Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

GEOTECHNICAL OVERVIEW
DIRECT TRANSFER FACILITY
PUMP STATION
BONITA, CALIFORNIA

PREPARED FOR:
Kennedy Jenks Consultants
10920 Via Frontera, Suite 110
San Diego, California 92127

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
5710 Ruffin Road
San Diego, California 92123

May 7, 2014
Project No. 107627001

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Project No. 107627001

Mr. Corey Young
Kennedy Jenks Consultants
10920 Via Frontera, Suite 110
San Diego, California 92127

Subject: Geotechnical Overview
Direct Transfer Facility Pump Station
Bonita, California

Dear Mr. Young:

In accordance with your authorization, we have prepared a geotechnical overview for various Direct Transfer Facility Pump Station sites in Bonita, California. This report presents our geotechnical findings and conclusions regarding the proposed project. Our report was prepared in accordance with our proposal dated August 26, 2013. We appreciate the opportunity to be of service on this project.

Sincerely,
NINYO & MOORE

Francis O. Moreland, PG, CEG
Senior Geologist

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Principal Geologist

FOM/GTF/gg

Distribution: (1) Addressee (via e-mail)

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1. INTRODUCTION

In accordance with your request and our proposal dated August 26, 2013, we have prepared a geotechnical overview for various Direct Transfer Facility Pump Station sites located in Bonita, California (Figure 1). This report presents our conclusions regarding the geotechnical conditions at subject sites.

2. SCOPE OF SERVICES

Ninyo & Moore's scope of services for this project included review of pertinent background data, performance of a geologic reconnaissance, and engineering analysis with regard to the proposed project. Specifically, we performed the following tasks:

- Reviewing background information including available geotechnical reports, topographic maps, geologic data, fault maps, and aerial photographs.
- Performing a site reconnaissance of the sites.
- Compiling and analyzing the data obtained.
- Preparing this report presenting our preliminary geotechnical findings and conclusions with regard to the project.

3. PROJECT AND SITE DESCRIPTION

We understand approximately 15 alternative parcels (sites) are under consideration for siting of a direct transfer facility pump station. The sites are located in the vicinity of Sweetwater Road, Willow Street, Bonita Road, and the City of San Diego's existing north-south oriented, 36-inch diameter water pipeline (Figure 2). The alternative sites are located north and south of the Sweetwater River. The preferred site includes the lower flat portions of APN 591-241-14 Family Trust and APN 591-241-02 Julie Lim, located on the south side of Bonita Road and west of Willow Street. Conceptually, the proposed pump station may be founded near finish pad grade and may have pump canisters up to 10 feet in depth. The depth of proposed cuts and fills, pump station layout and other project details are presently unknown.

General site conditions for each parcel are presented below:

Table 1 – General Site Conditions

Parcel No.	Parcel Name	Conditions
APN 591-210-09	Tessitore Trust	Currently vacant, the previous home was recently demolished. Vegetation consists of two moderate sized trees. Elevations range from approximately 65 to 80 feet above mean sea level (MSL).
APN 591-210-10	Womens Club	A wood-frame, single story structure is located on the central portion of the gently sloping graded lot. The structure is surrounded by asphalt concrete paved parking. Vegetation consists of moderate to large sized trees and shrubbery. The pad elevation is approximately 95 feet MSL.
APN 591-220-02	Sharon Trust	Undeveloped lot, vegetation consists of moderate to large sized trees, shrubbery, and weeds. The parcel generally occupies a north-south trending valley bottom. Elevations range from approximately 70 feet MSL at the southern end to 125 feet MSL at the northern end.
APN 591-220-06	Sharon Trust	Residential lot with the residence at the northern end of the lot. Vegetation consists of moderate to large sized trees, shrubbery, and weeds. The parcel generally occupies a north-south trending ridge with elevations ranging from approximately 70 feet MSL at the southern end to 135 feet MSL at the northern end.
APN 591-230-02	County of San Diego	Undeveloped property designated Sweetwater County Park. Vegetation consists of dense growth of moderate to large sized trees, shrubbery, and weeds. The parcel occupies the Sweetwater River bottom. Elevations generally range from approximately 50 to 55 feet MSL.
APN 593-240-24	City of Chula Vista	This parcel is currently part of the Chula Vista Municipal Golf Coarse. The parcel is generally flat with landscaping consisting of grass, shrubbery, and trees. Elevations range from approximately 55 to 60 feet MSL.
APN 591-240-39	County of San Diego	Residential lot with the residence at the southwestern corner of the lot. Vegetation consists of a dense growth of moderate sized trees, shrubbery, and weeds. The parcel is relatively flat with an elevation of approximately 55 feet MSL.
APN 591-240-36	Kaiser	This parcel is a developed commercial property. Improvements consist of five two-story commercial buildings and asphalt concrete paved parking. Vegetation consists of landscaping around the buildings and at scattered locations in the parking lots. The parcel is relatively flat with an elevation of approximately 60 feet MSL.
APN 591-240-40	Family Trust	This parcel is a developed commercial property. Improvements consist of a one-story commercial building and asphalt concrete paved parking. Vegetation consists of landscaping at scattered locations in the parking lot. The parcel is relatively flat with an elevation of approximately 60 feet MSL.

Table 1 – General Site Conditions

Parcel No.	Parcel Name	Conditions
APN 591-240-27	Bonita Auto Care	This parcel is a developed commercial property. Improvements consist of a service station/mini-mart and asphalt concrete paved parking. Vegetation consists of minor landscaping. The parcel is relatively flat with an elevation of approximately 60 feet MSL.
APN 591-241-12	SCI Ca Funeral Services	The offices of Glen Abbey Memorial Park are located on this parcel. Improvements consist of the office building and asphalt concrete paved parking. Vegetation consists of landscaping. The parcel is a relatively flat graded pad with an elevation of approximately 70 feet MSL. The pad has descending and ascending slopes to the north and south, respectively.
APN 592-040-10	SCI Ca Funeral Services	This parcel generally consists of the entry drive to Glen Abbey Memorial Park. It is asphalt concrete paved and rises southward to the Memorial Park.
APN 592-050-44	SCI Ca Funeral Services	This parcel generally consists of the Glen Abbey Memorial Park. Vegetation consists of grass and landscaping. Elevations vary across the site.
APN 591-241-02	Julie Lim	This is a residential lot with the residence off The Hill Road. The remainder of this parcel is undeveloped. Vegetation consists of a dense growth of moderate sized trees, shrubbery, and weeds. The northern end of the parcel is relatively flat with an elevation of approximately 60 feet MSL. The southern portion of the parcel consists of a slope which rises approximately 45 feet to the residential lot.
APN 591-241-14	Family Trust	This parcel is undeveloped. The northern portion of the parcel is relatively flat and the southern portion rises to adjacent residential properties. The northern portion of the lot has an elevation of approximately 60 feet MSL.

4. GEOLOGIC CONDITIONS

Our findings regarding regional and site geology and groundwater conditions at the subject site are provided in the following sections. This information is based on the findings from our background review and was prepared without the benefit of site-specific subsurface exploration.

4.1. Regional and Geologic Setting

The project area is situated in the coastal portion of the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip

of Baja California (Norris and Webb, 1990). The province varies in width from approximately 30 to 100 miles. In general, the province consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks, and Cretaceous igneous rocks of the southern California batholith. The portion of the province in San Diego County that includes the project area consists generally of Quaternary and Tertiary age sedimentary rock.

4.2. Site Geology

Geologic units mapped across the subject sites included fill, alluvium, older alluvium, Otay Formation, and Mission Valley Formation. Surficial soils such as topsoil and colluvium may also be present. Generalized descriptions of the units encountered or anticipated are provided in the subsequent sections. A geologic map of the region is presented on Figure 3.

4.2.1. Fill

Although not mapped, fill associated with the original grading of the various parcels is anticipated to underlie portions of the sites. We expect that the fill materials were derived from nearby natural materials and consist of clayey to silty, sand, and clayey to sandy silt. Fills on some of the sites, particularly the commercial sites near the intersection of Willow Street and Bonita Road, is likely to be imported materials and their material types are unknown.

4.2.2. Alluvium

Alluvium (designated Q_a), associated with the Sweetwater River, is expected to underlie many of the subject parcels. Based on previous geotechnical evaluations near the sites (Ninyo & Moore, 2009) we anticipate that the alluvium extends to depths of 60 feet or more. The alluvial materials are generally expected to consist of damp to saturated, stiff to very stiff, sandy clay, and loose to medium dense, silty to clayey, sand.

4.2.3. Older Alluvium

Older alluvium (river terrace) (designated Q_{oa}) has been mapped as underlying several of the subject parcels. The older alluvial materials are generally expected to consist of damp to saturated, very stiff, sandy clay, and medium dense to dense, sandy silt, and silty to clayey, sand.

4.2.4. Otay Formation

Materials of the Otay Formation (designated T_o) have been mapped along the northern portions of Parcels 591-220-02 and 591-220-06. The Otay Formation generally consists of weakly indurated, sandy claystone and clayey siltstone, and weakly cemented, sandy siltstone and clayey to silty sandstone. Strongly cemented zones are often encountered within materials of the Otay Formation.

4.2.5. Mission Valley Formation

Materials of the Mission Valley Formation (designated T_{mv}) have been mapped along the southern portions of Parcels 591-220-02 and 591-220-06. The Mission Valley Formation generally consists of weakly indurated, sandy claystone and clayey siltstone, and weakly cemented, sandy siltstone and clayey to silty sandstone. Strongly cemented zones are often encountered within materials of the Ardath Shale.

4.3. Geology of Individual Parcels

A summary of the geology expected at each parcel is provided in the following Table 2:

Table 2 – General Geologic Conditions

Parcel No.	Parcel Name	Geologic Conditions
APN 591-210-09	Tessitore Trust	Fill underlain by older alluvium
APN 591-210-10	Womens Club	Fill underlain by Mission Valley Formation
APN 591-220-02	Sharon Trust	Mission Valley Formation and Otay Formation (alluvium in the valley bottom)
APN 591-220-06	Sharon Trust	Mission Valley Formation and Otay Formation
APN 591-230-02	County of San Diego	Alluvium and older alluvium
APN 593-240-24	City of Chula Vista	Fill overlying alluvium and older alluvium
APN 591-240-39	County of San Diego	Alluvium
APN 591-240-36	Kaiser	Fill overlying alluvium
APN 591-240-40	Family Trust	Fill overlying alluvium

Table 2 – General Geologic Conditions

Parcel No.	Parcel Name	Geologic Conditions
APN 591-240-27	Bonita Auto Care	Fill overlying alluvium
APN 591-241-12	SCI Ca Funeral Services	Fill overlying older alluvium
APN 592-040-10	SCI Ca Funeral Services	Fill overlying older alluvium
APN 592-050-44	SCI Ca Funeral Services	Fill overlying older alluvium
APN 591-241-02	Julie Lim	Older alluvium
APN 591-241-14	Family Trust	Older alluvium

4.4. Groundwater

Based on our experience and borings in the vicinity (Ninyo & Moore, 2009), we anticipate that groundwater is at an elevation of roughly 55 feet MSL beneath the subject parcels. Fluctuations in the groundwater level may occur due to variations in ground surface topography, subsurface geologic conditions and structure, rainfall, irrigation, and other factors.

4.5. Faulting and Seismicity

The project area is considered to be seismically active. Based on our review of the referenced geologic maps and stereoscopic aerial photographs, as well as our geologic field reconnaissance, the subject sites are not underlain by known active or potentially active faults (i.e., faults that exhibit evidence of ground displacement in the last 11,000 years and 2,000,000 years, respectively). Major known active faults in the region consist generally of en-echelon, northwest-striking, right-lateral, strike-slip faults. These include the Rose Canyon, Coronado Bank, San Diego Trough, and San Clemente faults, located to the west of the site, and the Elsinore, San Jacinto and San Andreas faults, located to the east of the site. The locations of these faults are shown on Figure 4.

The closest known active fault is the Rose Canyon fault, which can generate an earthquake magnitude of up to 7.2 (California Geological Survey [CGS], 2003). The Rose Canyon fault is located approximately 7 miles west of the sites.

4.5.1. Ground Surface Rupture

Based on our review of the referenced literature and our site reconnaissance, no active faults are known to cross the subject sites. Therefore, the potential for ground rupture due to faulting at the site is unlikely. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

4.5.2. Liquefaction and Seismically Induced Settlement

Liquefaction of cohesionless soils can be caused by strong vibratory motion due to earthquakes. Research and historical data indicate that loose granular soils and non-plastic silts that are saturated by a relatively shallow groundwater table are susceptible to liquefaction. Younger alluvial deposits, which underlie many of the subject parcels may be susceptible to liquefaction. However, subsurface exploration should be performed to evaluate the potential for liquefaction and the resulting dynamic settlement.

4.6. Landsliding

Based on our review of referenced geologic maps, literature and topographic maps, landslides, or indications of deep-seated landsliding were not noted underlying the project site. The potential for significant large-scale slope instability at the site is not a design consideration.

5. GEOTECHNICAL CONSTRAINTS

In general, geotechnical constraints include undocumented fill, ground surface rupture, strong ground motion, and liquefaction. Potential geotechnical constraints at each of the subject parcels are presented in Table 3 below:

Table 3 – Geotechnical Constraints

Parcel No.	Parcel Name	Potential Geotechnical Constraints
APN 591-210-09	Tessitore Trust	Undocumented fill
APN 591-210-10	Womens Club	Undocumented fill
APN 591-220-02	Sharon Trust	No known constraints
APN 591-220-06	Sharon Trust	Undocumented fill
APN 591-230-02	County of San Diego	Liquefaction, Shallow groundwater
APN 593-240-24	City of Chula Vista	Liquefaction, Undocumented fill, Shallow groundwater
APN 591-240-39	County of San Diego	Liquefaction, Shallow groundwater

Table 3 – Geotechnical Constraints

Parcel No.	Parcel Name	Potential Geotechnical Constraints
APN 591-240-36	Kaiser	Liquefaction, Undocumented fill, Shallow groundwater
APN 591-240-40	Family Trust	Liquefaction, Undocumented fill, Shallow groundwater
APN 591-240-27	Bonita Auto Care	Liquefaction, Undocumented fill, Shallow groundwater
APN 591-241-12	SCI Ca Funeral Services	Undocumented fill
APN 592-040-10	SCI Ca Funeral Services	No known constraints
APN 592-050-44	SCI Ca Funeral Services	No known constraints
APN 591-241-02	Julie Lim	Undocumented fill, Shallow groundwater
APN 591-241-14	Family Trust	Undocumented fill, Shallow groundwater

6. CONCLUSIONS

Based on our review of the referenced background data and geologic field reconnaissance, it is our opinion that project design and construction on any of the four sites under consideration is feasible from a geotechnical standpoint. Prior to project design, a subsurface geotechnical evaluation should be performed to evaluate site-specific geotechnical conditions. Geotechnical considerations include the following:

- Undocumented fill soils are anticipated at the preferred site. Based on our reconnaissance of the site, the undocumented fills are expected to be relatively shallow. Shallow groundwater is also anticipated at the preferred site. A steep natural slope exists on the preferred site which should be evaluated for stability prior to design.

- Liquefiable soils are anticipated to be present at parcels APN 591-220-06, APN 593-240-24, APN 591-240-39, APN 591-240-36, APN 591-240-40, and APN 591-240-27. Liquefiable soils are not anticipated to be a design consideration at the remaining sites.

- Undocumented fill soils are anticipated to be present on parcels APN 591-210-09, APN 591-210-10, APN 591-230-02, APN 593-240-24, APN 591-240-36, APN 591-240-40, APN 591-240-27, and APN 591-241-12.

- No active faults are reported underlying or adjacent to any of the sites.

- On-site excavations will encounter variations in excavation characteristics such as caving in loose fill and alluvial soils, and difficult excavations in Mission Valley or Otay Formation materials.

7. LIMITATIONS

The geotechnical analyses presented in this geotechnical report has been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no controls.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

8. REFERENCES

California Building Standards Commission (CBSC), 2010, California Building Code (CBC), Title 24, Part 2, Volumes 1 and 2.

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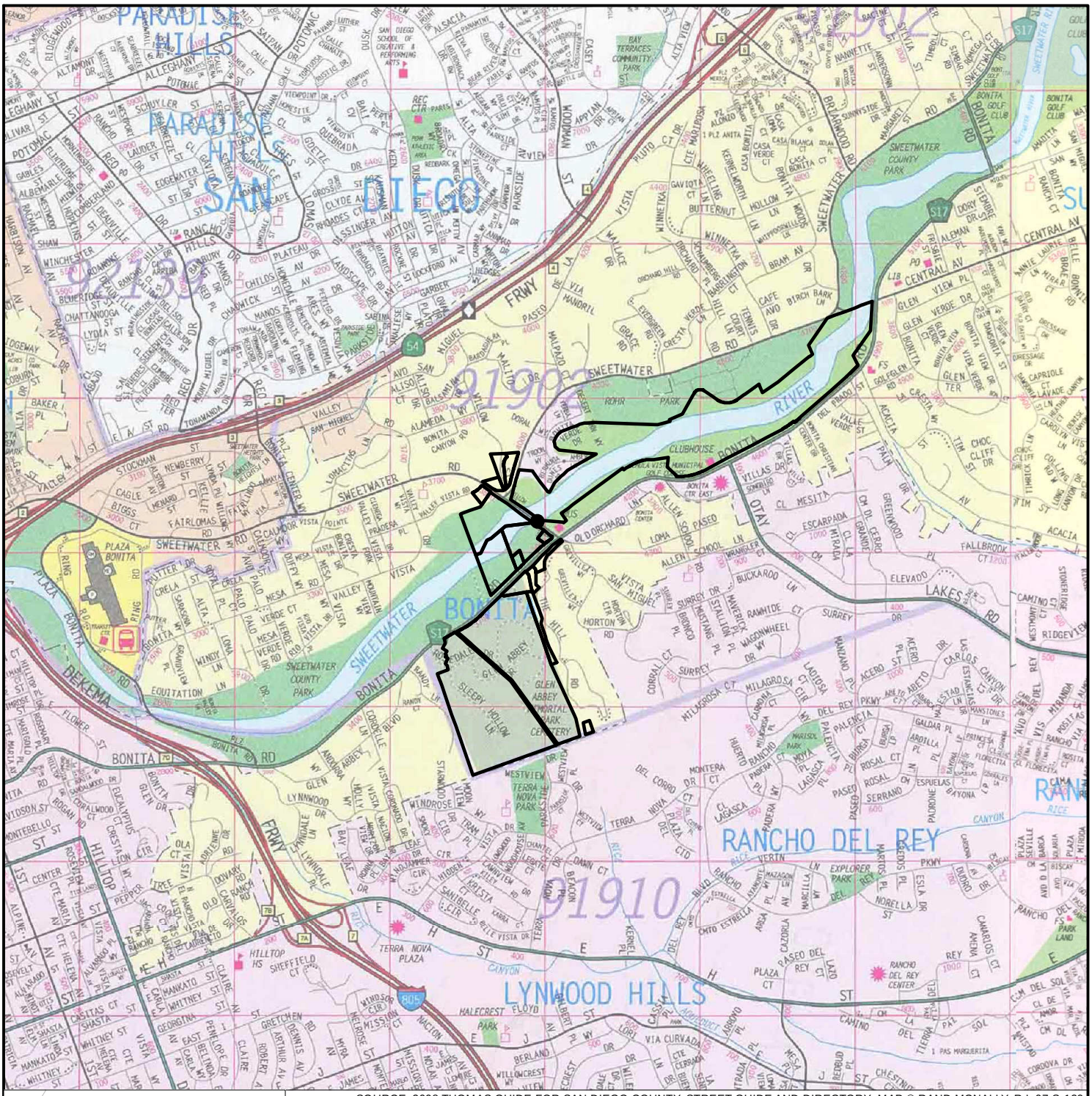
AERIAL PHOTOGRAPHS				
Source	**Date**	**Flight**	**Numbers**	**Scale**
United States Department of Agriculture	4-14-53	AXN-10M	117 and 118	1:20,000



MAP INDEX

LEGEND

PROJECT SITE/PARCEL

SCALE IN FEET

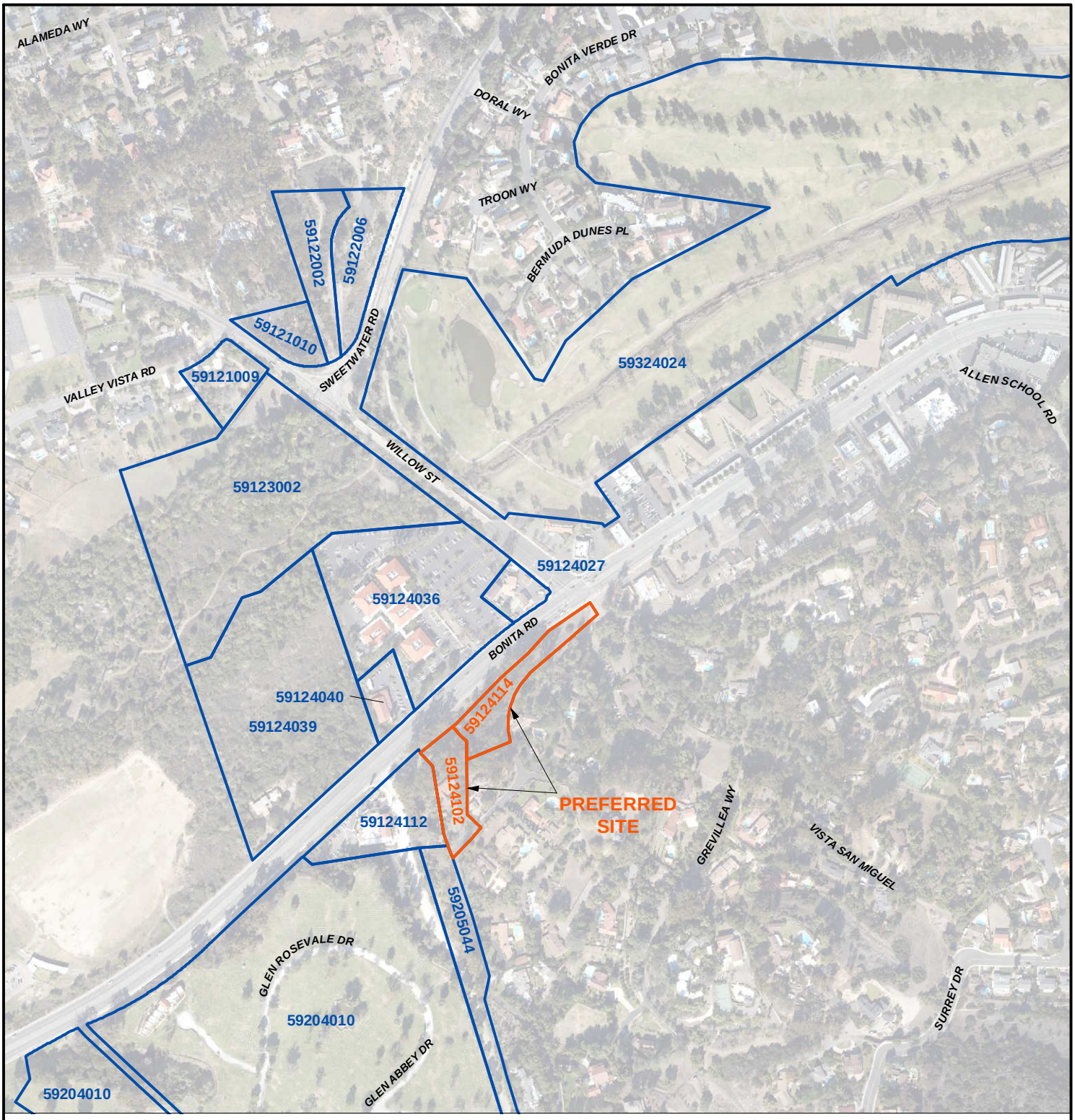
0 1,200 2,400 4,800

N

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore	SITE LOCATION	FIGURE
PROJECT NO. / DATE	DIRECT TRANSFER FACILITY PUMP STATION BONITA, CALIFORNIA	1
107627001 / 5/14		

1_107627001_SL.mxd 5/1/2014 JDL



SOURCE: GOOGLE EARTH, 2013.

LEGEND

PROJECT SITE/PARCEL WITH APN NUMBER

N

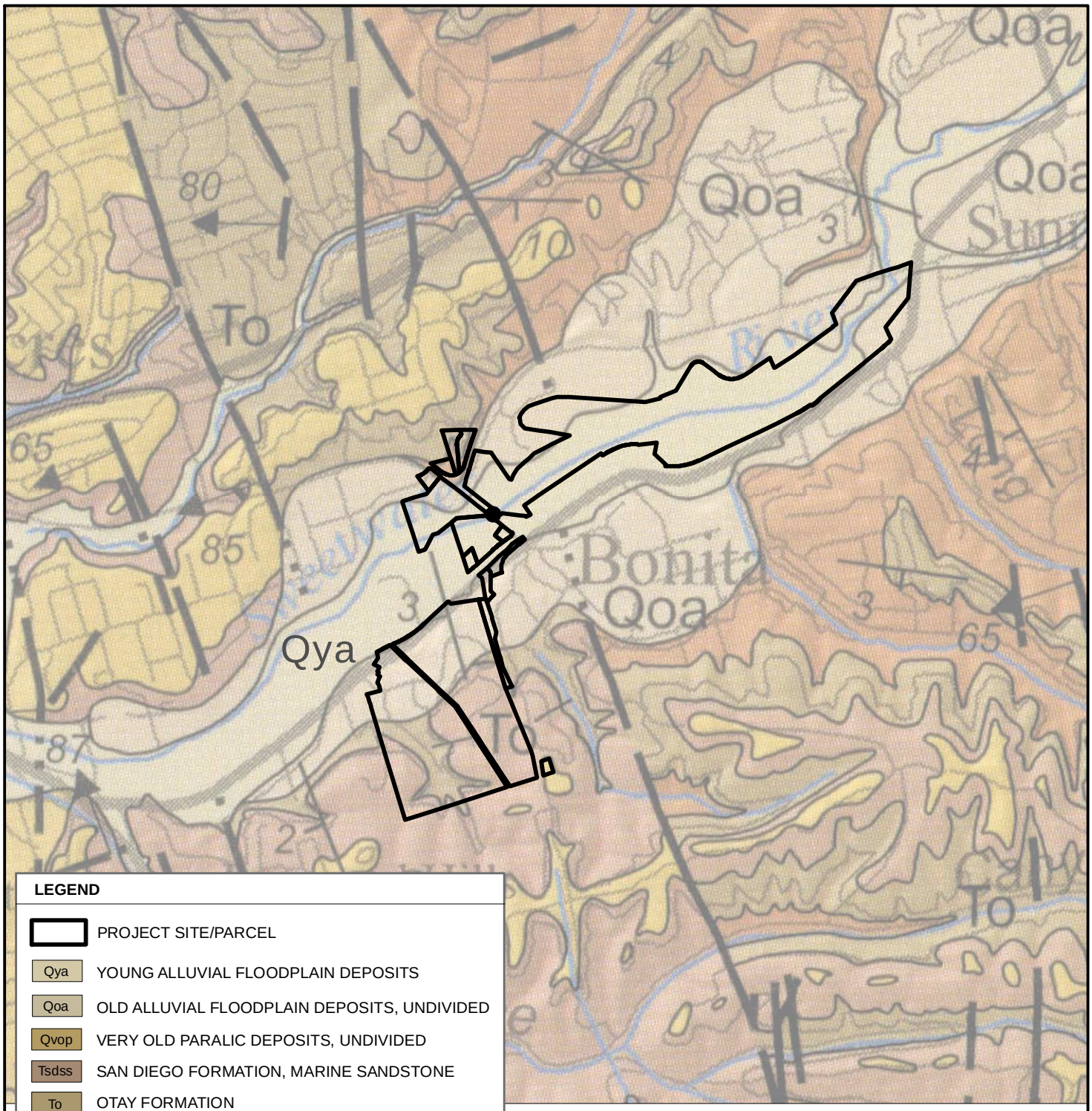
SCALE IN FEET

0 250 500 1,000

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore	SITE PLAN	FIGURE
PROJECT NO. 107627001 / DATE 5/14	DIRECT TRANSFER FACILITY PUMP STATION BONITA, CALIFORNIA	2

2_107627001_SP.mxd 5/6/2014 JDL



LEGEND

- PROJECT SITE/PARCEL
- Qya — YOUNG ALLUVIAL FLOODPLAIN DEPOSITS
- Qoa — OLD ALLUVIAL FLOODPLAIN DEPOSITS, UNDIVIDED
- Qvop — VERY OLD PARALIC DEPOSITS, UNDIVIDED
- Tsdss — SAN DIEGO FORMATION, MARINE SANDSTONE
- To — OTAY FORMATION
- Tmv — MISSION VALLEY FORMATION
- 65 / U / D — FAULT - SOLID WHERE ACCURATELY LOCATED, DASHED WHERE APPROXIMATE, DOTTED WHERE CONCEALED. ARROW AND NUMBER INDICATE DIRECTION AND ANGLE OF DIP OF FAULT PLANE
- 4 — STRIKE AND DIP OF BEDS, INCLINED

SOURCE: KENNEDY, M.P., AND TAN, S.S., 2008, GEOLOGIC MAP OF THE SAN DIEGO 30' X 60' QUADRANGLE, CALIFORNIA

N

SCALE IN FEET

0 1,000 2,000 4,000

NOTES: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore

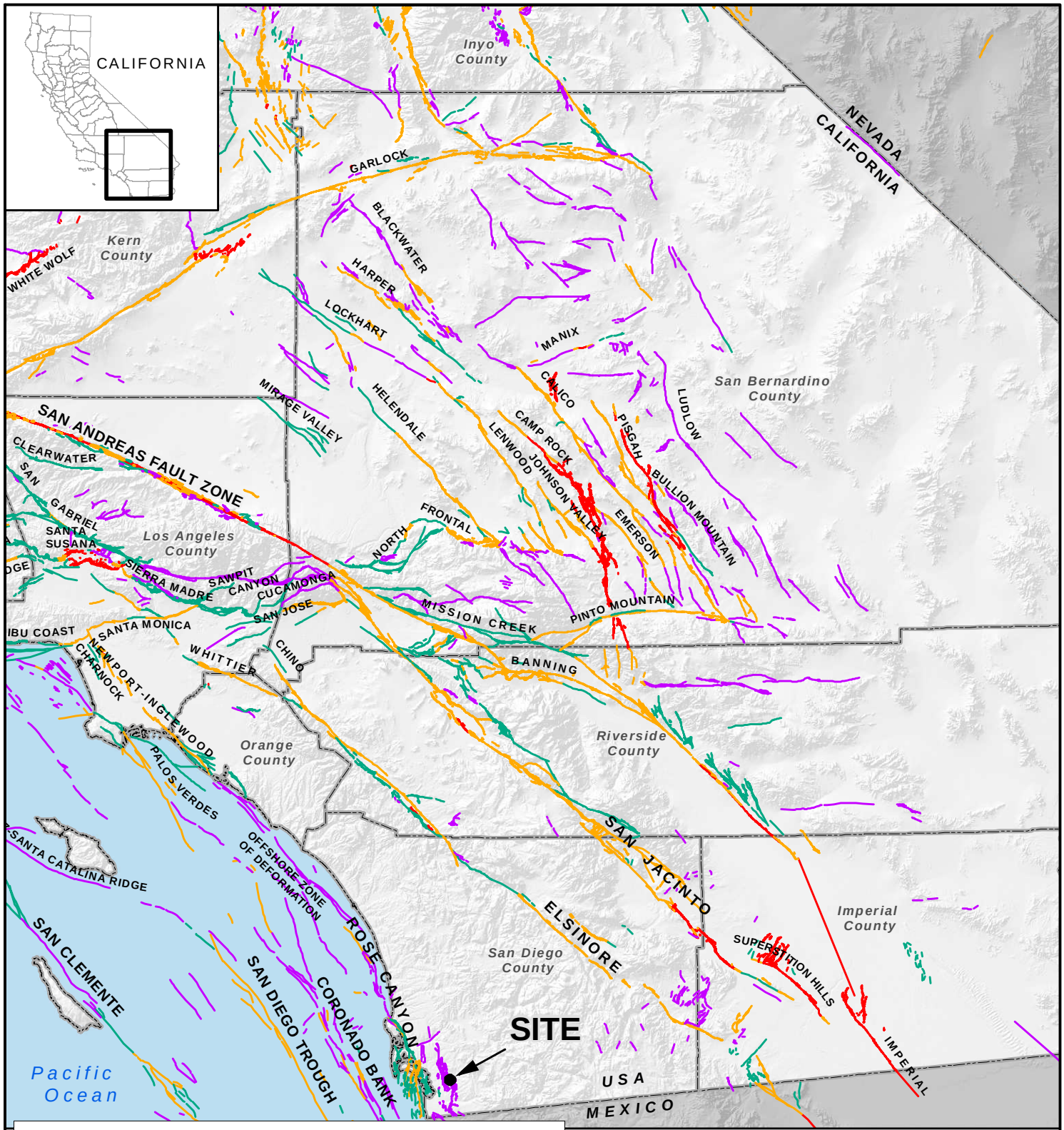
GEOLOGY

FIGURE 3

PROJECT NO.	DATE
107627001	5/14

DIRECT TRANSFER FACILITY PUMP STATION
BONITA, CALIFORNIA

3_107627001_G.mxd 5/1/2014 JDL



LEGEND

CALIFORNIA FAULT ACTIVITY

- HISTORICALLY ACTIVE
- HOLOCENE ACTIVE
- LATE QUATERNARY (POTENTIALLY ACTIVE)
- QUATERNARY (POTENTIALLY ACTIVE)
- STATE/COUNTY BOUNDARY

SOURCE: U.S. GEOLOGICAL SURVEY AND CALIFORNIA GEOLOGICAL SURVEY, 2006, QUATERNARY FAULT AND FOLD DATABASE FOR THE UNITED STATES, ACCESSED 2011, FROM USGS WEB SITE: HTTP//EARTHQUAKES.USGS.GOV/REGIONAL/QFAULTS/.

SCALE IN MILES

0 30 60

N

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

REGIONAL FAULTING

FIGURE 4

PROJECT NO.	DATE
107627001	5/14

DIRECT TRANSFER FACILITY PUMP STATION
BONITA, CALIFORNIA

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