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Subject: Response to Comments regarding Impacts to Special-status Wildlife Species for the Aggie Research Center Project

The City of Davis invited public comment on the scope of its Draft Supplemental Environmental Impact Report for the Aggie Research Center (ARC) Project on November 15, 2019. The City received a comment letter from Dr. K. Shawn Smallwood (16 December 2019). The letter comments on potential project impacts to wildlife posed by renewable energy generation, particularly solar power. The purpose of this letter is to respond to these comments.

Some comments address impacts birds and bats from wind turbines. The comment stems from the Mace Ranch Innovation Center's (MRIC) project materials and, specifically, to an artist's conceptual rendering of what types of renewable energy generation might be used at the MRIC project. The ARC applicant has decided not to utilize wind turbines for the Project, however, so these comments are no longer applicable.

Dr. Smallwood comments that a "large collection of data and fatality monitoring reports from industrial solar projects" indicate "high avian fatality rates caused by birds colliding with the panels – not just waterbirds resulting from the so-called 'Lake Effect'". This response will consider the scale and arrangement of the solar installations where bird mortality data has been recorded based on publicly available data.

Solar installation scale is roughly classed into two or three categories of output (Walston et al. 2015). Residential scale installations include rooftops, and range from 5 to 20 kW output, on average. Commercial/industrial scale solar is not well-defined in the literature, but generally references installations that power a specific facility or facilities. Output from commercial/ industrial facilities range from ~1 to 2 MW for smaller commercial to 80 to 390 MW for major corporations (Apple, Google, Amazon, etc.), as reported by Solar Energy Industries Association (SEIA 2019).

Utility scale installations are considered to be ground-mounted facilities that generate more than 1 MW (Walston et al. 2015, Moore-O'Leary et al. 2017) or 5 MW (Ong et al. 2012) of power. Utility scale installations, by definition, feed into the power grid for purchase by consumers, and can generate up to 550 MW of power.

Studies in the literature that discuss the impacts of solar installations on birds typically address large utility-scale installations (see reference list). Most of the studies analyze projects producing 250 or more MW of power. The smallest project for which data is available, a site in South Africa, is 96 MW. (Visser et al. 2019.) The size, configuration and location requirements of these installations can make them particularly susceptible to bird strikes. The installations are composed of fixed or tracking photovoltaic (PV) solar panels, or heliostat (mirror) panels in parabolic trough or concentrated solar power (CSP) systems. CSP systems use heliostats to reflect sunlight to water in a central tower, heating the water and generating energy from the steam.

All three of these types of large-scale utility installations consist of concentrated panels in continuous rows or concentric circles, covering large areas. Larger photovoltaic (PV) plants use between 5.8 and 9.0 acres of land per MW of power produced (Ong et. al 2012). Because of their size and other environmental requirements (flat, open areas), these plants are ordinarily sited in natural, undeveloped areas on public land (Ong et al. 2012, Cameron et al. 2012). The presence of ponds adjacent to these installations, particularly in deserts where water is scarce, has been posited to create a "lake effect," in which birds mistake panels reflecting the sky for water, leading to collisions (Kagan et al. 2014). It was also hypothesized that birds were attracted to the source of polarized light reflecting off heliostats (Kagan et al. 2014). In systems that use heliostats, birds can also be killed by the heat from the panels, or in CSP systems, from the concentration of heat near the central tower (Kagan et al. 2014, WEST 2016).

Based on the preceding discussion, the potential impacts to wildlife, particularly avian species, at ARC is expected to be minimal. The solar installation at the ARC, at full buildout, is projected to generate a maximum of approximately 11.25 MW of power. The smallest solar project for which scientific literature addressing wildlife impacts is available is a 96 MW, 445-acre array in South Africa. (Visser et al. 2019; mortality rate was estimated to be 0.98 bird mortality per acre.) The ARC site is located adjacent to an urbanized area, as opposed to the large-scale solar farms which are typically sited in large, open space areas. The PV panels will not be concentrated in a single array, or even in one particular area. Rather, they will be widely dispersed across approximately 40 acres (22%) of the 185-acre campus on rooftops and in parking lots at varying elevations. There are no ponds adjacent to the solar panels. The nearest permanent open water feature, Lake Alhambra, is approximately 0.6-mile west from the western boundary of the Project. Due to the distance from the lake and the configuration of the solar arrays spread over the campus, it is unlikely that birds would be attracted by any "lake effect" caused by the PV solar panels.

Based on the examples in the literature, therefore, we believe that the potential for wildlife collisions with the ARC solar panels is low.

Cordially,

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