MEMORANDUM

To: Patrick Brown (Soitec)
From: Trey Driscoll, Senior Hydrogeologist
Subject: Critique of "Impacts of Soitec Solar Projects on Boulevard and Surrounding Communities," by Dr. Victor M. Ponce, dated 15 November 2013
Date: June 5, 2014

INTRODUCTION AND SUMMARY OF CONCLUSIONS

Thank you for the opportunity to review and critique Dr. Victor M. Ponce's whitepaper, *Impacts of Soitec Solar Projects on Boulevard and Surrounding Communities, San Diego County, California*, dated November 15, 2013 (Whitepaper). In the Whitepaper, Dr. Ponce defines the average annual groundwater recharge in the Boulevard area and compares that to the water demands of four solar projects proposed in the area, including the Rugged Solar Farm (Rugged), Tierra del Sol Solar Farm (Tierra del Sol), LanEast Solar Farm (LanEast), and LanWest Solar Farm (LanWest) (jointly, the Proposed Project).[1] He concludes that Boulevard's groundwater supply is insufficient to provide any water to the Proposed Project, and instead, suggests that the "the Boulevard Soitec projects must resort to imported water to satisfy their needs."[2]

The Whitepaper pre-dates the publication of the DPEIR, the associated groundwater resource investigations (included as DPEIR Appendices 3.1.5-5 (Tierra del Sol), 3.1.5-6 (Rugged), 3.1.5-7 (Pine Valley Mutual Water Company), and 3.1.5-8 (Jacumba Community Services District)), as well as publication of the Groundwater Mitigation and Monitoring Plans (GMMPs) for each proposed groundwater source in the County's administrative record.[3] Therefore, the Whitepaper

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1 The Proposed Project was analyzed in a Draft Programmatic Environmental Impact Report (DPEIR), released for public comment and review on January 3, 2014. The Rugged and Tierra del Sol Solar Farms were analyzed at a project-level of detail because Major Use Permits have been submitted for their construction. The LanEast and LanWest Solar Farms were analyzed at a programmatic level of detail because no land use permits have been submitted to the County for their construction. DPEIR, pp. S.0-2 to S.0-4.

2 See Ponce, Executive Summary, at 2. The Ponce whitepaper has no page numbers. Accordingly, all page references in this memorandum are to the PDF page upon which the citation appears. The Ponce November 2013 whitepaper is available for download at http://ponce.sdsu.edu/boulevardsoitec.html

3 The administrative record for the Proposed Project can be found online at http://www.sdcounty.ca.gov/pds/ceqa/SOITEC_SOLAR_DEVELOPMENT_ADMINISTRATIVE_RECORDS.html.

is based on an incomplete understanding of the Proposed Project and does not directly critique the adequacy of the technical analysis presented in the DPEIR.

This memorandum is provided to compare and contrast the County's approach to evaluating groundwater resources with that proposed in the Whitepaper, to evaluate the assumptions, methodology and results presented by the Whitepaper, and to evaluate the Whitepaper's findings. This memorandum finds that the Whitepaper's conclusion that the Proposed Project cannot rely on groundwater is unsupported for four reasons. First, the Whitepaper relies on generic estimates of annual groundwater recharge in the Boulevard area that are contrary to, and less reliable than, the site-specific groundwater recharge rates calculated for the Proposed Project, as determined using the methodology required by the County's Guidelines for Determining Significance and Report Format and Content Requirements—Groundwater Resources (County of San Diego 2007) (County Guidelines).

Second, the Whitepaper is not based on a soil moisture balance analysis calculated using site-specific parameters, including precipitation over a thirty year period, evapotranspiration, soil moisture capacity, runoff and existing/proposed water demands.

Third, the Whitepaper's estimate of sustainable yield as 30% of annual recharge is unsupported and based on an overly simplistic view of sustainable yield that conflicts with the County Guidelines' established methodology. Instead of defining a percentage of estimated recharge available for use, the County Guidelines evaluate potential impacts in multiple contexts using measurable thresholds for groundwater in storage, well-interference, and potential impacts to groundwater-dependent habitat. These site-specific calculations are more reliable and scientifically justified than the Whitepaper's generic estimate of sustainable yield.

Fourth, the Whitepaper assumes in error that the Proposed Project will rely entirely on local groundwater sources, and relies on an out of date water demand calculation sheet.

THE COUNTY'S GROUNDWATER RESOURCE GUIDELINES

In its executive summary, the Whitepaper states "[…] the issues of groundwater sustainability are, unfortunately, not very well defined. Sustainable yield is reckoned to be a moving target, subject to adaptive management. To remain comprehensive, sustainable yield must include hydrological, ecohydrological, and socioeconomic considerations."[4]

[4] See Ponce whitepaper, Executive Summary, at 2.

The limitation of sustainable yield that the County applies in its Guidelines is similar to, if not exactly, what the Whitepaper suggests. The County thus has required the applicants for the Proposed Project to perform site-specific hydrogeologic investigations to evaluate potential impacts to groundwater resources and to propose mitigation measures as needed to avoid potentially significant impacts. The site-specific hydrogeological investigations for the Proposed Project are included in the DPEIR as Appendices 3.1.5-5 through 3.1.5-8, and the associated GMMPs are included in the County's administrative record, as noted above.

Before analyzing the Whitepaper's methodology, it is helpful to first describe the County's Guidelines to understand the groundwater investigation and methodology required by the County for the Proposed Project.[5]

The County Guidelines discuss the issue of sustainable yield and how it applies in the local context, including fractured rock aquifers like what is found underlying the Proposed Project area. As stated in the County Guidelines:

> "The concept of sustainable yield (often referred to as safe yield) for a groundwater basin has been heavily debated. In general, the County assumes that sustainable yield is the amount of groundwater that can be withdrawn from it annually without producing an undesirable result (Todd, 1959). The controversy over sustainable yield is related to the definition of an undesirable result. It is generally recognized that undesirable results include not only the depletion of the groundwater reserves, but also the intrusion of water of undesirable quality, the contravention of existing water rights, the deterioration of the economic advantages of pumping, excessive depletion of streamflow, impacts to groundwater-dependent vegetation, and land subsidence […]"[6]

Additionally, the County Guidelines state:

> "The guidelines below were designed to work together to provide a tiered evaluation of groundwater resources, which ultimately determine the sustainable yield for a given project. The final estimated sustainable yield for a project or basin takes into consideration water quantity, quality, and potential impacts to

[5] The whitepaper does not mention the County Guidelines or critique the methodology required by the Guidelines, despite essentially offering an oblique critique. *See* Ponce whitepaper, References, at 58-59. We note, however, that Dr. Ponce took the opportunity to submit comments on the County Guidelines when they were being developed, to which the County responded.

[6] County of San Diego, Sec. 1.8, at 6.

> biological resources (groundwater-dependent habitat). […] A water balance analysis provides a first level evaluation of determining sustainable yield. Potential further constraints to sustainable yield come by combining the findings of the water balance analysis, assessment of well interference and assessment of drawdown at groundwater-dependent habitat. […] Water quality, a critical component in determining sustainable yield for a given project, is addressed in the poor groundwater quality guideline. If analytical results from groundwater samples collected indicate any constituents tested exceed its primary MCL (and the water is intended for potable use without any ability to treat the contaminated water to safe drinking water standards below the primary MCL), the project would effectively have no potable water for use."[7]

The County has managed groundwater resources in one form or another since the late 1970s, when the first groundwater policy was adopted by the County of San Diego Board of Supervisors (Groundwater Policy I-77). In 1991, the County adopted the Groundwater Ordinance and associated Department of Planning and Land Use (now, the Department of Planning and Development Services) policy "County Standards for Site Specific Hydrogeologic Investigations."

The current County Guidelines, prepared by the County Geologist along with four individuals on the County Groundwater Technical Advisory Committee, and adopted in March 2007, include measurable standards and analysis methodologies to assess groundwater-related impacts of water-intensive uses. Relevant to the Proposed Project, the County Guidelines require three different site-specific analyses for projects in fractured rock basins that are described below. First, the County Guidelines require projects not to reduce groundwater in storage to a level of 50% or less over a 30-year period as a result of groundwater extraction, modeled using a water balance analysis (or equivalent approach), inclusive of drought periods and considering the cumulative context (including maximum build out of County General Plan designations).[8]

Second, the County Guidelines require analysis of potential well interference on and off property by assessing the level of drawdown in offsite wells after a five year projection of groundwater drawdown, and/or saturated thickness of major water bearing fractures in offsite wells.[9]

Third, the County Guidelines require analysis of potential impacts to groundwater-dependent habitat as part of its sustainable yield evaluation, which has been incorporated into the County

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7 County of San Diego, Sec. 4.0, at 22.
8 County of San Diego, Sec. 4.1, at 22-23.
9 County of San Diego, Sec. 4.3, at 25-27.

Guidelines from a separate County document, the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements—Biological Resources (County of San Diego 2010) (County Biological Guidelines).[10]

The following sections summarize the analyses required under the County Guidelines to evaluate whether the Proposed Project's groundwater demand exceeds established thresholds.

Groundwater in Storage Criterion

To adequately evaluate whether a project would exceed the 50% groundwater in storage criterion, the County requires:

1. Calculate groundwater recharge using approved precipitation/climatic data (typically from the past 30-year period), CIMIS evapotranspiration data, soil types and their moisture holding capacity and runoff potential, and estimates of runoff using the RECHARG2 computer program developed by Dr. David Huntley at San Diego State University (SDSU);
2. Estimate groundwater demands under three conditions: existing conditions, with the project, and with maximum build-out of the County General Plan;
3. Estimate groundwater storage capacity for each hydrogeologic unit based on calculations of specific yield, the potential saturated thickness, and the extent of each hydrogeologic unit; and
4. Model long-term groundwater availability that depicts the volume of groundwater in storage over a 30-year period, including periods of drought, as well as scenarios that include other water uses in the study area under existing conditions and reasonably foreseeable future conditions.[11]

The County requested that the analysis of the Rugged and Tierra del Sol solar farms be performed within 0.5-mile radial areas surrounding each supply well as opposed to the entire watershed area.[12] Use of the 0.5-mile radial area as opposed to the entire watershed area substantially limits the volume of groundwater in storage against which groundwater withdrawals are measured and thus represents an approach that is conservative compared to the

[10] See County of San Diego, Sec. 4.0, at 22 (referencing County of San Diego 2010, Sec. 4.2, at 15).
[11] See County of San Diego, Sec. 4.1, at 22-23.
[12] With respect to the Tierra del Sol Solar Farm, the 0.5 mile radius area was further reduced because approximately 48 acres of the area was in Mexico. See DPEIR, Appendix 3.1.5-5, at p. 3-1.

watershed approach. This approach to defining the study area is also closely aligned with that suggested by the Whitepaper.

The results of this analysis for the Rugged and Tierra del Sol Solar Farms are presented in the groundwater investigation reports for each solar farm, which were included in the DPEIR as Appendices 3.1.5-5 (Tierra del Sol) and 3.1.5-6 (Rugged).

Well Interference Criterion

To adequately evaluate whether projects would substantially interfere with off-site wells, the County requires well tests which collect drawdown and recovery data within the production wells and monitoring well(s), and an analysis that reports measured drawdowns, recoveries, and calculates aquifer properties for the various hydrogeologic units present (e.g., specific capacity, residual drawdown, transmissivity, storativity). Drawdown-recovery curves are used to model long-term drawdown at projected rates of pumping for various locations using the Cooper–Jacob approximation to the Theis equation (a standard hydrologic method).

The intent of the well interference analysis is to cover projects that have continual ongoing water uses that remain static over time, and thus, the criterion requires drawdown to be measured after a 5-year projection of drawdown. Such projects have historically comprised the majority of the groundwater dependent projects processed by the County. In recent years, however, renewable energy projects like the Proposed Project have proposed producing a relatively large amount of water during the short-term construction portion of the project, which could potentially cause direct well interference impacts from the water demand in these shorter durations of pumping.

To evaluate potential impacts from short-term pumping of groundwater on the Rugged and Tierra del Sol sites, the County Groundwater Geologist requested that two additional analysis be provided in addition to the 5 year projection of drawdown, including: (1) a short-term 90 day drawdown analysis to evaluate the peak construction demand, and (2) a 1 year drawdown analysis to evaluate drawdown during the anticipated one year construction period.

These adjustments to the County Guidelines essentially increase the temporal resolution of the analysis, and increase the ability to detect short-term significant impacts, if present. Furthermore, the well interference analysis did not include the effects of recharge over the 5-year period analyzed (from either direct precipitation or boundary inflows from the alluvial aquifer), further assuring a conservative analysis.

The results of this analysis for the Rugged and Tierra del Sol Solar Farms are presented in the groundwater investigation reports for each solar farm, which were included in the DPEIR as Appendices 3.1.5-5 (Tierra del Sol) and 3.1.5-6 (Rugged).

Groundwater-Dependent Habitat Criterion

The analysis for effects on groundwater-dependent habitat is similar to the well-interference analysis, except the thresholds are more restrictive, and potentially groundwater-dependent habitat must be mapped and identified so that potential impacts can be evaluated.[13] Anticipated drawdown is then modeled at the closest groundwater dependent habitat to the production wells. Determining whether thresholds are met requires knowledge of the historical low groundwater levels, which was not known for the Rugged and Tierra del Sol sites. Recognizing this uncertainty and the results of theoretical drawdown projections, the analyses for the Proposed Project identified biological impacts relative to groundwater-dependent habitat as potentially significant and thus require the implementation of a GMMP.

The results of this analysis for the Rugged and Tierra del Sol Solar Farms are presented in the groundwater investigation reports for each solar farm, which were included in the DPEIR as Appendices 3.1.5-5 (Tierra del Sol) and 3.1.5-6 (Rugged).

Other Groundwater Quantity CEQA Criteria

The groundwater quantity guidelines also include standards with respect to groundwater overdraft conditions and low well yield, neither of which is applicable to the Proposed Project. There are no fractured rock basins that have been officially documented and mapped by the County to be in an overdraft condition, and the low well yield criterion is applicable only to residential development.

DISCUSSION OF THE WHITEPAPER'S ASSUMPTIONS

The Whitepaper states that "all water resources, including surface and groundwater, originate in precipitation." It uses the 43-year and 25-year rainfall records from two climatological weather stations, identified as Boulevard and Boulevard 2, respectively, to estimate an average annual rainfall of 15.82 inches for the Boulevard area[14]. Data from these two stations are available online from the Western Regional Climate Center (WRCC 2012). The Whitepaper then presents

[13] County of San Diego, Sec. 3.3.1.4, at 19.
[14] See Ponce whitepaper, Concluding Remarks, at 15.

two water balance methods to estimate the amount of rainfall that infiltrates and recharges the underlying groundwater aquifers.[15] These two methods use quantities of precipitation, storm water runoff, evaporation and transpiration (i.e., the amount of water in versus the amount of water leaving) to calculate the amount of water available to recharge groundwater.

The Whitepaper, however, does not use these water balance methods, but instead relies on a study conducted by Scanlon et al. (2006) that synthesizes global studies of recharge in semiarid and arid regions. The Whitepaper applied the higher end (5% of mean annual rainfall) of a range of estimates of recharge to the Boulevard area. The estimated runoff coefficient utilized in the Whitepaper of 10-15% of precipitation is not sourced or substantiated, whereas the groundwater investigation reports use USDA's curve number method to make site-specific estimates of runoff.

The Scanlon paper estimated average annual recharge rates of 0.2 to 35 mm, which represented 0.1% to 5% of mean annual precipitation over large study areas of 40 to 374,000 square kilometers (km^2). The Whitepaper estimated an average annual recharge in the Boulevard area at 0.066 feet, or 20 millimeters (mm).[16]

Scanlon et al. also stated that "extreme local variability in recharge, with rates up to 720 meters per year, results from focused recharge beneath ephemeral streams and lakes and preferential flow mostly in fractured systems."[17] Groundwater production in the Boulevard area is from fractured rock that is characterized to have, as the Whitepaper states, "fast hydraulic response and low specific yield."[18] The implication being that fractured rock aquifers may receive recharge at higher rates than 5% of mean annual rainfall.

In contrast to the Whitepaper's generic estimate that 5% of mean rainfall results in groundwater recharge, the groundwater investigation reports estimated that recharge rates in the Proposed Project sites range between 6% and 12% of mean annual precipitation.[19] The groundwater investigation reports for the Tierra del Sol and Rugged Solar Farms calculated these site-specific recharge estimates using the soil moisture balance approach developed by Dr. David Huntley of SDSU and adopted by the County in the County Guidelines as an approved method to estimate recharge. These estimates included monthly rainfall data for a 30 year period, July

[15] See Ponce whitepaper, Table 4, at 18 and 19.
[16] See Ponce whitepaper, Groundwater Recharge, at 19
[17] Scanlon et al. 2006, page 3354.
[18] See Ponce whitepaper, Groundwater Recharge, at 55.
[19] Tierra del Sol and Rugged Groundwater Resource Investigation Reports (Dudek 2013).

1982 through July 2012, from both Campo and Tierra del Sol rain gauges, reference evapotranspiration data for Zone 16 provided by the California Irrigation Management Information System (CIMIS), soil moisture capacity data from the United States Department of Agriculture (USDA), and runoff data estimated using the Natural Resources Conservation Services (NRCS) curve number method.[20]

The Whitepaper states that "pumping from groundwater may proceed as long as it does not encroach upon existing groundwater rights, either natural or anthropogenic."[21] The Proposed Project has groundwater rights based on overlying landowner status and may produce water for beneficial use.[22] The County of San Diego established restrictions on the Proposed Project's groundwater use to protect other existing users and natural habitat. The County requires that well interference be limited to not cause significant drawdown (e.g., 20 feet of additional drawdown in fractured rock or 5 feet of additional drawdown in alluvium) at nearby wells and that the water table not decline more than 10 feet in response to pumping by the Proposed Project at specific monitoring wells to protect groundwater resources, including oak woodland habitat.[23]

Finally, the Whitepaper states that calculating recharge based on the surface watershed as a whole makes the resulting analysis subject to "*The Tragedy of the Commons*", where (to paraphrase) seemingly minor and incremental impacts, compounded over the whole watershed, become substantial.[24] However, the County method to evaluate the potential impacts of the proposed pumping addresses this issue by 1) using a spatial scale of 0.5-mile radial areas (502 acres) surrounding the Proposed Project pumping centers to define hydrogeological boundaries, and 2) by including an analysis of cumulative conditions (as defined in the DPEIR as other known water-intensive projects and General Plan build out). Calculation of the water balance

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20 Tierra del Sol and Rugged Groundwater Resource Investigation Reports (Dudek 2013).

21 See Ponce whitepaper, Groundwater supply, at 32.

22 As stated in The California Law of Water Rights, 'the concept of ownership of percolating water under the correlative doctrine is that such ownership lies in the public, or at least that part of the public comprising the owners of all overlaying lands, and that individual landowners have rights based upon their ownership of the overlying land but not private ownership in the water itself until it has been reduced to actual possession – just as in the case of the water of watercourses' (Hutchins 1956). Furthermore, the right to the use of percolating water, as well as the corpus of the water itself, is real property. The decree in Burr v. Maclay Rancho Water Co., as order modified by the Supreme Court, adjudged the right of the plaintiff as the owner of certain lands to take waters from the underlying supply for use on such lands and declared "that such right is parcel of said lands" (Burr v. Maclay Rancho Water Co., Calif. 1908). 'And a Federal court stated in 1950 that in California, rights to the use of groundwaters, "whether flowing, stored or percolating, are part and parcel of the land, and as such are real property" (Rank v. Krug, S.D. California 1950).

23 See the Rugged Groundwater Monitoring and Mitigation Plan (Dudek 2013c) and Tierra del Sol Groundwater Monitoring and Mitigation Plans (Dudek 2013d).

24 See Ponce whitepaper, Sustainable groundwater yield, at 53

analysis is done by using the County approved soil-moisture soil balance approach, which considers temporal effects that include climatological fluctuations over a 30 year period. The results of this analysis for the Rugged and Tierra del Sol Solar Farms are presented in the groundwater investigation reports for each solar farm, which were included in the DPEIR as Appendices 3.1.5-5 (Tierra del Sol) and 3.1.5-6 (Rugged).

DISCUSSION OF THE WHITEPAPER'S RESULTS

The Whitepaper states that "sustainable yield should be taken as a suitable fraction of recharge, the fraction varying between a conservative value of 10% and a compromise midrange value of 30%."[25] The Whitepaper makes a reference to a peer-reviewed article in the journal *Ground Water* that "values exceeding 30% require detailed hydrological and ecohydrological studies to assure that pumping levels exceeding that threshold are not likely to affect baseflow and/or riparian/upland/wetland ecosystems in the vicinity."[26] However, a review of that article indicated that no value was defined to regulate a sustainable yield to a percentage of recharge. The article did conclude, however, that "sustainable yield is a flexible concept" that is dependent on the spatial scale and definition of the hydrological boundaries of the area potentially impacted by pumping, the calculation of a water budget, and consideration of temporal effects that include climatological fluctuations.

The County's approach specifically includes the criteria proposed by the article in the journal *Ground Water*. Although the County does not dispute some of the basic theoretical premises stated in the Whitepaper, the approach ties sustainable yield to unsupported values of recharge and allowable capture. The "available" volumes of groundwater withdrawal proposed by the Whitepaper (i.e., between 10% and 30% of the Whitepaper's calculations of recharge) impart an overly simplistic view of sustainable yield.

Instead of defining a generic percentage of recharge as available for use, the County's approach evaluates potential groundwater impacts in multiple contexts using multiple measurable thresholds: groundwater in storage, well-interference, and potential impacts to groundwater dependent habitat. The County's more detailed and comprehensive approach allows for projects to be evaluated for potential significant impacts across a variety of metrics, including but not limited to excessive groundwater capture.

[25] See Ponce whitepaper, Sustainable groundwater yield, at 34.
[26] See Maimone, 2004.

Finally, the Whitepaper bases its groundwater demand totals for the Proposed Project on an AECOM water estimation sheet that is out of date, and makes the faulty assumption that 100% of the construction-related water demands is proposed to be met by onsite pumping, as described below.

Rugged Solar

The Whitepaper assumes that all construction water demands will be met by groundwater production in the Boulevard area. As discussed in the Rugged Groundwater Resources Investigation Report (Dudek 2013a), not all construction water demand will be supplied by the on-site wells. Approximately 30% of the construction water will be imported from the Jacumba Community Services District (JCSD), Pine Valley Mutual Water Company (PVMWC), and if necessary, recycled water from Padre Dam Municipal Water District (PDMWD). Groundwater Resources Investigation Reports and corresponding Groundwater Monitoring and Mitigation Plans have been prepared for both the JCSD and PVMWC.

Tierra del Sol

The Whitepaper assumes that all construction water demands will be met by groundwater production in the Boulevard area. As discussed in the Tierra del Sol Solar Farm Groundwater Resources Investigation Report (Dudek 2013b), not all construction water demand will be supplied by the on-site wells. Of the total construction water demand, a maximum of 18 acre-feet (rounded) will be supplied from the on-site supply well with the remainder supplied from off-site sources including the JCSD, PVMWC and recycled water from PDMWD.

CONCLUSION

The Whitepaper does not explicitly define the potential impacts of the Proposed Project on the groundwater resources in the Boulevard area because 1) it does not include site-specific information that defines groundwater recharge, 2) does not include a water balance analysis based on site-specific parameters (i.e., precipitation, evapotranspiration, soil moisture capacity, runoff and existing/proposed water demands), and 3) does not accurately define the scope of the Proposed Project with regards to meeting water demands. Furthermore, the whitepaper mistakenly assumes that all construction water demands will be met by on-site wells. In particular, the whitepaper applies unsupported generalities to estimate recharge to groundwater

for the Proposed Project and then uses inaccurate total project construction water demands to conclude that proposed pumping "is sure to place at risk existing natural ecosystems".[27]

More broadly, the Whitepaper's failure to identify any reason not to rely on the County's approach for managing groundwater use undercuts its conclusion that the Proposed Project must resort to imported water to satisfy their needs. By failing to acknowledge the existence of County Guidelines, or the required application of these guidelines to the Proposed Project (which includes groundwater investigation reports for each solar farm, included in the DPEIR as Appendices 3.1.5-5 (Tierra del Sol) and 3.1.5-6 (Rugged), and the development of mitigation measures for potentially significant biological impacts relative to groundwater-dependent habitat, including project-specific GMMPs), the Whitepaper's assessment of Proposed Project impacts on groundwater resources is premature and not a critique of the ability of the Proposed Project to rely on groundwater for construction and operational purposes.

In stating that "No development, no matter how lofty its aim, should place at risk existing natural ecosystems,"[28]—while also repeatedly emphasizing that "all groundwater is connected"[29]—the Whitepaper appears to contradict its own definition of sustainable yield, which includes anthropogenic groundwater rights. In fact, the Whitepaper's inherent implication is that ***any*** additional groundwater use beyond the current status quo would be unacceptable, even if the potential effects are theoretical or speculative.

Furthermore, the Whitepaper identifies many springs and seep features, but does not provide evidence that current groundwater consumption in the local area is having adverse effects on these natural ecosystems.

The purpose of the County Guidelines and the CEQA significance thresholds it contains, is to ensure groundwater impacts do not exceed defined thresholds/tolerance limits, which are based on the concept of sustainable yield. The Whitepaper does not provide useful information to determine whether the Proposed Project would exceed those significance thresholds.

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[27] See Ponce whitepaper, Sustainable groundwater yield, at 50.
[28] See Ponce whitepaper, Executive Summary, at 2.
[29] See Ponce whitepaper, pgs. 32 and 53.

REFERENCES

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Dudek 2013d. Final Groundwater Monitoring and Mitigation Plan Tierra del Sol Solar Farm Project Major Use Permit 3300-12-010, Boulevard, San Diego County, California. November 2013.

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Trey Driscoll, PG, CHG – Senior Hydrogeologist

Trey Driscoll is an senior hydrogeologist with over 10 years' experience in the environmental field. Mr. Driscoll specializes in environmental investigations, groundwater supply and remediation, and soil gas studies. Mr. Driscoll brings diverse experience to the project team and has supported numerous projects encompassing a wide range of areas. Mr. Driscoll's project experience includes municipal well design, logging, and construction oversight; municipal well destruction; soil gas surveys for methane; experiments with pilot studies for in situ remediation; water quality and hydrology technical reports; phase I and II site assessments; and exploratory groundwater investigations.

EDUCATION

Hobart and William Smith Colleges, Geneva, New York
BS, Geoscience and Environmental Studies, 2000

CERTIFICATIONS

Professional Geologist (PG), CA No. 8511 (exp. 3/31/2013)

Certified Hydrogeologist (CHG), CA No. 936 (exp. 3/31/2013)

QSD/QSP #20167

PROFESSIONAL AFFILIATIONS

National Groundwater Association

PROJECT EXPERIENCE

Development

Installation of Methane Mitigation System, City of Los Angeles, Los Angeles County, California. Designed and oversaw installation of methane mitigation system for Eleven South, a new 13-story residential building in downtown Los Angeles. Completed plans in accordance with the Los Angeles Department of Building and Safety Methane Mitigation Standard.

Soil Gas Monitoring, San Diego County, California. Managed soil gas monitoring for methane, including the collection, analysis, and reporting of data in compliance with the County of San Diego's former methane testing ordinance, for over 1,000 new homes.

Redevelopment Project, City of Chula Vista, San Diego County, California. Performed phase I site assessments for property undergoing redevelopment.

Education

School Site Monitoring Project, Santa Barbara County Education Office, Santa Barbara County, California. Project geologist/manager for indoor air quality and sub-slab vapor monitoring for school site undergoing investigation for chlorinated solvents in Santa Barbara. Work was performed under the oversight of the California Department of Toxic Substance Control.

Energy

Methane Mitigation Project, San Diego Gas and Electric (SDG&E), San Diego County, California. Inspected proper methane mitigation for transformers, service connections, and distribution trench dams as required by SDG&E.

Weldon Solar Project, Renewable Resources Group, Kern County, California. Performed a hydrology and water quality analysis to determine the potential impact of the project on drainage and to downstream water bodies.

Methane Gas Venting Systems Project, San Diego and Los Angeles Counties, California. Designed, inspected, and certified installation of passive sub-slab venting systems for methane gas.

Municipal

Municipal Water Well Installation Project, Santa Ynez River Water Conservation District Los Olivos, Santa Barbara County, California. As site geologist, supervised installation of four municipal water wells. Conducted aquifer pump tests and logged lithology of borehole for a project funded by the Federal Emergency Management Agency.

Municipal Assessment to Determine the Suitability for Groundwater Development, Lee Lake Water District Corona, Riverside County, California. Project manager for assessment to determine the suitability for groundwater development. Evaluated potential well sites in context of local geology and fault zones, existing wells, water levels, and water quality.

Municipal Water Supply Well Project, U.S. Department of Agriculture, Joshua Tree, San Bernardino County, California. As project geologist, prepared all contract documents, including technical specifications, for project funded by a U.S. Department of Agriculture Rural Development Grant.

Resource Management

Beach Replenishment Material Evaluation, Unified Port of San Diego, San Diego County, California. Project geologist and manager for the project, which involved determining the compatibility of previously dredged material for beach replenishment in accordance with U.S. Army Corps of Engineers guidance.

Monitoring Well Installation Project, Former Crazy Horse Landfill, City of Salinas, Monterey County, California. Geologist for project that included installation of six monitoring wells at a landfill. Responsible for characterizing vertical and horizontal movement of contamination in conjunction with ongoing litigation.

High Groundwater Conditions Evaluation, Cal Sorrento Ltd., San Diego County, California. Geologist for project that involved installation of multiple wells. Conducted 5-day aquifer test to determine hydraulic properties of alluvial aquifer. Estimated theoretical well spacing required to dewater the site.

Gas Station Site Contamination, Las Vegas, Nevada. As project geologist, oversaw the installation of four monitoring wells and 10 soil borings to characterize site lithology and the vertical and horizontal extent of contamination.

Expansion of Water Treatment Facilities, Cities of Irvine and Indio, Orange and Riverside Counties, California. Prepared water quality and hydrology technical reports in conjunction with environmental impact reports performed under the California Environmental Quality Act (CEQA) for water treatment facilities undergoing expansion.

Phase II Site Assessment for Dry Cleaning Facility, Toluca Properties, City of Oceanside, San Diego County, California. Created a work plan for soil gas sampling and installation of monitoring wells, as well as collection of soil samples to determine soil properties. Conducted soil vapor extraction test to determine radius of influence. Received risk-based closure for the site from the County of San Diego.

Phase II Site Assessment for Leaking Underground Storage Tank Site, Saint Vincent's School, Santa Barbara County, California. Delineated the extent of soil contaminated and developed work plan for removal of petroleum-contaminated soil. Oversaw soil remediation and received closure for site from the County of Santa Barbara.

Evaluation of Contamination, Santa Barbara County, California. Investigated previously unknown hydraulic cylinder uncovered at site in Santa Barbara. Worked in conjunction with regulators to develop soil sampling plan to determine presence of soil contamination. Received closure on site.

Soil Analysis Project, Phoenix, Arizona. Drilled four exploratory soil borings at site to determine soil properties. Involved logging of borehole and collection of soil samples for laboratory analysis. Developed work plan and health and safety plan.

Environmental Analysis Project at MGM Mirage and Mandalay Bay Resort Group Merger, Las Vegas, Nevada. Performed an environmental due diligence audit completed for the researched subsidence in Las Vegas due to groundwater withdrawal and the potential for differential subsidence to impact building foundations. Also investigated faults and fissures in the Las Vegas Valley to determine their potential impacts.

Water/Wastewater

Monitoring Well Installation and Pump Testing, Santa Barbara County, California. Project geologist for the installation of two monitoring wells in the Monterey formation along the Gaviota Coast. Supervised the drilling, construction, and logging of the wells. Currently conducting pump testing to determine the sustainable yield in accordance with County of Santa Barbara guidance.

Water Supply Well Installation Project, City of Vista, San Diego County, California. Project geologist/manager for the installation of a water irrigation supply well for Vista Sports Park. Supervised drilling, construction, and pumping of an artesian well completed in fractured granite.

Recycled Water Storage Project, City of San Diego, San Diego County, California. Project geologist for the City of San Diego in cooperation with the U.S. Geological Survey evaluating the potential to use the Tijuana River Alluvial Basin for seasonal storage of recycled water.

Remediation Technologies Research, SPX Corporation, City of Stockton, San Joaquin County, California. Researched remediation technologies, including in situ redox manipulation, for use at a site contaminated with metals including hexavalent chromium. Also conducted stormwater investigation to determine source of metals in water. Determined that the degrading asphalt layer at the site was the primary source and developed list of potential remedial options, including phytoremediation.

Sewage Treatment Facility Percolation Study, Rancho Santa Fe, San Diego County, California. Investigated treated effluent wastewater discharges to percolation beds. Installed piezometers and monitored water levels during a percolation study.

Water Treatment Plant Hydrology Study, City of Indio, Riverside County, California. Prepared hydrology study for water treatment plant in Indio under CEQA for plan to update the facility.

Groundwater Management Plan, Rainbow Valley, San Diego County, California. Served as researcher on lithology and hydrology of Rainbow Valley for a groundwater management plan.

Relevant Previous Experience

- Supported in conducting an enhanced in situ bioremediation at two facilities contaminated with chlorinated solvents by injecting ethanol as an electron donor to promote reductive dechlorination by existing bacteria.
- Oversaw drilling of soil borings and logged lithology using both hollow stem auger and mud rotary drilling.

- Supported the implementation of in situ pilot studies using potassium permanganate as a chemical oxidant to degrade chlorinated solvents. Additionally, performed tracer test to determine aquifer characteristics.
- Oversaw geoprobe sampling of groundwater to characterize the extent of a chlorinated solvent plume.
- Prepared groundwater monitoring reports for various sites.
- Performed quarterly monitoring at chlorinated solvent and 1,4-dioxane contaminated sites. These sites are undergoing containment and remediation using pump and treat technologies
- Sampled for the presence of nitrosodimethylamine (NDMA) to determine the viability of a new municipal water well in the vicinity of a plume.
- Created and modified CADD drawings including designs for methane mitigations systems, lithologic logs, and groundwater elevation and concentration maps.