PRELIMINARY SITE EVALUATION

Tessera Solar Project

Saguache County, Colorado

June 11, 2010

AMEC Geomatrix, Inc. (AMEC) was contracted by Tessera Solar North America to perform a preliminary site evaluation of a land parcel located in the San Luis Valley, and provide preliminary opinions in response to public comments received. These preliminary opinions were developed based on the review of project documents referenced at the end of this report and from a site visit on Wednesday June 9, 2010.

AMEC is a world-wide consulting firm that practices in the general fields of engineering and the applied earth sciences. AMEC has strong capabilities in environmental engineering, water treatment, surface and groundwater hydrology, engineering geology, geotechnical and foundation engineering, seismic geology, environmental health and safety, and earthquake engineering. The Durango office of AMEC specializes in civil engineering, water quality/treatment and quantitative hydrogeology.

AMEC has focused this preliminary evaluation of four questions raised in public comments. These questions are:

1. Will foundation installation have any effect on groundwater levels?
2. What effect will foundation installation have on the artesian aquifer, and will it stop the flow of water anywhere?
3. Will foundation installation have an effect on groundwater quality?
4. Is soil stable enough to support solar unit foundations?

AMEC Geomatrix, Inc.
556 Main Avenue, Suite A
Durango, CO
USA 81301
Tel (970) 764-4070
Fax (970) 764-4077
www.amecgeomatrixinc.com

GROUNDWATER ASSESSMENT

AMEC reviewed available information related to both regional hydrogeology and local groundwater conditions including a site visit on June 9, 2010 to view current surface conditions. Background material used primarily for this review included the Groundwater Atlas of Colorado (CGS, 2003), information within the Colorado Division of Water Resources (CDOWR) Rio Grande Decision Support System (RGDSS), the numerical groundwater flow model developed for the basin (as provided in the RGDSS), and various available reports and literature specific to the region. In addition, a summary of site-specific water resources was provided in the report "Description of the Surface and Groundwater Resources on the Potential Tessera Solar Site" prepared by Davis Engineering Services. The following discussion is based on our review of these sources and our visit to the site.

Regional Hydrogeology

The San Luis Valley is a north-trending structural depression that forms a basin bounded by the foothills of the San Juan Mountains to the west and the Sangre de Cristo Range to the east. The valley is underlain by as much as 12,000 feet of clay, silt, sand, and gravel deposits interbedded with volcanic flows and tuffs (Emery, et al, 1971). The alluvial deposits are generally coarse and permeable near the mountains and grade to fine-grained, less permeable deposits toward the center of the valley. These basin-fill deposits form the aquifer system within the valley, and are generally hydraulically connected with the alluvium of the Rio Grande and its tributaries.

The two major hydrogeologic units in the San Luis Valley are the upper unconfined aquifer and the lower confined aquifer, which is predominately in the Alamosa Formation (CGS, 2003). Deeper confined units also occur within the underlying Vallejo-Santa Fe Formation. A series of laterally-extensive clay layers in the Upper Alamosa Formation forms the primary confining layer between the unconfined and confined aquifers. Although the rock material comprising these aquifers is similar, their storage characteristics and water level responses are quite different (Emery, et al, 1971).

The principal components of groundwater recharge in the valley are mountain-front recharge (primarily to the deeper confined units), precipitation, irrigation return flow, streambed and ditch infiltration, and groundwater inflow. Groundwater is discharged from the system via evapotranspiration, withdrawals from wells and drains, discharge to streamflow, and underflow out of the basin into New Mexico. In the northern portion of the basin, surface and shallow groundwater flow toward a topographic low where it historically collected as a series of lakes and was discharged via evaporation and evapotranspiration. Currently, a series of groundwater wells pumps the water out of the closed basin back into the main Rio Grande basin to augment water deliveries to New Mexico.

Surface water and groundwater in the San Luis Valley are used primarily for irrigated agriculture. Surface water is distributed through a system of canals and laterals having an aggregate length of over 150 miles. In addition to these surface water supplies, over 10,000 wells have been drilled in the basin in both the unconfined aquifer and in deeper confined aquifers. Water levels in the unconfined groundwater wells are shallow and generally near the surface. Many of the wells completed in the confined aquifer are flowing artesian wells with static water levels higher than ground surface.

Local Hydrogeology

Groundwater local to the First Phase site occurs both within the unconfined aquifer and within the deeper confined aquifers. A review of the numerical groundwater model developed for the basin suggests that the depth to the confining clays in the vicinity of the site ranges from 90 to 100 feet. The thickness of the clay unit was noted as approximately 100 feet, with confined aquifers occurring beneath this zone.

Unconfined groundwater at the site is very shallow, with depths likely ranging from close to zero to approximately 8 feet deep. This is based on water levels recorded in a shallow water level monitoring well installed by the United States Geologic Survey (Well RG-10, Davis Engineering, 2009), and from observations of surface conditions at the site. Water levels in Well RG-10 have been measured consistently since 1975, and depths to water in the well have ranged from approximately 2 feet to a maximum of 6 feet, with an approximate long term average of 4.5 feet. During the site visit, greener wetlands type vegetation was observed in topographic low areas, indicating the water table is consistently very near the surface in these areas.

Groundwater in the shallow unconfined system is simulated in the numerical groundwater flow model as flowing primarily to the south-southeast of the site, toward the Close Basin pumping system. Recharge to the unconfined system in the vicinity of the site is primarily derived from infiltration from direct application of irrigation water to the surface on fields near the site, infiltration from numerous surface ditches conveying irrigation water near the site, from irrigation return flows from fields near the site, and from direct precipitation. Irrigation activities were observed to occur generally upgradient of the site (i.e. north and northeast of the site), while no direct application of water was observed at the site or downgradient of the site (i.e. to the immediate south and southwest of the site). Discharge of shallow unconfined groundwater occurs as through-flow toward downgradient areas and as evapotranspiration from vegetation in topographically low areas.

As noted by Davis Engineering, a total of 16 decreed water wells exist on the First Phase property. These wells all penetrate the confined aquifer and are at least 250 feet deep. All of these wells are small capacity (~ 50 gpm or less) and are decreed for stock water and limited irrigation. Water levels in these wells are generally near or just above ground surface, and thus the wells are artesian. During the site visit, a single deep well was observed. This well was not in active use, but had water reporting to the surface likely through leaks in the well head piping or valves. The water at the surface near this well is a direct indication of flowing artesian conditions of the confined aquifer beneath the site.

Groundwater in the confined system is simulated in the numerical groundwater flow model as flowing primarily to the south of the site The majority of recharge to the confined system occurs as mountain-front recharge at considerable distances from the site. This recharge occurs at higher surface elevations in mountain foothill areas, and thus accounts for the observed artesian conditions (i.e. there cannot be significant recharge to the system local to the site). Discharge from the confined groundwater system beneath the site is primarily as flow to the surface through wells (when active) and as through-flow to downgradient areas.

Groundwater Issues

AMEC has developed the following opinions related to the groundwater issues noted at the beginning of this report. These opinions should be considered general and preliminary, and should be revisited as part of ongoing planning, design, and operations at the site.

Will foundation installation have any effect on groundwater levels?

As noted, groundwater in the unconfined system is primarily sourced from infiltration from water added at the surface as part of local irrigated agriculture activities. Groundwater flows through the unconfined system generally from the north-northeast across the site toward the south-southwest. A significant number of foundations for the solar units will be installed into this groundwater flow system. The foundations should not impact groundwater flow or groundwater levels, as shallow groundwater will simply flow around the foundations and continue flowing in a southward direction toward the Closed Basin pumping wells.

From a broader project perspective, changes in water use at the property could have an impact of local groundwater level and flow conditions. As noted, most of the water enters the shallow groundwater system as a result of both local and regional application of irrigation water. Once the project is complete, water previously applied as irrigation to the site will no longer be applied, but will instead be used primarily to periodically clean the solar units. Changing the amount water applied as irrigation with water used to clean the units may result in reductions of direct recharge to the shallow groundwater system at the site, and groundwater levels at the site may decline as a result.

However, this modification in water use at the surface will have no effect on regional and local irrigation applications upgradient of the site, which likely provide the majority of recharge to shallow groundwater flowing through the site. As such, local modifications to water use at the site would be expected to have limited or no impact on groundwater levels in the unconfined aquifer at the site.

What effect will foundation installation have on the artesian aquifer, and will it stop the flow of water anywhere?

As noted, the clay units that result in the separation of unconfined and confined groundwater beneath the site range from 90 to 100 feet deep. This is significantly deeper than the expected depths of the foundations, and as such the foundations will not penetrate or impact the confining clays or the artesian aquifer.

The only action that could impact the local artesian aquifer would be a significant increase in local pumping that would result in decreased water levels and affect the direction of deep groundwater flow. The project does not include increased pumping from the confined aquifer; therefore there will be no impact of this type.

Will foundation installation have an effect on groundwater quality?

The foundations of the solar units will be installed into the shallow unconfined groundwater system, as discussed in the geotechnical section. It is anticipated that the unit foundations will be driven into the soil from the surface. The material comprising the foundations of the units should be chemically inert, and thus will not pose a chemical risk to local groundwater.

Limited and short term impacts to water quality of the shallow groundwater at the site could occur from standard construction activities, such as highly localized oil and gas leaks from vehicles, etc, similar to any other large construction project.

GEOTECHNICAL ASSESSMENT

Based on review o f the Geologic Suitability Study completed by Mountain Engineering and Testing, Inc. dated November 2, 2009, the site is located within Saguache County, Colorado. The project will consist of developing a 200 MW solar plant consisting of 25 kilowatt-electric SunCatchers solar arrays over an area of approximately 1,500 acres.

As evidenced by the laboratory program to date and field density tests, the subsurface soils on site consist primarily of medium dense to dense silty sands (SM), poorly graded sands (SP), and silty gravels (GM). The water table was encountered at the time of the investigation at a depth of approximately 7 feet. It should also be noted that the water table was observed at the surface in numerous areas during a recent site visit conducted by AMEC.

Is soil stable enough to support solar unit foundations?

The proposed method of foundation construction will consist of driven piles to an anticipated depth ranging between 15 and 20 feet. Driven piles are typically used to transmit the applied loads from the proposed structure to the underlying stronger soil layer. The resistance from the applied load is primarily developed from the frictional resistance at the soil-pile interface. Pile foundations also resist horizontal forces by bending while supporting the applied vertical load. Based on preliminary soil and foundation analyses, the above proposed foundation type appears to be suitable for the bearing pressures anticipated to be applied by the SunCatchers due to uplift and wind loads. No geologic fatal flaws were noted by the field investigation, although a site specific seismic hazard analysis may be warranted given the close proximity of the project site to a Quaternary fault system.

However, additional geotechnical investigations consisting of excavating test pits and advancing geotechnical borings is recommended to further delineate subsurface conditions and/or fatal flaws.

Samples obtained from the field investigation should be integrated into a laboratory field program to further evaluate the foundation soil engineering characteristics. With an additional geotechnical investigation, the pile foundation depth, diameter and type can be optimized.

REFERENCES

Colorado Geologic Survey, 2003, Groundwater Atlas of Colorado, Special Publication 53 (http://geosurvey.state.co.us/wateratlas/index.asp).

Colorado Department of Water Resources, Rio Grande Decision Support System - http://cdss.state.co.us/DNN/RioGrande/tabid/57/Default.aspx

Davis Engineering Services, Inc., 2009, Description of Surface and Groundwater Resources on the Potential Tessera Solar Site, July-September.

Emery, P.A, A.J. Boettcher, R.J. Snipes, and J.J. McIntyre, Jr. 1971, Water Resources of the San Luis Valley, South-Central Colorado, United States Geological Survey Hydrologic Investigation Atlas 381.

Mountain Engineering and Testing, Inc., 2009, Geologic Suitability Study Proposed Tessera Solar Project, November.