Geo-Logic
ASSOCIATES
Geologists, Hydrogeologists and Engineers

MEMORANDUM

TO: Patrick O'Neill, HDR

FROM: Sarah J. Battelle, Geo-Logic Associates

DATE: February 28, 2011

SUBJECT: **MODIFIED CONSTRUCTION WATER SUPPLY EVALUATION**
TULE WIND PROJECT
EAST SAN DIEGO COUNTY, CALIFORNIA

At your request, this memorandum is being provided to supplement the Tule Wind Farm Groundwater Investigation Report (Geo-Logic, 2010), and to address the change in anticipated water needs for the Tule Wind Project construction based on recent revisions to the project description, which reduces the number of wind turbines from 134 to 128.

1. Water Capacity Analysis in Groundwater Investigation Report

The conclusions reached in the Groundwater Investigation (Geo-Logic 2010) remain valid. The groundwater investigation revealed that the combined groundwater resources on Tribal land and Rough Acres Ranch are sufficient to accommodate the maximum anticipated pumping rate of 130 gallons per minute (gpm) during the construction of the Tule Wind Project.

2. Water Supply Analysis

The purpose of our groundwater investigation was to evaluate the available groundwater resources in the area to support project construction based on initial gross water supply needs for various construction elements associated with a 134 wind turbine project as provided by Iberdrola Renewables, Inc. (IRI). The Groundwater Investigation Report assumed the total volume of extracted groundwater to support the construction of the 134-turbine Tule Wind Project conservatively could be approximately 65 to 125 acre-feet (approximately 21 to 41 million gallons). This analysis utilized a conservative estimate of the anticipated total volume of extracted groundwater to assess whether groundwater resources had sufficient capacity to support the maximum total required project water demand over the estimated nine (9) month construction period. The report concluded that there was sufficient groundwater to support the project water needs (Geo-Logic, 2010).

However, following additional discussions with project members, subsequent to the release of the Groundwater Investigation Report, as described below, the Tule Wind Project's anticipated construction water supply demand is significantly less than that estimated in the Groundwater Investigation Report, and in line with the 17.5 million gallon estimate included in the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

2.1. Calculating the Tule Wind Project's Water Supply Demand

Based on information provided by IRI (2010) the estimated water demand has been refined. Table A (below) summarizes the project construction activities that require water (IRI, 2010). The table provides estimated water use totals for the original 134 wind turbine project, and the more recently proposed 128 wind turbine project, during the construction period. Analysis of groundwater resources in the area available for construction activity is provided in the Groundwater Investigation Report (Geo-Logic, 2010).

As provided by IRI, construction activities include turbine foundation construction, new and modified access road construction, and associated dust suppression. The construction period for these activities is anticipated to be approximately nine (9) months in length. Table A identifies the estimated water demand based on IRI's construction experience. In addition, the water demand estimates provided in the table include filling four (4) 10,000 gallon water tanks one time for fire suppression. The San Diego Rural Fire Protection District will be responsible for maintaining water tank levels for the life of the Project.

2.2. Project Construction Activities – Estimated Water Demand

1. ***Road Construction*** – Up to 120,000 gallons per day (gpd) will be required over an approximate 72-day construction period, or approximately 8,640,000 gallons of water for road construction. This amount is not anticipated to change for the 128 turbine project.

2. ***Turbine Foundation Concrete Mixing*** – Turbine foundation construction is estimated to require 7,500 to 15,000 gallons of water per foundation, depending on the size of the wind turbine selected (larger turbines require more water for their foundations). Assuming construction of two foundations per day, water demand will be approximately 15,000 to 30,000 gpd. However, if larger turbines are used (such as a 3.0 MW turbine), then less turbines would be built to create a 201 MW project. For purposes of estimating total water demand for this construction activity, 15,000 gpd (67 days for 134 turbine foundations), or approximately 1,005,000 gallons is estimated for turbine foundation concrete mixing. This amount would decrease slightly by approximately 45,000 gallons (6 turbines x 7,500 gallons per foundation) for the 128 turbine project.

3. ***Dust Suppression During Turbine Foundation Construction –*** Dust suppression activities during turbine foundation construction is estimated to require 100,000 gpd for a maximum of 67 days for 134 turbines, or approximately 6,700,000 gallons. This amount would decrease slightly by approximately 300,000 gallons (2 foundations per day, 6 less foundations x 100,000 gpd) for the 128 turbine project.

4. ***Dust Suppression During Turbine Erection*** – An estimated sixty (60) days for turbine erection will be required. During this period of turbine erection, approximately 50,000 gpd will be required for dust control on project roads, or approximately 3,000,000 gallons. This amount would decrease slightly by approximately 100,000 gallons (2-3 turbines erected per day x 50,000 gpd).

5. ***Fire Protection (Four 10,000 gallon tanks)*** – 40,000 gallons total, which constitutes a one-time filling of all four (4) 10,000 gallon tanks. There would be no change in this water supply estimate under either the 134 or 128 turbine project.

Table A (below) summarizes the anticipated water demand for the 134 and 128 wind turbine projects.

Table A
Estimated Project Construction Water Supply
for 134 Wind Turbines versus 128 Wind Turbines

134 Turbines	Daily rate (gpd)	Days	Gallons	128 Turbines	Daily rate (gpd)	Days	Gallons
Road construction	120,000	72	8,640,000	Road construction	120,000	72	8,640,000
Turbine Foundations	15,000	67	1,005,000	Turbine Foundations	15,000	64	960,000
Dust Suppression During Foundation Construction	100,000	67	6,700,000	Dust Suppression During Foundation Construction	100,000	64	6,400,000
Dust Suppression During Turbine Erection	50,000	60	3,000,000	Dust Suppression During Turbine Erection	50,000	58	2,900,000
Fire Protection - 4 tanks		1	40,000	Fire Protection - 4 tanks		1	40,000
		Total (gals)	**19,385,000**			**Total (gals)**	**18,940,000**
		Total (acre-feet)	**59.5**			**Total (acre-feet)**	**58.0**

2.3. Analysis of Construction Water Demand Reduction with 128 Turbine Project

As presented in the table above, a reduction of six turbines will reduce construction water demand during turbine foundation construction by approximately 45,000 gallons (at 7,500 gallons per turbine foundation), dust suppression during foundation construction by approximately 300,000 gallons (3 days at 100,000 gpd), and dust suppression during turbine erection by approximately 100,000 gallons (2 days at 50,000 gpd), for a total reduction of approximately 445,000 gallons (approximately 1.4 acre-feet).

The Draft EIR estimates that the construction of the Tule Wind Project would require approximately 17.5 million gallons of water (approximately 53.7 acre-feet). (Draft EIR/EIS, 2010). The modified 128 turbine project would exceed this estimate by approximately 8%, or 1,440,000 gallons (approximately 4.4 acre-feet).

The Groundwater Investigation Report conservatively assumed that construction water supply required would be 65 to 125 acre-feet and concluded that there would be a sufficient water supply available to serve this demand. Based on the revised analysis presented above, the identified groundwater supply will be sufficient to serve either the 134 or 128 turbine projects.

3. Operations

Future operational needs for the project associated with the turbine operations and maintenance (O&M) have been estimated at 2,500 gallons per day, equivalent to about two (2) gallons per minute supplied by a well to be drilled in the vicinity of the O&M building. No change in water demand associated with operation of the wind project is anticipated due to the reduction of six wind turbines.

4. Conclusion

Based on the assumptions used for the project water needs, as provided by IRI (2010) and presented herein, when comparing the 134 turbine project (analyzed in the Draft EIR/EIS) to the 128 turbine project, the reduction in wind turbines will result in an estimated reduction of approximately 445,000 gallons. The existing analysis included in our Groundwater Investigation Report dated December 2010, which evaluated a more conservative, higher water demand, supplemented by the analysis herein associated with a lesser demand and smaller impact to the local groundwater resource, demonstrates that there is a sufficient water supply available to serve the 128 turbine project. Accordingly, the conclusions reached in the Groundwater Investigation (Geo-Logic 2010) remain valid, as supplemented by the information and analysis provided herein. If you have any questions, please call me at (858) 451-1136.