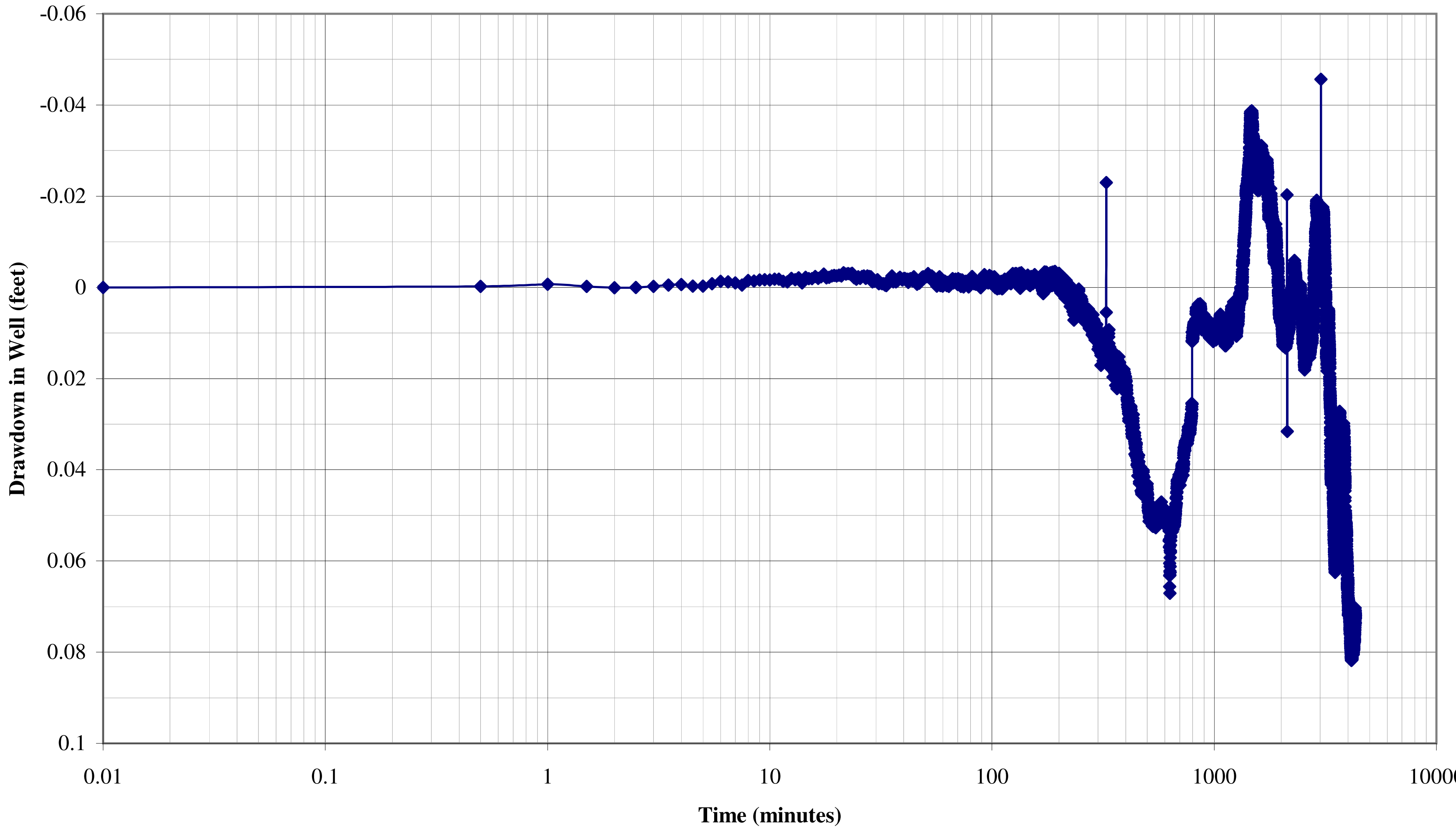
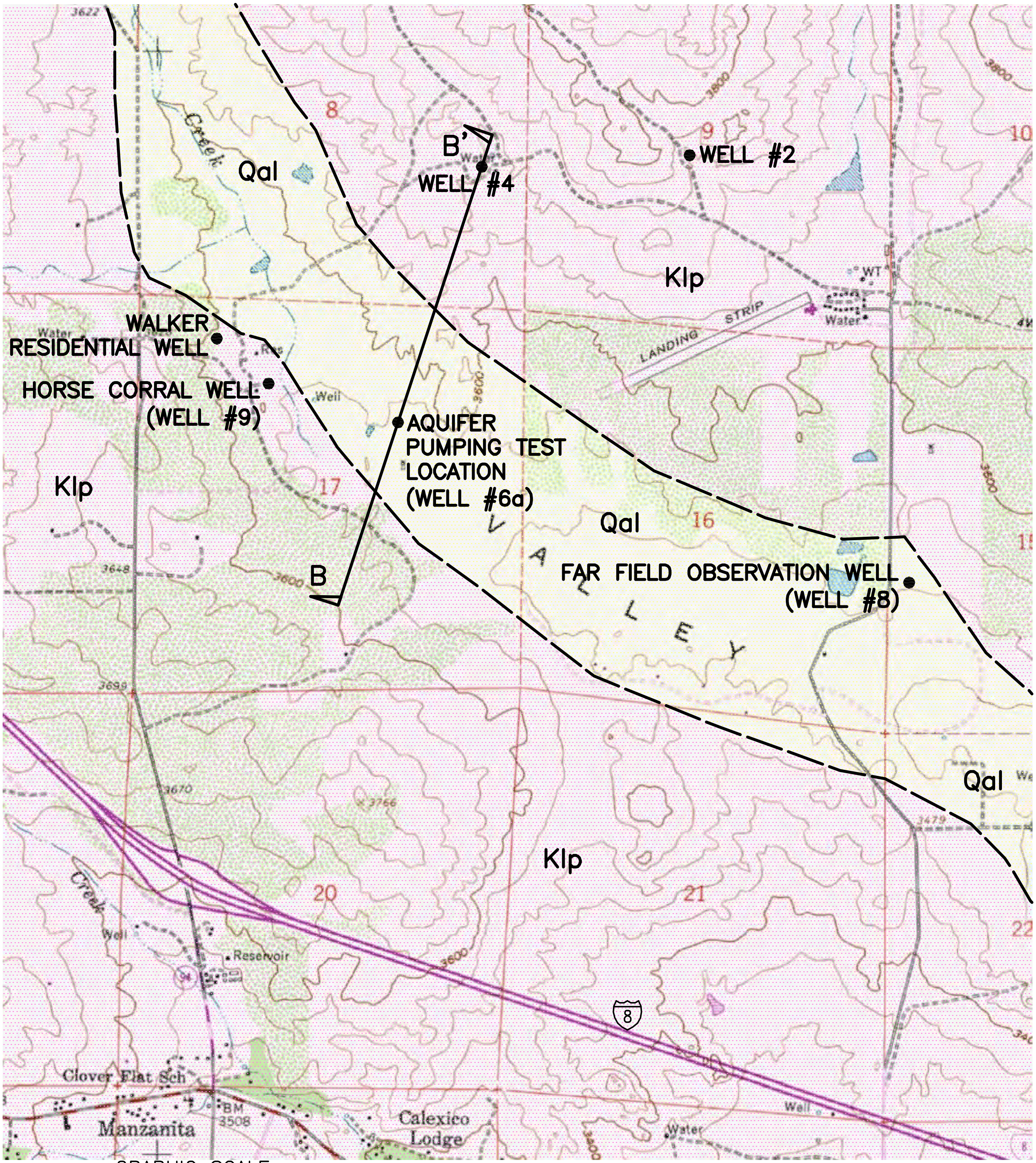


Figure 9
Well #8 Far Field - Observation Well
Time-Drawdown Plot
Rough Acres Ranch





GRAPHIC SCALE

1000 0 500 1000 2000

(in feet)

1 inch = 2000 ft.

N

REFERENCE: PRELIMINARY GEOLOGIC MAP OF EL CAJON 30' x 60' QUADRANGLE, SOUTHERN CALIFORNIA, V. R. TODD, 2004

EXPLANATION:

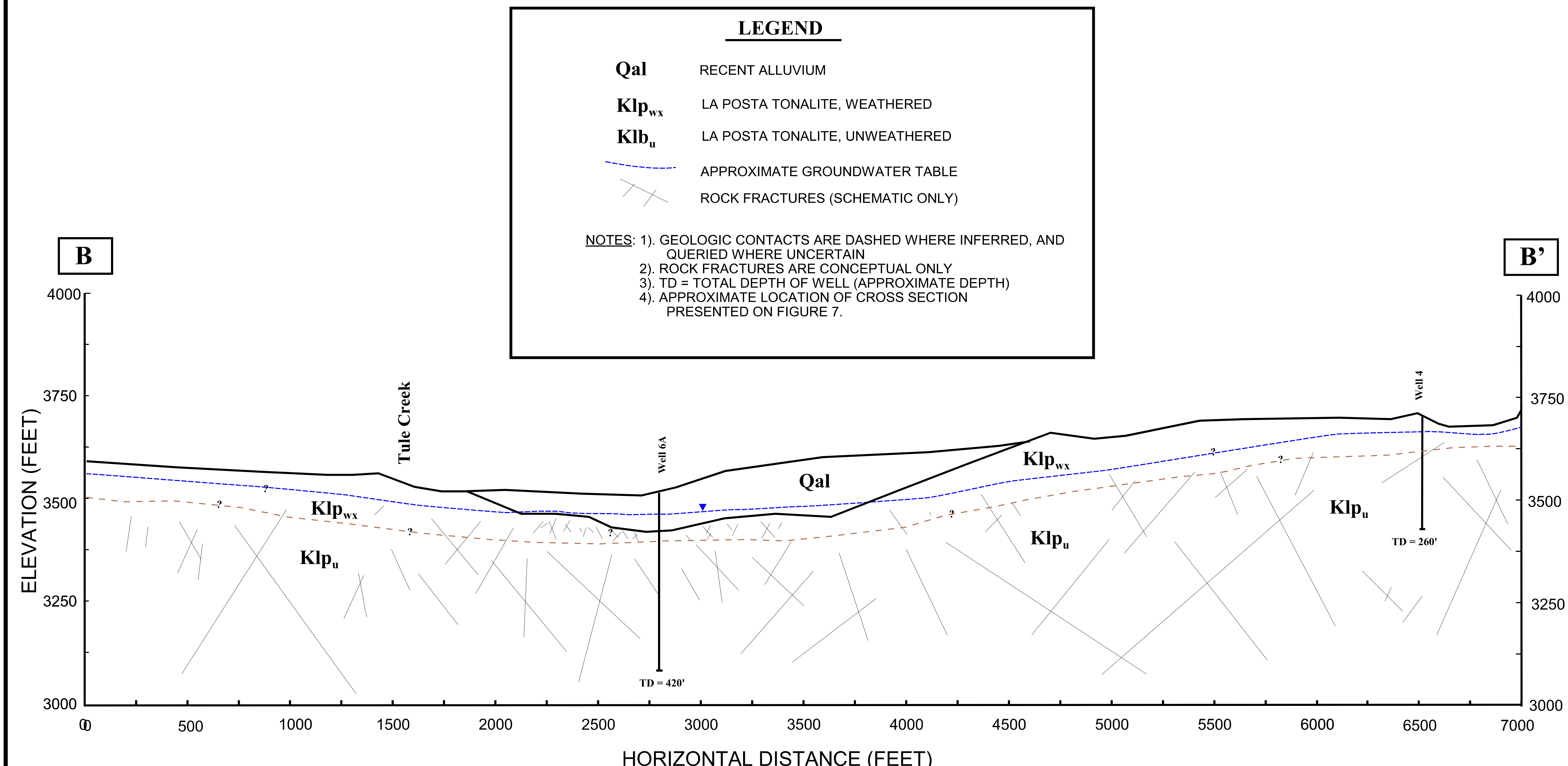
Qal	ALLUVIUM
Klp	TONALITE OF LA POSTA (EARLY AND LATE CRETACEOUS)
— — —	APPROXIMATE GEOLOGIC CONTACT
B B'	CROSS-SECTION LOCATION

GEOLOGIC MAP
ROUGH ACRES RANCH AQUIFER TEST SITE

TULE WIND PROJECT
SAN DIEGO COUNTY, CA

Geo-Logic
ASSOCIATES

DRAWN BY: VL	DATE: NOVEMBER 2010	JOB NO. 2010-005



NORTH 18° EAST

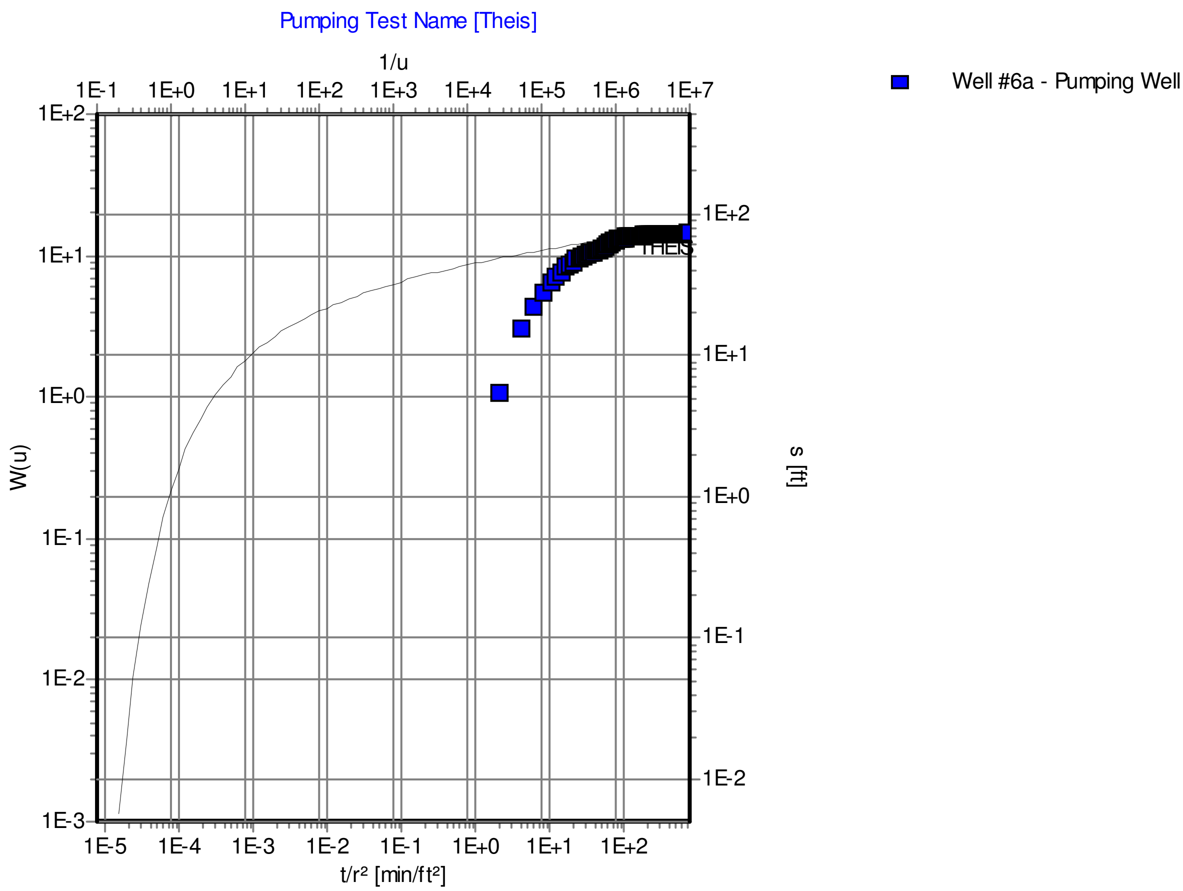
HORIZONTAL SCALE: 1 INCH = 500 FEET
VERTICAL SCALE: 1 INCH = 250 FEET
2x VERTICAL EXAGGERATION
(11 X 17 INCH FORMAT ONLY)

References: USGS, 1975, 7.5' Live Oak Springs, CA Quadrangle.

CONCEPTUAL HYDROGEOLOGIC CROSS SECTION		
ROUGH ACRES STUDY AREA SAN DIEGO COUNTY, CALIFORNIA		
Geo-Logic ASSOCIATES		
Draft JGF	Date OCT 2010	Project No. 2010-0005

Appendix A
Analytical Results from Aquifer Test Program

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test:	**Pumping Test Name**			
Analysis Method:	**Theis**			
Analysis Results:	Transmissivity:	1.51E+2 [ft²/d]	Conductivity:	3.03E-1 [ft/d]
	Storativity:	3.19E-5		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		
Comments:	Match to late time data. Pumping Well.			

Evaluated by: MWV

Evaluation Date: 11/18/2010

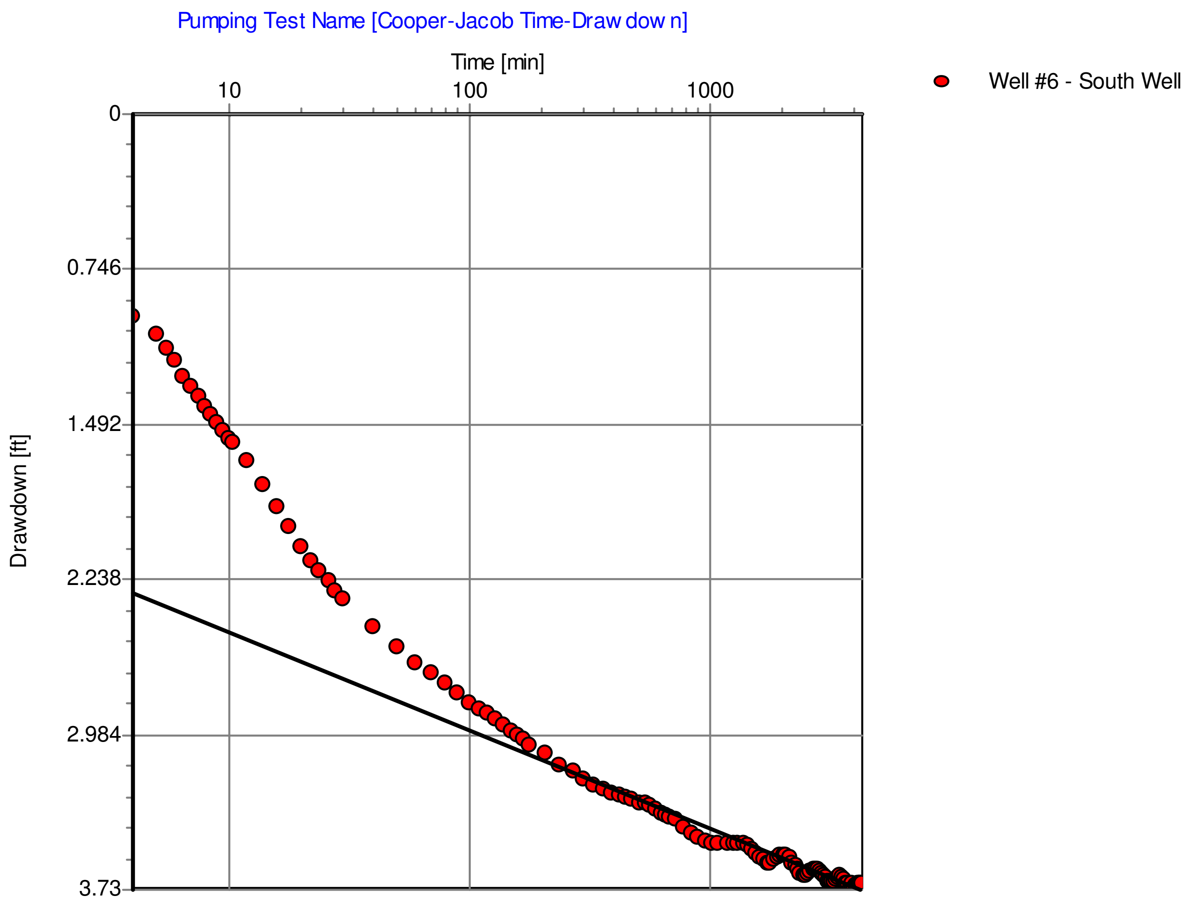
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test:	**Pumping Test Name**			
Analysis Method:	**Cooper-Jacob Time-Drawdown**			
Analysis Results:	Transmissivity:	3.75E+3 [ft²/d]	Conductivity:	7.50E+0 [ft/d]
	Storativity:	2.28E-7		
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		
Comments:	Match to latest time data. Observation Well.			

Evaluated by: MWV

Evaluation Date: 11/18/2010

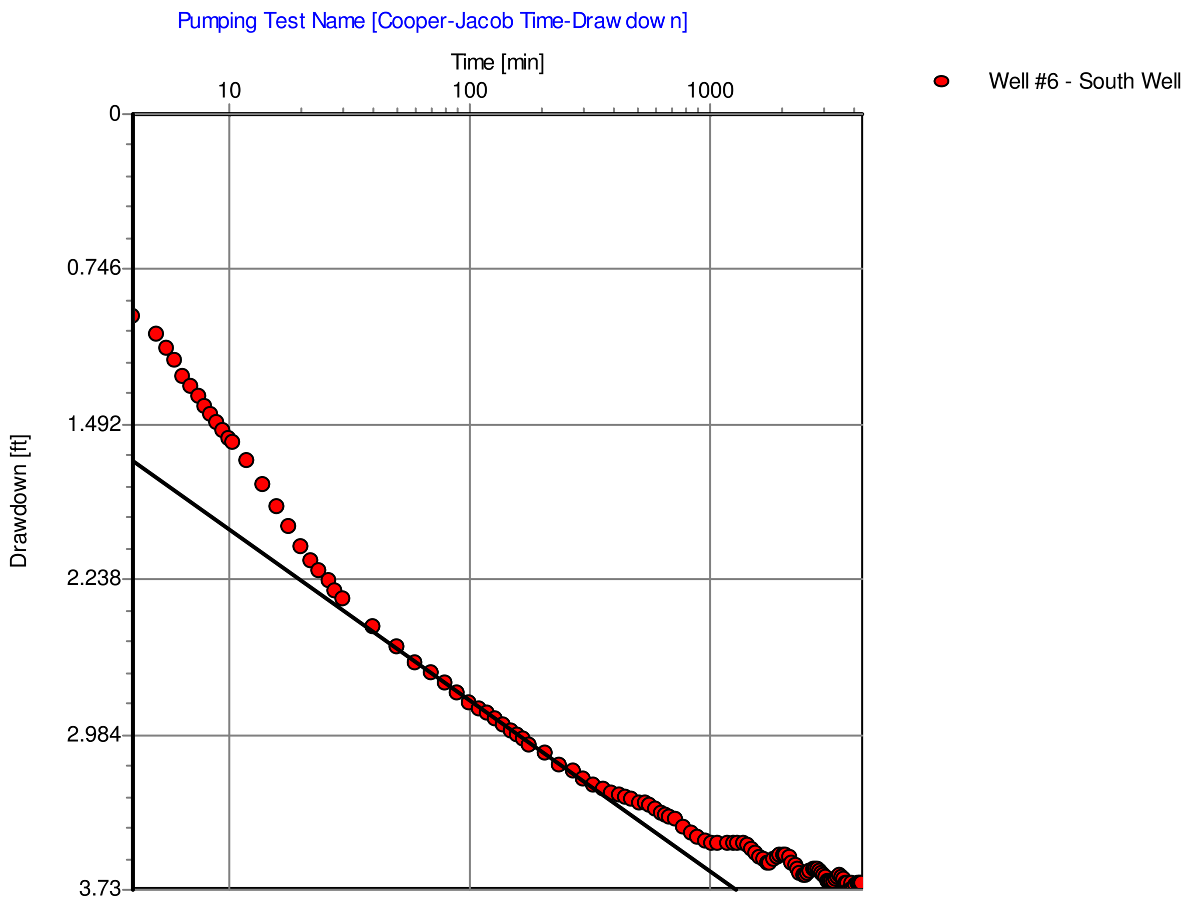
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	2.14E+3 [ft²/d]	Conductivity:	4.28E+0 [ft/d]
	Storativity:	1.01E-4		

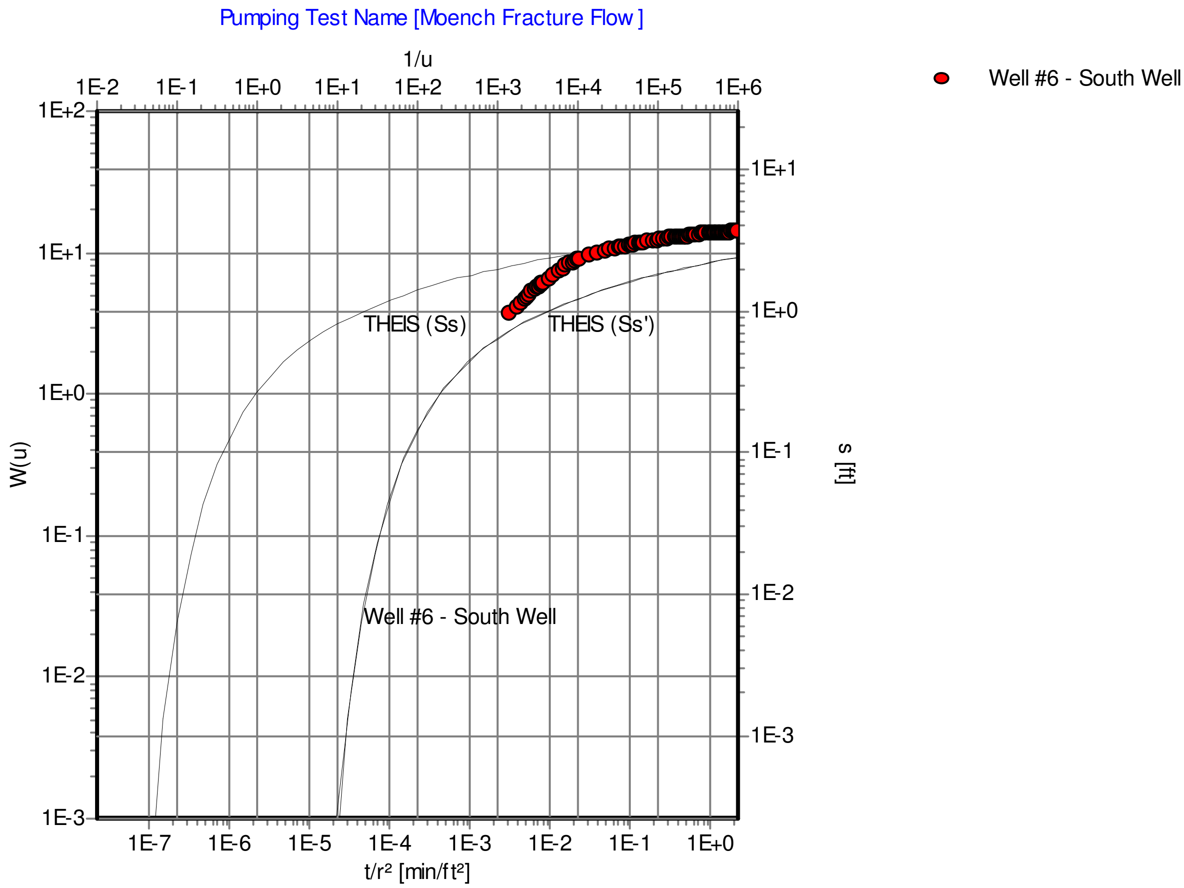
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to middle time data. Observation Well.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



<u>Pumping Test:</u> **Pumping Test Name**

<u>Analysis Method:</u> **Moench Fracture Flow**

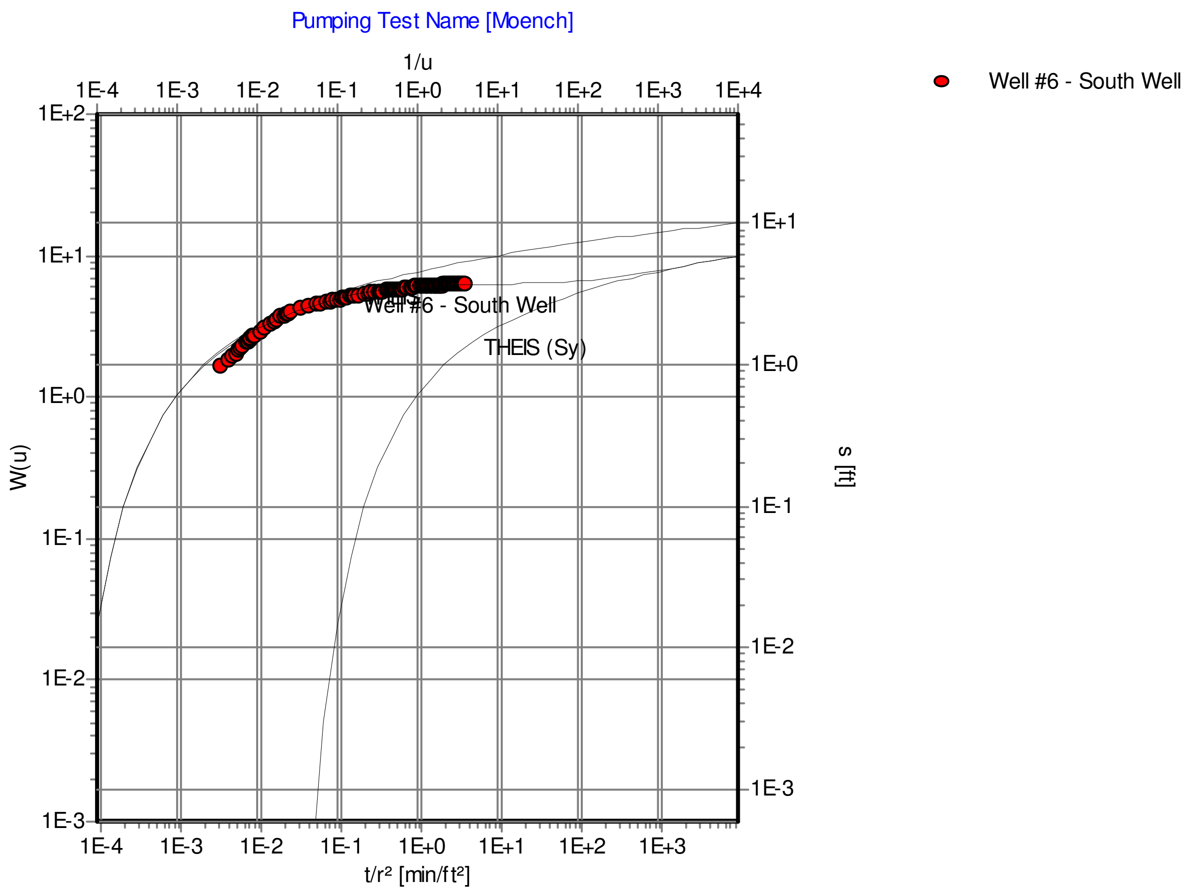
<u>Analysis Results:</u>	Transmissivity:	2.95E+3 [ft²/d]	Conductivity:	5.91E+0 [ft/d]
	Storativity:	4.48E-6		
<u>Test parameters:</u>	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	b:	357 [ft]
	Screen length:	310 [ft]	Kv/Kh:	0.1
	Boring radius:	0.271 [ft]	C:	0.231
	Discharge Rate:	50 [U.S. gal/min]	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	200	K(block)/K(fracture):	0.1

<u>Comments:</u> Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

	Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Moench**

Analysis Results:	Transmissivity:	1.30E+3 [ft²/d]	Conductivity:	2.60E+0 [ft/d]
	Storativity:	7.87E-1	Conductivity (vertical):	2.60E-1 [ft/d]

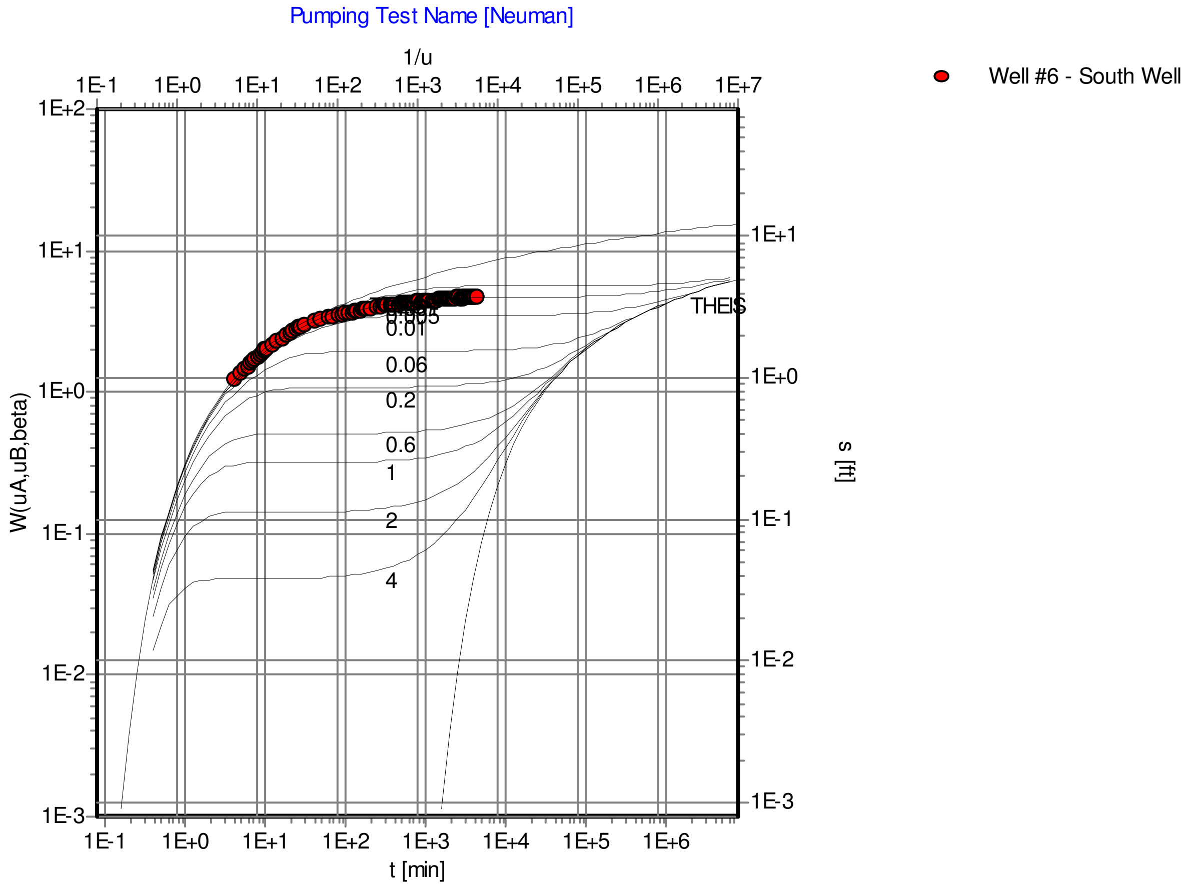
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Unconfined Aquifer	
	Screen length:	310 [ft]	S/Sy:	0.001
	Boring radius:	0.271 [ft]	Kv/Kh:	0.1
	Discharge Rate:	50 [U.S. gal/min]	Gamma:	1E9
	b:	357 [ft]		

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	9.67E+2 [ft²/d]	Conductivity:	1.93E+0 [ft/d]
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Beta:	0.005
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		
	LOG(Sy/S):	4		

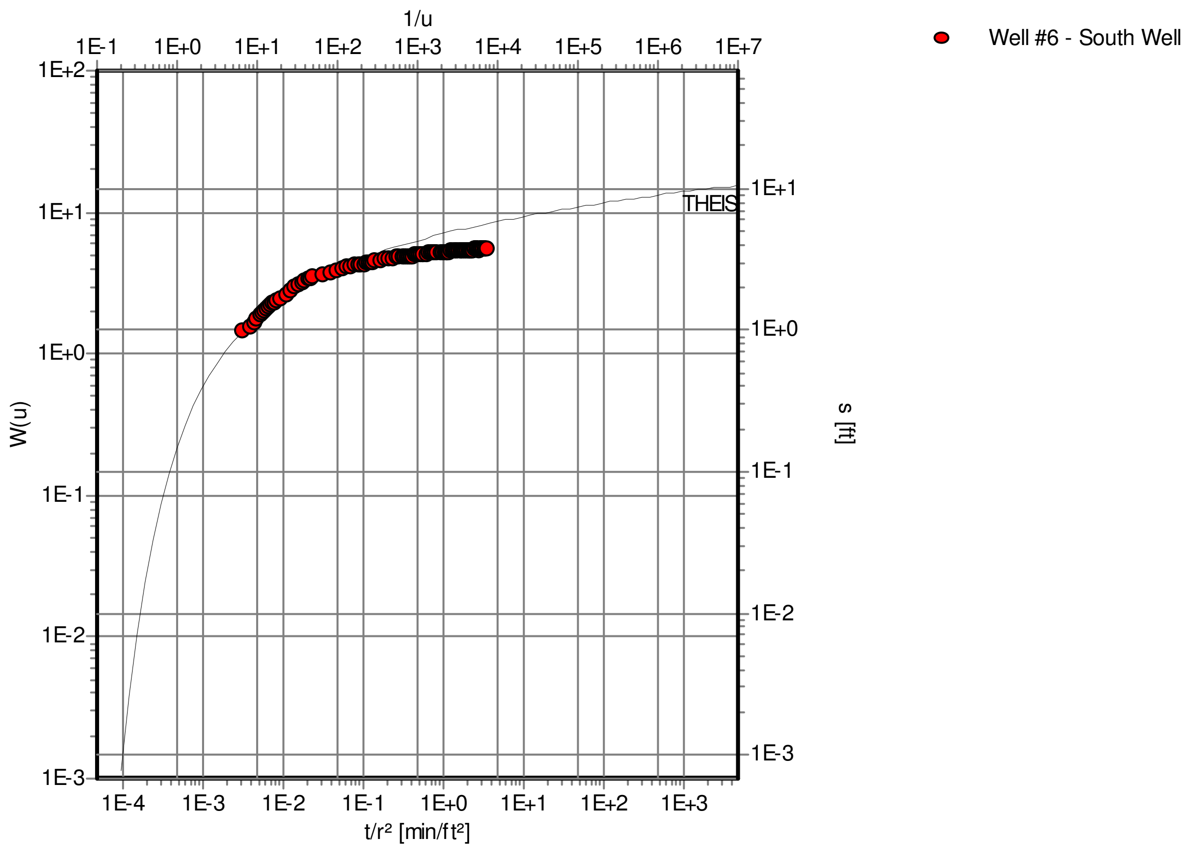
Comments: Match to entire data set.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:

Pumping Test Name [Theis]



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	1.13E+3 [ft²/d]	Conductivity:	2.26E+0 [ft/d]
	Storativity:	1.47E-3		

Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to early time data. Observation Well.

Evaluated by: MWV

Evaluation Date: 11/18/2010

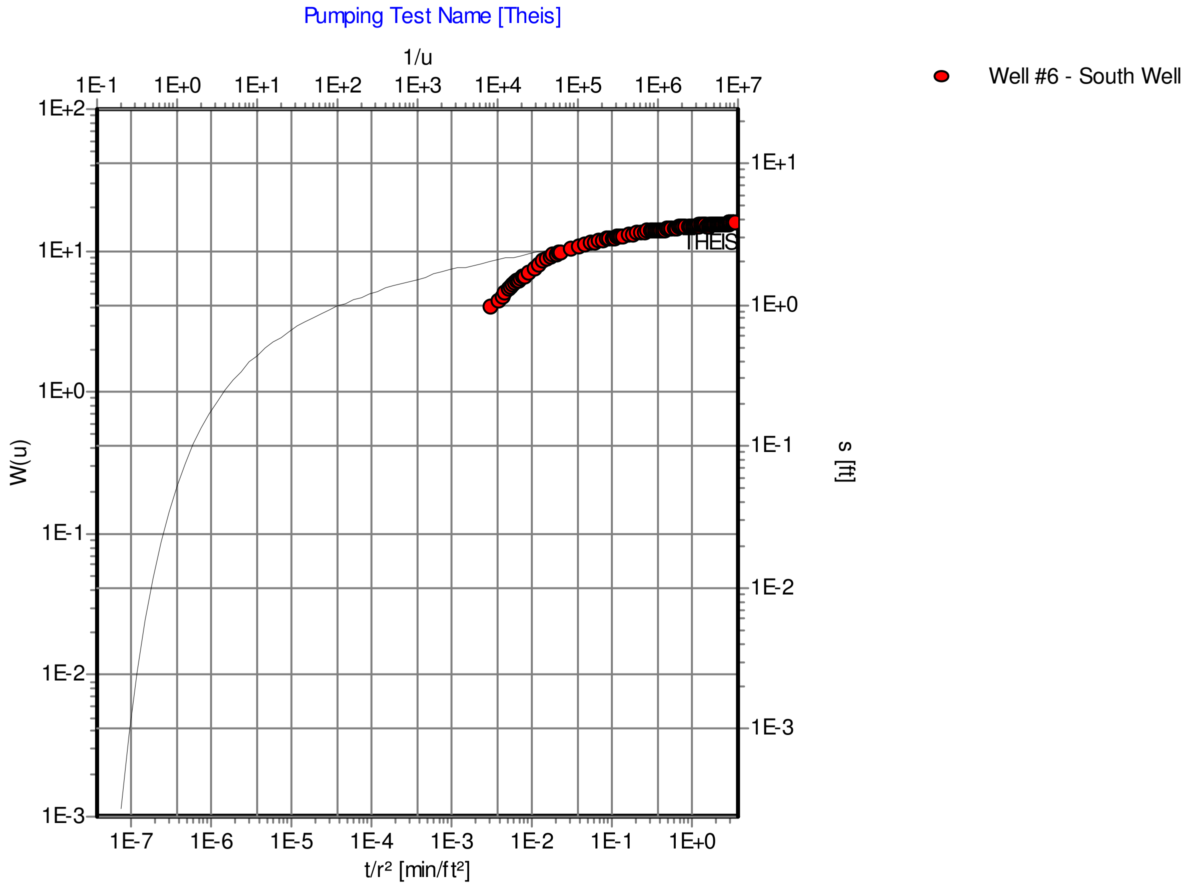
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	3.18E+3 [ft²/d]	Conductivity:	6.36E+0 [ft/d]
	Storativity:	3.29E-6		

Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

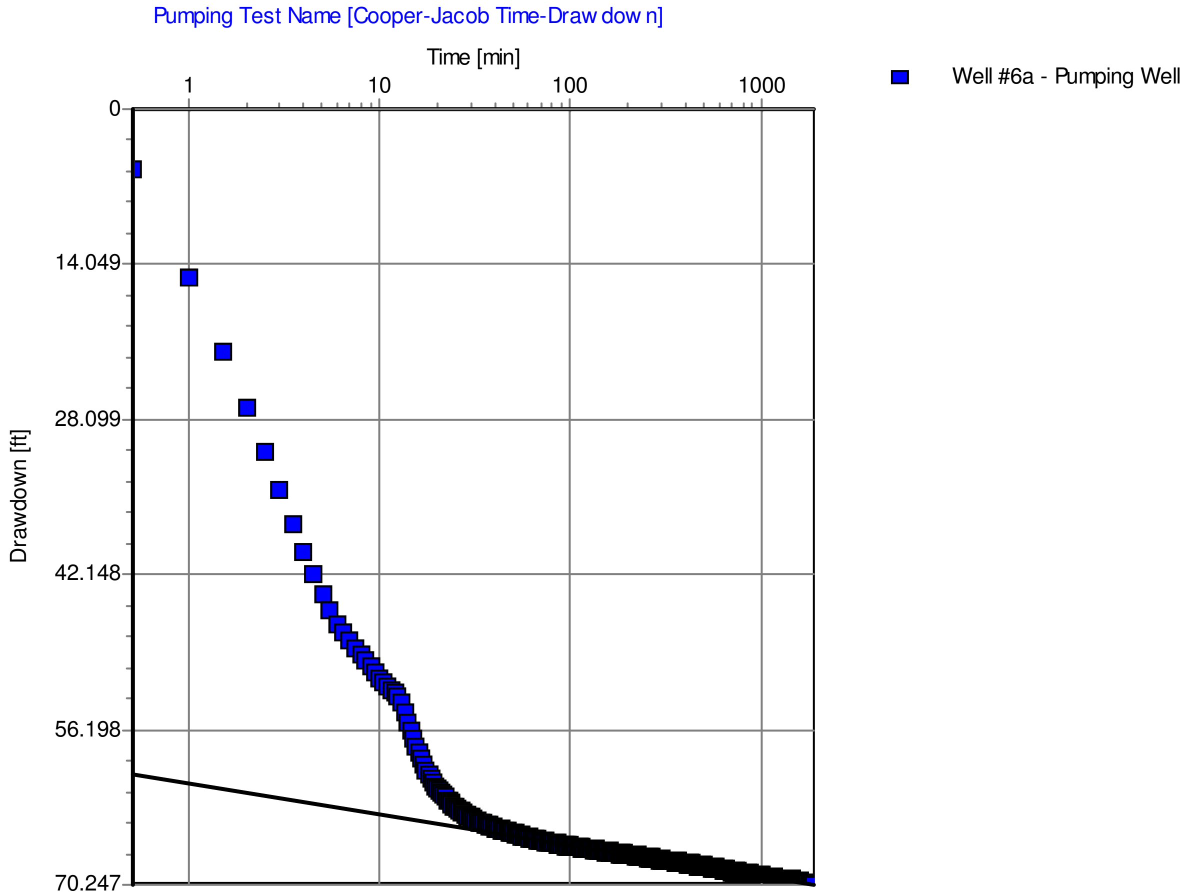
Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report

Project: Rough Acres

Number:

Client:



Pumping Test: **Pumping Test Name**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:	Transmissivity:	6.30E+2 [ft²/d]	Conductivity:	1.26E+0 [ft/d]
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Unconfined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments: Match to late time data.

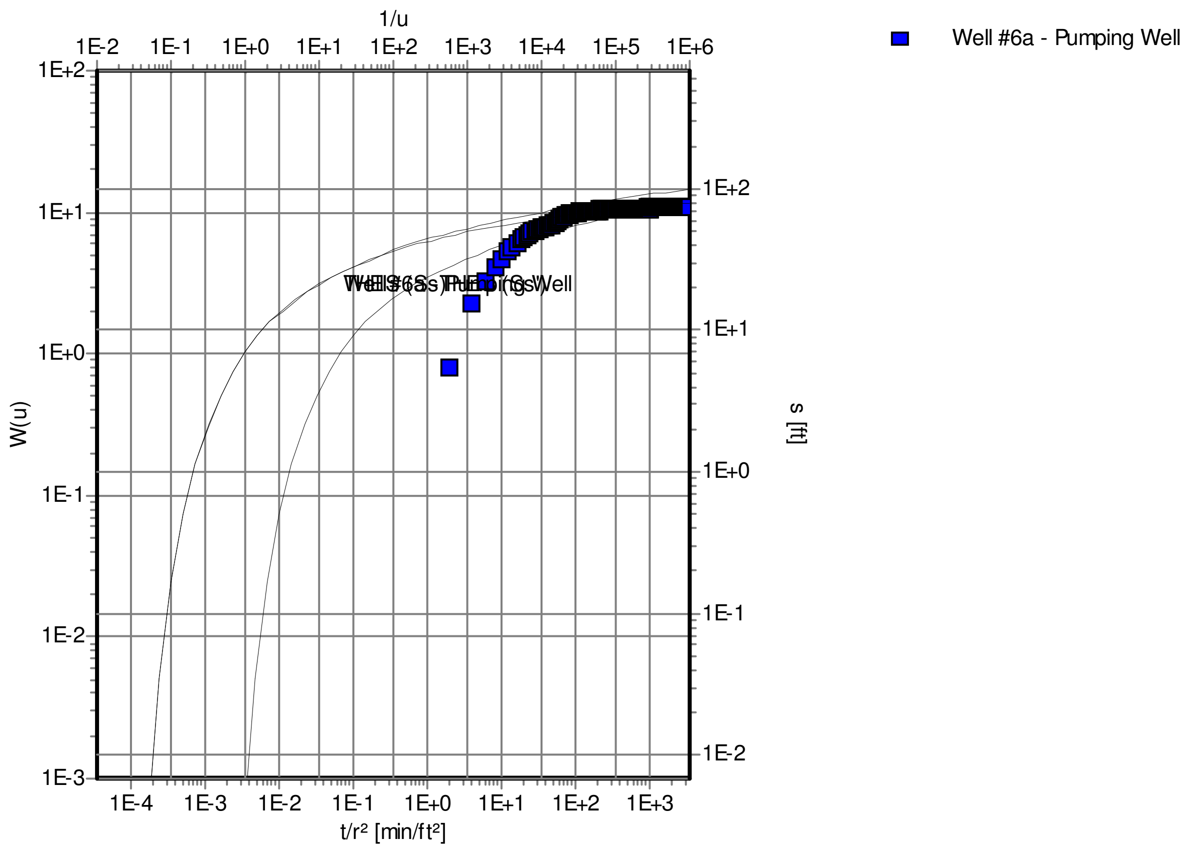
Evaluated by: MWV

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report
Project: Rough Acres
Number:
Client:

Pumping Test Name [Moench Fracture Flow]



Pumping Test: **Pumping Test Name**

Analysis Method: **Moench Fracture Flow**

Analysis Results:	Transmissivity:	1.12E+2 [ft²/d]	Conductivity:	2.25E-1 [ft/d]
	Storativity:	2.70E-4		

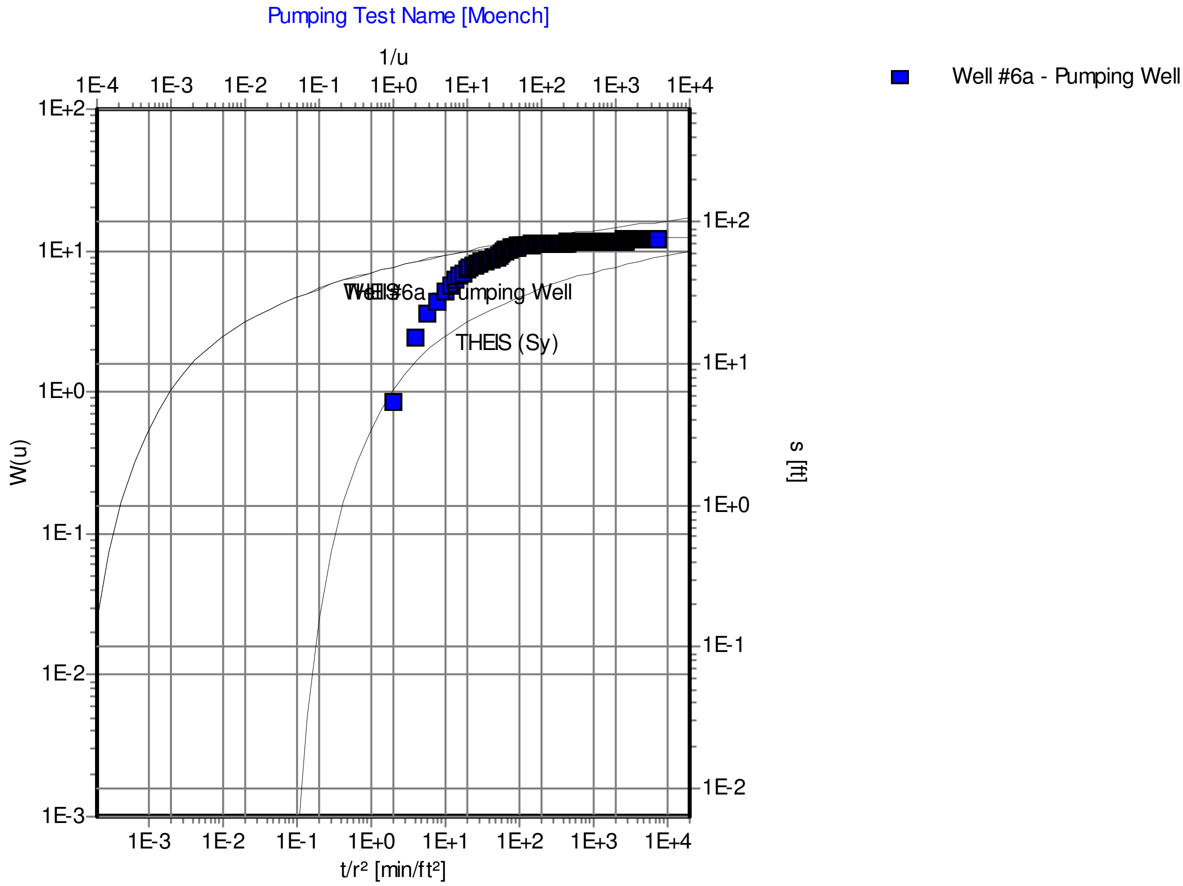
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	b:	357 [ft]
	Screen length:	310 [ft]	Kv/Kh:	1
	Boring radius:	0.271 [ft]	C:	0.231
	Discharge Rate:	50 [U.S. gal/min]	K(block)/K(Skin):	0.1
	Ss(blk)/Ss(fract):	20	K(block)/K(fracture):	0.1

Comments: Match to late time data.

Evaluated by: MWV

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc.	**Pumping Test Analysis Report**	
460 Philip Street - Suite 101	Project:	Rough Acres
Waterloo, Ontario, Canada	Number:	
Phone: +1 519 746 1798	Client:	



Pumping Test:	**Pumping Test Name**			
Analysis Method:	**Moench**			
Analysis Results:	Transmissivity:	1.21E+2 [ft²/d]	Conductivity:	2.43E-1 [ft/d]
	Storativity:	1.72E-1	Conductivity (vertical):	2.43E-1 [ft/d]
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Unconfined Aquifer	
	Screen length:	310 [ft]	S/Sy:	0.001
	Boring radius:	0.271 [ft]	Kv/Kh:	1
	Discharge Rate:	50 [U.S. gal/min]	Gamma:	1E9
	b:	357 [ft]		

Comments:

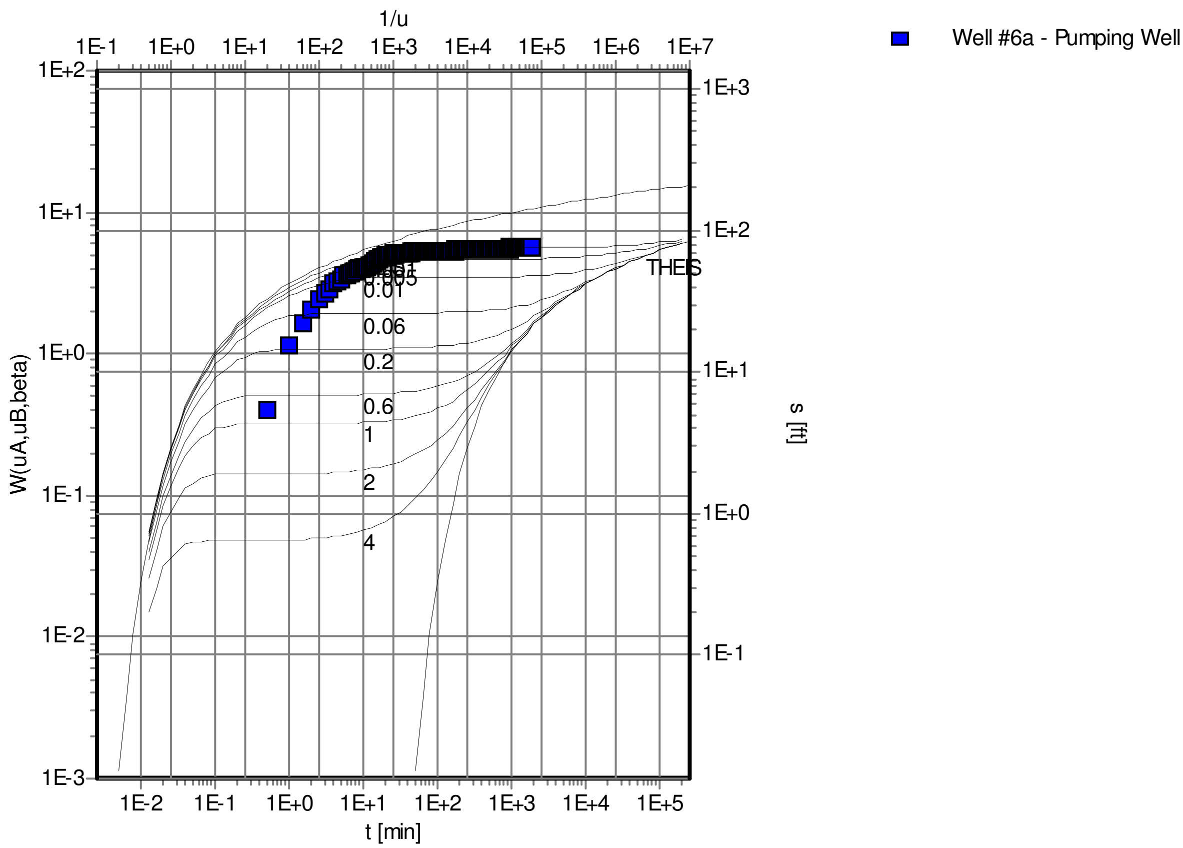
Evaluated by:

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report
Project: Rough Acres
Number:
Client:

Pumping Test Name [Neuman]



Pumping Test: **Pumping Test Name**

Analysis Method: **Neuman**

Analysis Results:	Transmissivity:	5.69E+1 [ft²/d]	Conductivity:	1.14E-1 [ft/d]
	Storativity:	1.62E-2	Specific Yield:	1.62E+2

Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Beta:	0.005
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		
	LOG(Sy/S):	4		

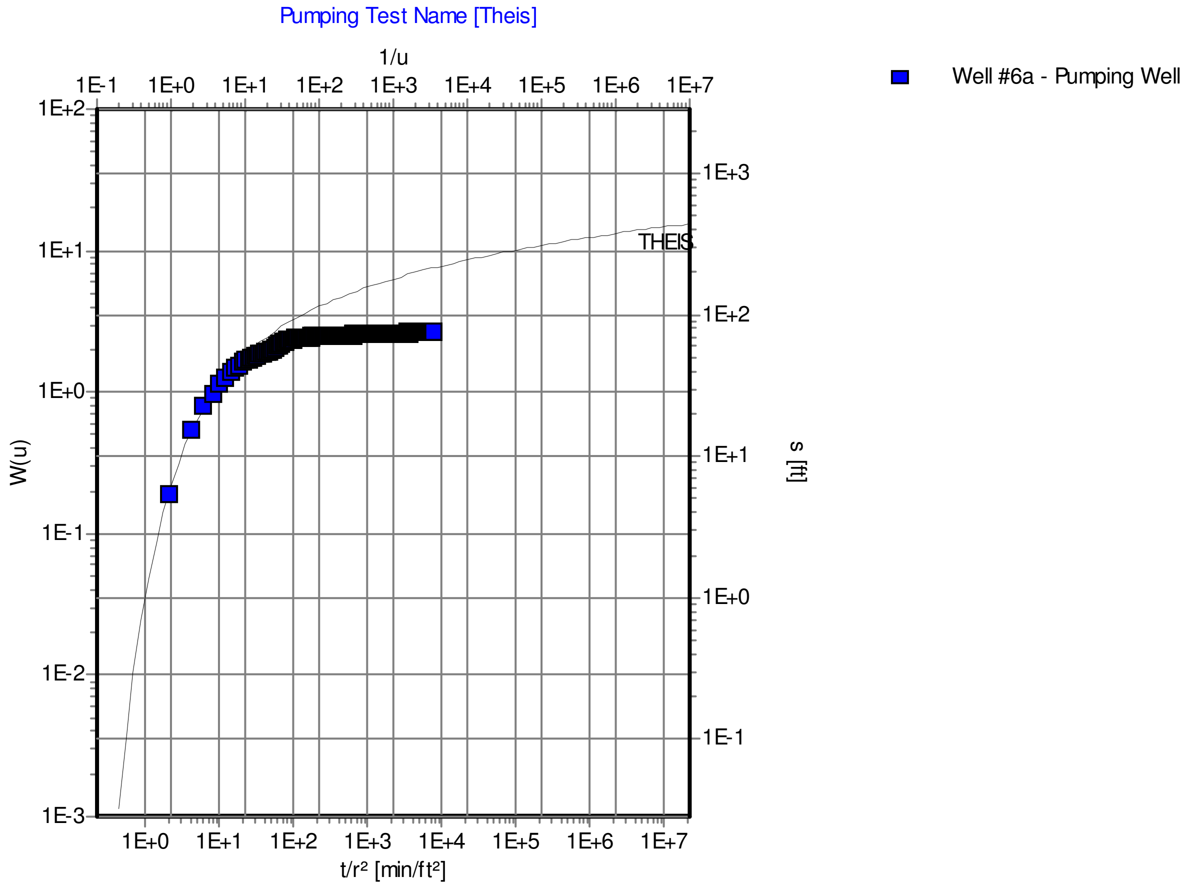
Comments: Match to late time drawdown data.

Evaluated by: MWV

Evaluation Date: 11/17/2010

Waterloo Hydrogeologic, Inc.
460 Philip Street - Suite 101
Waterloo, Ontario, Canada
Phone: +1 519 746 1798

Pumping Test Analysis Report	
Project:	Rough Acres
Number:	
Client:	



Pumping Test: **Pumping Test Name**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	2.69E+1 [ft²/d]	Conductivity:	5.39E-2 [ft/d]
	Storativity:	1.64E-1		

Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	Confined Aquifer	
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

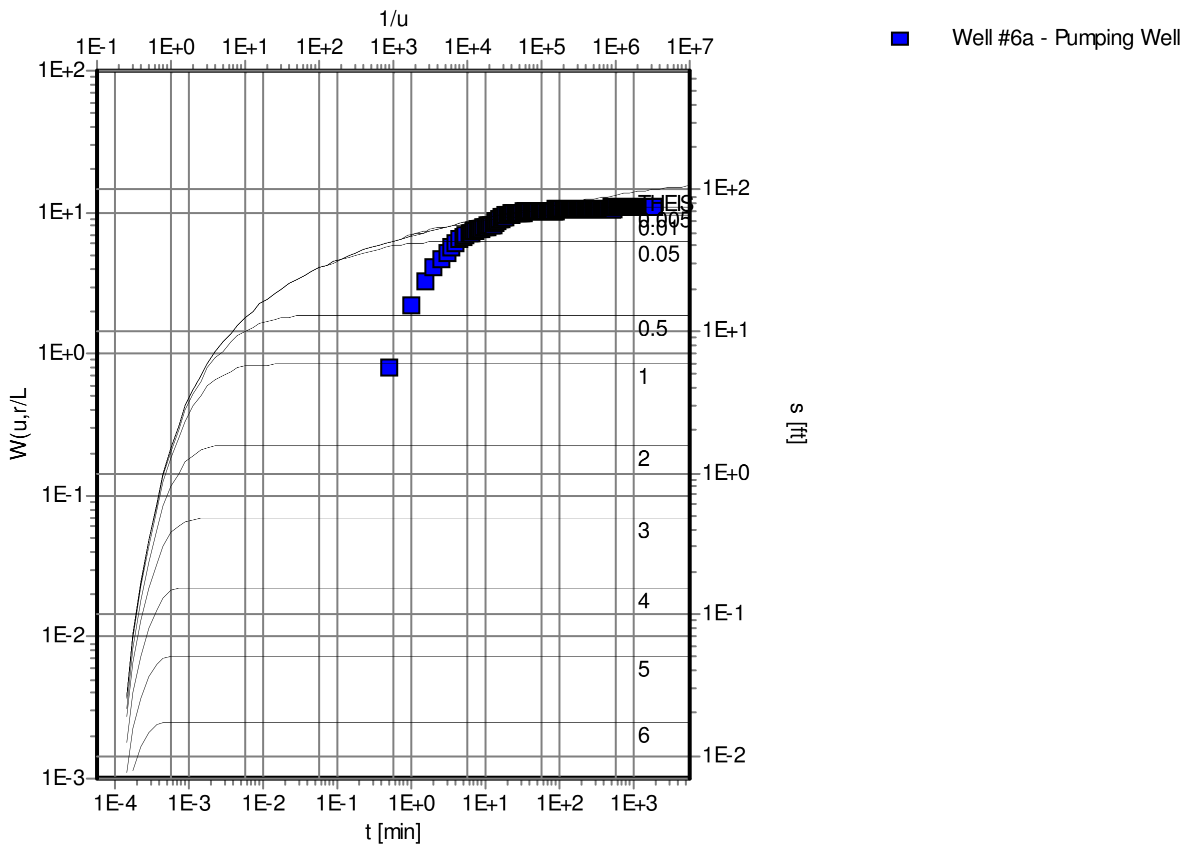
Comments: Match to early time data.

Evaluated by: MWV

Evaluation Date: 11/18/2010

Waterloo Hydrogeologic, Inc. 460 Philip Street - Suite 101 Waterloo, Ontario, Canada Phone: +1 519 746 1798	**Pumping Test Analysis Report** Project: Rough Acres Number: Client:

Pumping Test Name [Walton]



Pumping Test:	**Pumping Test Name**			
Analysis Method:	**Walton**			
Analysis Results:	Transmissivity:	1.11E+2 [ft²/d]	Conductivity:	2.21E-1 [ft/d]
	Storativity:	7.08E-4	c:	1.30E+5 [min]
Test parameters:	Pumping Well:	Well #6a	Aquifer Thickness:	500 [ft]
	Casing radius:	0.167 [ft]	r/L:	0.005
	Screen length:	310 [ft]		
	Boring radius:	0.271 [ft]		
	Discharge Rate:	50 [U.S. gal/min]		

Comments:

Evaluated by: MWV

Evaluation Date: 11/17/2010

Appendix B
Department of Water Resources Well Completion Reports

#4

Power at well

NO pump

Across Road From Bathrooms in West Canyon

water was Discolored & hence quit using

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
1255 Imperial Ave
San Diego, CA 92101
619-338-2222

#4

INVOICE

ERMIT TYPE & NUMBER: LWEL 16226 **INVOICE DATE:** 16 SEP 2004

ERMIT OWNER: **CONTACT:**
ADEM ROBERT S&MARY O TRUST B1
653 OCEAN ST

92008

PN: ~~611-110-01-00~~ 611-060-03
611-070-01
APPLICANT:
FADEM ROBERT S&MARY O TRUST B1

ITE ADDRESS: ~~2533~~ MCCAIN VALLEY RD
OCATION DESCRIPTION: ~~2533~~ MCCAIN VALLEY RD,

ROJECT DESCRIPTION/SCOPE
umber of Wells on Permit Application:1
escription of Work:new
ype of Use for Each Well:private

EE/DEPOSIT DETAILS

FEE CODE	DESCRIPTION	TIME ACCT.	ACCT. CODE	AMOUNT
6LE01--EHO	WATER WELL PERMIT	429E01	9773-773	390.00
			09-16-04 11:30 9773 773 429E[illegible] CHECK	[illegible]
			TOTAL AMOUNT DUE	$390.00

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
WELL PERMIT APPLICATION

Parcel 1 ~~Pz~~ 600

DEH USE ONLY
PERMIT # W LWCL162
WELL COMPUTER #
FEE:
WATER DIST:

1. Property Owner: Hamann Companies Phone: [illegible]
[illegible] Mailing Address [illegible] City [illegible] Zip

2. Well Location - Assessors Parcel Number ~~611-110-01~~ 611-060-03 611-070-01
[illegible] Site Address City BOULEVARD 91905 Zip

3. Well Contractor - Well Driller Jim Mayes Company Name: [illegible]
[illegible] Mailing Address [illegible] City [illegible] Zip

Phone#: [illegible] C-57#: [illegible] ☐ Cash Deposit ☐ Bond Posted

4. Use: ☒ Private ☐ Public ☐ Industrial ☐ Cathodic ☐ Other ______

5. Type of Work: ☐ New ☐ Reconstruction ☐ Destruction Time Extension: ☐ 1st ☐ 2nd

6. Type of Equipment: Air Rotary

7. Depth of Well: Proposed: [illegible] Existing: ______

8. Proposed:

Casing	Conductor Casing	Filter/Filler Material	Perforations
Type: Steel	☐ Yes ☐ No	☐ Yes ☐ No	From: ______ To: ______
Depth: [illegible]	Depth: ______ ft.	From: ______ To: ______	From: ______ To: ______
Diameter 7 in.	Diameter ______ in.	Type: ______	From: ______ To: ______
Wall/Gauge: [illegible]	Wall/Gauge: ______	Wall/Gauge: ______	

9. Annular Seal: Depth: [illegible] ft. Sealing Material: [illegible]
Borehole diameter: ______ in. Conductor diameter: ______ in. Annular Thickness ______ in.

10. Date of Work: Start: [illegible] Complete: [illegible]

On sites served by public water, contact the local water agency for meter protection requirements.

I hereby agree to comply with all regulations of the Department of Environmental Health, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work, I will furnish the Department of Environmental Health with a complete and accurate log of the well. I accept responsibility for all work done as part of this permit and all work will be performed under my direct supervision.

Contractor's Signature: [illegible] Date: [illegible]

DISPOSITION OF APPLICATION (Department of Environmental Health Use only)

☒ **Approved** ☐ **Denied** Special Conditions: Grading and clearing associated with access to, or the construction, maintenance or destruction of water wells, may require additional permits from the County of San Diego and/or other agencies. ______

Specialist: [illegible] Date: 4/16/04

DEH-LU-731a (Rev. 4/02) NCR

[illegible]

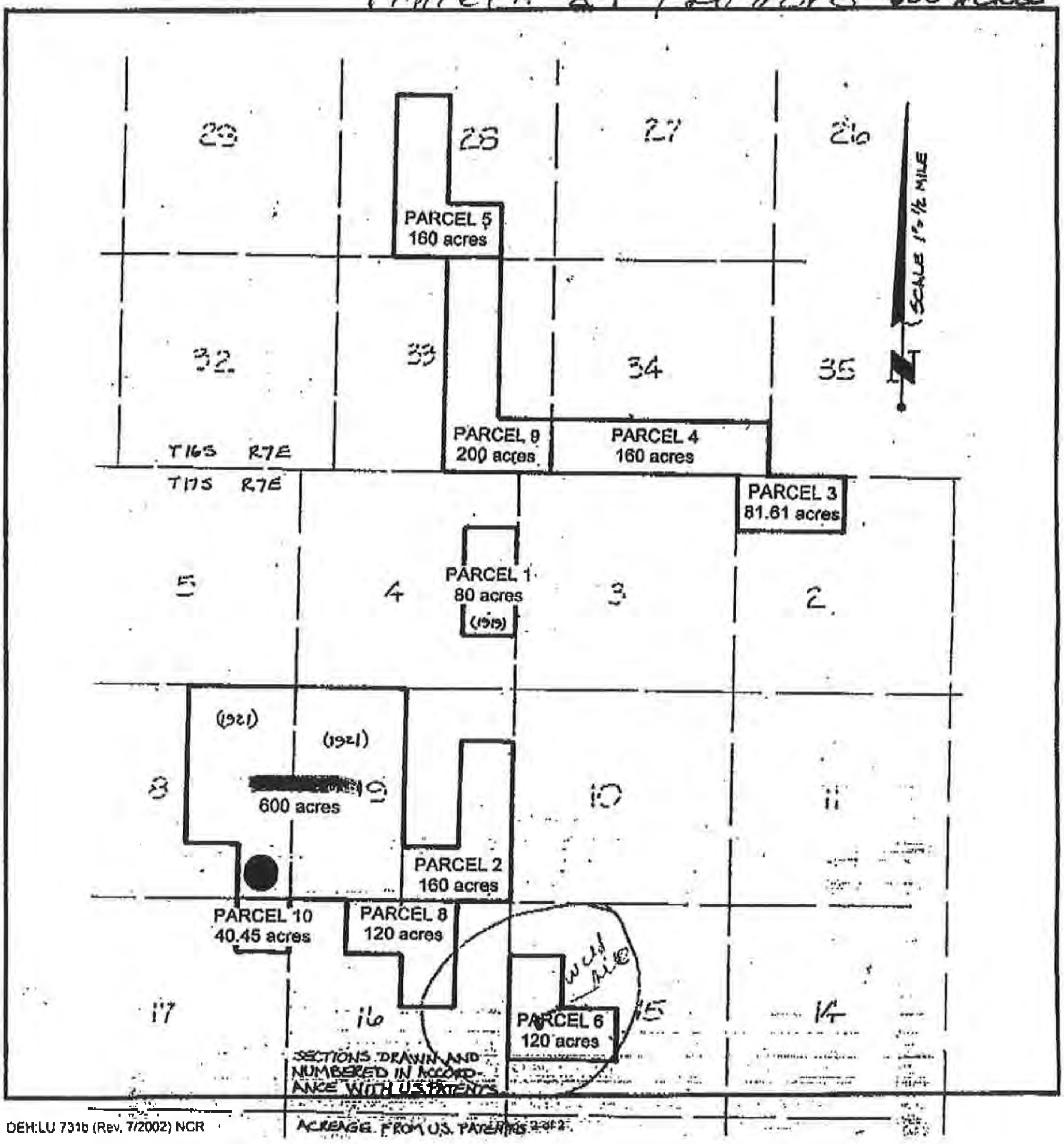
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWCL 16226
Assessor's Parcel Number: ~~611-[illegible]-07~~
611-060-03
611-070-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # ~~7~~ ~~[illegible]~~ 600 ACRES



County Mail Station – A-21

FIRST CARBON COPY

ASSESSORS PARCEL NUMBER:

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101-2417

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name John Well No 2
Address Rocky Acres
City ______ Zip ______

(2) LOCATION OF WELL (See instructions):
County ______ Owner's Well Number ______
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______

DEPARTMENT USE ONLY
Completed Well Construction:
Date ______
Date Inspected ______
Comments ______
Water Sample Taken? ______
Sanitarian's Approval: ______

Jetteg #8

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item (12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) Gravel Pack:
Yes ☒ No ☐ Size 3/8ths
Diameter of above 9"
Packed from 0 to 185 ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	91	6 5/8	188	0	185	3/32ths

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 91' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing Bentonite - cement

(10) WATER LEVELS:
Depth of first water, if known 130 ft.
Standing level after well completion 35 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Driller
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test — ft. At end of test — ft.
Discharge 15 gal/min after 1 hours Water temperature Cool
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 260 ft. Depth of completed well 185 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-91 – Sandy, D.G.
91-130 – Soft, orange, white & brown
130-133 – Gray soft (3 GPM)
133-185 – Soft orange, white, black
185-190 – Loose rocks (20 GPM)
190-260 – Soft & hard

Work Started 19 Completed 19

WELL DRILLERS STATEMENT: I hereby declare under penalty of perjury that the information provided in this report is true. This water well was installed in compliance with San Diego County Code and State of California, Department of Water Resources, Bulletin No. 74.

SIGNED [signature]
(Well Driller)

NAME ______
(Person, firm, or Corporation) (Type or Print)

ADDRESS ______

CITY ______ ZIP ______

LICENSE NO. ______ DATE THIS REPORT ______

DHS:EHP-732 (83) CONFIDENTIAL – NOT FOR PUBLIC USE – WATER CODE SEC. 13752

DUPLICATE
Driller's Copy

Page 1 of 1

Owner's Well No. # 1

Date Work Began 9-25-04, Ended 9-27-04

Local Permit Agency San Diego E.H.S.

Permit No. LWEL16226 Permit Date 9-16-04

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 0909442

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

CONFIDENTIAL

NOT FOR PUBLIC USE

WATER CODE SEC. 13752

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0 - 91	sandy, dg
91 - 130	soft, orange, white & brown
130 - 133	very soft
133 - 185	soft, orange, white & black
185 - 190	loose rocks
190 - 260	soft & hard

TOTAL DEPTH OF BORING 260 (Feet)

TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER

Name Hamann Companies

Mailing Address 1000 Pioneer Way

El Cajon, Ca. 92020

CITY STATE ZIP

WELL LOCATION

Address McCain Valley Rd

City Jacumba

County San Diego

APN Book 611 Page 110 Parcel 01

Township 17 Range 7E Section 15

Lat ___ N Long ___ W

DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

See Attached

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)

WATER SUPPLY

X Domestic ___ Public

___ Irrigation ___ Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 130 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 35 (Ft.) & DATE MEASURED 9-27-04

ESTIMATED YIELD * 15 (GPM) & TEST TYPE airlift

TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN - (Ft.)

* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 - 91	11	x				steel	6 5/8	.188	
0 - 185	6½		x			pvc	4	sch 40	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 - 91	x	x		
0 - 185			x	5/16 pea gravel

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

✓ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME JIM MANOS DRILLING & PUMP
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VLY RD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR

2-6-05 DATE SIGNED

360722 C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

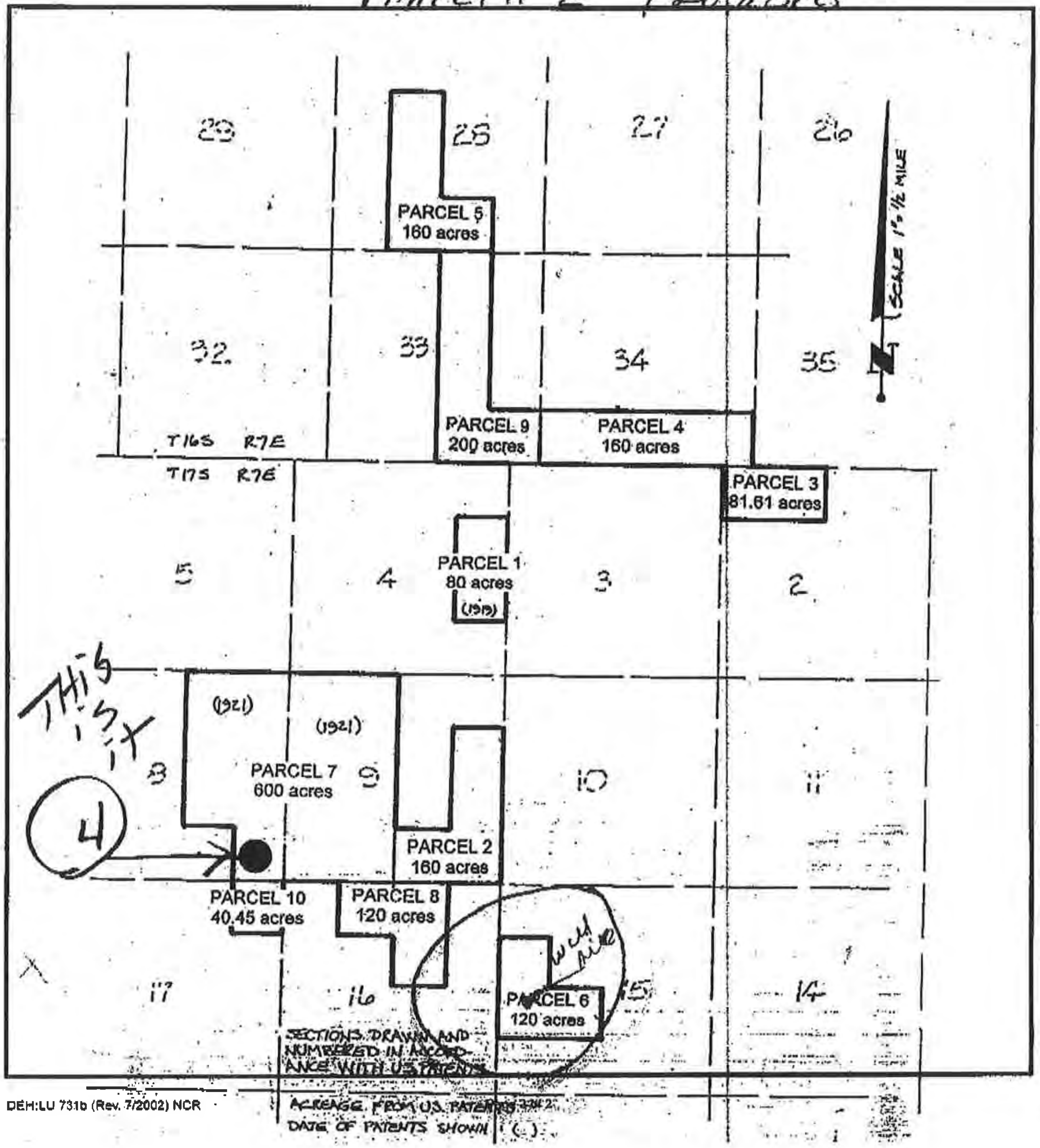
COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

Control #: LWCL 16226
Assessor's Parcel Number: 611-110-01

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, easements, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.

Parcel # 2 120 acres



DEH:LU 731b (Rev. 7/2002) NCR

Fully operational

#6 No Logs Available

origional well on Ranch

6A New
Public
well

Fully operational

QUADRUPLICATE FEB 09 2010

For Local Requirements

County of San Diego
Dept. of Environmental Health
Land & Water Quality Div.

Page 1 of 1

Owner's Well No. —

Date Work Began 11-4-09, Ended 11-10-09

Local Permit Agency San Diego C.H.S.

Permit No. [illegible]20420 Permit Date 11-13-09

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 1089956

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 – 10	sandy-rocks
10 – 30	sandy-slightly firm
30 – 32	soft
32 – 70	sandy
70 – 85	harder
85 – 87	cracks
87 – 230	black & white rock, softer areas
230 – 233	softer, orange
233 – 330	black, white & orange
330 – 332	softer, orange
332 – 395	black & white rock, softer areas
395 – 395	sand
395 – 420	black & white rock

NOT FOR PUBLIC USE

CONFIDENTIAL

SEE WATER CODE SECTION 13752

Completed Well Construction

Date 2/9/10

Date Inspected

Comments KIVA control on this page.

Water Sample Taken? [illegible]

TOTAL DEPTH OF BORING 420 (Feet)

TOTAL DEPTH OF COMPLETED WELL 4[illegible] (Feet)

WELL OWNER

Name [illegible]ve Partners

Mailing Address 1000 Pioneer Way

El Cajon, Ca 9202[illegible] CITY STATE ZIP

WELL LOCATION

Address Mc [illegible] Valley Road

City [illegible], Ca

County San Diego

APN Book 511 Page 090 Parcel 04

Township [illegible] Range [illegible] Section 17

Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

x NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation x Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 30 (Ft.) & DATE MEASURED 11-10-09

ESTIMATED YIELD * 60 (GPM) & TEST TYPE airlift

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN — (Ft.)

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 – 56	12	x				steel		.188	
0 – 75		x				steel	6 5/8	.188	
0 – 385	6½		x			pvc	4	CL200	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 – 56	x (cement was pumped)			
0 – 75		x		
0 – 385			x	3/16 pea gravel

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other [illegible]

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME TIM MANOS DRILLING & PUMP (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

16052 LAWSON VALLEY ROAD, JAMUL, CA 91935
ADDRESS CITY STATE ZIP

Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR

[illegible] DATE SIGNED

3601 C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

8

This WELL HAS
NO pump or power
NEEDS to be
relocated EAST
outside of
TRANSMISSION LINE
power EASEMENT

Fain Drilling & Pump Co. Inc.

12029 Old Castle Rd.
Valley Center, CA 92082
Phone (760) 749-0701
Fax (760) 749-6380

Invoice

#8

Date	Invoice #
2/11/2005	8048

Bill To

THE HAMANN COMPANIES
1000 PIONEER WAY
EL CAJON, CA 92020

P.O. No.	Terms	Project
	Due on receipt	

Description	Qty	Rate	Amount
DRILLING 970 FT DEEP WELL APN 611 110 01			
PARCEL 6 120 AC			
EQUIPMENT SET UP	1	500.00	500.00
DRILLING 6.5" DIA HOLE	400	12.00	4,800.00
DRILLING 400-800' 6.5" DIA HOLE	400	14.00	5,600.00
DRILLING 800 - 970' 6.5" DIA HOLE	170	16.00	2,720.00
REAMING 6" TO 10" DIA HOLE	226	12.00	2,712.00
FURNISH AND INSTALL 6" WELL CASING	228	13.00	2,964.00
INSTALL 50 FT. SURFACE SEAL	1	1,500.00	1,500.00
WELL PERMIT AND FILING FEES	1	490.00	490.00

Total	$21,286.00
Payments/Credits	$0.00
Balance Due	$21,286.00

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. Par. 6 -120

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0909549

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE
LONGITUDE
APN/TRS/OTHER

Date Work Began 2/1/05, Ended 2/9/05
Local Permit Agency ~~DEH~~
Permit No. 16456 Permit Date 2/1/05

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	12	Slope wash - sandy decomposed granite - brown color
12	212	Weathered Granitic Rock
212	225	Broken Rock
226	310	Weathered granitic rock mostly white quartz
310		Water 8 gpm
310	961	Granitic rock large crystals of white quartz
961		Water 40+ gpm
961	970	Fractured granitic rock large quartz crystals

TOTAL DEPTH OF BORING 970 (Feet)
TOTAL DEPTH OF COMPLETED WELL 970 (Feet)

WELL OWNER

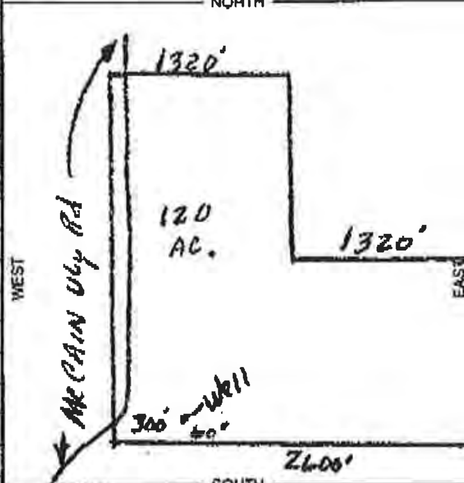
Name The Hamann Companies
Mailing Address 1000 Pioneer Way
El Cajon Ca 92020
CITY STATE ZIP

WELL LOCATION

Address Rough Acres Ranch McCain Valley Rd.
City Boulevard
County San Diego
APN Book 611 Page 110 Parcel 01
Township 17S Range 7E Section 15
Lat 36 16 772 N DEG. MIN. SEC.
Long 115 64 465 W DEG. MIN. SEC.

LOCATION SKETCH

NORTH



WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. **PLEASE BE ACCURATE & COMPLETE.**

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * 50 (GPM) & TEST TYPE airlift
TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 800 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	226	10	X				Steel	6	.188	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			
50	226			X	

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

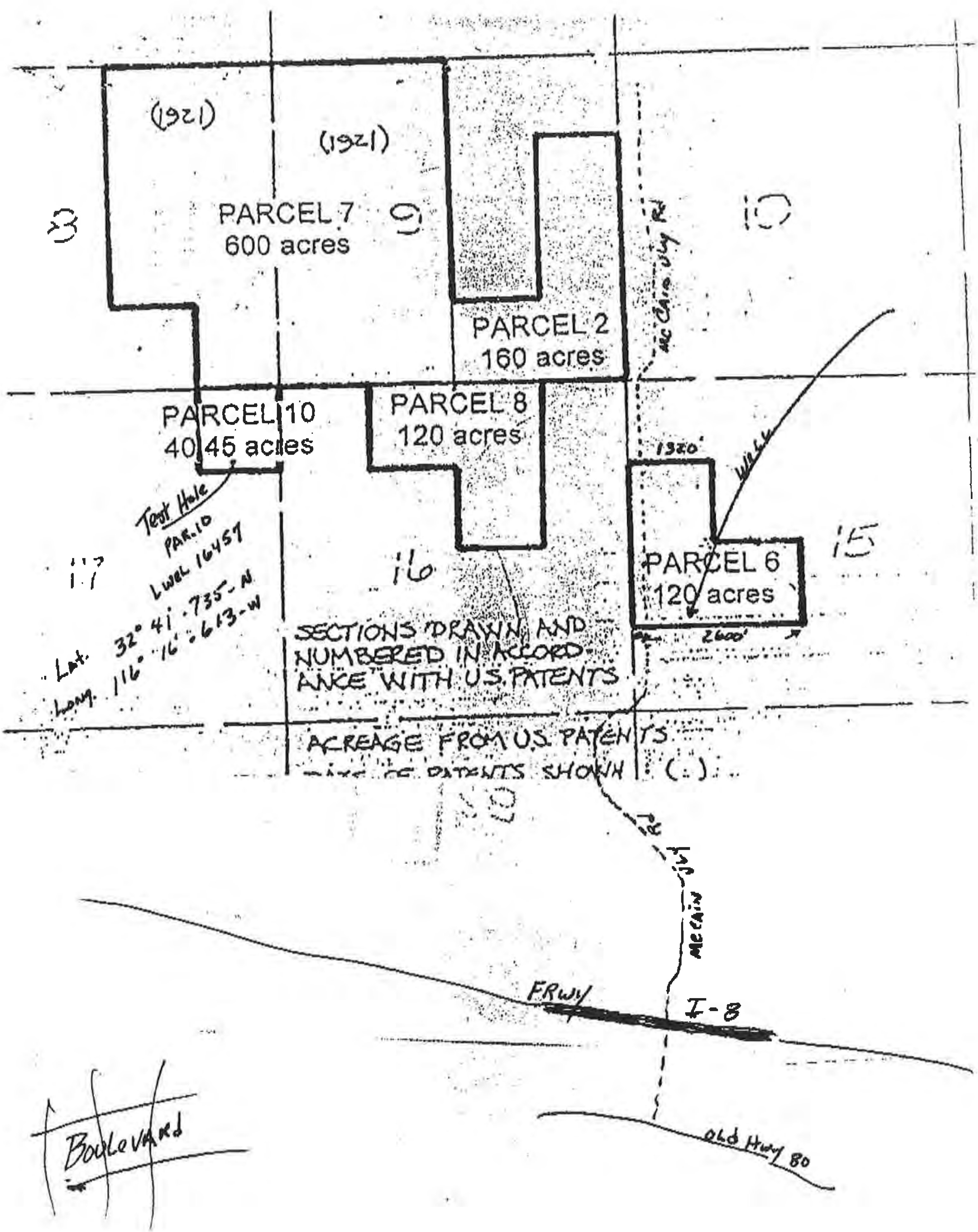
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Fain Drilling & Pump Co. Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
12029 Old Castle Rd. Valley Center, Ca 92082
ADDRESS CITY STATE ZIP

Signed Joe R. Fain
C-57 LICENSED WATER WELL CONTRACTOR
2/11/05 DATE SIGNED
328287 C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM



(1921)
(1921)
PARCEL 7
600 acres
PARCEL 2
160 acres
PARCEL 10
40 45 acres
PARCEL 8
120 acres
PARCEL 6
120 acres
1320'
2600'
WELL
Test Hole
PAR. 10
LWEL 16457
Lat. 32° 41' .735-N
Long. 116° 16' .613-W
SECTIONS DRAWN AND NUMBERED IN ACCORDANCE WITH U.S. PATENTS
ACREAGE FROM U.S. PATENTS
McCain Vly Rd
FRWY
I-8
Old Hwy 80
Boulevard

9

Fully operational
old well
No info
probably 5-10 GPM
& shallow

APPENDIX C

CUMULATIVE WATER QUANTITY IMPACTS ANALYSIS

ROUGH ACRES RANCH WATER PRODUCTION AREA

MCCAIN VALLEY, EAST SAN DIEGO COUNTY, CALIFORNIA

Table 1
Estimated Groundwater Demand - Rough Acres Ranch Water Production Area

Land Use Scenario	Land Use	Quantity	Water Demand per Unit (afy)	Total Demand (afy)
Existing Conditions	Single Family Residential	7	0.5	3.5
	Cattle/Livestock Free-Range Grazing (100 head)	1	2.13	2.13
	Poultry (500 hens)	1	0.11	0.11
	Total Water Demand (Existing Conditions)			5.74
Existing Conditions Plus 9-Month Construction at 50 gpm	Single Family Residential	7	0.5	3.5
	Cattle/Livestock Free-Range Grazing (100 head)	1	2.13	2.13
	Poultry (500 hens)	1	0.11	0.11
	Project 9-month Construction (50 gpm)	1	60	60
	Total Water Demand (Existing Conditions Plus 9-Month Construction at 50 gpm)			65.74
Existing Conditions Plus 9-Month Construction at 100 gpm	Single Family Residential	7	0.5	3.5
	Cattle/Livestock Free-Range Grazing (100 head)	1	2.13	2.13
	Poultry (500 hens)	1	0.11	0.11
	Project 9-month Construction (50 gpm)	1	120	120
	Total Water Demand (Existing Conditions Plus 9-Month Construction at 100 gpm)			125.74

Note: afy - acre feet per year; gpm - gallons per minute

Table 2
Groundwater in Storage Calculation - Effects of Pumping at 50 GPM
Rough Acres Ranch Water Production Area

Hydrogeologic Unit	Area (acres)	Specific Yield (%)	Saturated Thickness (ft)	GW in Storage (af)
Fractured Rock	502	0.10%	500	251
Residuum	502	5%	10	251
Alluvium	250	10%	20	500
Total				**1002**

Change in Groundwater in Storage (50 gpm)

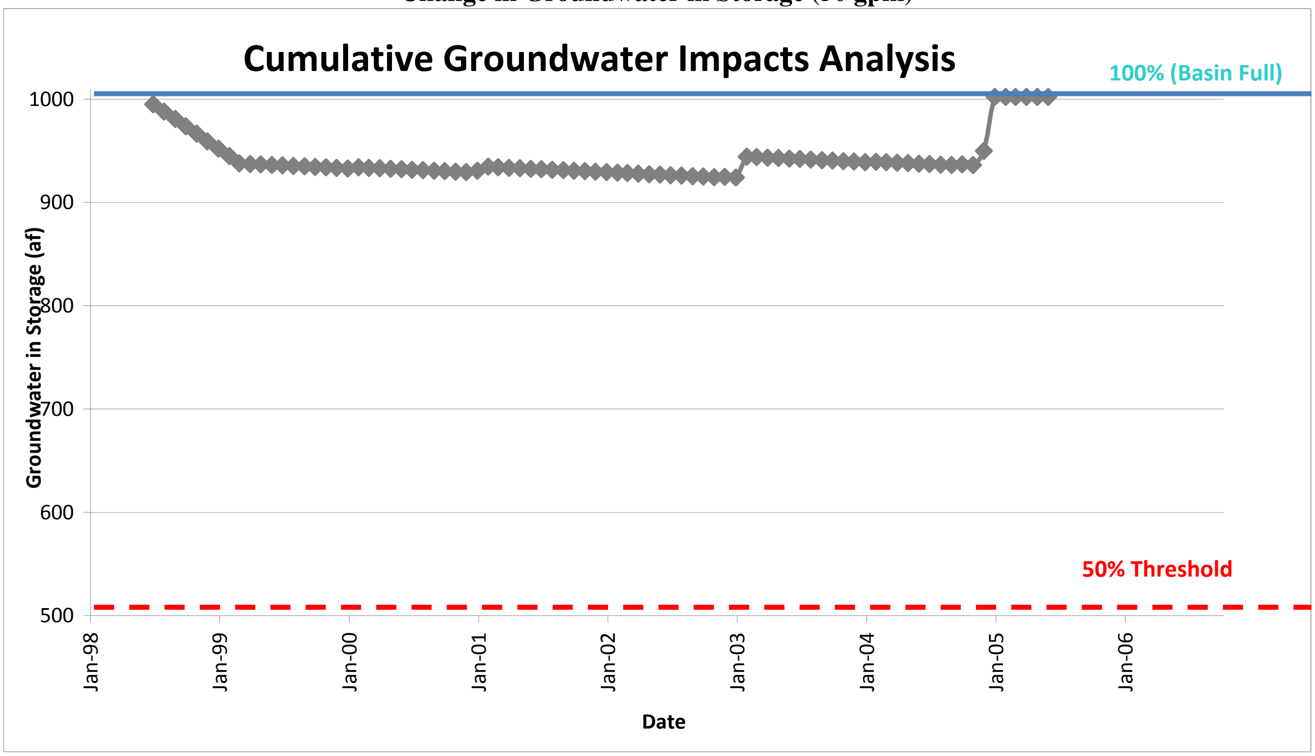


Table 3
Groundwater in Storage Calculation - Effects of Pumping at 100 GPM
Rough Acres Ranch Water Production Area

Hydrogeologic Unit	Area (acres)	Specific Yield (%)	Saturated Thickness (ft)	GW in Storage (af)
Fractured Rock	502	0.10%	500	251
Residuum	502	5%	10	251
Alluvium	250	10%	20	500
Total				**1002**

Change in Groundwater in Storage (100 gpm)

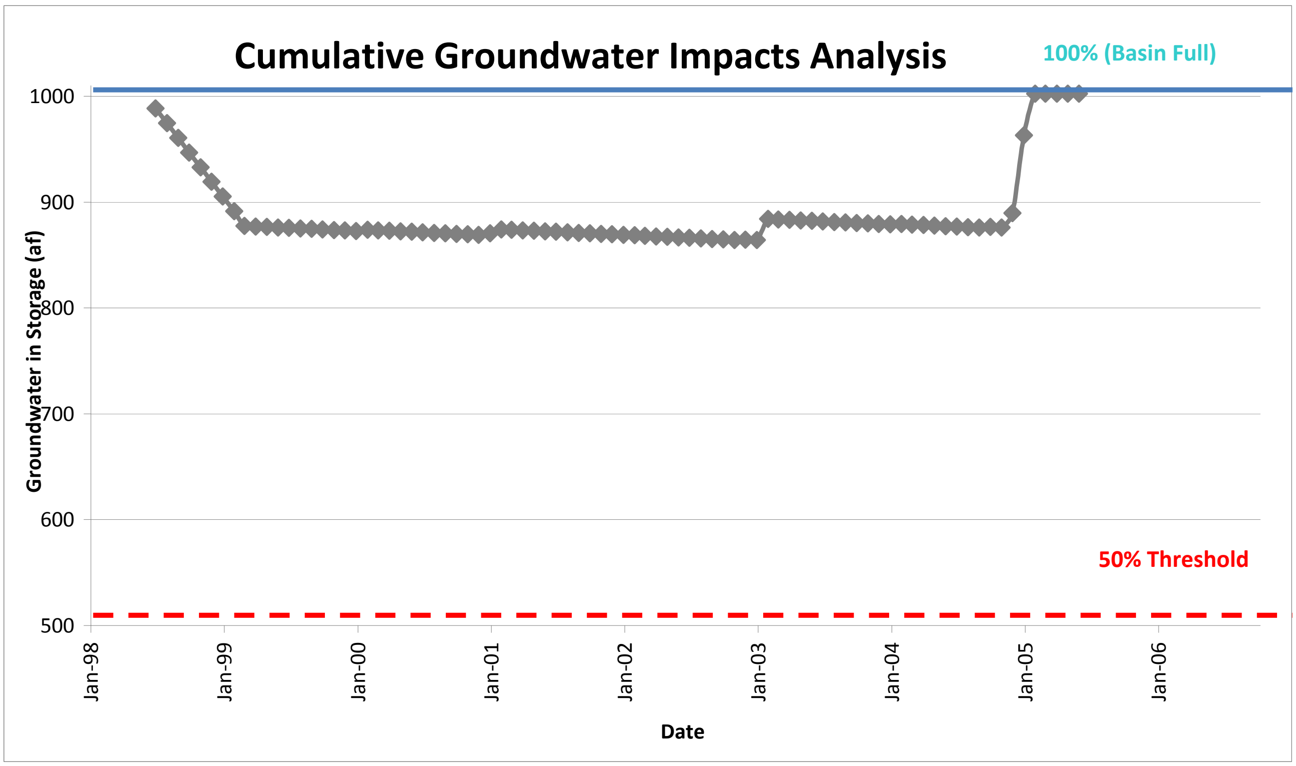
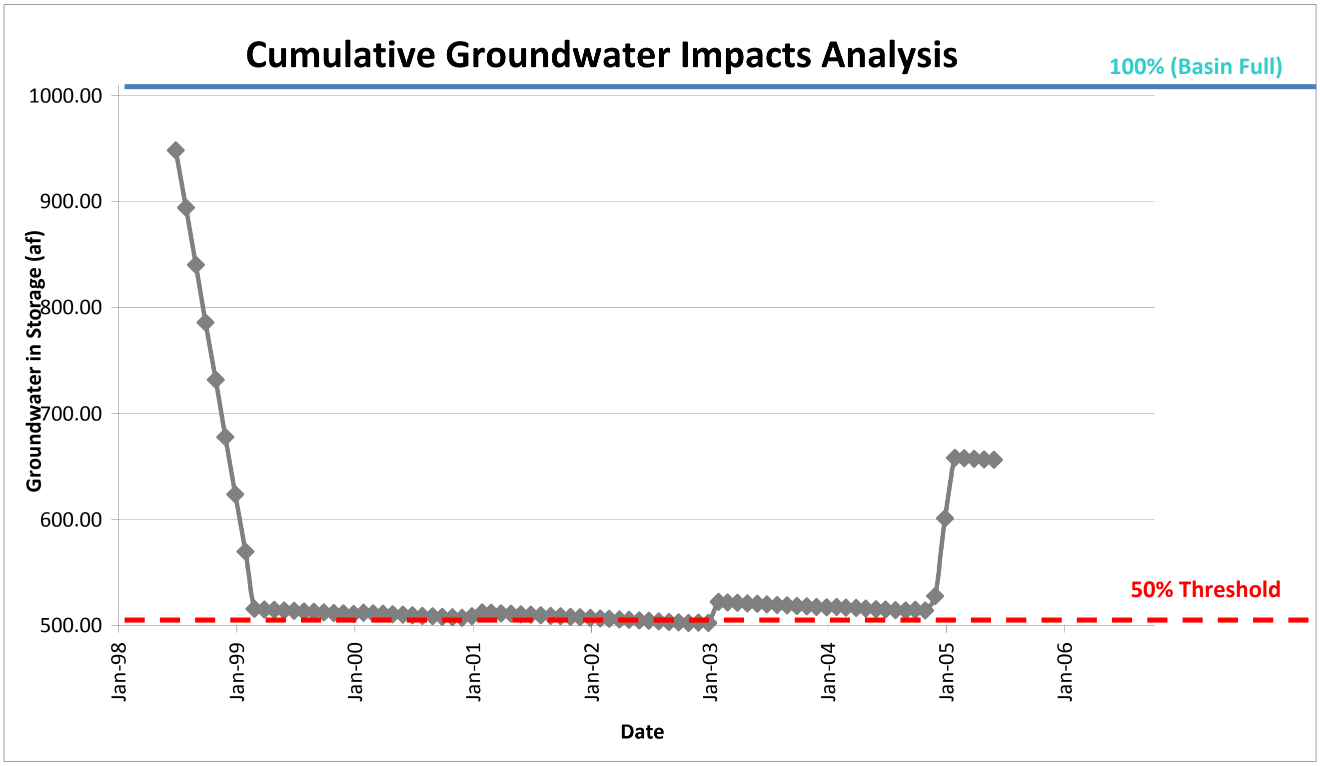


Table 4
Groundwater in Storage Calculation - Effects of Pumping at 400 GPM
Rough Acres Ranch Water Production Area

Hydrogeologic Unit	Area (acres)	Specific Yield (%)	Saturated Thickness (ft)	GW in Storage (af)
Fractured Rock	502	0.10%	500	251
Residuum	502	5%	10	251
Alluvium	250	10%	20	500
Total				**1002**

Change in Groundwater in Storage (400 gpm)



APPENDIX C

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Cumulative Project List

Appendix C

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects Cumulative Project List

Project	Project Type	Project Location	Status
Wind Energy Projects			
ESJ WIND PROJECT I: Development of 400 MW of wind generation. Phase I (just north of the town of La Rumorosa) is proposed to generate approximately 100 MW of energy with 45 to 52 turbines. Point of interconnection proposed with the ECO Substation. Proposed to be online in July 2012 (CAISO 2010).	Public Facilities and Utilities (Wind)	Northern Baja CA, Mexico, In the Sierra Juárez mountains north of the town of La Rumorosa.	Final Interconnection Study completed. Draft Interconnection Agreement (IA) provided for review. (Queue No. 159a). The project would be built in multiple phases. Phase I is the Jacume phase and it expected to commence construction in 2011 and be completed in 2012.
ESJ WIND PROJECT II: Development of 300 MW of wind generation. Point of interconnection proposed with the ECO Substation. Proposed to be online in May 2013 (CAISO 2010).	Public Facilities and Utilities (Wind)	Northern Baja CA, Mexico. In the Sierra Juárez mountains.	In Transition Cluster. Interconnection Study is anticipated to be completed July 2010. The Interconnection Agreement is anticipated to be completed in December 2010. (Queue No. 183).
ESJ WIND PROJECT III: Development of 420 MW of wind generation. Point of interconnection proposed with the ECO Substation. Proposed to be online in February 2014 (CAISO 2010).	Public Facilities and Utilities (Wind)	Northern Baja CA, Mexico. In the Sierra Juárez mountains.	In Transition Cluster. Interconnection Study is anticipated to be completed July 2010. The Interconnection Agreement is anticipated to be completed in December 2010. (Queue 215).
Transmission and Other Renewable Projects			
SUNRISE POWERLINK: Development of a 150-mile transmission line from Imperial County to Sycamore Canyon near Poway.	Public Facilities and Utilities (Transmission)	Traverses southeastern San Diego County.	Permitting stage and under legal challenge. On May 14, 2010, SDG&E submitted to CPUC and BLM a final Project Modifications Report that defines changes made to the project along the entire route after publication of the Final EIR/EIS.
DEBENHAM ENERGY - CACA 0504855: Wind testing site. 2,169 acres.	Public Facilities and Utilities	West of the community of Boulevard, south of I-8.	Wind testing stage (Type II).
NATIONAL QUARRIES - CACA 050635: Wind testing site. 4,435 acres.	Public Facilities and Utilities (Wind)	Southeastern San Diego County, north of I-8, east of Sunrise Highway. Sawtooth Mountain.	Memorandum of Understanding/CRA signed. Application complete April 22, 2009 Wind testing stage (Type II) Testing.
OCOTILLO EXPRESS, LLC - CACA 051552. Development of 562 MW on 14,691 acres in two phases.	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north and south of I-8	A Plan of Development (POD) prepared in September 2009. The project is currently in the wind testing stage (Type II) under CACA 047518 and CACA 050916 (MAP ID items 9 and 10)

Project	Project Type	Project Location	Status
GREENHUNTER, OCOTILLO EXPRESS, LLC - CACA 047518: Wind testing site. 6,280 acres.	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north of I-8.	Finding of No Significant Impact and decision record posted. Testing and monitoring ROW issued. ROW expires 2/3/2012. Wind testing stage (Type II).
OCOTILLO EXPRESS, LLC - CACA 050916: Wind testing site. 9,247 acres.	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north of I-8.	Wind testing stage (Type II).
RENEWERGY, LLC, CACA 048004: Wind testing site. 3,912 acres	Public Facilities and Utilities (Wind)	Southwestern Imperial County, north of I-8.	Meteorological Tower Environmental Assessment nearing completion. Pending Native American consultation. Cultural literature started. Wind testing stage (Type II).
IMPERIAL VALLEY SOLAR - SOLAR TWO, CACA 047740: Development of up to 750 MW of energy on 6,140 acres of Bureau of Land Management-administered public lands and on 360 acres of private lands.	Public Facilities and Utilities (Solar)	North of I-8 in southwestern Imperial County.	Application for Certification filed with California Energy Commission June 30, 2008. Application for Certification/POD determined adequate under minimal criteria. Notice of Intent published October 17, 2008. The Final EIS published July 2010.
Development Projects (Federal)			
GOLDEN ACORN CASINO AND TRAVEL CENTER: SCH No. 2007071097: 33-acre expansion consisting of 150-room hotel, 900-space parking garage, surface parking, RV park, casino expansion, bowling alley, arcade, offices, retail, restaurants/food service, wind turbines, and water and wastewater improvements in three phases.	Commercial	South of I-8 at Crestwood.	Draft off-reservation Environmental Evaluation complete. Public review ended August 2007.
CAMPO LANDFILL PROJECT: 493-acre landfill facility and a 657-acre buffer area surround landfill.	Public Facilities and Utilities	Southeast corner of Campo Reservation.	On May 27, 2010, the Campo General Council voted to rescind applicable lease agreements in order to terminate the Campo Sanitary Landfill Project. The vote occurred at a special General Council meeting resulting from a petition signed by the required number of tribal members. (Campo Kumeyaay Nation 2010).
LA POSTA CASINO: Existing casino consisting of a 20,000-square-foot casino facility on an approximately 20-acre portion of the La Posta Reservation.	Commercial	2 Crestwood Road, Boulevard, CA La Posta Reservation, just west of existing Kumeyaay Wind facility.	Final environmental document 2006. Started operation in 2007.
BOULEVARD BORDER PATROL STATION: 32-acre site proposed for an administrative and training/educational facility, operated 24 hours a day, 7 days a week. At least 250 personnel, over three shifts, would occupy the site throughout the week.	Public Facilities and Utilities	North of I-8, on the east side of Ribbonwood Road.	Final Environmental Assessment and Finding of No Significant Impact issued February 2010.

Project	Project Type	Project Location	Status
CAMPO (LA POSTA) BORDER PATROL STATION: 25-acre site that includes a heliport.	Public Facilities and Utilities	32355 Old Hwy 80, Pine Valley.	Station opened in 2008.
LA POSTA MOUNTAIN WARFARE TRAINING FACILITY: Construction of a special warfare operation and training facility on approximately 2,250 acres.	Public Facilities and Utilities	La Posta Road, south of I-8, Campo.	Final Environmental Assessment dated September 2007.
BORDER PATROL FENCE PROJECT: As of March 2009 the 18-foot-tall, 3-foot-deep fence has been completed in eastern San Diego County (Haseoton, pers. comm. 2010).	Public Facilities and Utilities	Along U.S.–Mexico border in eastern San Diego County.	Constructed in eastern San Diego County from July 2008 to March 2009.
WIND MEASUREMENT TOWERS: The Descanso Ranger District proposes to authorize temporary wind measurement towers. The towers would be approximately 160 feet high and testing would be 3 years or less in duration.	Wind Measurement Testing	Cleveland National Forest. Descanso Ranger District. San Diego County. North side of I-8, LEGAL - T 16 S, R 5 E, Sections 1, 2, and 13.	U.S. Forest Service issued a permit in February 2010 for 3 towers in the area of La Posta Valley and Fred Canyon Road.
CONSOLIDATION AND REISSUANCE OF SDG&E PERMITS: The Forest Service is proposing a "master permit" to consolidate and reissue approximately 75 permits presently issued to SDG&E.	Public Facilities and Utilities	Cleveland National Forest.	Expected decision by the Forest Service in March 2011.
Development Projects (County)			
KETCHUM RANCH: TM 5524; subdivide 1,250 acres into 2,125 residential units, retail commercial development, elementary school site, public park, recreational center, open space, and associated infrastructure and utilities.	Residential	South of I-8, north of Old Highway 80 and west of Carrizo Gorge Road.	Department of Planning and Land Use (DPLU) letter dated July 2007 requesting an EIR. Project placed on idle status in January 2010.
ELDER: TPM 20981; subdivide 109 acres into five single-family residential lots. The proposed project is a minor residential subdivision with the Boulevard Community Planning Area. The project proposes to divide 109.29 net acres into four parcels and a remainder measuring 11.2 acres, 11.2 acres, 11.3 acres, 11.6 acres, and 63.9 acres.	Residential	South of Old Highway 80 and west of McCain Valley Road.	First Draft EIR was submitted in February 2006. No activity since 2006. Project owner changed February 2010.
DAVIS-INMAN: TPM 21081; subdivide 96.23 acres into four residential lots.	Residential	32062 Highway 94.	Problem with project site access identified. Appeal due to fire code filed October 2009.
STAR RANCH: TM 5459; subdivide 2,160.1 acres into 460 single-family residential lots, commercial uses, equestrian facility, helipad, water treatment facility, and wastewater treatment facility.	Residential	South of Big Potrero and west of Buckman Springs Road.	Scoping letter sent to DPLU on August 27, 2008. Project is on idle status.

Project	Project Type	Project Location	Status
HARVEST GLEN: TM 5366; subdivide 286.68 acres into 40 single-family residential lots.	Residential	Buckman Springs Road and Lake Morena Drive.	DPLU extension approval letter dated January 2006. The project was placed on idle status on January, 10, 2010.
VAUGHN: TM 5417; 14-lot TM with a 15th non-buildable lot for the roads and water system. The proposed lots range from 5.00 to 6.85 net acres. The project site is 81.24 acres.	Residential	30069 Canvasback Drive, Campo, just west of Buckman Springs Road.	DPLU first iteration review letter dated October 17, 2006.
VOLLI: TPM 20889; subdivision to create four 8-acre parcels, and one 7.9 parcel for a single family residence	Residential	Old Highway 80 and La Posta Road, near Boulder Oaks.	Project determined to have inactive status as of November 2009.
McCLINTOCK: TPM: 20755; minor subdivision of 10.0 gross acres into two residential parcels of 4.15 acres and 4.56 acres net.	Residential	Basso Road in the Campo/Lake Morena Community.	Project was approved on June 19, 2003.
BARTLETT: TPM: 20754: subdivide 164 acres into four single-family residential lots.	Residential	1850 Lake Moreno Drive.	Project was approved on June 17, 2003.
TIBBOT TPM: 20686: subdivide 35 acres into four single-family residential lots.	Residential	20774 Bee Valley Road.	Notice of Determination filed with County Clerk on Oct 17 2006.
DART TPM: 20675: 33.46-acre subdivision into three lots. Two lots for single-family residential (SFR) and one for general commercial uses.	Residential	Ribbonwood Road and Roadrunner Lane.	Project approved January 4, 2007.
GRIZZLE: TPM: 20719: subdivision of one lot into four parcels with a remainder parcel for SFR development.	Residential	McCain Valley Road and I-8.	Notice of Determination filed with County Clerk on Jun 29 2006.
ARELLANO: TPM: 20756 subdivide a 17.27-acre parcel into three parcels.	Residential	Hauser Creek Road west of Lake Morena Drive.	County staff completed review on January 26, 2009.
PIJNENBURG: TPM: 20778: five-lot subdivision on a 76-acre site.	Residential	Barrett Smith Road, North of Interstate 94.	Approved on August 6, 2009.
HEALD: TPM 21014: four-lot subdivision (5 net acres each) with a remainder lot (15 net acres) on a 36-acre site.	Residential	Southern terminus of Sunfish Way.	Project is on idle status as of February 2, 2010.
CAMPO HILLS COMMERCIAL BUILDING: site plan to develop a commercial building consisting of four attached units and a parking area.	Commercial Building	Evening Primrose Trail and Sheridan Road.	Project approved August 16, 2007.
BUCKMAN SPRINGS BORROW RECLAMATION PLAN: Allow for the continued use of Buckman Springs Borrow Pit to complete road repairs countywide by the County of San Diego, Department of Public Works. Additionally, a Reclamation Plan (RP 05-001) is being processed to ensure that the project site is reclaimed pursuant to the Surface Mining and Reclamation Act of 1975 (as	Reclamation Plan	1588 Buckman Springs Road.	Project approved in January 2007.

Project	Project Type	Project Location	Status
amended) at the conclusion of each of the three phases of extraction on site. The Major Use Permit expired November 7, 2005, but the extension to the Major Use Permit was applied for prior to expiration of the original permit. The modification to the Major Use Permit would allow for continued extraction of materials for an additional 25 years, rather than 50 years. The project site is located on 19.31 acres.			
BORROW PIT MILLER CREEK: Major Use Permit and Reclamation Plan for the RCP - Circle F Ranch project. The project proposes the extraction of sand resources within approximately 58.2 acres along the Miller Creek alluvial valley. A 16.4-acre area at the north end of the project site would be used for the creation of wetlands. The general operations for processing material and access would consist of an additional 61.9 acres.	Reclamation Plan	East of La Posta Road and North of Highway 94.	Draft EIR currently in the process. Funds not available for EIR submittal. Inactive status January 2010.
NEXTEL CELL TOWER: 35-foot faux broadleaf tree with antennas and equipment shelter.	Cell Tower	North of Highway 94 on Harris Ranch Road.	Project approved October 16, 2006.
BUCKMAN SPRINGS CELL TOWER: Installation and operation of telecommunication facility disguised as a faux monopine tree 50 feet high with six panel antennas located at a height of 46 feet. The associated equipment cabinets would include one electric meter panel, one telephone interface, and would be housed within an equipment enclosure measuring 20 feet by 11.5 feet by 10 feet.	Cell Tower	4277 Buckman Springs Road.	Mitigated Negative Declaration completed February 2007.
VERIZON CELL TOWER: 35-foot-high mono-pine mounted with 12 panel antennas. Associated equipment would include an emergency generator and two air-conditioning units that would be surrounded by an 8-foot-high concrete block wall and equipment cabinets that would be placed within an equipment shelter.	Cell Tower	22201 Mariah Way.	Draft Initial Study Checklist completed November 4, 2009.
VISTA CELL TOWER: 39-foot-high faux cross arm utility poles to accommodate four wireless carriers. Each of the proposed faux utility poles would consist of three panel antennas mounted to the cross arm and two sets of three antennas flush mounted to the utility pole. The facility would contain a total 18 antennas when fully occupied by all wireless carriers. Associated equipment for AT&T, Sprint, and T-Mobile would consist of	Cell Tower	1524 Kimberly Way.	Scoping Letter submitted to project applicant on February 15, 2010 requesting additional information.

Project	Project Type	Project Location	Status
four outdoor equipment cabinets and one Global Positioning System (GPS) antennas for each carrier. Verizon's supporting equipment would consist of indoor equipment cabinets enclosed within a prefabricated equipment shelter, one GPS antenna, and one 30 kW emergency generator enclosed by a Concrete Masonry Unit (CMU) wall with a s solid metal gate. The proposed utility poles and supporting equipment would be surrounded by a 34-foot by 70-foot by 6-foot CMU enclosure.			
BARRETT WIRELESS: Nextel wireless facility in Potrero on occupied property. Antenna pole would be camouflaged as a monopine and access road to facility would need to be improved.	Cell Tower	Highway 94, west of Saxon Road and east of Emery Road.	Notice of Exemption sent to County Clerk on October 9, 2007.
HORIZON TOWER: 30-foot-tall faux monobroadleaf and associated equipment contained within a shelter 20 feet long by 11.5 feet wide. The lease area is 41.2 feet wide by 48 feet long and would be surrounded by a 6-foot-high fence.	Cell Tower	Cam Del Monte Road and Shasta Way.	Approved in March 2010.
WHITE STAR CELL TOWER: Replace one existing panel antenna with a new panel antenna and add four additional panel antennas on top of the existing 100-foot-tall lattice tower	Cell Tower	1680 Tierra del Sol at Shasta Way.	Approved in April 2008.
OUTDOOR WORLD TOWER: The project consists of a 30-foot-tall faux monobroadleaf and associated equipment contained within a shelter 20 feet long by 11 feet and 6 inches wide. The lease area is 41 feet and 2 inches wide by 48 feet long and would be surrounded by a 6-foot-high fence.	Radio Antenna	37113 Highway 94.	Approved in March 2010.
RADIO ANTENNA: 100-foot lattice FM radio broadcast antenna tower and associated transmitting equipment. The FM transmit antenna measures approximately 40 feet and is mounted vertically parallel to the top portion of the tower; it does not extend beyond the height of the tower. The equipment would be concealed within a 8-foot by 8-foot by 10-foot tall prefabricated equipment shelter located adjacent to the tower, to the north. The exterior finish of the equipment shelter is to be textured and painted (earth tone) to blend with the existing natural environment. Access would be provided through the existing 10-foot-wide dirt access road (within a 30-foot easement) off Lake Morena Drive.	Radio Antenna	2456 A Lake Morena Drive.	Approved in September 2009.

Project	Project Type	Project Location	Status
PACIFIC BELL CELL SITE: Construct a cell tower site.	Cell Tower	44441 Old Highway 80.	Approved in March 2001.
CALLE NADA CELL SITE: 50-foot faux cypress and related power and radio equipment for cell site.	Cell Tower	4737 Calle Nada.	Approved in August 2007.
VERIZON WIRELESS CELL SITE: Addition of one 2-foot diameter microwave antenna mounted inside of the existing faux water tank (permit P04-019), two GPS antennas mounted to the outside of the previously approved 11-foot 6-inch by 28-foot concrete, prefabricated equipment shelter, and the installation of a 30 kw emergency backup generator with a 52-gallon diesel fuel tank The generator would be located inside the previously approved concrete equipment shelter. The equipment shelter would need to be slightly modified to allow an extra door for access and two vents for ventilation.	Cell Tower	31906 Old Highway 80.	Approved in March 2009.
GASOLINE CURVE CELL TOWER: Project proposes a 30-foot faux broadleaf tree cellular antenna and 230-square foot equipment shelter	Cell Tower	Shockey Road and Campo Road.	Categorical Exemption approved in September 2007.
OZBIRN CINGULAR CELL TOWER: Construction of a wireless telecommunications facility of a 45-foot camouflage utility pole with three antennas.	Cell Tower	1524 Kimberly Way, Campo.	Approved in March 2005.
SDG&E MTN EMPIRE OPERATOR TRAINING FACILITY: Major Use Permit modification for the operation of an explosives storage facility.	Commercial	30763 Old Hwy 80.	Approved in March 2009
ADELAIDES ROMAN CATHOLIC CHURCH: Major Use Permit to allow a religious assembly use with an elementary school on an approximately 5.13-acre site to be constructed in three phases.	Church	Sheridan Road and Custer Road.	Approved in November 2007.
BUCKMAN SPRINGS ROAD BRIDGE: Construct a new 450-foot bridge over Cottonwood Creek.	Public Facilities and Utilities	Southwest of I-8, north of Morena Stokes Valley Road, Campo.	Estimated completion date Summer 2013.
RIBBONWOOD ROAD SIGHTLINE IMPROVEMENT: Approximately 270-foot improvement to sightline on a horizontal curve.	Public Facilities and Utilities	North of I-8 along Ribbonwood Road approximately 0.25 miles south of Opalocka Road, near Boulevard.	Estimated completion date Spring 2011.

Source: SDG&E East County Substation Project

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APPENDIX D

List of Fires Identified in Figure 14 Fire History Map

Appendix D
Fires Identified in Figure 14 Fire History Map

YEAR_	FIRE_NAME
1911	
1911	
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1911	
1912	
1912	
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YEAR_	FIRE_NAME
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1949	
1950	CONEJOS
1950	BOULDER CREEK
1950	PUEBLO SIDING
1952	
1953	
1953	BRONCO FLATS
1953	HIPASS
1958	HAUSER #1
1958	
1958	
1958	HAUSER #2
1960	
1962	
1963	
1968	DONOVAN
1969	
1970	LAGUNA
1970	KITCHEN
1970	GUATAY

YEAR_	FIRE_NAME
1971	MORENA
1972	CUYAPAIPE
1972	
1973	BOULDER OAKS
1973	BUCKMAN
1974	OUTSIDE ORIGIN #2
1974	RIBBONWOOD
1976	HAMBEY #3
1978	HWY 25
1978	
1980	CANEBRAKE
1981	LIVE OAK
1982	TULE
1983	FLINN
1983	MCCAIN
1983	CARRIZO
1986	CAMERON
1987	CARRIZO
1988	BUCKMAN
1989	THING #2
1989	PINE VALLEY
1992	MANZANITA
1992	STAR
1993	JEWEL
1994	LA POSTA
1995	MCCAIN
1995	RIBBONWOOD
1995	CHURCH
1995	HAUSER
1996	WHITE
1996	HWY 94
1996	SPENCER
1997	BRONCO
1999	SHOCKEY
1999	COTTONWOOD
1999	RAILROAD
1999	CAMPO
2000	HAUSER
2000	BORDER #6
2000	BUCKMAN

YEAR_	FIRE_NAME
2002	TROY
2002	BOBCAT
2002	MANZANITA#2
2003	CEDAR
2004	BORDER #10
2005	RAILROAD
2005	RIBBONWOOD
2005	CHURCH
2006	HORSE
2006	PINE
2007	PINE
2007	HARRIS 2
2008	CARRIZO
2008	SHOCKEY

Source: CALFIRE GIS DATA