Appendix C

Casino Site Lighting Design

PIVOTAL lighting design
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March 15, 2024

Jeff Barnes
Principal
Dale Partners

Re: Koi Shiloh Casino Site Lighting Design Approach

Dear Jeff:

In review of the numerous concerns over the impact of the site and building lighting for the proposed Shiloh Casino, I offer my professional recommendations specific to the Shiloh Casino site in Windsor, CA. Comparisons have been made to other casinos and even large shopping malls, but it is unlikely that these other projects have been cognizant enough of their neighbors to include the services of a lighting designer charged with developing and implementing measures to limit the impact of electric light beyond the premises. While the project cannot claim zero impact to the surrounding community, there are a number of measures that can be incorporated into the design to reduce the impact to the nighttime environment. Acorn Environmental has recommended a number of guidelines for the project, and Pivotal Lighting Design can assist the design team and client with implementation of these strategies for the best outcomes relative to project goals and being a responsible neighbor to the residents of Windsor, CA.

The recommendations from Acorn stress careful selection and placement of luminaires which are shielded and filtered for reduced brightness and impact on the site. The prescriptive requirements include no strobe lights, flood lights, or spotlights. To this end, the project team has eliminated the large digital displays on the exterior of the events center in favor of a semi-open copper rainscreen. These screens will serve as a filter itself for a lighting system devised to backlight and provide a low-intensity dappled glow. This is the first of several mitigating efforts the team has undertaken.

Acorn also references the Model Lighting Ordinance (MLO) a joint publication from the Illumination Engineering Society (IES) and International Dark-Sky Association (IDA) which offers best practices for protecting the nighttime environment by reducing or eliminating light waste into the night sky (light pollution) or beyond the proposed property boundary (light trespass). One major recommendation from the MLO is to utilize a warm correlated color temperatures (3000K or less) for exterior lighting for reduced likelihood of blue wavelengths which stimulate the photoreceptors of humans and some wildlife.

Further, much like energy codes limit the amount of watts available for a lighting installation, the MLO proposes limits on lumens, the unit of light energy, based upon application and the context of the site. Both energy codes and the MLO propose default lighting zones to determine what tier of limitations apply based on five tiers from 0-4. For this project site, the MLO context is LZ1 (lighting zone level 1) for low-density residential areas, though pockets within the site are permitted to be zoned for LZ2 for light commercial and business districts. The attached site graphic denotes the intended pockets in

which the LZ2 designation is desired whereas the site overall will be designed for LZ1 to maintain a nighttime condition consistent with the surrounding residential areas. In addition to total allowable lumens, the MLO governs how light can be distributed out of the luminaires with stricter requirements for lower lighting zones in proximity to the project boundaries.

With these guidelines in mind, various strategies and mitigating efforts have been discussed with the architectural team based on the early imagery.

Strategy #1 – Identify an appropriate project boundary. The property line shall be considered the boundary where abutting vineyards and undeveloped areas along the south and east of the site. For property lines separated by public roadways, the centerline of such roadway can be considered as the project boundary, but in deference to the existing condition, the proposed site wall surrounding along Old Redwood and Shiloh Roads will be considered the boundary to create a buffer zone to the residential areas. The only exception will be at the three entrances. The project boundary will be extended to the centerline of the roadway only at those locations. No illumination will be permitted beyond this project boundary, and lighting equipment at these entrances will target aiming downward and backward toward the site so that only even, indirect luminances are visible to neighbors. All signage would be illuminated in this way rather than to be internally illuminated.

Strategy #2 – Keep light oriented downward. Luminaires which emit light upward, above horizontal, allow the potential for that light to propagate quite far and reflect back off of cloud cover contributing to sky-glow. Discussion with the architectural team has identified accent lighting at the entry canopy to the casino which can be re-integrated in a downward orientation to avoid this.

Strategy #3 – Capture any upward light. To aid this strategy, the glazed entry canopy is being revised to a solid material. This will also capture light reflected off the ground hardscape material. The lighting and landscape teams will work to coordinate less reflective materials in uncovered areas. Additionally, the MLO permits for limited lumens above horizontal in LZ1 and LZ2 zones, but effort shall be made to "capture" the light emitted upward with built or natural material.

Strategy #4 – Allow roadways to be dark. The loop road is designated for vehicular traffic, and vehicles have headlamps. The loop road will be allowed to be dark except where there is potential conflict with pedestrians or hazards such as bus parking, sharp curves, and intersections. Poles will be minimized to not more than 16ft in height to reduce area of coverage. Lighting at the front roadways will be concentrated at the points of entry, the roundabout, and intersections. Lighting between these points may be considered where shielded by sufficiently mature landscape.

Strategy #5 – Establish "no fly" zones. A buffer zone around the site will be created in which no lighting equipment will be located. This zone is indicated by the hatch pattern on the attached site graphic starting just inside the project boundary and extending inward toward roadways or structures encompassing the vineyards. These no-fly zones illustrate the intent to allow these spaces to go dark. No permanent lighting will be installed in the paved area indicated for surface parking.

Strategy #6 – Control interior spill light. The planned structures for the site require various openings and various sub-strategies are needed to address them.

- Casino/Events windows – Glazing will be minimized and primarily facing the main entryway; spill light will be utilized for backlighting of rain screens or contributing to illumination below canopies.
- Casino skylights – Shading devices will be used to black out interior light that would otherwise be wasted into the night sky.
- Hotel – Guest room windows facing Shiloh Road and the creek will be minimized, and automated shading and lighting sequences will be employed. A reliable presence detection method such as room-key docking will be used to enable lighting and also lower shades at sunset. The interior room lighting will also be developed with consideration of luminaire placement relative to windows.
- Parking structure lighting – A minimum of openness is required around the structure. Solid walls are planned for the most sensitive exposures with a parapet wall wrapping all other exposures to contain reflected light. Lighting placement and luminaire distribution will be carefully coordinated to contain direct light onto the parking garage footprint. Further, automated controls will reduce light levels when occupants are not detected. The top level poses the greatest challenge to controlling light pollution. Pole lights will be located interior to the parking surfaces so that all emitted light can be useable on the parking surface. Sight lines will be studied to ensure the lighting equipment is not visible from common angles of adjacent properties, and the lighting team will explore material options for the parking surface to reduce reflectance.

Additional strategies have been developed specifically to protect the wildlife within the creek running through the site.

Strategy #7 – Create internal project boundary at the creek. The riparian line will be used to establish an internal project boundary in which no illumination will be permitted. Consequently, a lighting "no-fly" zone is also created on either side of the creek riparian lines extending to the building structures and out to the project site boundary. As the width of the riparian line narrows toward the north of the site, the no-fly zone will be maintained to at least the width set by the building separation.

Strategy #8 – Cordon off utilitarian light. As noted for control of interior light spill, the sides of the parking deck facing the creek will be solid. A wall with a gate will also be constructed around the service yard to shield the creek from work lights which will be automatically controlled-off when not in use.

Strategy #9 – Leverage technology. The compelling natural, daylit views from the bridge over the creek can be maintained by incorporating electrochromic glass which can be automatically shaded when electric pathway lighting is required to contain electric light within the bridge. The glass can be fully transparent when daylight is present.

All of these strategies will be employed, but the success of the aggregate implementation will be evaluated with a full 3-dimensional light spill analysis performed at the conclusion of design development allowing corrective action to be implemented prior to construction documents.

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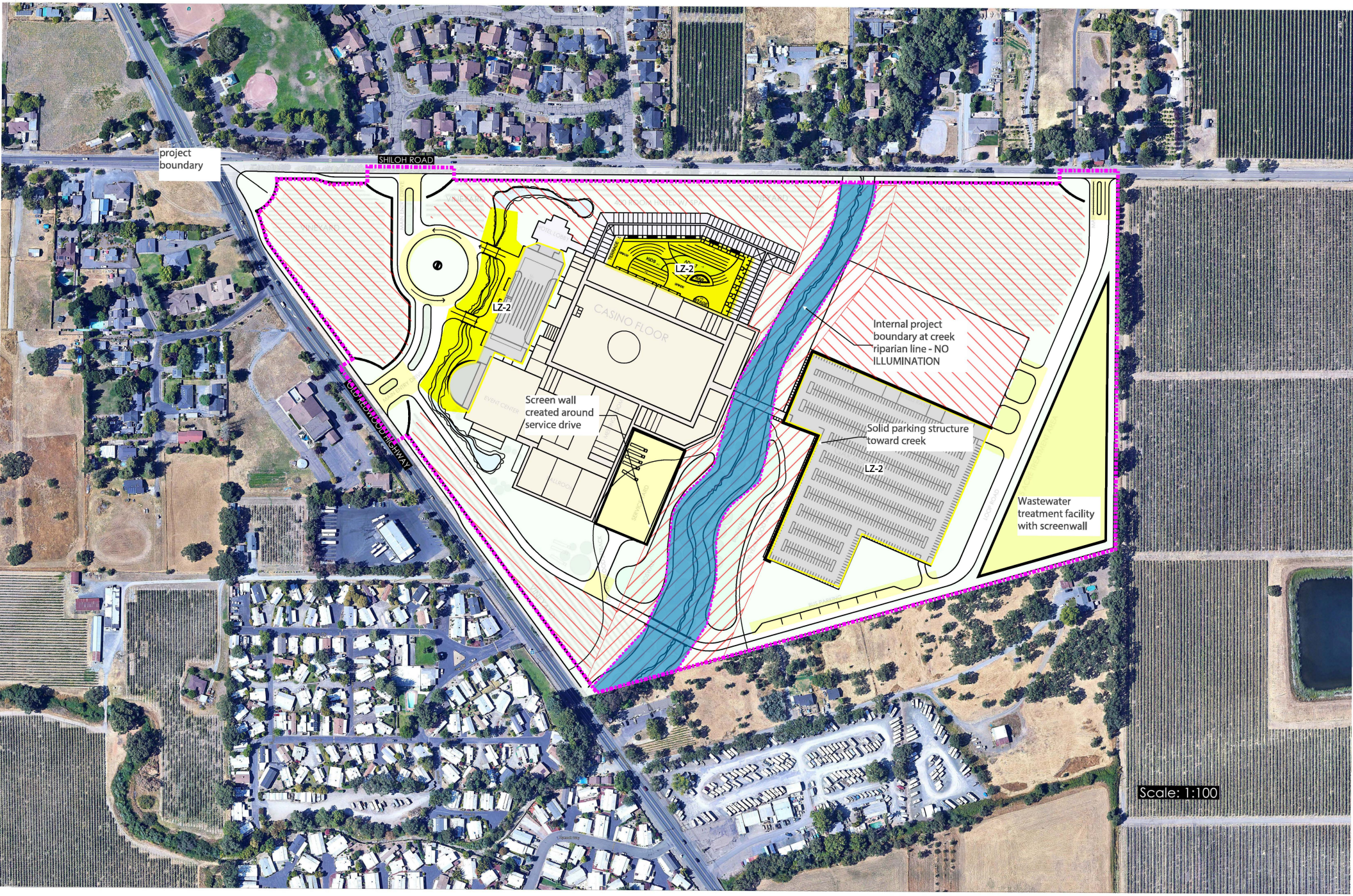
Best Regards,

Leah Robinson, PE, LC, MIES
Senior Lighting Designer


project boundary
SHILOH ROAD
LZ-2
LZ-2
CASINO FLOOR
Internal project boundary at creek riparian line - NO ILLUMINATION
Screen wall created around service drive
Solid parking structure toward creek
LZ-2
Wastewater treatment facility with screenwall
Scale: 1:100