CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
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W11a

Link to Staff Report Addendum dated October 7, 2013

DATE: September 27, 2013

TO: Coastal Commissioners and Interested Persons

FROM: John Ainsworth, Senior Deputy Director
Steve Hudson, District Manager
Barbara Carey, Supervisor, Planning and Regulation
Melanie Faust, Coastal Program Analyst

RE: **Pepperdine University Major LRDP Amendment No. 1-11B ("Campus Life Project")** (Determine final location, orientation and management of upper Marie Canyon playing field and install sports field lighting to allow year-round, unlimited night use of the field) public hearing and action (Agenda Item W11a) at the October 9, 2013 Commission meeting in San Diego.

SUMMARY OF AMENDMENT

Pepperdine University proposes to amend the certified Long Range Development Plan (LRDP) for its 830-acre, Malibu-area campus. LRDP Amendment (LRDPA) 1-11B would: (1) delineate the final location, orientation and layout of the previously approved (in LRDPA 1-11A) upper Marie Canyon sports playing field and restrooms; (2) direct the management of the associated landscaped area, and (3) authorize installation and use of new, permanent, stadium-type, outdoor playing field lights, including extension of electrical service to the western side of the canyon.

The proposed sports field lights consist of six, 80-foot high poles, three per side on the long axis of the future 240-foot by 360-foot playing field, each pole supporting four angled, downward directed, shielded fixtures with 1500-watt metal halide bulbs in each fixture (6,000 watts/pole for a total bank of 36,000 watts of lighting power) mounted at an elevation-equivalent of 645 feet above sea level (above the 565-foot future field surface).

The Commission must take **final action** on LRDPA 1-11B at the October meeting in accordance with the timeline detailed in Section III (C) on page 8, below.

SUMMARY OF STAFF RECOMMENDATION

Together, LRDPA 1-11A and 1-11B would authorize the University's Campus Life Project. LRDPA 1-11A was approved by the Commission at the December 13, 2012 Commission meeting and effectively certified on September 11, 2013, and included almost 400,000 square feet of new structural development, approximately 640,000 cubic yards of grading (total), and extensive new sports program facilities, including a two-acre recreational sports field in upper Marie Canyon. The Campus Life projects are designed to develop campus housing, sports facilities, parking, and community spaces within the approximately 230-acre lower campus, where Seaver College (Pepperdine's undergraduate program) is located. The approximately 50-acre, upper (graduate) campus that was completed in 2003 was not included. As a private college, Pepperdine plans to construct the projects over a period of approximately twelve years

as sponsorship is secured through the "Campus Life Project" fundraising campaign. The complete list of Campus Life Project components is provided in Section IV below.

LRPDA 1-11B is the subject of this staff report. Staff is recommending that the Commission approve Long Range Development Plan (LRDP) Amendment 1-11B with two suggested modifications, which would prohibit lighting of the approved recreational field in Marie Canyon and require the submission of a Recreation Area Management Plan.

Pepperdine proposes to install high performance, stadium-type sports lighting at the Marie Canyon playing field, and to allow unrestricted year round night use of the site. For the reasons discussed below, staff recommends that the Commission find that the proposed lighting would both pose a significant risk of substantial adverse impacts to habitat within the canyon's chaparral ESHA that cannot be mitigated, and adversely impact public coastal access and public use of coastal recreational amenities by diminishing the ability of coastal visitors to enjoy dark sky views from beaches, trails and parks. High intensity lighting in this location could result in adverse impacts to the dark sky character of Malibu and the Santa Monica Mountains. Restriction of the hours of nightly use of the facility would not sufficiently mitigate the impacts of the lighting, in part because significant (though not exclusive) use of the canyon ESHA habitat by crepuscular wildlife occurs in the hours from dusk to mid-evening, and near dawn. In addition, time restrictions would not sufficiently mitigate impacts to public access, recreation or visual impacts because most parking lots providing access to publicly used trail routes with views of the subject site close by 10:30 p.m. according to Pepperdine, limiting any mitigating benefit that lighting curfews might have for reducing project impacts on the dark sky character of trails used for night hikes. The modifications recommended by staff would prohibit outdoor lighting of the Marie Canyon recreation area, and require the submission of a Recreation Area Management Plan.

Pepperdine asserts that light pollution currently emitted by four, 28-foot high lights installed in 1984 for a riding arena abandoned in 1999 constitutes an existing "baseline" and that the current proposal would be an improvement in that it would result in less significant light impacts to the ESHA. Commission staff has determined that both the 1984 lighting and the arena that the lights served were installed without necessary coastal development permits, though Pepperdine disputes this. Even if the current proposal were an improvement over the existing conditions, the fact that a proposal compares favorably to existing unpermitted development cannot be used as the basis for approval of the new development as explained in Section IV below. Finally, regardless of the legal status of the existing lights, LRDPA 1-11 calls for complete redevelopment of the subject upper Marie Canyon area (see complete project description in Section IV below), and as such, the proposed lights must be considered on their own merits. All of this is discussed in detail in Section IV below.

Staff recommends therefore that the Commission **deny** the proposed Pepperdine University LRDP Amendment 1-11B, as submitted and **approve** the amendment subject to suggested modifications. The **motions to accomplish this commence on Page 4** of this staff report. The standard of review for the proposed amendment to the certified LRDP, pursuant to Sections 30605 and 30512(c) of the Coastal Act, is whether the LRDP, as amended, meets the requirements of and is in conformance with the Chapter 3 policies of the Coastal Act.

For additional information or for instructions on submitting written comments, please contact Melanie Faust at the North Coast District Office at (707) 826-8950.

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Substantive File Documents: Pepperdine University Long Range Development Plan (originally certified in 1990), as amended; "The Malibu Miracle, a Memoir," by William S. Banowsky, President Emeritus, Pepperdine University, 2010, Pepperdine University Press.

EXHIBITS

Note: Exhibits 1-11 courtesy of Pepperdine University. Some exhibits may appear in color in the on-line staff report available at the Commission's web site: www.coastal.ca.gov

Exhibit 1. Regional Map
Exhibit 2. Malibu Area Map
Exhibit 3. Aerial View of Pepperdine University & Malibu Area
Exhibit 4. Campus Life Project Component 5 Boundary, including Recreation Area
Exhibit 5. Recreation Area Proposed Layout, Upper Marie Canyon
Exhibit 6. Profile View – Recreation Area, Upper Marie Canyon
Exhibit 7. "Qualite International Series" Sports Field Light Specification
Exhibit 8. Visibility from Trail Corridors north of Recreation Area
Exhibit 9. Visual Simulation of Recreation Area View from Trail Corridor
Exhibit 10. View of Upper Marie Canyon Recreation Area Site from Pacific Coast Highway
Exhibit 11. Existing Globe Lights Proposed for Replacement in LRDPA 1-11A
Exhibit 12. Memorandum of Commission Staff Ecologist Jonna Engel, Ph.D., August 23, 2013
Exhibit 13. Supplemental Memorandum of Dr. Engel, September 26, 2013
Exhibit 14. Mr. James Benya Technical Lighting Critique and Curriculum Vitae

I. MOTIONS AND RESOLUTIONS

A. DENIAL OF LRDP AMENDMENT CERTIFICATION AS SUBMITTED

Motion I:

I move that the Commission certify the Pepperdine University Long Range Development Plan Amendment LRDP-1-11B, as submitted.

Staff Recommendation for Denial:

Staff recommends a **NO** vote. Following this staff recommendation will result in failure of this motion to pass, denial of certification of the proposed Long Range Development Plan Amendment as submitted, and the adoption of the following resolution and findings. The motion to certify passes only by an affirmative vote of a majority of the appointed Commissioners.

Resolution to deny certification of LRDP Amendment 1-11B, as submitted:

The Commission hereby denies certification of the Pepperdine University Long Range Development Plan Amendment 1-11B, and adopts the findings set forth below on the grounds that the Long Range Development Plan Amendment as submitted is inconsistent with the requirements of Chapter 3 of the Coastal Act. Certification of the LRDP Amendment as submitted would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse effects that the approval of the Plan would have on the environment.

B. CERTIFICATION OF THE LRDP AMENDMENT WITH SUGGESTED MODIFICATIONS

Motion II:

I move that the Commission certify Pepperdine University's LRDP Amendment 1-11B, if it is modified as suggested in the staff recommendation.

Staff Recommendation to Certify the Amendment with Suggested Modifications:

Staff recommends a **YES** vote. Passage of this motion will result in certification of the Long Range Development Plan Amendment only if modified as suggested. The motion to certify passes only by an affirmative vote of a majority of the appointed Commissioners.

Resolution to certify LRDP Amendment 1-11B, with Suggested Modifications:

The Commission hereby certifies the Pepperdine University Long Range Development Plan Amendment 1-11B, if modified as suggested, and adopts the findings set forth below on the grounds that the LRDP, as amended and as modified, is consistent with Chapter 3

of the Coastal Act. Certification of the LRDP Amendment if modified as suggested complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the LRDP Amendment on the environment, or 2) there are no further feasible alternatives and mitigation measures that would substantially lessen any significant adverse impacts of the LRDP Amendment on the environment.

II. SUGGESTED MODIFICATIONS

The Commission hereby suggests the following modifications to the proposed Pepperdine University Long Range Development Plan Amendment 1-11B, which are necessary to make requisite Coastal Act consistency findings discussed in Section IV, below. If Pepperdine University accepts and agrees to each of the suggested modifications within six (6) months of Commission action, LRDP Amendment 1-11B will become effective upon Commission concurrence with the Executive Director's finding that this acceptance has been properly accomplished.

New text recommended by Commission staff is shown in <u>underline</u>. Other suggested modifications that do not directly change LRDP text, such as directives, are shown in 12-pt. *italics*.

Suggested Modification 1:

The sixth bullet of the policy recitations in the LRDP "Visual Resources" section shall be revised as shown below

- Campus Lighting

(A) Existing "globe" style outdoor light installations throughout the campus should be replaced with new light fixtures designed to minimize sky glow and light trespass in adjacent areas. In accordance with the University's proposal pursuant to LRDP Amendment 1-11, concurrent with the implementation of the "Campus Life Program" development, all existing "globe" style outdoor light installations throughout the campus shall be replaced with modern light fixtures designed to minimize sky glow and light trespass in adjacent areas, consistent with the provisions of Section B below, in accordance with the schedule and locations proposed by the University and appended to the LRDP.

(B) New outdoor campus lighting shall be designed to achieve the minimum degree of illumination necessary for public safety. Lighting shall be downward directed, shielded, energy efficient, dark sky-compatible, and shall incorporate state-of-the-art improvements in lighting technology when replaced thereafter. Replacement bulbs or fixtures shall be upgraded to incorporate best available technology over the life of the installation. Where safety goals would be adequately met without overhead lighting, such as along pathways, ground-level directive lights or standards less than three feet in

height shall be used. Campus lighting shall be designed to minimize light trespass into adjacent non-target areas, and to limit the illumination of campus open space and sensitive habitat areas to the maximum extent feasible. Programmable timing devices shall be utilized to turn off unnecessary lights where feasible.

(C) All new field lighting of athletics facilities shall be limited to the approved locations of the Tari Frahm Rokus Field, Stotsenberg Track, and Eddy D. Field Baseball Stadium as of August 2013, within the main campus area, and installed and maintained with "Qualite" or a superior, state-of-the-art technology designed to dark sky-compatible standards. Lighting shall be minimized, directed downward, and shielded using the best available visor technology and pole height design to minimize light spill, sky glow, and glare impacts to public views to the maximum extent feasible. Replacement components shall be of at least equal or superior quality to the original installations. All sports lighting shall be designed to minimize light trespass into adjacent non-target areas, and to limit the illumination of adjacent open space and sensitive habitat areas.

Suggested Modification 2:

The following shall be included as a new bulleted policy within the ESHA section of the certified LRDP:

At the time a Notice of Impending Development (NOID) is submitted for development in Marie Canyon, north of Huntsinger Circle Drive, a "Recreation Area Management Plan" shall be included in the submittal and shall at a minimum include the specifications listed below. The NOID shall commit the University to comply with the approved plan as long as the proposed development is Marie Canyon, or any portion thereof, continues to exist. If, for any reason, such a plan is not submitted with the NOID, it shall be appropriate for the Commission to condition the NOID to preclude commencement of development until a plan meeting the following requirements is submitted:

(1) The Recreation Area in Marie Canyon shall be limited to day use, and no night lighting, whether temporary or permanent, shall be installed.

(2) The location of the 1,600-sq.-ft. restroom/storage building shall be at the southeastern portion of the Recreation Area, immediately adjacent to " Facility J" (or the "Page Terrace Parking Lot" as it is otherwise known in August 2013), east of the Recreation Area;

(3) The orientation of the day-use playing field within the Recreation Area may be adjusted from time to time within the boundaries of the Recreation Area as necessary to maintain field conditions;

(4) Management of grass turf within the Recreation Area shall be performed in accordance with the following requirements:

- No rodenticides containing any anticoagulant compounds (including, but not limited to, Warfarin, Brodifacoum, Bromadiolone or Diphacinone) shall be used.
- Use of pesticides and herbicides shall be minimized.
- Integrated Pest Management shall be implemented, which may include use of appropriate biopesticides, lining the playing field to exclude rodents, etc.

- Efficient irrigation or other management practices shall be used, to eliminate runoff from turf during the dry season or during extended dry periods during the rainy season.
- Grass cultivars that are pest-resistant shall be used.

(5) All paving, such as but not limited to walkways, shall use permeable pavement;
(6) Stormwater runoff from the playing field shall be infiltrated, detained, or retained on-site for each storm event, up to and including the 85th percentile, 24-hour storm event.
(7) If a turf field is not planted, or is discontinued in the future, the University shall submit a landscaping plan to supplement the Recreation Area Management Plan, for Executive Director review and approval, that utilizes a palette of locally native fire retardant plants that are drought tolerant and require minimal application of pesticides, herbicides, and water, and shall implement the approved plan.

III. PROCEDURAL REQUIREMENTS

A. STANDARD OF REVIEW

The standard of review for the proposed amendment to the certified LRDP, pursuant to Sections 30605, 30512(c), and 30514(b) of the Coastal Act, is that the proposed amendment must meet the requirements of and be in conformance with the Chapter 3 policies of the Coastal Act.

Pursuant to Section 13551(b) of Title 14 of the California Code of Regulations ("14 CCR"), the University's resolution for submittal must indicate whether the LRDP amendment will require formal adoption by the Board of Regents after the Commission approval, or if it is an amendment that will take effect automatically upon the Commission's approval pursuant to Coastal Act Sections 30512, 30513 and 30519. Because this approval is subject to suggested modifications by the Commission, the University must act to accept the adopted suggested modifications for the LRDP amendment to become effective. In addition, pursuant to 14 CCR section 13537(b), the University must do so within six months from the date of Commission action on this application. Finally, the other requirements of 14 CCR Section 13547, which provides for the Executive Director's determination that the University's action is legally adequate, must occur before the LRDPA shall be effective.

B. NOTICE OF IMPENDING DEVELOPMENT

Section 30606 of the Coastal Act and 14 CCR sections 13547 through 13550 govern the Coastal Commission's review of subsequent development where there is a certified LRDP. Section 13549(b) requires the Executive Director or his designee to review the notice of impending development (or development announcement) within ten days of receipt and determine whether it provides sufficient information to determine if the proposed development is consistent with the certified LRDP. The notice is deemed filed when all necessary supporting information has been received.

Pursuant to 14 CCR Section 13550(b)-(d), within thirty days of filing the notice of impending development, the Executive Director shall report to the Commission the pendency of the development and make a recommendation regarding the consistency of the proposed development with the certified LRDP. After public hearing, by a majority of its members

present, the Commission shall determine whether the development is consistent with the certified LRDP and whether conditions are required to bring the development into conformance with the LRDP. No construction shall commence until after the Commission votes to render the proposed development consistent with the certified LRDP.

Pepperdine has not processed any notices of impending development concurrently with the LRDP Amendment Request 1-11.

C. PUBLIC PARTICIPATION; COMMISSION PROCESSING & DEADLINE

Section 30503 of the Coastal Act requires public input in preparation, approval, certification and amendment of any LRDP. The University held public hearings (recognized through the Los Angeles County Conditional Use Permit hearings) and received written comments regarding the projects from public agencies, organizations and individuals. The hearings were duly noticed to the public consistent with 14 CCR Sections 13552 and 13551, which require that notice of availability of the draft LRDP amendment (LRDPA) be made available six (6) weeks prior to the Regents' approval of the LRDP amendment. Notice of the subject amendment has been distributed to all known interested parties. A detailed narrative of Pepperdine University's outreach efforts associated with the Campus Life Project has been provided by Pepperdine staff.

LRDPA #1-11 was filed as complete on August 20, 2012. The Commission extended the review for one year at the October 2012 meeting. In November, LRDPA #1-11 was divided into two parts by mutual agreement of Pepperdine and CCC staff. The Commission approved #1-11A with three suggested modifications on December 13, 2012 (#1-11A was effectively certified September 11, 2013). The Commission hearing on #1-11B was scheduled for September 11, 2013 (Agenda Item W36a, staff report dated August 23, 2013), but it was postponed on September 3 at Pepperdine's request. The final deadline for Commission action is October 19, 2013. Therefore, the Commission must act on LRDPA #1-11B at the October meeting.

IV. FINDINGS AND DECLARATIONS

The standard of review applied by the Coastal Commission in evaluating Pepperdine's request to amend the LRDP is the Chapter 3 policies of the Coastal Act. The following findings support the Commission's rejection of the LRDP amendment as submitted and approval of the LRDP amendment if modified as suggested in Section II above (*Suggested Modifications*). The Commission hereby finds and declares as follows:

A. AMENDMENT, CONTEXT & ENVIRONMENTAL SETTING

Pepperdine University's 830-acre Malibu-area campus is located west of Malibu Canyon Road and north of (and immediately adjacent to) Pacific Coast Highway (see Exhibits 1 – 3). The Malibu Country Estates subdivision shares the southwestern border of the campus (Exhibit 4), and open spaces surround most of the remainder. The southern portion of the campus is bounded on the east, west, and south by the City of Malibu (population 12,000), which was incorporated in 1991. The Malibu Bluffs Recreation Area and the Malibu Bluffs Community Park are located south of the campus and Pacific Coast Highway. The campus lands and areas to the north of the campus are located within unincorporated Los Angeles County (see Exhibit 3). The entire

campus is located within the Coastal Zone; therefore development on the campus is subject to the Coastal Commission's review authority pursuant to the Pepperdine's certified Long Range Development Plan. The LRDP was effectively certified in 1990 (see also Background, Section B below). Because Los Angeles County does not have a certified Local Coastal Program, prior to certification of the LRDP, development on the campus was subject to the Commission's direct coastal development permit jurisdiction.

Pepperdine proposes to amend the certified Long Range Development Plan (LRDP) for its 830-acre, Malibu-area campus. LRDPA 1-11B would (1) delineate the final location, orientation and layout of the previously approved (in LRDPA 1-11A) upper Marie Canyon sports playing field and restrooms; (2) direct the management of the associated landscaped area; and (3) authorize installation and use of new, permanent, stadium-type, outdoor playing field lights, including extension of electrical service to the western side of upper Marie Canyon and specifically consisting of six, 80-foot high poles, three per side on the long axis of the future 240-foot by 360-foot playing field, each pole supporting four angled, downward directed, shielded fixtures with 1500-watt metal halide bulbs in each fixture (6,000 watts/pole for a total bank of 36,000 watts of lighting power) mounted at an elevation-equivalent of 645 feet above sea level (above the 565-foot future field surface).

LRDP Amendment Request 1-11A and 1-11B (Campus Life Project)

In August 2012, the University submitted a complete amendment request, LRDP Amendment #1-11, to incorporate the University's Campus Life Project in the LRDP. In October 2012, the Commission extended the time for review of the amendment request for one year. In November 2012, #1-11B of the amendment was separated from the larger part of the amendment (#1-11A) by mutual agreement between Pepperdine staff and Commission staff, to allow additional time for Commission staff to further analyze the potential visual and habitat impacts associated with the placement of stadium type lighting on the periphery of the campus adjacent to wild canyon habitat and sensitive chaparral habitat which was within the area affected by #1-11B.

The list in the following paragraph summarizes the Campus Life Project components previously authorized in LRDPA #1-11A (shown in regular font) (a related plan for future baseball field lighting at the main campus sports complex is included for context, and shown in *italics* below). The remaining Campus Life Project components, which relate to the future recreation area in upper Marie Canyon, are proposed pursuant to LRDPA #1-11B, and are the subject of this staff report, are shown in the second paragraph below, in **bold underline**:

LRDPA #1-11A: (1) Student Housing (150,692 net square feet). Provide new and refurbished student housing including 468 new beds; (2) Events Center (235,845 net square feet). Construct an Athletics and Events Center with NCAA-collegiate competition volleyball and basketball facilities & practice courts, seating for 5,470 spectators, and 698 new parking spaces provided by constructing an adjacent parking structure with 265 (net) new parking spaces and converting the surface lot of the nearby law school into a tiered lot with 433 (net) new parking spaces; (3) Soccer Field & Track. Upgrade the surface of the existing, at-grade soccer field (with perimeter track), and install new high performance outdoor sports playing field lights comprised of eight, 110-foot high poles, each mounted with 192 fixtures with 2000-watt bulbs, for a 384,000-watt bank of adjustable lighting power designed to provide a playing field lighting level of 100 foot-

candles at maximum power, which is required to meet NCAA broadcasting standards. *(staff note: the certified LRDP also provides for future outdoor field lighting at the existing baseball field adjacent to the soccer field, where Pepperdine also plans to install new playing field lights comprised of eight poles ranging from 80- to 120-feet in height, with 147 fixtures with 1500-watt bulbs, for a 220,500-watt bank of adjustable lighting designed to meet NCAA broadcasting standards at maximum power)*; replace 1,000 seats with 1,000 new, permanent bleacher seats; construct a restroom/storage structure (1,500 sq. ft. building) and ten (net) new parking spaces (4) Town Square (4,500 sq. ft.). Construct a campus community "welcome" center with landscaped quad and 203 underground parking spaces; and (5) Upper Marie Canyon Recreation Area. Within an approximately 10-acre area of upper Marie Canyon, north of Huntsinger Circle Drive: a) relocate the existing debris basin approximately 400 linear feet north and extend the limits of the existing stockpile area; b) demolish and remove a portion of an existing tiered parking area and storage containers and trailers, remove perimeter fencing and four working, 28-foot high light standards with diesel generator from former arena/field on the western side of the canyon; c) fill the present location of the debris basin with approximately 300,000 cubic yards of graded material excavated from other campus construction sites (over 600,000 cubic yards of total grading), and re-grade the existing pad (former arena site) on the western slope of the canyon, incorporating the non-engineered pad material into the new, engineered pad (approximately 40,000 cubic yards of total grading); c) finish the completed new pad at a maximum surface elevation 565 feet above sea level and plant the approximately four acres of finished flat surface area with grass turf, serving as a dual-purpose, wastewater-irrigated, mowed fire break that includes a 240-ft. x 360-ft. (approximately two acres) recreational sports playing field approved for day use; d) construct restrooms (1,600 sq. ft. building).

LRDPA #1-11B: Determine final location and layout of future playing field and restrooms in upper Marie Canyon, which were approved in concept via LRDPA #1-11A; establish landscape management rules; install new, permanent, stadium-type outdoor lighting at the future playing field, consisting of six, 80-foot high poles, three on each of the long sides of the field, supporting four angled, downward directed, shielded fixtures with 1500-watt metal halide bulbs in each fixture (6,000 watts/pole) mounted at a maximum elevation-equivalent 645 feet above sea level; extend electrical service to the west side of upper Marie Canyon to power the new lights; allow year-round, unrestricted night use of the site.

Environmental sensitivity of upper Marie Canyon

The upper Marie Canyon site where the Commission approved a new sports field (via LRDPA #1-11A) and where Pepperdine now proposes the installation and year-round use of new lights is surrounded on three sides by chaparral habitat that constitutes an environmentally sensitive habitat area (or "ESHA") for purposes of Coastal Act section 30240. Commission staff ecologist Jonna Engel, Ph.D., visited the site, and has determined the presence of sensitive habitat which she describes in her memorandum dated August 23, 2013, included in Exhibit 12. The canyon slopes were designated as open space in the original certification of the LRDP. Immediately northwest of the proposed site of the future playing field lights, Pepperdine has planted and maintained a several acre native habitat restoration site that was required by the Commission as part of its certification of LRDPA #97-2, in 1998. The restoration site provides mitigation for the loss of other canyon habitat associated with the construction of a new stockpile area in upper Marie Canyon authorized pursuant to #97-2. The proposed installation and use of high

performance, stadium-type sports lighting would result in fuel modification of the native vegetation within in the restored habitat area, and would limit the function of the habitat for use by wildlife. Moreover, the canyon connects to contiguous, high quality habitat and protected open spaces leading to the nearby parklands of the Santa Monica Mountains National Recreation Area.

Comparative locations of approved and proposed campus sports field lighting

The Commission has previously authorized two other sets of outdoor sports field lighting on the Pepperdine campus. Last December, as part of LRDPA #1-11A, the Commission approved sports field lighting for the existing soccer field/track shown in Exhibit 4. Previously, in certifying the LRDP in 1990, the Commission authorized sports field lighting for the existing baseball field, which is located immediately adjacent to, and south of the soccer field. (See Exhibit 4.) The soccer and baseball fields are located within the main campus sports complex, surrounded by development. The fields are not located adjacent to environmentally sensitive habitat. The sports lighting for these fields currently planned by Pepperdine includes:

> Sports Lighting: Soccer Field & Track. Install new high performance outdoor sports playing field lights comprised of eight, 110-foot high poles, each mounted with 192 fixtures with 2000-watt bulbs, for a 384,000-watt bank of adjustable lighting power designed to provide a playing field lighting level of 100 foot-candles at maximum power, which is required to meet NCAA broadcasting standards.
>
> Sports Lighting: Baseball Field & Stadium: Install eight, 80- to 120-foot high poles, with a total of 147 fixtures with 1500-watt bulbs, for a 220,500-watt bank of adjustable lighting power designed to provide between 50 and 100 foot-candles at maximum power (outfield, infield), which is required to meet NCAA broadcasting standards.

The location where Pepperdine currently proposes a third set of sports field lighting -- upper Marie Canyon -- is unlike the location of the other main sports complex fields, which are located mid-campus, surrounded by development and in a location where the soccer and baseball fields have been in continuous use since Seaver College opened in 1972. Marie Canyon, by contrast, is surrounded on three sides by chaparral ESHA, including a native plant and habitat restoration site.

Pepperdine incorrectly relies on a comparative "baseline" analysis of light pollution

The history of the subject site (upper Marie Canyon, north of Huntsinger circle) over the past thirty years has a direct bearing on the analysis of the instant proposal for new, permanent sports lighting in upper Marie Canyon. Due to the length of time involved and the age of some of the documents and Commission actions, the subject is complicated and difficult to summarize. Nevertheless, due to the importance of the history, a condensed recitation of key points follows, including, to the extent possible, discussion of the differing perspectives of Commission staff and Pepperdine University staff (based on comments provided to date to Commission staff). The following section will discuss the history in more detail.

Pepperdine staff has emphasized that the subject canyon site contains a former horseback riding arena, and that the University continues to use four light standards (28-foot poles with metal

halide lamps) that it installed around that arena in 1984. The lights require the operation of a portable diesel generator to provide a source of power, as there is no electrical service to the western side of upper Marie Canyon where the original arena was developed. Pepperdine claims that the #1-11B proposal for new, permanent sports lights in the canyon should be favorably considered by the Commission because Pepperdine has concluded that the new lights would produce less environmental light pollution than the existing lights.

Pepperdine notes that the existing lights are mounted horizontally, which produces light spill beyond the area targeted for illumination. Pepperdine retained a lighting design consultant (Francis Krahe and Associates) to evaluate the existing lights and compare them with the lights that Pepperdine proposes to install pursuant to LRDPA #1-11B. Pepperdine's consultant determined that the proposed lights, of a more contemporary design that aims light downward toward the targeted area and shields the upward spill of light from the fixtures, would produce less light pollution than the existing lights. Pepperdine's view is that the proposed new lights would provide an improvement over the "baseline" of light pollution Pepperdine attributes to the remnant 1984 arena lights. On this basis, Pepperdine believes that the proposed new lights warrant approval.

Pepperdine's claims for the proposed new lights overlook a number of important facts that affect the analysis. The main issues are summarized in three main points:

1. As part of a complete site redevelopment, the proposed (#1-11B) sports lights should be considered on their own merits, as new development being added to a vacant area. All of the existing development in the upper Marie Canyon area (an approximately 10-acre site), including the 1984 arena lights, will be completely removed, and the entire site re-graded to construct the recreation area pad, playing field, and new sports lighting now proposed by Pepperdine. As such, it is necessary for the Commission to consider the LRDPA allowing for the new lights for consistency with the policies of the Coastal Act, without comparison to any currently existing lighting. Where, as here, existing development is being completely removed as part of a proposal, established Commission practice calls for the review of the impacts from the proposed new development on the undeveloped site.

2. The existing lights are unpermitted and therefore the existence of the lights cannot be considered as a basis to support approval of new development. Commission staff research indicates that neither the1984-vintage arena lights, nor even the pad graded into the western slope of upper Marie Canyon in approximately 1983 to support the arena for which the lights were installed, were undertaken with the benefit of necessary coastal development permits. An applicant is not entitled to rely on unauthorized development to establish a baseline or context in relationship to which new development appears favorable, as discussed in Section IV of this report.

3. The existing lights are 30 years old and have never been subjected to any form of environmental impact analysis (until now). The University has indicated that the existing lights were installed in 1984, but it has no identified any permit authorizing the lights. In

fact, the University conceded that there is no permit that expressly mentions the lights. Accordingly, there has been no Commission review of the impacts of the lights.

While the Commission staff and Pepperdine staff may disagree on some points pertaining to the history of development in upper Marie Canyon, and the status of various Commission approvals (or lack thereof), it is beyond dispute that the 1984-vintage lights have never been subjected to any form of environmental impact analysis –until now.

Existing Lights installed in 1984 – as well as the facility they were installed to illuminate – are unpermitted development

Pepperdine staff has acknowledged that there is no coastal development permit or LRDP amendment or Notice of Impending Development of record that specifically mentions the arena lights. However, Pepperdine argues that the silence in the record does not mean the lights are not approved. To understand the University's argument, it is necessary to understand the history of development and development authorization related to equestrian uses and Marie Canyon.

Pepperdine received authorization for construction of an arena at the original campus equestrian facility in 1975, when the South Central Coast Regional Commission[1] approved coastal development permit (CDP) P-4-24-75-5129. That permit authorized construction of a riding arena to the east of Marie Canyon. The regional commission subsequently approved the dismantling of that facility to make room for dormitories, in 1980. A 1981 amendment to that dormitory permit (5-81-395-A) and an associated "Haul Route Plan" clarified that the earthen material removed from the site as part of the construction of the dormitory would be placed south of Huntsinger Circle, and the equestrian facility would be relocated and placed on top of that fill.

The University argues that it was allowed to move the equestrian facility to Marie Canyon at that time, and that the reason the permit failed to specify that relocation was that cut and fill was to be balanced on the Marie Canyon site, thus making it unnecessary to include the site in the Haul Route Plan. However, there are two problems with this analysis. First, although balancing cut and fill on site could have meant that the site did not need to be included in the Haul Route Plan, that grading would still have needed to be authorized in the permit, which it was not. Second, even if the grading itself could somehow have been implicitly approved, the relocation of the existing equestrian facility to that newly graded area would have needed express authorization. Thus, the fact that neither CDP amendment 5-81-395-A nor any other permit mentioned the relocation of the equestrian facility to the Marie Canyon site meant that such relocation was not authorized. Nevertheless, sometime between 1980 and 1983, the University relocated the equestrian facility to Marie Canyon.

For whatever reason, the University did not move a barn that was adjacent to the original arena and had an attached flood light that illuminated the arena, along with the arena, leaving the arena without any lighting. In 1984, without any Coastal Commission authorization, the University added the existing lighting to the Marie Canyon arena.

[1] Prior to 1981, the Coastal Act created regional commissions that reviewed development proposals, and the statewide commission served as an appellate body.

The University also argues that even if lights were not expressly authorized for the arena, they were implicitly authorized, as any arena needs lights. There are three problems with this argument. First, the University provides no rational for why an arena could not be constructed solely for day use. Second, when the regional commission approved CDP P-4-24-75-5129, in 1975, it also approved tennis courts and specifically authorized lights on some and not other courts. Thus, the regional commission clearly considered recreational court lighting to be the sort of thing that must be addressed in a permit if it is to be allowed. Third, Pepperdine's position that arena lights should be assumed to be an approved feature of the arena in upper Marie Canyon overlooks the fact that arena lights of the type installed in the canyon never existed at the original facility and would not have been necessary if the barn and 6,000-square-foot riding ring approved for placement south of Huntsinger Circle Drive had been constructed in accordance with CDP 5-81-395A.

Pepperdine also suggests that even if the horse arena and/or the lights were not permitted (though the Pepperdine staff emphasizes that this claim does not mean the campus concedes that the arena and lights were unpermitted), a background statement in the certified LRDP (not a certified LRDP policy) that itself derives from a background statement included in the original campus Specific Plan by Pepperdine's consultant (Bright and Associates) in 1983, provides a sort of universal approval that Pepperdine interprets as conferring legitimacy on any development of any kind that existed anywhere on the 830-acre campus at the time of LRDP certification (1990), whether it was brought to the attention of staff or not: (from page 28 of the Specific Plan, 1983 edition):

> *Section IV (New Development)*
> "*AMBIENT CONDITIONS*
> *Development at Pepperdine University has been consistent with the goals, policies, rules and regulations of the County of Los Angeles (Departments/Sections of Regional Planning, Flood Control, Health and County Engineer-Facilities), Regional Water Quality Control Board, South Coast Air Quality Management District and the California Coastal Commission. Developments have been located in close proximity to existing facilities to reduce sprawl and they also have been designed to minimize energy consumption and vehicle miles traveled. The adequacy of existing infrastructure, such as sewers and spray irrigation sectors, to support existing and future facilities and the impact of growth on natural and man-made resources also have been important considerations in the planning of new campus facilities and services.*

Pepperdine's reliance on this citation is further addressed in Section C, below. As the citation is only general background text, and not a certified LRDP policy, it provides no standard or even guidance that is relevant to evaluating any specific development. The passage does not state that it is an approval of all existing development, nor can it be construed to be a blanket approval for all campus development, in particular development that Pepperdine may have undertaken but did not identify for staff evaluation at the time of LRDP certification. The initial LRDP submittal

that the Commission certified in 1989/1990[2] included a graphic depiction of all development on the campus. That document showed the retention basin in Marie Canyon and nothing else. It showed no equestrian facility in Marie Canyon. It did show a "proposed" future equestrian facility (labeled as facility #357) to be constructed some distance northwest of Marie Canyon, in the proposed upper graduate campus area, but nothing in Marie Canyon. It is also worth noting that this was so even though the original site of the facilities had been shown (as facility 14) on campus maps prior to relocation of the horse program in 1981. As such, the Commission does not concur with Pepperdine's representation that the above recitation affords "deemed approved" status for all development undertaken prior to effective certification of the LRDP in 1990, and certainly not for the equestrian facility that then existed in Marie Canyon but was specifically excluded from the map.

Certified LRDP map revised by Pepperdine without processing an LRDP amendment

As explained below, a staff review undertaken in July 2013 revealed that Pepperdine revised the certified LRDP map commencing in 1991 . Among the revisions to the map, the revision added a rectangle to upper Marie Canyon north of Huntsinger Circle Drive, west of the oval shape labeled "RB" (for "retention basin", otherwise known as the Debris Basin).

The revised map was submitted to the Commission as part of an LRDPA (#91-2), but the University did not characterize the LRDPA as being a request to approve that change, or even highlight that this particular change to the map had been made, so the LRDPA did not involve a request for ATF authorization of the existing equestrian facility. In fact, the key for this new map listed the rectangular figure (incorrectly) as an "existing and previously approved" facility. Furthermore, Pepperdine did not bring the LRDP map change to the attention of staff. The uncertified change to the map was unrelated to other development processed in the submittals. It could have been identified for a certified LRDP map amendment in that or any of the subsequent submittals, but it never was. The upper Marie Canyon arena symbol carried forward on other LRDP maps submitted for the next six years, shown as one of the "existing and previously approved facilities" according to the map legend.

It was not until Pepperdine submitted unrelated LRDP amendments in 1991, a year after the LRDP was effectively certified, that Pepperdine began including the rectangular symbol identified as "facility 357" in upper Marie Canyon (where the pad and arena were constructed in 1981) on copies of the certified LRDP Map submitted to the Coastal Commission staff in support of various LRDP amendments and Notices of Impending Development (unrelated to the horse facility) in the years that followed. The "facility 357" and symbol were not presented to staff for LRDP map amendment review, even though numerous opportunities to do so as part of other amendments processed by Pepperdine arose.

Although the upper Marie Canyon pad/arena were added to the LRDP map by Pepperdine from 1991 onward without seeking Commission certification for the change, the new barn installed south of Huntsinger Circle Drive when the original horse facilities were moved pursuant to CDP 5-81-395A was for some reason not added to the maps when the horse arena was added. The

[2] The Commission certified the LRDP with suggested modifications in September, 1989, adopted revised findings in January of 1990, and completed effective certification later in 1990.

barn did not appear until Pepperdine requested an amendment of the certified LRDP map to make this addition pursuant to LRDPA 97-2.

The relocated barn was shown on the LRDP map for the first time as part of the map change processed by Pepperdine in LRDP 97-2 (which was approved by the Commission in February 1998). The on-campus horse program was already being phased out at that time, and was permanently closed in 1999 according to Pepperdine.

Conversion of "facility 357" to other uses without LRDP amendment

Pepperdine states that the former arena was converted to an informal recreational sports playing field in 2000, after the horse program was abandoned. Since 2000, Pepperdine has installed new features such as fencing and goal nets, removed vegetation and graded an unknown volume of soil to construct an additional playing field in upper Marie Canyon, south of the upper Marie Canyon pad/arena, extended reclaimed wastewater irrigation infrastructure to both fields, and other changes. Approximately an acre of non-native grass turf was planted without a landscape management plan; the grass cover is visible in aerial photographs of the site. Site visits by Commission staff during the past year have noted that the turf has mostly died back and the fields do not appear to be well maintained.

Pepperdine allows night use of the former arena area through a sign-up program administered by the campus recreation program office. Pepperdine states that the former horse barn south of Huntsinger Circle Drive remains standing, and was converted to campus maintenance program use after the last horses were relocated in 1999. Pepperdine has not submitted an LRDP amendment or Notice of Impending Development for any of these changes in use or new development, nor LRDPA map change requests to reflect the conversion of equestrian facilities to other uses. Pepperdine did not include a change in the barn's "equestrian facility" designation on the certified map even in the current LRDPA #1-11, which still shows the barn labeled "equestrian facility" even though it hasn't been used for horse stabling for 14 years.

In 1995, Pepperdine cleaned out the Marie Canyon debris basin that is located immediately east of the arena/pad in upper Marie Canyon, removing 38,000 cubic yards of fill. The Regional Water Quality Control Board determined that the development was unauthorized and included disturbance of several acres of the Marie Canyon riparian corridor channel. The RWQCB noted in a letter copied to the Coastal Commission staff and dated January 3, 1996 that the grading, undertaken in November 1995 had placed the graded spoils in an adjacent area where it was used as fill for parking lot construction, and paved over. Commission staff subsequently determined that the area that was paved was part of the identified stockpile site shown on the certified LRDP map.

Through a subsequent LRDP amendment, the parking area was approved after the fact, and a further LRDP amendment was eventually submitted by Pepperdine, LRDPA 97-2, to secure approval for a new stockpile site to replace the previously paved-over site, further north in upper Marie Canyon. That amendment request included environmental review of the potential impacts that the proposed new stockpile grading would impose on the canyon habitat and proposed restoration of several acres of native habitat that had been damaged by erosion caused by the use of the area as part of a trail damaged by equestrian use associated with the campus horse

program (aerial photographs clearly show the eroded trail takeoff at the northwestern corner of the arena).

When Pepperdine submitted LRDPA 97-2 for the new stockpile site; Pepperdine included a request for the Commission to certify, as well, a correction of the certified LRDP map to show the campus equestrian facility "in its actual location" and to delete facility "357" from the future upper campus site shown on the certified LRDP map.

Here, it is critical to recognize the distinction between a map correction and actual authorization of a physical facility in a particular geographic location. The map that the University submitted with this request, as part of LRDPA #97-2, showed the upper Marie Canyon pad/arena as "existing and approved development", as had all of the previous amendment submittals (unrelated to the equestrian facilities) dating back to 1991, as noted above. Thus, Commission staff treated it as a clerical correction to the existing map. By separate color coding, that map that the University submitted as part of LRDPA #97-2 did also seek actual authorization of a very small number of new facilities. The green map coding shows that the only actual physical changes for which the University requested Commission review in #97-2 were the addition of a green square immediately south of Huntsinger Circle Drive, explained as the existing barn, tied to the continued representation of the arena/barn north of Huntsinger Circle, and a circular stockpile facility area (labeled as 480) northeast of the retention basin.

As well, with the submittal of LRDPA 97-2, Pepperdine included a cover letter indicating that while environmental review documents were included in the submittal for the construction that would be required to develop the new proposed stockpile site, the letter specifically stated that no environmental review was necessary for the requested map change, which would only correct the map to show the equestrian " facility 357" "in its actual location" and to delete the other, future "facility 357" site from the certified LRDP map (until this time, both the "facility 357" on the future upper campus site shown on the LRDP map and the "facility 357" labeling the arena/pad in upper Marie Canyon, were both shown on the maps submitted by Pepperdine for various amendments). Pepperdine had determined at that time (when #97-2 was submitted for Commission review) that Pepperdine would close down the horse facility, which was already winding down by then.

All of these facts are relevant to the Commission's review of LRDPA 1-11B. The main argument that Pepperdine has presented in favor of its request for Commission approval of the proposed sports lighting in upper Marie Canyon is that existing lights installed in 1984 to serve the arena in the same approximate location produce significant amounts of environmental light pollution in Marie Canyon when in use and that the proposed new sports lighting would produce comparatively less light pollution. As explained more fully below, an applicant may not rely on the existence of unpermitted development to obtain approval of new development. Therefore Pepperdine's entire theory of environmental impact analysis of the proposed #1-11B sports lights rests on asserting that the remaining 1984-vintage lights were installed with the benefit of Coastal Commission approval.

Subsequently, in the application for LRDPA 97-2, Pepperdine added the horse barn as an equestrian program feature (facility 357) on the LRDP map and removed the equestrian facility

features from the "future" development shown for the upper graduate campus site, noting that the map should be thus corrected to reflect the horse facility "as it actually exists." Pepperdine explained at that time that it no longer intended to make a permanent site for the horse facilities on the future upper (graduate) campus, and was actively phasing out the horse program at that time. Pepperdine staff submitted LRDPA 97-2 with a cover letter noting that as a map correction, the change did not require environmental review, which was necessary only for the new stockpile location that was the primary development proposed by LRDPA 97-2. Moreover, the LRDPA 97-2 map changes did not reflect the arena or the arena lights as part of the consideration because the maps showed that feature as "existing development" and only the small barn south of Huntsinger and the upper campus future development were proposed for a change from the versions of the maps that Pepperdine had previously been submitting to staff. It is important to note that LRDPA 97-2 did not review or approve the horse arena as it exists or in any way not already approved in CDP 5-81-395A.

Pepperdine was in the process of phasing out the horse program at the time LRDPA 97-2 was processed, and soon converted the barn to use by the campus maintenance program staff. The barn had been the focus of the LRDPA 97-2 map change approved in 1998, which identified it as an equestrian facility for the first time, though it had been in the same location since 1981. Pepperdine has processed numerous LRDP amendments and NOIDS in the years since the horse program was abandoned and the related facilities converted to other uses. If the required LRDPA and NOID for the change of equestrian facility use had been brought to the attention of staff, or included in any of the other LRDP map changes, amendments or NOIDS processed by the University thereafter, the proposal to continue and intensify the use of the 1984-vintage arena lights and diesel generator would have triggered the required environmental review. Instead, the lights (and barn) have been used for unauthorized purposes for thirteen years since termination of the equestrian use the lights were installed to serve, without the necessary LRDPA/NOID for such use.

All of this notwithstanding, it seems to be Pepperdine's general view that the upper Marie Canyon site represents flat recreational playing space that is in very short supply on the campus such that its use must be extended through night hours. Pepperdine states that it is not possible to expand sports facilities within the lawn area of the 30-acre Alumni Park adjacent to Pacific Coast Highway on the southern part of the campus (lighted tennis courts and an unlit, existing intramural playing field adjacent to the tennis courts are located there now), stating that expanded recreational fields would conflict with other outdoor uses of the area, would be unattractive additions to the manicured presentation lawns that frame the campus entrance, and would have lighting impacts on Pacific Coast Highway

Environmental Light Pollution is an Emerging Visual and ESHA Issue

Commission staff research has determined that night sky light pollution is an emerging regional, national and even international concern. The Commission staff ecologists note that the effects of night lighting on sensitive habitat and species is not well understood, but that new research supports the basis for concern and the need to limit light pollution to the extent feasible. The City of Malibu and the County of Los Angeles are both pursuing methods of regulating outdoor light pollution to protect dark skies. Outdoor sports field lighting, in particular, has the potential to introduce an urbanized form of light that, even with the best designs is not suited to placement

adjacent to sensitive habitat or other areas that would otherwise have relatively dark conditions at night.

Light pollution also affects public coastal access and public use of coastal recreational amenities by diminishing the ability of coastal visitors to enjoy dark sky views from beaches, trails and parks. Unlike Pepperdine's two other sets of Commission-approved future sports field lights for the central campus sports complex the upper Marie Canyon site would substantially expand active campus development into a wild canyon, on the periphery of the developed campus, and in a location that is situated at a higher elevation than the rest of the main developed campus area. The memorandum of Dr. Engel dated August 23, 2013 describes the varying forms of environmental light pollution, including sky glow. Dr. Engel has determined that even with the high quality lighting design and advanced technology proposed by Pepperdine for the Marie Canyon field lights, approximately 30 percent of the lighting reaching the playing field surface will nevertheless be reflected skyward. Under the frequent damp weather conditions common in coastal California, even the highly advanced lighting proposed by Pepperdine would create amplified "sky-glow" a significant amount of the time, and extend related impacts deep into the canyon and surrounding terrain to the detriment of species reliant on wildlife corridors (and night sky enthusiasts using the nearby trail corridors above Marie Canyon).

The northern portions of the campus include portions of the designated Malibu Canyon Significant Ecological Area, and connect through contiguous open spaces to thousands of acres of the Santa Monica Mountains National Recreation Area (the SMMNRA comprises almost 150,000 acres). SMMNRA is the largest area of protected parklands near an urban area in the United States and preserves one of the best examples of a Mediterranean climate ecosystem in the world. Publicly-used trail corridors run across the Pepperdine lands above the project site, and historically-used trails with prescriptive rights run through the center of campus, very close to the proposed location of the Marie Canyon recreation area according to Commission records. Use of the site for day-use recreation would have a negligible effect on the views available from any of the trail corridors, but night lighting could significantly increase the visual effects of the field lights as viewed from trails – and under sky glow conditions, possibly from parks and beaches south of the campus due to the higher elevation of the Marie Canyon site and the potential weather conditions during night games at the field.

Lower campus (former Marie Canyon) sites of previously approved sports lighting:
The Commission has previously authorized two other sets of outdoor sports field lighting within Pepperdine's main, lower campus sports complex (detailed in Section IV). The sports fields approved for such lighting include the existing baseball field (approved for field lights when the LRDP was certified in 1990) and the existing soccer field/track (approved for field lights in #1-11A). Other facilities within the main campus sports complex include tennis courts, swimming pool, practice fields and courts, and the campus fieldhouse.

An alternative to placing a third set of sports lights in upper Marie Canyon, where the site is surrounded on three sides by chaparral ESHA, could be the careful scheduling of the lighted playing fields that are authorized for the main sports complex facilities, combined with enhanced development of extra day-use recreational fields. Staff notes that moderate changes to the 30-acre Alumni Park lawn area, such as minor re-contouring of the previously graded area northeast

of the existing tennis courts, could expand the existing recreational sports playing field in its current location there and possibly create a second field. These measures would at least double, and possibly triple existing day-use playing field space in combination with the regulation-sized future playing field approved for upper Marie Canyon.

Upper Marie Canyon – views from trails

In addition to the Marie Canyon site's proximity to ESHA, the site is also visible from numerous locations along a publicly used trail corridor located approximately 2000 feet to the north of the Marie Canyon field site. Other historically established trails predating the development of the Pepperdine campus run through the center of the campus and branch into several routes connecting to other area trails and roadways. The Commission in certifying the LRDP in 1990 acknowledged the existence of these trails, including established prescriptive rights to the use of the trails. Exhibit 2 of the LRDP certification revised findings contains a schematic trail map of the Pepperdine campus originally published in Pepperdine's Specific Plan. The map shows the proposed realignment of the Coastal Slope Loop Trail Pepperdine indicated would be established around the northwestern campus lands, to provide trail users to an equally useful route as campus development progressed. This realignment has not occurred, but Pepperdine indicates that it has been actively working with adjoining landowners and the staff of the Santa Monica Mountains Conservancy to resolve this matter. The LRDP requires that the alternative trail route be provided; one leg of the existing, historic route passes almost directly through the upper Marie Canyon location proposed for #1-11B.

A visual simulation of the upper Marie Canyon playing field, as viewed from a publicly-used trail corridor north of the site has been prepared by Pepperdine and is included as Exhibits 8 and 9. As discussed below, the new, stadium-type lower campus sports complex field lights, which have not yet been installed though some older lights presently exist. The future new baseball and soccer field lights would be restricted to days and hours of use: for example, the field lights can only be operated at maximum NCAA-broadcasting power for ten games per year, each; and the fields can only be used until 10 pm, with allowances for overtime. These restrictions arose from a mutual agreement of Pepperdine and the Malibu Country Estates subdivision homeowners group, according to Pepperdine, and are reflected in the County's Conditional Use Permit for the Campus Life Project. Pepperdine notes that the baseball field lights are a related project, and subject to the agreements with the neighboring subdivision, but are not included in the Campus Life Project

B. BACKGROUND

Pepperdine University acquired a portion of the lands that would become the Malibu-area campus in 1968, adding additional acreage later. In 1969, Los Angeles County approved a zone change to allow the campus site to be used for educational purposes. Between 1969 and 1972, Pepperdine undertook a massive campus grading and construction campaign detailed in "The Malibu Miracle, a Memoir" by William S. Banowsky, President Emeritus of Pepperdine University, Pepperdine University Press, 2010. In 1972, the Planning Commission approved a Conditional Use Permit for the expansion of the Pepperdine's facilities. Specific Plans for campus development were not adopted under the Conditional Use Permit until December 30, 1976.

Under the Coastal Act of 1976, the campus came under the jurisdiction of the Coastal Commission. The University applied for a claim of vested rights for all facilities shown on the 1976 Specific Plan. The claim of vested rights to complete the remainder of the facilities under the 1976 Specific Plan was denied by the South Coast Regional Commission in June 1977. An appeal of this decision to the State Commission resulted in a finding of no substantial issue, leaving the denial in place.

On September 12, 1989, the Commission considered the Pepperdine University Long Range Development Plan (LRDP) for the 830-acre campus. In its action, the Commission denied the LRDP as submitted and approved it with suggested modifications necessary to bring the LRDP into conformance with the Coastal Act. These modifications related to public coastal access, hazards, visual resources, marine resources, and environmentally sensitive habitat protection. The Commission adopted findings for the September action on January 11, 1990. On February 7, 1990, the Pepperdine University Board of Regents acknowledged the receipt of the Commission's certification and agreed to the terms of the modifications of the LRDP. On April 12, 1990, the Commission concurred with the Executive Director's determination that the Board's action accepting the certification was legally adequate and sent such determination to the Secretary of Resources, thereby effectively certifying the LRDP.

The Commission approved coastal development permits for some campus development prior to certifying the LRDP. Since certification, the Commission has approved numerous amendments to the LRDP. The Campus Life Project, LRDPA #1-11, is Pepperdine's most recent amendment submittal of record, and includes almost 400,000 square feet of new structural development, approximately 640,000 cubic yards of grading (total), and extensive new sports facilities.

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C. REVIEW OF PROPOSED LIGHTS AS NEW DEVELOPMENT

The University acknowledges that the proposed installation of sports field lighting (LRDPA #1-11B) at the authorized Marie Canyon playing field (the field was approved as part of LRDPA #1-11A for day use) would introduce a significant new, permanent source of artificial night lighting to the upper Marie Canyon site. Pepperdine asserts, however that the appropriate way to consider the potential impacts of the potential light emissions of the proposed field lights is by comparison with light emissions presently produced by existing development in the same general location of upper Marie Canyon, north of Huntsinger Circle Drive. Pepperdine asserts on this basis and as discussed further below that the proposed new field lights would produce lower levels of light pollution in the subject Marie Canyon location, when compared with the existing light sources (which must be completely removed, however, to construct the approved, future Marie Canyon playing field before the new lights could be installed).

Pepperdine concludes on this basis (comparing baselines of "existing" and "proposed" light emissions in Marie Canyon), as discussed below, that the proposed upper Marie Canyon sports field lights would provide a net reduction in the amount and intensity of light pollution produced on site, thereby providing a net benefit to the Marie Canyon environment. Pepperdine further concludes that, having reached this conclusion, the direct contributions of the proposed new lights to the Marie Canyon environment are not relevant, and the lights should be approved on that basis under any standard of environmental impact analysis or application of the Chapter 3 policies of the Coastal Act.

Pepperdine disputes staff's conclusion (see extensive discussion in the Summary section incorporated into the findings by reference as though fully set forth herein) that the arena pad graded in upper Marie Canyon was undertaken without the benefit of a required coastal development permit. However, upon request by Commission staff for evidence of coastal development permit approval for the arena pad, Pepperdine replied on July 29, 2013 with (among other information) a copy of an after-the-fact grading plan for the arena pad, stamped "As Built Pepperdine University Grading Plan for Non-Structural Fill Pad" and signed "approved for grading" and "approved for drainage" by Los Angeles County staff in April 1987 – six years after the pad was constructed. No other approved plans for the pad were identified by

Pepperdine. Commission staff research of archival records found no evidence that the arena pad was ever approved.

This difference of conclusions would ordinarily be a moot point, given that all of the previous development for the graded pad, horse arena, lights, fencing, etc. discussed above must be removed – completely – including even the old arena pad which must be re-graded and incorporated into the new, engineered fill pad that will underlie the approved, future Marie Canyon recreation area (#1-11A). However, Pepperdine relies on the existence of the four remaining 1984-vintage arena light standards as the basis for approval of the new, permanent outdoor sports field lights proposed in #1-11B. As explained herein, the Commission rejects the argument of Pepperdine that the remnant 1984 lights provide a legally-appropriate basis for approval of proposed #1-11B development.

Nevertheless, the Commission evaluates redevelopment of a site that is undertaken after existing development is fully removed (as is the case here) as new development. In this way, the Commission requires a review of the proposed new development "from scratch." This means that the history of whether the development preceding the proposed new development was authorized by necessary permits or other approvals, or not does not play a part in the Commission's analysis: the proposed new development must be considered on its own merits. Therefore, with regard to the development proposed in #1-11B, the Commission hereby determines that the complete removal of the existing field and construction of the new Marie Canyon fill pad and the substantially larger playing field authorized pursuant to #1-11A is four times larger than the existing field (former arena site), constitutes complete redevelopment of the site. Therefore, the Commission must treat the new proposed field lighting as new development and evaluate the impacts of that lighting as compared to an undeveloped site with no artificial lighting. Stated differently, the existing lights cited by Pepperdine are not an appropriate "baseline" against which to evaluate the proposed upper Marie Canyon field lights.

Pepperdine's "baseline" comparison method

As stated previously, Pepperdine asserts that the ambient light emitted at night by existing development in Marie Canyon, as measured by an architectural lighting consultant retained by the University (Francis Krahe & Associates), establishes a "baseline" of ambient light conditions in the subject area of upper Marie Canyon, north of Huntsinger Circle Drive. Pepperdine states that its consultant has measured the light levels at night when all sources of lighting that may currently affect the site are in use at full power to establish the "existing baseline" of night lighting conditions in Marie Canyon.

Pepperdine has also explained that its lighting consultant separately modeled the light emissions that the consultant estimates would be produced by the operation of the proposed sports field lighting ("Qualite International Series" brand fixtures, with specified wattages and mounted at specified heights and locations, see Exhibits 4 – 7) as proposed by the University for installation at the Marie Canyon playing field site. The resultant model establishes the "proposed baseline" theoretically superimposed by the University's consultant on the proposed site based on the "Qualite" specifications, for comparison. The University's consultant has thus compared the measured "existing baseline" of the Marie Canyon playing field site with the modeled "proposed baseline" and concludes that the proposed baseline would produce a net benefit to the Marie

Canyon setting by reducing the amount of light pollution at the site, as compared with the "existing baseline."

Pepperdine's calculation of the existing baseline conditions in the subject area of Marie Canyon thus relies on the contributions of existing development in Marie Canyon to form the "existing baseline" of light emissions at the subject site. Pepperdine's consultant acknowledged that a nearby parking lot on the east side of the site contributes a small amount of light, but that most of the light pollution contributed by existing conditions is emitted by a set of four outdoor field lights (formerly installed in 1984 for the arena described above) presently located on the western side of upper Marie Canyon, north of Huntsinger Circle Drive, in the same general location authorized for the future Marie Canyon playing field. As well, most of the parking lot lights contributing measurable light to the consultant's analysis would be removed along with all of the existing field lights to construct the authorized Marie Canyon fill pad and recreation area, before the proposed sports field lights could be installed.

Pre-existing field lighting in Marie Canyon

Pepperdine has stated that the existing field lights in Marie Canyon (the lights contributing to the "existing baseline") were installed by the University in 1984. Staff research has determined, as discussed above that the previously graded pad, arena, and arena lights that were graded, constructed and installed in upper Marie Canyon between 1981 and 1984 were constructed without the benefit of required coastal development permits (though Pepperdine staff have clarified that they do not agree with staff's conclusions in this matter). The University states that the lights were placed around the perimeter of an arena used by the University's on-campus equestrian program from approximately 1981 until the program was eliminated in 1999. The subject site does not have electrical service; therefore, the lights have always required the use of a diesel-fueled generator as a power source.

Pepperdine states that in the years since the on-campus horse program ended in 1999, the administration has allowed intramural recreational use of the former arena (and converted the former barn south of Huntsinger Circle Drive to maintenance facility use). Pepperdine states that the lights still require the use of a generator and that the area is used by the campus community upon request through a sign-up system administered by the campus recreation department. Only groups including someone qualified to run the generator are allowed to use the site at night, according to the campus recreation department, and then only until 10 p.m.

Pepperdine's recreation department information explains that most of the campus intramural and club sports teams use other campus facilities (such as the recreational sports field at Alumni Park, just northeast of the lower campus tennis courts, and the practice field in the main campus sports complex) and off-campus locations (such as nearby beaches, parks and mountain trails). Pepperdine acknowledges that the former arena site (which has a flat area about 100 feet wide by 200 feet long, with sparse turf) is substandard for most organized intramural and club team sports. A visit to the site by Commission staff on October 30, 2012, and on August 7, 2013, confirmed that the conditions of the informal field do not appear to indicate regular use.

Pepperdine's lighting consultant, however, has compared the existing light levels, which are produced primarily by the remaining arena lights according to the consultant (Pepperdine states

that the remaining metal halide lights that are still in use operate with a maximum combined bank of 8000 watts of lighting power, and that the lights are horizontally mounted, two 1000-watt lights per pole, on four, 28-ft. high poles) with the proposed Marie Canyon playing field lights (which would operate with a combined bank of 36,000 watts of lighting power around a 240-foot by 360-foot playing field, with lights mounted on six, 80-ft. high poles, 6000 watts of lighting power per pole). The consultant has determined that the proposed lights would nevertheless produce lower light emissions as measured near ground level adjacent to the proposed field, than the existing field lights. The University attributes this difference primarily to the improved Qualite design, with shielded and downward-directed fixtures.

Pepperdine's proposed upper Marie Canyon field lighting constitutes new development

Commission staff has determined that the existing Marie Canyon field lights were installed without the required coastal development permit, in 1984, at a horse arena and graded pad that were not constructed with the benefit of necessary Commission approvals. It is beyond dispute that the existing lights have never been subject to any form of environmental impact analysis in the almost 30 years that the University has continued to use the lights, until now. Pepperdine further acknowledges that the existing lights must be completely removed to construct the new pad that will support the Marie Canyon recreation area conceptually authorized in LRDPA # 1-11A. Thus, regardless of the unpermitted nature of the existing field lights, the complete removal of the existing field and construction of the new pad and substantially larger field constitutes complete redevelopment of the site. Therefore, the Commission must evaluate the new proposed field lighting as new development since the "baseline" of the existing lights cited by Pepperdine is not an appropriate basis for evaluating the proposed Marie Canyon playing field lights (LRDPA 1-11B).

Moreover, an applicant is not entitled to rely on unpermitted development as a baseline in support of the approval of proposed new development. *LT-WR, L.L.C. v. California Coastal Comm'n* (2007) 152 Cal.App.4th 770, 797 ("to enable the Commission to protect coastal resources, and to avoid condoning unpermitted development, the Commission properly reviewed the application as though the unpermitted development had not occurred"). Thus, when unpermitted development has altered a site, in order to fairly evaluate the impacts of any new proposed development, the Commission has consistently taken the position that it must compare the proposed condition to the condition that would exist currently were the unpermitted development not to have occurred (See, e.g., Commission findings in support of its February 6, 2013 action on the "Substantial Issue portion" of Appeal No. A-6-ENC-11-073 (Gordon), as shown in its January 17, 2013 staff report at 12; Commission Findings in support of its January 11, 2012 action on CDP Application No. 4-08-069 (Kies), as shown in its December 22, 2011 staff report, at page 2; Commission Findings in support of its July 13, 2011 approval of CDP Application and Appeal Nos. 2-06-18/A-2-MAR-08-028 (Lawson's Landing, Inc.), section V.D., as shown in July 12, 2011 Addendum, at page 12.)

Pepperdine asserts that the existing lights were deemed approved both through the Commission's actions (a statement in the initial, 1989 certification that "Development at Pepperdine University has been consistent with the goals, policies, rules and regulations of the County . . . and the California Coastal Commission" – see previous summary for full quotation) and its inaction (failure to object to the lights previously). However, the quote from the LRDP certification was

a general statement, adopted at the time of LRDP certification for the campus as a whole, as reflected by the fact that it goes on to talk about clustering and infrastructure, not the details of specific projects. The LRDP certification was also based on plans submitted by Pepperdine, which did not show the arena or lights north of Huntsinger Circle Drive or the barn south of Huntsinger Circle Drive (either as existing or future proposed development in those locations). It would be wholly inappropriate to interpret that language as expressing Commission support for individual components of a specific facility, especially one such as the field lighting that was not shown on any plans, and even more so given that 15 years earlier, the Commission specifically called out its approval of lighting in connection with tennis courts while simultaneously approving the initial horse facility without any mention of lighting.

Nor can the Commission's failure to take action on the lights be seen as implicit approval thereof. Such an argument is effectively an estoppel argument, and it will not lie against the Commission in a case such as this, where Commission staff was not even aware of the existence of the violation until very recently. See *Feduniak v. CCC* (2007) 148 Cal.App.4th 1346. The only thing to which Pepperdine points as evidence that the Commission should have been aware of the lights is a picture in the file from the 1997 LRDP Amendment No. 2-97, in which a light standard was visible. The lighting was not part of the application, and it was not discussed anywhere in the LRDP or the findings. The fact that this single photograph is in the file cannot reasonably be seen as evidence of the Commission intending to grant after-the-fact approval of the lighting.

Finally, Pepperdine itself seems to concede the fact that lights cannot be treated as implicit in the approval of an equestrian facility, as an assumed component, in that it argues for that status for the lights on the parking lots (letter from Pepperdine University staff dated July 29, 2013 at page 5), but it makes no such argument for the equestrian facility.

In addition to all of that, it is beyond dispute that the Commission has never reviewed the existing Marie Canyon lights, which were installed prior to certification of the LRDP in 1990. No environmental analysis of the lights was ever undertaken or presented to the Commission by Pepperdine. Finally, Pepperdine converted the existing lights and the former equestrian facilities to other uses in 1999 without processing a further LRDPA for that change. The night use of the facilities and installation of lights would have been reviewed had such an amendment request been submitted for Commission consideration.

Moreover, even if Pepperdine had secured necessary approvals for the 1984 riding ring lights, removal of the lights is necessary to construct the proposed project by Pepperdine's own admission. The existing pad, informal intramural field, fencing, lights, and all other existing development in the subject area of upper Marie Canyon must be completely removed, and the site re-graded, to construct the approved LRDPA #1-11A development before the proposed LRDPA #1-11B lights could be installed. In addition, electrical service must be extended to an area where such service has not previously been available, to power the proposed new lights (the proposed lights are too powerful to be supported by the existing diesel generator, according to the University).

For all of these reasons, therefore the Commission requires the consideration of the proposed new lights (#1-11B) as new development and rejects the University's argument that impacts resulting from the new lights must be compared with a baseline of site disturbance arising from a history of unpermitted development at the subject site.

In considering LRDPA #1-11B by this standard, as new development, Commission staff ecologist Jonna Engel, Ph.D. has determined that proposed new lights represent a substantial risk of significant and adverse threat to the environmentally sensitive resources of Marie Canyon and beyond. The results of her analysis are set forth in a memorandum attached hereto as Exhibit 12 and further supplemented in a memorandum dated September 26, 2013 attached hereto as Exhibit 13. In addition, Pepperdine has acknowledged that the proposed #1-11B field lights would be visible from publicly-used trail corridors at elevations above, and generally north of, the subject site (Exhibits 8 and 9).

D. ENVIRONMENTALLY SENSITIVE HABITAT AREA

Section 30240 of the Coastal Act states:

> *(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
>
> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

Section 30107.5 of the Coastal Act defines "environmentally sensitive habitat area" as:

> *…any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.*

Section 30230 of the Coastal Act states that:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act states that:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges- and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow,*

encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Setting and Proposed Development

The campus of Pepperdine University occupies 830 acres located along the lower south flank of the Santa Monica Mountains immediately north of Pacific Coast Highway and approximately one-half mile from the Pacific Ocean. The campus is built on coastal terraces and foothills and is surrounded by steep and rugged mountains with narrow north-to-south flowing creeks and associated ridges and canyons. The majority of the campus lies in the Marie Canyon watershed, and much of the lower reach of Marie Canyon was filled to construct the existing campus, where the riparian drainages have been confined and now run underground beneath the campus through a series of storm water conveyances commencing with the existing retention basin north of Huntsinger Circle Drive (the location of the Marie Canyon Recreation Area authorized in LRDP Amendment 1-11A) and draining ultimately to the Pacific Ocean downgradient of the campus. The campus lands are bounded by large blocks of undeveloped public and private land including the open space dedicated and owned by the University and Malibu Creek State Park. The southwestern boundary of the campus is shared with the Malibu Country Estates Subdivision. (See Exhibits 1 – 4).

As described above, LRDP Amendment 1-11A, approved by the Commission with suggested modifications last December included almost all of the University's "Campus Life Project" – a mix of projects designed to improve and expand campus housing, sports facilities, parking, and social spaces on the main, "lower campus." (The "upper campus" or "Drescher Graduate Campus" constructed in 2002 was not included in the Campus Life Project.) Among the Part A Campus Life Project components was a proposal to construct Campus Life Project Component 5, a "Recreation Area" in Marie Canyon, north of Huntsinger Circle Drive. The Recreation Area as authorized conceptually by the Commission in approving Part A (with suggested modifications) would eventually contain a four-acre flat surface landscaped with irrigated turf, providing mainly for a 240-ft. by 360-ft. regulation sized sports playing field and a 1,600-ft. restroom/storage building. (See Exhibits 4 – 6).

LRDPA 1-11B includes the University's proposal to install a set of new, permanent high-performance, stadium-type outdoor sports lights for the Marie Canyon playing field authorized in LRDPA 1-11A (Exhibits 6 and 7), and the use of the field at night. LRDPA 1-11B also includes final design, siting and orientation of the recreational amenities, and management of the turf area.

Unlike the other Campus Life Project components located within the central developed areas of the campus, Component 5 included development in an area at the periphery of the campus, where limited disturbance for a retention basin and stockpile site with driveway and some parking is presently authorized and used mostly by day. In the subject location of Marie Canyon, the development associated with the main developed campus is separated by Huntsinger Circle Drive immediately south of the Recreation Field location. Most of the campus sports facilities are located within a central area that includes the baseball field, track, soccer field, swimming pool, tennis courts, and fieldhouse (see Exhibit 4).

Day-use facilities authorized for the Recreation Area in #1-11A include construction of a fill pad with other campus construction cut material, and eventually completing the pad to a flat surface area of about four acres in size, at a maximum finished elevation of 565 feet above sea level. The construction of a 240-ft. by 360-ft. playing field for Pepperdine's intramural and club sports program, and a 1,600 sq. ft. restroom/storage building on the southeastern portion of the site was authorized at the Marie Canyon Site pursuant to the Commission's approval of LRDP Amendment 1-11A. However, no field lights were authorized as part of that amendment.

The amendment was divided into two parts last November – the larger #1-11A, and the specific proposal in #1-11B to install new, permanent high performance outdoor stadium-type lights at the Marie Canyon playing field to allow night use of the facility. LRDPA 1-11B was separated to allow additional time for staff review of potential risks the sports lights and night use of the Marie Canyon playing field posed to visual and ESHA resources.

The Marie Canyon site, unlike the main campus site authorized for stadium-type sports lighting, is surrounded on three sides by dense chaparral vegetation, which constitutes an environmentally sensitive habitat area (ESHA), and which extends offsite to the north as part of a much larger contiguous chaparral habitat area. Moreover, the chaparral ESHA is located entirely within an area designated as 'Open Space' pursuant to the certified Pepperdine Long Range Development Plan (LRDP). In a memorandum dated August 23, 2013 (included as Exhibit 12), Commission staff ecologist Jonna Engel, Ph.D., analyzes the habitat value of the area surrounding the Marie Canyon sports field site, determines that the site constitutes ESHA, and discusses the environmental impacts of introducing light into natural areas. In a supplementary memorandum dated September 26, 2013 (included as Exhibit 13), Dr. Engel addresses the standards for judging lighting impacts in more technical detail. At Dr. Engel's request, Mr. James R. Benya provided a technical critique of Pepperdine's lighting analysis, which is included with Mr. Benya's curriculum vitae as Exhibit 14. Mr. Benya is an electrical engineer and lighting consultant who was a co-chairman of the Model Lighting Ordinance Joint Task Force for the International Dark Sky Association and the Illuminating Engineering Society.

Analysis

Commission staff ecologist Dr. Jonna Engel reviewed the environmental setting of the subject Marie Canyon site, including a site visit on October 30, 2012, and has reviewed the University's proposal in LRDPA 1-11 Part B to construct new, permanent outdoor sports lighting and to allow night use of the Marie Canyon playing field for intramural and club team sports. Dr. Engel summarized the results of her review in her memorandum dated August 23, 2013.

Dr. Engel was requested by staff to determine if ESHA existed at the site, whether the introduction of the proposed field lighting and the night use of the site would affect the Marie Canyon ESHA, and to make recommendations regarding any measures that might reduce the project's adverse effects on sensitive resources. Dr. Engel additionally confirmed that the habitat of concern meets the characteristics identified by Commission staff ecologist John Dixon for designation of ESHA in the Santa Monica Mountains set forth in a memorandum prepared by Dr. Dixon, dated March 25, 2003.

In response to staff's request Dr. Engel determined that the Marie Canyon location proposed by the University for the installation of new, permanent playing field lights and night use is located immediately adjacent to steep canyon slopes supporting chaparral ESHA contiguous to broader expanses of ESHA. The continuous habitat reaches to the protected open spaces and parklands generally north of the Marie Canyon playing field site.

Dr. Engel determined that the habitat in and adjoining the Marie Canyon area under review is comprised of "unfragmented and continuous relatively pristine native habitat" which the Commission has determined since 2003 constitutes ESHA in the Santa Monica Mountains. Dr. Engel determined that the western, northern, and eastern slopes surrounding the subject Marie Canyon area ("Component 5" of the University's Campus Life Project) support habitat that meets the three tests for ESHA in the Santa Monica Mountains:

1) The slopes are properly delineated as supporting coastal sage scrub and chaparral habitats;
2) The habitats are largely undisturbed and relatively pristine stands of native plant communities;
3) The habitats are part of large, contiguous blocks of undeveloped and relatively pristine habitat.

Dr. Engel emphasized that: "It is the unique position and surroundings of the Component 5 site that set it apart from other sports fields on the Pepperdine University campus. The Component 5 site is positioned like a bowl or amphitheater against the slopes of the Santa Monica Mountains at the apex and northern-most edge of campus; at the urban-rural (artificial light-natural light) boundary. The slopes surrounding the Component 5 site support native habitat that rises to the level of ESHA that in turn supports numerous native animals. Because of its topographical setting the Component 5 site is actually more isolated that a plan-view map would suggest. Animals within and around the Component 5 site, especially at night, experience the area generally as an uninhabited and natural area suitable for conducting animal business as usual."

Dr. Engel's August memorandum contains a detailed explanation of the way light energy is perceived by human receptors and animal receptors, which varies considerably in ways that make clear the significant and adverse impacts on wildlife that night lighting in the subject Marie Canyon location is likely to cause. Dr. Engel also explains the hazard that such lighting in the Marie Canyon location poses for migratory birds using the Pacific Flyway. The Pacific Flyway is a major north-south pathway for migratory birds that includes all of California. However, within the flyway, birds follow particular routes, one of the most important of which follows the coast line and adjacent mountain slopes. Dr. Engel explains that: "The main concern with artificial night lighting at the new intramural field is its location at the outer edge of campus at the urban-rural (artificial light-natural light) boundary and the potential for night migrating birds to become confused and attracted to the lights during inclement/foggy weather. Most migratory movement occurs early in the evening so any impacts to migrating birds due to the intramural field night lighting are likely to occur during the first two to three hours after sunset. Birds that migrate at night use the moon and stars for navigation. During clear weather they appear to be able to distinguish artificial lighting from light emanating from the planets and stars. However, during inclement weather, birds can become confused and drawn to artificial lights. This phenomenon has been observed on numerous occasions at lighted buildings, oil platforms, and athletic fields. Once drawn into an artificial light source a number of negative outcomes including mortality can

occur; birds may crash into something, circle the light source becoming exhausted, or become confused and drawn off course."

Dr. Engel has also reviewed (Exhibits 12 & 13) the lighting analyses prepared by Pepperdine University's architectural lighting consultant (Francis Krahe & Associates). In her August memorandum Dr. Engel explains that the methodology used by the consultant in concluding that the proposed sports field lighting at Marie Canyon would not affect wildlife lacks analysis specific to light impacts upon wildlife and does not evaluate the unique location and topography of the Component 5 area. The University's lighting consultant estimated the extent of light trespass beyond the authorized Marie Canyon playing field that would be produced by the Part B lights. The consultant determined that light trespass at an intensity (illuminance) of 0.1 footcandles (which the consultant described as a full-moon equivalent) would not extend beyond the targeted playing field area if the new Part B field lights are installed as prescribed (Exhibit 6 and 7). However, in her memoranda (Exhibits 12 & 13) Dr. Engel points out that the accurate standard for describing a full moon equivalent of lighting is actually 0.01 footcandles. Thus, the light intensity that the Part B field lights would generate in the surrounding area (0.1 footcandles) may actually be significantly brighter than a full moon, and would in any case represent this light impact every night (the University projects year-round, nightly use of the Marie Canyon playing field once the proposed Part B lights are installed). This impact is significant for wildlife use of the subject playing field area and of the environmentally sensitive habitat surrounding much of the Marie Canyon Marie Canyon site.

Pepperdine has recently estimated the area within which light trespass would equal 0.01 footcandles (Slide 15 of Pepperdine's Briefing Books entitled "The Campus Life Project: The Next Step in Fulfilling our Long Range Development Plan LRDP Amendment 1-11, Part B"). The 0.01 isopleth includes the lower portion of the chaparral ESHA on the western hillside. Pepperdine argues that this level of illumination is consistent with industry standards for this sort of environment and will have no significant adverse impact on the habitat in that area. Based on Mr. Benya's technical analysis (Exhibit 14) and Dr. Engel's own assessment, staff concludes that these light levels will cause adverse impacts and that the estimated area affected may be a significant underestimate. Mr. Benya concludes that "…standards used in the [Environmental Impact Analysis] are far too lenient and do not correspond to the lighting impact metrics contained in the tenth edition IES Lighting Handbook. The environmental team should have been aware of these new standards and should have used them, if not in their EIA, certainly in their addendum. I also believe that the EIA and [the lighting consultant's Addendum #1] reports were based on incorrect use of lighting measurements of illuminance by not being taken at the property line, and luminance by not being taken with the proper instrument and proper distance. These shortcomings underreported the lighting impact of current and future proposed lighting and should be corrected before any conclusions about the environmental impact of lighting are drawn." Dr. Engel (Exhibit 12) explains that within the actual areas of significant light trespass, "adverse impacts to wildlife in the surrounding Marie Canyon ESHA from artificial night lighting, such as the proposed field lights, are expected to include increased disorientation, disruption of foraging patterns, increased predation risk, disruption of biological clocks, increased mortality on roads, and disruption of dispersal movements through artificially lighted landscapes."

Dr. Engel concludes that night use of Marie Canyon made possible by the University's proposed installation and use of new, permanent high performance stadium-type artificial outdoor lighting would pose an unacceptable, significant and adverse threat to environmentally sensitive habitat and to sensitive species.

In her memoranda, Dr. Engel also explains why the outdoor sports lighting proposed by the University for installation at the Marie Canyon poses a much more significant threat to ESHA, wildlife and migratory birds than was the case for two other recent examples of Commission review of outdoor sports lighting proposals (Beach Chalet, at Golden Gate Park in San Francisco, and Malibu High School field lights).

Conclusion

The Commission agrees with the conclusions in Dr. Engel's memoranda and incorporates them here, thus adopting them as its own findings. For the reasons set forth above, and as more fully described in Dr. Engel's memoranda attached as Exhibits 12 and 13 of this staff report, the proposed development requested by the University in LRDPA 1-11B consisting of installing electrical service, and new, permanent high performance stadium-type field lights in Marie Canyon, north of Huntsinger Circle Drive, and allowing night use of the Marie Canyon playing field made possible by the lights, poses a substantial risk of significant, and adverse effects upon ESHA resources of the Marie Canyon area and to broader expanses of contiguous ESHA and open spaces beyond the immediate Recreation Area site. Suggested Modification 1 prohibiting outdoor sports field lighting in Marie Canyon and limiting such lighting to the existing sports fields on the main developed campus is therefore necessary in order to make the LRDPA consistent with section 30240 of the Coastal Act. Specifically, Suggested Modification 1 provides for:

Suggested Modification 1:

The sixth bullet of the policy recitations in the LRDP "Visual Resources" section shall be revised as shown below

- Campus Lighting

(A) Existing "globe" style outdoor light installations throughout the campus should be replaced with new light fixtures designed to minimize sky glow and light trespass in adjacent areas. In accordance with the University's proposal pursuant to LRDP Amendment 1-11, concurrent with the implementation of the "Campus Life Program" development, all existing "globe" style outdoor light installations throughout the campus shall be replaced with modern light fixtures designed to minimize sky glow and light trespass in adjacent areas, consistent with the provisions of Section B below, in accordance with the schedule and locations proposed by the University and appended to the LRDP.

(B) New outdoor campus lighting shall be designed to achieve the minimum degree of illumination necessary for public safety. Lighting shall be downward directed, shielded, energy efficient, dark sky-compatible, and shall incorporate state-of-the-art improvements in lighting technology when replaced thereafter. Replacement bulbs or

fixtures shall be upgraded to incorporate best available technology over the life of the installation. Where safety goals would be adequately met without overhead lighting, such as along pathways, ground-level directive lights or standards less than three feet in height shall be used. Campus lighting shall be designed to minimize light trespass into adjacent non-target areas, and to limit the illumination of campus open space and sensitive habitat areas to the maximum extent feasible. Programmable timing devices shall be utilized to turn off unnecessary lights where feasible.

(C) All new field lighting of athletics facilities shall be limited to the approved locations of the Tari Frahm Rokus Field, Stotsenberg Track, and Eddy D. Field Baseball Stadium as of August 2013, within the main campus area, and installed and maintained with "Qualite" or a superior, state-of-the-art technology designed to dark sky-compatible standards. Lighting shall be minimized, directed downward, and shielded using the best available visor technology and pole height design to minimize light spill, sky glow, and glare impacts to public views to the maximum extent feasible. Replacement components shall be of at least equal or superior quality to the original installations. All sports lighting shall be designed to minimize light trespass into adjacent non-target areas, and to limit the illumination of adjacent open space and sensitive habitat areas.

Turf management practices near ESHA; water quality protection

In addition to the recommendations of Dr. Engel, Commission staff Water Quality Program Analyst Vanessa Metz, Ph.D., has also analyzed the proposed amendment request concerning management practices for the four acres of irrigated, managed turf the University proposes to install and maintain at the Recreation Area in Marie Canyon, including the Marie Canyon playing field. Dr. Metz noted that Audubon International Society publishes "Environmental Management Practices for Golf Courses," (an undated fact sheet) from which Dr. Metz advised a subset of specific measures pertinent to the Marie Canyon Recreation Area setting, listed below, based on her expertise as a biologist and water quality specialist:

Management of grass turf within the Recreation Area shall be performed in accordance with the following requirements:

- Rodenticides containing any anticoagulant compounds (including, but not limited to, Warfarin, Brodifacoum, Bromadiolone or Diphacinone) shall be prohibited.
- Use of pesticides and herbicides shall be minimized.
- Integrated Pest Management shall be implemented, which may include use of appropriate biopesticides, lining the playing field to exclude rodents, etc.
- Efficient irrigation or other management practices shall be used, to eliminate runoff from turf during the dry season or during extended dry periods during the rainy season.
- Grass cultivars that are pest-resistant shall be used.

Dr. Metz advised that requirements tailored to the Marie Canyon setting, where pocket gophers and other rodents (which serve as a food source for raptors and other wildlife) could be a "pest" from the University's perspective when seeking to manage the proposed four acres of irrigated turf. The use of rodenticides containing anticoagulant compounds has been linked to the death of sensitive predator species, including mountain lions and raptors, in the Santa Monica Mountains.

These species are a key component of chaparral and coastal sage scrub communities in the Santa Monica Mountains considered ESHA. Dr. Metz also advised that the University prepare a Management Plan incorporating the above requirements as well as the following requirements recommended generally by the Commission's water quality program staff:

- Paving such as walkways, shall use permeable pavement;
- Stormwater runoff from the playing field shall be infiltrated, detained, or retained on-site for each storm event, up to and including the 85th percentile, 24-hour storm event.
- If a turf field is not planted, or is discontinued in the future, the University shall submit a landscaping plan to supplement the Recreation Area Management Plan, for Executive Director review and approval, that utilizes a palette of locally native fire retardant plants that are drought tolerant and require less application of pesticides, herbicides, and water, and shall implement the approved plan.

Therefore, to ensure that the final design and management of the Marie Canyon Recreation Area is incorporates measures to protect ESHA and water quality onsite and offsite in locations that may be affected by activities such as turf management at the Recreation Area and playing field, **Suggested Modification 2** incorporates the measures recommended by the Commission's water quality program staff as follows:

Suggested Modification 2:

The following shall be included as a new bulleted policy within the ESHA section of the certified LRDP:

At the time a Notice of Impending Development (NOID) is submitted for development in Marie Canyon, north of Huntsinger Circle Drive, a "Recreation Area Management Plan" shall be included in the submittal and shall at a minimum include the specifications listed below. The NOID shall commit the University to comply with the approved plan as long as the proposed development in Marie Canyon, or any portion thereof, continues to exist. If, for any reason, such a plan is not submitted with the NOID, it shall be appropriate for the Commission to condition the NOID to preclude commencement of development until a plan meeting the following requirements is submitted:

(1) The Recreation Area in Marie Canyon shall be limited to day use, and no night lighting, whether temporary or permanent, shall be installed.

(2) The location of the 1,600-sq.-ft. restroom/storage building shall be at the southeastern portion of the Recreation Area, immediately adjacent to " Facility J" (or the "Page Terrace Parking Lot" as it is otherwise known in August 2013), east of the Recreation Area;

(3) The orientation of the day-use playing field within the Recreation Area may be adjusted from time to time within the boundaries of the Recreation Area as necessary to maintain field conditions;

(4) Management of grass turf within the Recreation Area shall be performed in accordance with the following requirements:

- No rodenticides containing any anticoagulant compounds (including, but not limited to, Warfarin, Brodifacoum, Bromadiolone or Diphacinone) shall be used.

- Use of pesticides and herbicides shall be minimized.
- Integrated Pest Management shall be implemented, which may include use of appropriate biopesticides, lining the playing field to exclude rodents, etc.
- Efficient irrigation to minimize runoff shall be implemented.
- Grass cultivars shall be selected that are pest-resistant.

(5) All paving, such as walkways, shall use permeable pavement;
(6) Runoff from the playing field must be infiltrated or otherwise retained on-site (for the volume of water generated by the 85th% storm), and not flow directly to the storm drain system;
(7) Measures shall be included to reduce or eliminate dry-weather runoff from the playing field and reduce or eliminate runoff from the playing field between rain events during the rainy season;
8) If a turf field is not planted, or is discontinued in the future, the University shall submit a landscaping plan to supplement the Recreation Area Management Plan, for Executive Director review and approval, that utilizes a palette of locally native fire retardant plants that are drought tolerant and require minimal application of pesticides, herbicides, and water, and shall implement the approved plan.

Conclusion

To ensure that the Marie Canyon Recreation Area final design, development and management measures that will provide adequate protection of the biological productivity and quality of the Marie Canyon chaparral ESHA, wildlife corridors, migratory bird habitat, coastal streams and waters consistent with Sections 30230, 30231, and 30240 of the Coastal Act, the Commission finds it necessary to require **Suggested Modification 1 (**Restrict new field lighting to existing main campus sports complex), and **Suggested Modification 2** ("Marie Canyon Recreation Area Management Plan" requirements). These Suggested Modifications contain recommendations of Commission staff biologists and water quality specialists to restrict high performance outdoor sports field lighting to existing locations of developed sports fields located on the main Pepperdine campus and to prohibit such lights elsewhere on campus, such as in the subject area of Marie Canyon, and to thereby preserve and protect the natural night sky conditions of the chaparral ESHA of the canyon and contiguous habitat areas. In addition, Suggested Modification 2 requires the design, placement of structures and management of Marie Canyon Recreation area to be undertaken and maintained in a matter that will protect coastal water quality. Therefore, the Commission finds that LRDPA 1-11B would be consistent with the applicable policies of Chapter 3 of the Coastal Act if modified in accordance with Suggested Modifications 1 and 2.

E. PUBLIC COASTAL ACCESS AND RECREATION; VISUAL

Section 30210 of the Coastal Act states:

> *In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*

Section 30213 of the Coastal Act states:

> *Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred.*

Section 30214 of the Coastal Act states:

(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following:
(1) Topographic and geologic site characteristics.
(2) The capacity of the site to sustain use and at what level of intensity.
(3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses.
(4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter.
(b) It is the intent of the Legislature that the public access policies of this article be carried out in a reasonable manner that considers the equities and that balances the rights of the individual property owner with the public's constitutional right of access pursuant to Section 4 of Article X of the California Constitution. Nothing in this section or any amendment thereto shall be construed as a limitation on the rights guaranteed to the public under Section 4 of Article X of the California Constitution.
(c) In carrying out the public access policies of this article, the Commission, regional commissions, and any other responsible public agency shall consider and encourage the utilization of innovative access management techniques, including, but not limited to, agreements with private organizations which would minimize management costs and encourage the use of volunteer programs.

Section 30223 of the Coastal Act states:

> *Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.*

Section 30250(a) of the Coastal Act states:

> *(a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it, in other areas with adequate public services and where it will not have a significant adverse effect, either individually or cumulatively, on coastal resources.*

Section 30251 of the Coastal Act states:

The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

Campus Setting

The Pepperdine University campus is located on a coastal terrace between the Santa Monica Mountains to the north and bluffs descending to the Pacific Ocean to the south, across Pacific Coast Highway, which borders the campus (see Exhibits 1-3). Campus elevations range from approximately 200 feet above sea level at the front lawn area (Alumni Park) that defines the southern border of the campus, to more than 1,700 feet in the northern portion of the campus.

The northern portion of the 830-acre, Malibu-area campus and nearby open spaces are ringed by mountain ridges and traversed by a network of popular, publicly used trails of local and regional importance, with spectacular coastal vistas. The trails through and near the campus tie into other public roads and trails, connecting the campus lands and nearby trails to the Backbone trail – the primary trail route of the Santa Monica Mountains and to Pacific Coast Highway and local parks and beaches.

The Santa Monica Mountains Conservancy-owned Malibu Bluffs parklands south of the campus have recently been approved for public camping sites. The City of Malibu's Malibu Bluffs Park is located immediately east of the Conservancy lands. Both parks areas have views of the Pepperdine campus and various roads and trail routes connect the recreational amenities of the parklands to the nearby beaches and mountain trails.

The rural location of the Malibu area has helped to maintain the area relatively free of the effects of concentrated urban sources of light pollution. Star gazing attracts viewers to area beaches and parks with relatively dark sky conditions, and night hikes are popular in the mountains near Malibu. The area is a relatively convenient and affordable destination for the urban residents of the Los Angeles area (and beyond) who are increasingly unable to view starry night skies due to urban light pollution. The Pepperdine campus is located only 14 miles west of Santa Monica and less than 30 miles from downtown Los Angeles.

Upper Marie Canyon setting, #1-11B proposed playing field lights

Pepperdine proposes in LRDPA #1-11 B to install new, permanent, stadium-type outdoor sports lights for the future Marie Canyon playing field approved in #1-11A. Although the playing field was approved by the Commission for day-use, Pepperdine's proposal to install sports lighting at the field was divided into a separate amendment component to allow time for staff to analyze the potential visual and ESHA impacts of locating sports lights north of Huntsinger Circle Drive, on the periphery of the developed campus area. The subject site is surrounded on three sides by

steep slopes supporting chaparral ESHA; the habitat extends off campus to the north and is part of a larger contiguous chaparral habitat area that converges with the protected open spaces and parklands of the Santa Monica Mountains National Recreation Area near Pepperdine.

A publicly-used trail corridor shown in Exhibits 8 and 9 is located on the steep slopes approximately 2,000 ft. from the field location, at an elevation of approximately 1,700 feet above sea level above the future Marie Canyon playing field (the field surface would be a maximum of 565 feet above sea level). The lawns on the southern border of the campus are located at an elevation of approximately 200 feet above sea level. The proposed sports field lights would be installed on the surface of a fill pad finished at a maximum elevation of 565 feet above sea level. The proposed upper Marie Canyon playing field lights mounted on 80-ft. high poles would therefore extend vertically to the 645-foot elevation-equivalent.

Pepperdine states that the lights proposed for the future upper Marie Canyon playing field would consist of six, 80-ft. high poles, each with four shielded, angled "Qualite International Series" brand fixtures per pole (Exhibits 6 and 7). Each fixture would use 1,500 watts for a total of 6,000 watts of lighting power per pole, and 36,000 watts of maximum lighting power for the full bank of lights configured as proposed by the University. The lights would be arranged three per side along the lengths of the 240-foot by 360-foot future playing field. Pepperdine proposed the year-round night use of the site, for unlimited hours.

Pepperdine states that the Marie Canyon playing field would only be used for recreational sports at the intramural or club level and occasionally for other campus activities, and that the fixtures and lights proposed for the Marie Canyon field would not be adjustable to, or suitable for future adaptation to, the higher power settings necessary for NCAA collegiate-competition sports use, such as for regular or televised games. LRDPA #1-11B would also allow for the final siting of a new 1,600 sq. ft. restroom/storage building authorized in #1-11A and establish management requirements for landscaped areas.

Analysis

Coastal Act Section 30251 states that new development shall be sited and designed to protect views to and along the ocean and scenic coastal areas and that scenic and visual qualities of coastal areas be considered and protected as resources of public importance. Sections 30210, 30213, 30214, 30223, and 30250 additionally require that maximum public access be provided for all of the people of the state, that development be sited and designed to avoid significant, adverse effects on coastal resources, and that low cost forms of public coastal recreation (such as trails) be preserved and encouraged.

Although the Marie Canyon playing field is located in a canyon at the northern periphery of the developed campus partially shielded by steep slopes, the playing field lights situated at 645 feet above sea level would be located at a topographic elevation as much as five hundred feet higher than the lower campus elevations and from Pacific Coast Highway and nearby beaches situated at elevations less than 200 feet above sea level. Publicly used trail corridors with segments traversing the campus lands have direct views of the subject site, varying from less than 100 feet from the site in the case of historic trail routes that pass directly through Marie Canyon north of Huntsinger Circle Drive, to trail corridors north of the site with downslope views from elevations

ranging from a few hundred to over six hundred feet higher than the proposed playing field. The future playing field, if lit at night by the proposed field lights, would be highly visible from all of these trails. Pepperdine staff have stated that publicly-available parking areas with access to the trail routes traversing the northern campus area generally close by 10:30 p.m. As such, curfew requirements for the proposed playing field lights at the future Marie Canyon field would not mitigate the potential impacts of the field lights on the dark sky character of the area enjoyed by night hikers.

The Marie Canyon field lights would be readily visible at night from at least five viewing areas along the portion of the combined Mesa Peak and Coastal Slope public trail route that traverses the northern campus above Marie Canyon (Exhibit 8). Pepperdine indicates that hikers on the subject trail route would have views of the Marie Canyon field for several minutes from approximately five locations along the portion of the trail route analyzed in Exhibit 8. Other historic trail corridors through the campus exist as well, and were identified and acknowledged when the LRDP was certified in 1990. These routes run much closer to the proposed field, including through a portion of upper Marie Canyon, but have not been evaluated for potential visual impacts that may result from the installation and use of the proposed field lights.

Pepperdine trail corridors

The certified LRDP states (Conservation and Open Space section):

> *"The University shall offer to dedicate a public trail easement, limited to pedestrian and equestrian access only, over the Coastal Slope and Mesa Peak trails which cross the subject property. The trail routes may be realigned provided it is done in such a manner which provides for equivalent use, can be safely used, and minimizes impacts on sensitive resources. Final route selection shall include consultation with the Santa Monica Mountains Trail Council and the Los Angeles County Department of Parks and Recreation, subject to the review and approval of the Executive Director of the Coastal Commission."*

The public, including members of the Pepperdine campus community and campus visitors, use the existing Mesa Peak and Coastal Slope trails as well as other informal trails crossing or adjoining campus lands, including trail corridors located north of the subject site in Marie Canyon (see for example Exhibit 8 and 9). However, the existing trails on site do not correlate with the location of the recorded public trail easements on site in all areas. According to the University, the trail easements recorded for the area north of the Marie Canyon site offer access in "paper" locations that are nearly impossible to traverse in the field. Thus, the University has explained that campus representatives and the staff of the Santa Monica Mountains Conservancy have been discussing potential realignment of the recorded trail easements to better match the physical field conditions, which would ultimately be reflected in new, future easement locations if authorized by the Commission (pursuant to a future LRDP amendment request).

Nevertheless, the public right to the use of the original trail routes through the center of the main campus cannot be unilaterally extinguished by the University, and so, the trails continue to exist. Publicly used sections of the Mesa Peak and Coastal Slope Lateral Trails traverse the northern campus, and part of the historic route of the Coastal Slope Lateral Trail runs directly through the center of the campus, generally trending from the northeast, near the faculty housing site, along

the perimeter of northern Marie Canyon and forks ascending the canyon toward the west and winding through the southern portion of the campus along what is now John Tyler Drive, south from Huntsinger Circle Drive. The original network of trails traced a web of routes southwest through the Malibu Country Estates subdivision, tying into the canyon roads and trails to the west of the campus.

A schematic illustration prepared by Pepperdine and included by the Commission as Exhibit 2 of the revised findings for certification of the original LRDP in 1990 shows the Coastal Slope Lateral Trail route as it passes through the Pepperdine campus, and Pepperdine's proposed realignment the trail to the west of the campus, on Pepperdine lands. The Commission acknowledged the existence of prescriptive rights to the historic trails in certifying the original LRDP and required the provision of an equally usable, realigned trail consistent with Pepperdine's representations reflected in Exhibit 2 of the revised findings for certification.

The historic route of the Coastal Slope Lateral Trail includes a corridor through Marie Canyon near the existing pad that was used as a riding arena until 1999. Trail routes traversing campus lands are readily available in aerial photographs, particularly photographs of the campus lands in the 1970s. The Marie Canyon portion of the historic Coastal Slope Lateral Trail route was incorporated into Pepperdine's horseback riding program until the program was phased out in 1997 and closed in 1999. Pepperdine has developed an additional trail on the western slope of Marie Canyon that leads to the upper (graduate) campus.

Pepperdine staff state that the campus administrators do not limit or prevent public use of the historic trails through campus, but campus development patterns over time have obscured the routes in many places and the trails are not marked physically by Pepperdine. Pepperdine staff has confirmed that pedestrians and occasional horseback riders continue to cross the campus on the old trails routes. The main routes are still known to the Malibu-area community, and are well worn by continuing use of the Pepperdine campus community as well.

Visual Impacts of proposed sports field lights in upper Marie Canyon

Exhibit 9 shows a simulated view of the proposed upper Marie Canyon playing field site, as it would be viewed during the day from the route of the combined Mesa Peak and Coastal Slope trail where the alignment traverses the campus lands. The viewing angles selected for representation show a backdrop of other campus development, and the upper (graduate) campus completed in 2003 is visible to the west. Other views available from trail corridors closer to the subject site but outside the boundaries of the campus property may also provide public views of the subject site that would be more significantly affected than the views selected for analysis in Exhibits 8 and 9.

Pepperdine has not completed a visual analysis of the proposed project site from other public trail routes that run closer to the proposed site, through the main campus and Marie Canyon area; therefore the worst-case visual impacts that may be imposed on public viewing locations by night lighting of the playing field are not fully known. Direct glare impacts that reduce the character of the night hiking experience by introducing a strong urban light factor would affect some trail views directly; however, the more significant potential visual impact of the proposed Marie Canyon field lights would be the risk of more expansive, diffused "sky glow" effects.

As discussed below, atmospheric conditions that may reflect light unpredictably from the playing field surface, scattering light to produce the form of light pollution known as "sky glow" could render the effects of the playing field lights much more visible than illustrated by Exhibit 10. Sky glow is the unintended brightening of the night sky, and a form of light pollution caused by the introduction of artificial lighting into outdoor spaces. It is the "glow" effect that can be seen over distant populated areas at night.

Risk of "sky glow" artificial light pollution increased by coastal weather conditions

The proposed Marie Canyon playing field light poles and fixtures would not be directly visible from Pacific Coast Highway and environs during the day due to the distance between the field and the highway, which is illustrated by Exhibit 10. The Exhibit also suggests that, under clear night skies without atmospheric conditions contributing to the formation of "sky glow," the playing field lights would not ordinarily be visible from public viewing areas at the southern edge of the campus, including from PCH.

However, under foggy or cloudy conditions, the upper Marie Canyon playing field, back-dropped by the darker regions of the protected campus open spaces beyond the field, may result in sky glow impacts visible from a substantially greater (but impossible to predict) distance that is not captured by the illustration in Exhibit 10. Sky glow is by nature subject to considerable variability and thus is difficult to illustrate adequately in an exhibit or to predict or measure objectively in the field.

The coastal setting of the Pepperdine campus often produces foggy or cloudy weather. High atmospheric moisture conditions are conducive to the formation of sky glow, as Commission staff ecologist Jonna Engel, Ph.D. explains in her memoranda (Exhibits 12 and 13). Dr. Engel (Exhibit 12). Pepperdine acknowledges that the proposed lights for the upper Marie Canyon playing field would introduce a new, permanent source of stadium-type artificial lighting in Marie Canyon, and that the proposed lights may produce light pollution such as sky glow that would potentially be visible from public viewing areas. Pepperdine states that the shielded type of fixture ("Qualite International Series"-brand) it proposes would aim light downward toward the targeted playing field and thus reduce the potential for sky glow effects to the maximum extent feasible. Pepperdine states that the proposed lighting design would compare favorably in this regard to fixtures with clear globe lights or with other sports lights that are horizontally mounted or of lesser quality.

Pepperdine proposes through amendment request #1-11B that the Marie Canyon field lights would be operated nightly, year-round, for unlimited hours of use for campus intramural and club team sports and other campus activities. The intensive proposed schedule for night use of the facility, combined with the preponderance of nights with marine-influenced weather affecting Pepperdine's coastal location, suggests that even with the use of contemporary shielded, downward-aimed light fixtures that the University proposes, the Marie Canyon field may produce significant sky glow. Pepperdine states however, there is no method of preventing sky glow effects, that making a determination of when "excessive" sky glow is being created would be too subjective to regulate the use of the lights in accordance with atmospheric conditions, and

that it would be impractical to limit the use of the proposed Marie Canyon playing field on nights when atmospheric conditions arise that may produce sky glow while the lights are in use.

Protection of dark sky character

Commission staff ecologist Jonna Engel, Ph.D. has visited the site in upper Marie Canyon where the Pepperdine University proposes to install sports field lights, and has evaluated the University's LRDPA1-11B submittal. Dr. Engel has undertaken extensive research pertaining to the effects of outdoor sports lighting on environmentally sensitive habitat and wildlife use of habitat, assisted by graduate student biological intern Nick Sadrour. Dr. Engel prepared a memorandum dated August 23, 2013 included in Exhibit 12 summarizing the results of her research. Dr. Engel has also conferred with James R. Benya, Certified Professional Electrical Engineer and principal of Benya-Burnett Consulting. Dr. Engel explains the results of her consultations with Mr. Benya in a supplemental memorandum dated September 26, 2013 included as Exhibit 13. Mr. Benya's critique of the lighting studies prepared by Pepperdine's lighting consultants is included as Exhibit 14.

Mr. Benya is one of the co-chairs of the International Dark-Sky Association (IDA) – Illuminating Engineering Society (IES, formerly IESNA) Joint Task Force. Mr. Benya is an expert in lighting design, illuminating engineering, and lighting applications. Dr. Engel's September 26 memorandum explains that Mr. Benya advised staff that by its very nature, sports field lighting cannot be completely mitigated unless it is contained, for example by a sports dome. Mr. Benya also explained that the greater the contrast between the sports lighting source and the darkness of the surrounding environment, the greater the impact.

Dr. Engel explained in her first memorandum that sky glow is produced by a combination of light reflected off illuminated surfaces, light emitted directly, and light that is scattered (redirected) by the atmosphere itself. Mr. Benya has explained that about thirty percent of the light directed by sports lighting to a playing field surface is reflected back from the surface. Under atmospheric conditions associated with foggy or cloudy conditions, reflected artificial outdoor lighting can be reflected and further amplified by moisture in the air to produce "sky glow" effects that render the lighting significantly more visible than would otherwise be the case under clear skies. When sky glow-producing conditions arise, outdoor lighting may produce amplified visible effects on the night sky that will be perceived from much greater distances.

Pepperdine has explained that the two other sports fields authorized for outdoor field lighting on the Malibu-area campus, and described in more detail above (Section A) are located mid-campus, in the main campus sports complex established in its present location in 1972. At the main campus location planned for additional sports lighting, Pepperdine has explained that the presence of a neighboring subdivision, Malibu Country Estates, requires limitations on the hours of use of the soccer and baseball fields with sports lighting. These fields will be fitted with adjustable lighting designed to operate at the highest settings required by National Collegiate Athletics Association (NCAA) standards for broadcasting. Each of the two fields may be used for up to ten televised (brightest) games per season, and all field lighting must be turned off by 10 pm with provisions for overtime in collegiate competition games.

Pepperdine has explained that the limits on the hours of use of the soccer and baseball fields are required to limit impacts on residents of Malibu Country Estates by agreement and in the case of the soccer lights, in accordance with a requirement of the Conditional Use Permit approved b by Los Angeles County. Pepperdine has further explained that these limits would not affect the use of the proposed Marie Canyon playing field because its location in upper Marie Canyon would not affect the residents Malibu County Estates subdivision. Transferring night sports and recreation activities to the upper Marie Canyon site, however, will increase the intensity of use and potential impacts on the chaparral ESHA adjacent to the subject site as discussed in Section D above. In addition, the upper Marie Canyon lights would be operated late at night after the 10 pm curfew on the soccer and baseball field lights. During later evening hours therefore, when the campus sports complex playing field lights are turned off, the lights operating in upper Marie Canyon – an otherwise dark area - would be much more visible due to the impact of high contrast explained by Mr. Benya (see Exhibits 13 and 14). Mr. Benya has cautioned that even with the most optimally-designed outdoor sports lighting installations, approximately thirty percent of the light striking the playing field surface is reflected back into the sky. This factor increases the risk that the playing field lights will produce a dome of sky glow light pollution at the periphery of the developed campus, extending urban style light impacts into night skies and mountain trail areas far beyond the physical footprint of the playing field. The sports lights in the canyon would thus have the potential to substantially alter the dark sky character of the area and in worst-case atmospheric conditions, could light up the canyon and render it visible from the southern area of campus and the public viewing locations of the Malibu Bluffs parklands and beaches.

Impairment of dark sky character reduces opportunities for affordable coastal recreation

The potential increase in sky glow resulting from the proposed field lighting in Marie Canyon, which as Dr. Engel explains based on her consultation with Mr. Benya, may be significantly worsened by the proposed location of the upper Marie Canyon sports lights. The proposed upper Marie Canyon site of the sports lights would place the elevation of the future playing field pad at 565 feet above sea level and the actual lights at the elevation-equivalent of 645 feet above sea level. At this elevation, and in the natural amphitheater setting in the relative darkness of the wild canyon site, the sports field lights would serve as an intense "punctuation" of visible lighting on clear nights, altering the character of the night hiking experience for nearby trail users with views of the sports lights from trail corridors - and under damp weather conditions, potentially projecting a skyward dome of glowing light visible above the northern campus for miles.

Public lands in the Los Angeles County region are convenient, accessible, and affordable destinations for millions of coastal visitors seeking respite from urban southern California life; Malibu is only 30 miles west of downtown Los Angeles and less than 15 miles from Santa Monica. The Santa Monica Mountains National Recreation Area contains almost 150,000 acres of open spaces and parklands where urban visitors can enjoy inexpensive access to beautiful parks with dark sky views. An important part of public coastal access and recreation is the opportunity for coastal visitors to the area's beaches, mountains, and parklands to enjoy peaceful experiences within natural settings. The enjoyment of these publicly-available natural areas is one of the last affordable forms of coastal recreation. Night hiking, night photography, and stargazing are popular and inexpensive pastimes in the Santa Monica Mountains. Urban

residents of Los Angeles can travel by car or public transportation to the Santa Monica Mountains without the cost of air travel, and camp at public parks without incurring the cost of a hotel booking.

Light pollution from urban development has so obscured city skies that star-gazing is no longer possible without leaving the city. The convenient access to the Santa Monica Mountains presents an affordable opportunity for urban dwellers to experience the refreshment and beauty of coastal recreation in an area where dark sky character remains evident. Pepperdine's own campus recreation department offers frequent night hikes and stargazing events for students at nearby parks and trails, free of charge, noting that such outings make refreshing, affordable, stress-reducing study breaks. The same factors draw visitors from southern California and beyond to the Santa Monica Mountains. Clear views of the dark night sky are an important coastal access amenity of the region's public beaches, trails, and parks.

All of these factors strongly suggest that locating sports lighting in the upper Marie Canyon area of the Pepperdine campus, as Pepperdine proposes would pose an unacceptable risk to the dark sky character of the canyon and to adjoining open spaces and trails. Pepperdine asserts that even though the playing field proposed for sports lighting and year-round night use would be visible to nearby trail users when the lights are in operation at night (see Exhibits 8-10), such impacts should be considered insignificant. The Commission however rejects that conclusion because public coastal views of the night sky are a finite, resource freely available to all and should not be adversely impacted by converting an open space area surrounded by sensitive habitat and publicly used trail corridors through the introduction of urban artificial lighting.

Globe light replacement; LRDP Amendment 1-11A

The Commission approved LRDPA 1-11 last December subject to a suggested modification requiring the replacement of most of the globe light-style outdoor space lighting on the campus. Pepperdine agreed to implement this requirement in phases, as the Campus Life Project development is implemented. The globe lights will be replaced with contemporary lighting fixtures designed to avoid light pollution. The Commission determined in approving LRDPA 1-11A last December that the net effect of the development approved in that amendment would be a decrease in cumulative night lighting levels on campus, compared with the pre-Campus Life Project baseline conditions. In approving the soccer field lighting through #1-11A last December, the Commission concluded that upgrading the soccer field lighting posed little risk to public views or ESHA because the subject playing field was located within the established main campus sports complex near the urbanized center of the campus.

However, although the stadium lighting for the field in the center of campus did not pose a risk of significant, adverse impacts to public views or coastal recreational amenities, or ESHA as the soccer field site is surrounded by development, the lights would still result in some unavoidable cumulative impacts to public views. This impact was attributed to the risk that the soccer field lights, combined with other significant sources of ambient light pollution on campus, would significantly increase campus contributions to the sky glow form of light pollution emanating from the campus.

To mitigate the cumulative light pollution impacts of the development authorized pursuant to LRDP Amendment 1-11A, the University proposed and the Commission required a suggested modification requiring the replacement of all "globe" light standards on campus (except for 32 vintage lights of historic significance to the campus) with shielded fixtures (see Exhibit 11). The existing globe lights cast circular halos of light that cumulatively contribute to overall campus light pollution levels. Replacement of the globe lights will be undertaken in phases tied to the progress of the approximately twelve-year construction implementation schedule Pepperdine estimates for completion of the Campus Life Project development authorized in #1-11A.

However, the new field lighting Pepperdine proposes for upper Marie Canyon would be placed in a setting that, unlike the soccer field lighting in LRDPA 1-11A, is not proposed for a central campus location area far from environmentally sensitive habitat. The Marie Canyon site would extend the adverse effects of light pollution into adjacent chaparral ESHA as discussed in Section D above. From the perspective of potential to create sky glow impacts, the upper Marie Canyon site would place intense light within a dark environment. As lighting expert James R. Benya has explained to Commission staff ecologist Jonna Engel, Ph.D., and as she has explained in her memorandum dated September 26, 2013, sports lighting always introduces highly significant, unavoidable, and frequently unmitigable impacts in dark sky areas where high contrast between the lighting and the relative darkness of the setting area is extreme.

Mr. Benya was the co-chair of the International Dark-Sky Association (IDA) – Illuminating Engineering Society (IES, formerly IESNA) Joint Task Force that developed the *Joint IDA-IES Model Lighting Ordinance* published in June 2011, which also adopted the 5-Zone Lighting System included in the most recent version (10th Edition) of the IES Lighting Handbook. Under the 5-Zone construct, Zone LZO is the most environmentally sensitive zone and is defined as:

> *Areas where the natural environment will be seriously and adversely affected by lighting. Impacts include disturbing the biological cycles of flora and fauna and/or detracting from human enjoyment and appreciation of the natural environment. Human activity is subordinate in importance to nature. The vision of human residents and users is adapted to the darkness, and they expect to see little or no lighting. When not needed, lighting should be extinguished.*

The IDA-IES *Model Lighting Ordinance User's Guide* states the following for LZO recommended uses or areas:

> *Lighting Zone O should be applied to areas in which permanent lighting is not expected and when used, is limited in the amount of lighting and the period of operation. LZ-O typically includes undeveloped areas of open space, wilderness parks and preserves, areas near astronomical observatories, or any other area where the protection of a dark environment is critical. Special review should be required for any permanent lighting in this zone. Some rural communities may choose to adopt LZ-O for residential areas.*

The *Guide* states further: [LZO] *Recommended default zone for wilderness areas, parks and preserves, and undeveloped rural areas. Includes protected wildlife areas and corridors.*

Dr. Engel further explains in her September 26, 2013 memorandum that she and Mr. Benya concurred that the upper Marie Canyon area should be considered a LZO area. Dr. Engel states that the significance of this determination is that no ambient lighting is considered appropriate for the subject site. Dr. Engel emphasizes that her further research and consultation with Mr. Benya has reinforced the conclusion of her August 23, 2010 memorandum, which recommended that no artificial night lighting should occur at the intramural field in upper Marie Canyon, consistent with the latest lighting standards.

As well, the Marie Canyon site poses direct impacts of light pollution on the trail corridors above the campus, and potentially (under sky glow conditions discussed above) would be visible from public beaches and parks and from Pacific Coast Highway (see Exhibit 10, which shows that the lights in Marie Canyon, without sky glow, are only approximately 25 feet below the line of sight of a viewer at Pacific Coast Highway, looking toward the Marie Canyon site). Moreover, the expansion of high intensity night lighting into Marie Canyon, north of Huntsinger Circle Drive, and beyond the main developed area of campus extends the overall footprint of night sky lighting on campus and pushes the urban fringe represented by the concentrated urban development of the campus into otherwise undisturbed open spaces.

In addition, Section 30251 of the Coastal Act states in part that that:

> *Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, …, to be* ***visually compatible with the character of the surrounding areas****, and where feasible to restore and enhance visual quality in visually degraded areas.*

Although the University is not within the boundaries of the City of Malibu it is adjacent to the City on the east, south, and west. The City of Malibu is a semi-rural to rural area that is adjacent to large areas of open space and is a relatively dark community at night. The City's Certified Local Coastal Program (LCP) includes a policy that requires outdoor lighting be minimized and restricted to protect the dark sky character of the community and for protection of sensitive habitats. The City is currently working on developing a more comprehensive dark skies ordinance for the City. The unincorporated Los Angeles County area surrounding the campus is primarily open space with little or no nighttime lighting. The County has passed a rural lighting ordinance designed to address the problem of urban lighting encroachment into more rural areas. The County of Los Angles is also currently working with Commission staff on a draft LCP for the Santa Monica Mountains that will also include dark skies policies and ordinances. The introduction of new high intensity stadium lights that will produce a significant amount of sky glow on the periphery of the developed campus is not visually compatible with the dark skies community character of this rural and semi-rural area.

Pepperdine argues that the required campus-wide replacement of the existing globe lights incorporated into the certified LRDP pursuant to LRDPA 1-11A would mitigate sky glow that may be created by the proposed sports lighting at the upper Marie Canyon playing field. However, the subject Marie Canyon site is elevated more than three hundred feet above the rest of the campus as the terrain slopes southward toward the central campus from the Marie Canyon site. This topographic factor becomes more obvious in the oblique aerial photograph of 1984

attached to Dr. Engel's August 23, 2013 memorandum (Exhibit 12). For the reasons outlined above, the Marie Canyon site is now considered "Lighting Zone O" (LZ0) and therefore sports lighting in the canyon would not be appropriate even if the potential for the creation of sky glow could somehow be fully ruled out. Nevertheless if sports lighting were to be installed in Marie Canyon, the program to replace lights throughout the campus would not offset the light dome effect that could uniquely arise in the canyon location backdropped by the dark Santa Monica Mountain elevations framing the site as viewed from a distance.

As well, publicly used trail corridors run above and through the subject site, and are of particular importance as an affordable coastal access and recreational amenity. Cumulative impact mitigation for generalized light pollution created within the urbanized main core of the lower campus would reasonably be mitigated by the globe replacement program, where both the impact and the mitigation are aimed at generalized light pollution. The upper Marie Canyon site differs in important ways due to its relatively remote location outside the main developed core of the campus, and due to its environmental sensitivity. The Marie Canyon site is more readily visible at night from publicly used trail corridors, as well, such that the overall campus light mitigation realized by gradual replacement of old-style globe lights over the next decade would not offset the direct impacts of the lighting on the canyon habitat and the dark sky resources of the expansive, protected open spaces and parklands north of the subject site.

Therefore, to ensure that significant adverse impacts to public views are avoided, **Suggested Modification 1** adds language to an LRDP policy required by the Commission in approving LRDP 1-11A, to restrict new outdoor sports field lighting installations to the locations of the existing soccer field, track, and baseball fields located within the main developed area of the campus, and in an area of campus that has been continuously devoted to similar sports use, including use of night lighting, since the campus opened in 1971. The suggested modification would prohibit the installation of outdoor sports field lighting in upper Marie Canyon proposed by Pepperdine in LRDP 1-11B.

Public Coastal Access and Recreation, and Visual – Conclusion

The development included in the Campus Life Project that would be incorporated into the LRDP pursuant to proposed LRDP Amendment 1-11B has the potential to generate light pollution adversely affecting dark sky conditions of importance to public coastal access and recreation near the Pepperdine University campus. Coastal Act Section 30251 requires that new development shall be sited and designed to protect views to and along the ocean and scenic coastal areas and that scenic and visual qualities of coastal areas be considered and protected as resources of public importance. Additional Coastal Act Chapter 3 policies require that maximum public access be provided for all of the people of the state, that development be sited and designed to avoid significant, adverse effects on coastal resources, and that low cost forms of public coastal recreation be preserved and encouraged.

Suggested Modification 1 (lighting) limits the installation of new stadium-type outdoor sports field lighting to the existing soccer field, track, and baseball field located in the main developed area of campus. This restriction would minimize potential light pollution that would otherwise cause significant, adverse effects on visual resources, and on public coastal access and recreation.

Therefore, for all the above stated reasons, the Commission finds that only if modified by **Suggested Modification 1** will the request of Pepperdine University to amend its certified LRDP pursuant to LRDPA 1-11B, be consistent with the requirements of the Chapter 3 policies of the Coastal Act protective of public coastal access and recreation.

F. ALTERNATIVES

The University has considered and rejected several options for alternative locations for new recreational playing field areas on the Malibu campus. Two of the rejected options would have installed the new playing field in open space areas of the campus lands near environmentally sensitive habitat, and thus would not reduce the impacts of the proposed project, as compared with the proposed location in Marie Canyon, which is also located adjacent to ESHA.

The third alternative location considered by the University would utilize the 30-acre Alumni Park at the south end of the campus as the site of new intramural playing field space. Alumni Park is a previously graded, low-relief area on the south axis of the campus noted for the broad expanses of irrigated turf seen from Pacific Coast Highway. The turf is irrigated with reclaimed wastewater that is stored in two wastewater holding lagoons within Alumni Park. A tennis court shared by Pepperdine and the residents of the adjacent Malibu Country Estates subdivision is located in Alumni Park. There is also an existing intramural recreational playing field northeast of the lower campus tennis courts. The field is the main playing field for intramural and club sports team practices and games. The Alumni Park recreational sports field was identified as a permanent facility on the certified LRDP map (facility 301) at the time of original LRDP certification in 1990.

The University rejected the Alumni Park area as an alternative site for expansion of the existing recreational sports field or addition of a new field, citing conflicts with other outdoor campus activities. Nevertheless, the expansive lawns of Alumni Park, terraced over previously graded slope contours constructed primarily during massive campus grading activities between 1969 and 1972, could be re-countered slightly to provide additional playing field space. With an extra field, and the improvement of the existing Alumni Park field, campus-wide recreational playing field space – including the future upper Marie Canyon playing field – could be doubled almost immediately through work in Alumni Park alone, and tripled with the construction of the Marie Canyon field. The space to add at least one more field clearly exists in Alumni Park, where there is no adjacent ESHA. Pepperdine states that the Alumni Park site is not suitable for lighting due to proximity to Pacific Coast Highway. However, with enhanced recreational field space captured through improvement of existing facilities with room for expansion is probably far more cost effective as well as environmentally superior.

Finally, the new recreational area in Marie Canyon authorized by LRDPA 1-11A, would be almost four acres in completed surface area once constructed. Two smaller fields could be accommodated within that area, instead of the single, 240-foot by 360-foot field presently proposed in Marie Canyon.

Thus, a variety of alternatives exist for expanding the campus supply of day-use intramural playing field areas that have not been considered by the University or were rejected without

further analysis, in proposing use of a single site (upper Marie Canyon) that would serve Pepperdine's stated needs for expanded playing field hours only through the installation of sports lighting in the environmentally sensitive canyon location.

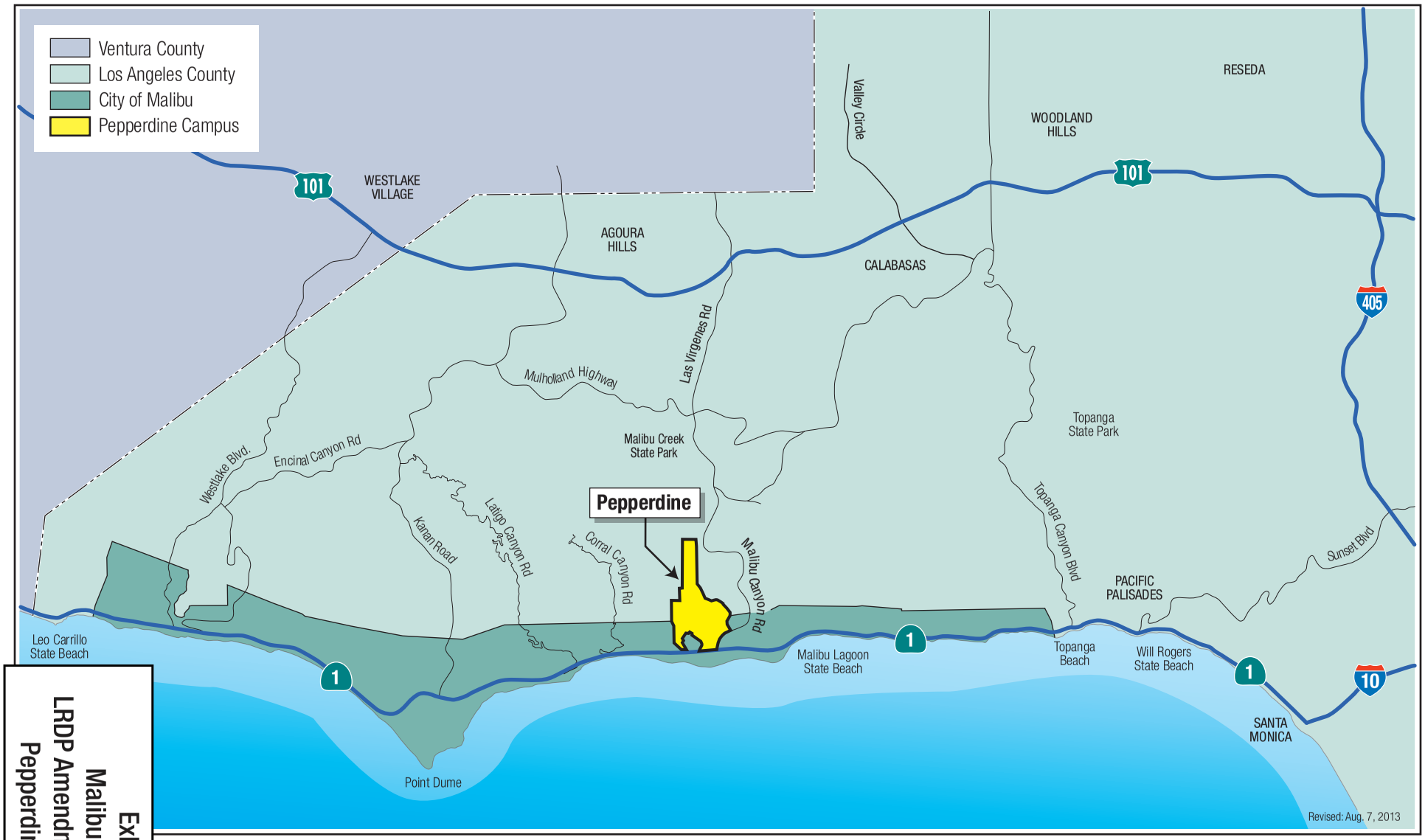
G. CALIFORNIA ENVIRONMENTAL QUALITY ACT

Pursuant to Section 21080.9 of the California Environmental Quality Act ("CEQA"), the Coastal Commission is the lead agency responsible for reviewing Long Range Development Plans for compliance with CEQA. The Secretary of Resources Agency has determined that the Commission's program of reviewing and certifying LRDPs qualifies for certification under Section 21080.5 of CEQA.

Section 21080.5(d)(I) of CEQA and Section 13540(f) of the California Code of Regulations require that the Commission not approve or adopt a LRDP, "…if there are feasible alternative or feasible mitigation measures available which would substantially lessen any significant adverse impact which the activity may have on the environment."

As described in detail above, two (2) modifications to the proposed LRDP Amendment are suggested to mitigate significant adverse impacts to environmentally sensitive habitat areas, public coastal access and recreation upon certification of the subject amendment. The Commission finds that for the reasons discussed in this report, if the LRDP amendment is modified as suggested, there are no additional feasible alternatives or feasible mitigation measures available that could substantially reduce any adverse environmental impacts. The Commission further finds that the proposed LCP amendment, if modified as suggested, is consistent with Section 21080.5(d)(2)(A) of the Public Resources Code.

Exhibit 1
Regional Map
LRDP Amendment 1-11, Part B
Pepperdine University



PEPPERDINE UNIVERSITY LRDPA #1-11, PART B

Malibu Area Map

MILES 0 1 2 3

Exhibit 2

Exhibit 2
Malibu Area Map
LRDP Amendment 1-11, Part B
Pepperdine University

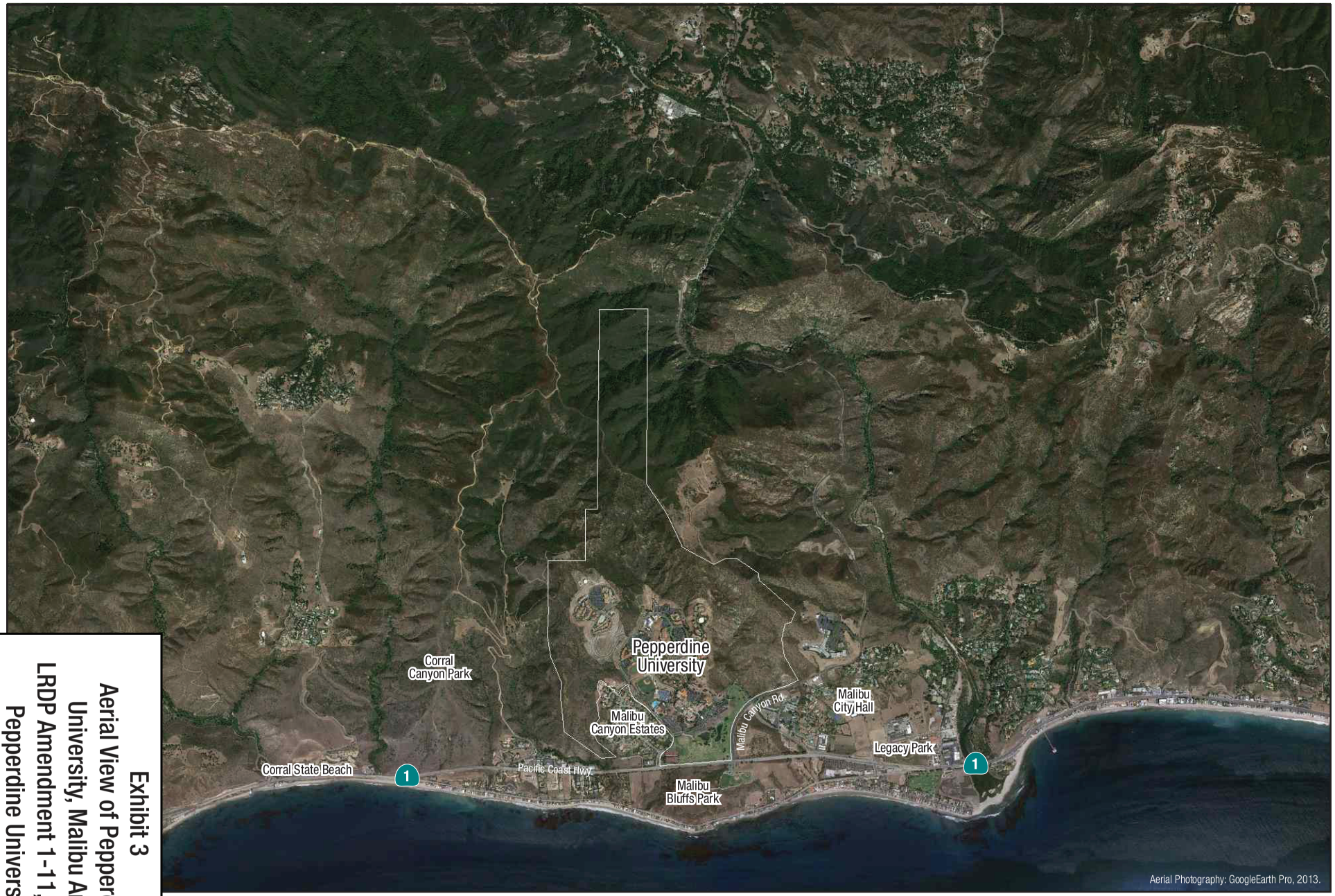


Exhibit 3
Aerial View of Pepperdine University, Malibu Area
LRDP Amendment 1-11, Part B
Pepperdine University

PEPPERDINE UNIVERSITY LRDPA #1-11, PART B

Aerial View of Pepperdine University, Malibu Area

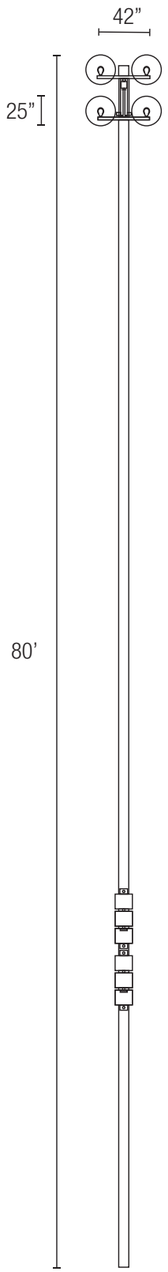
FEET 0 1,750 3,500

Exhibit 3

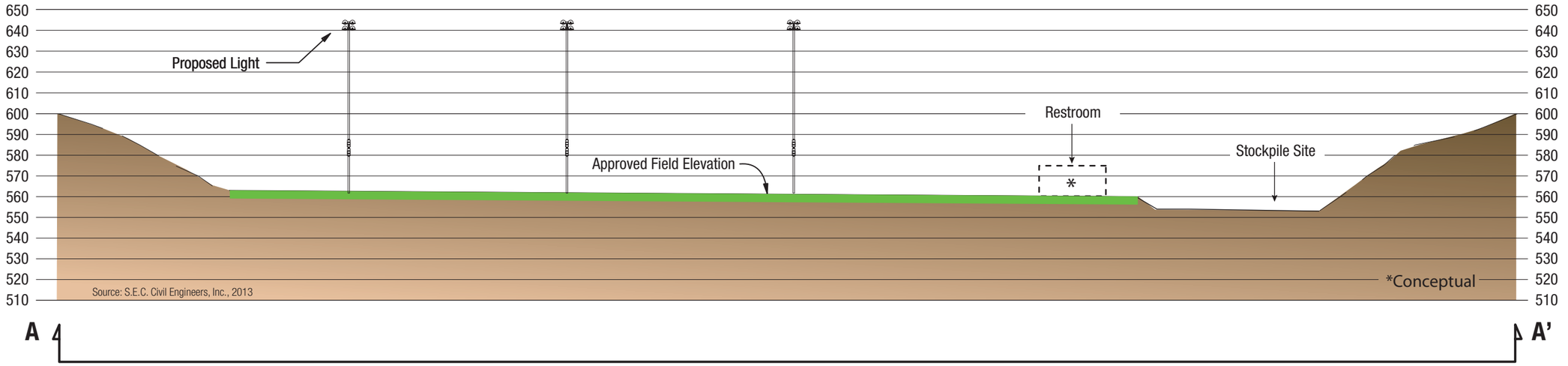
FEET 0 300 600

Exhibit 4
Aerial View of Pepperdine
Campus Component 5 Boundary
LRDP Amendment 1-11, Part B
Pepperdine University

Exhibit 5
Aerial View of Enhanced
Recreation Area
LRDP Amendment 1-11, Part B
Pepperdine University

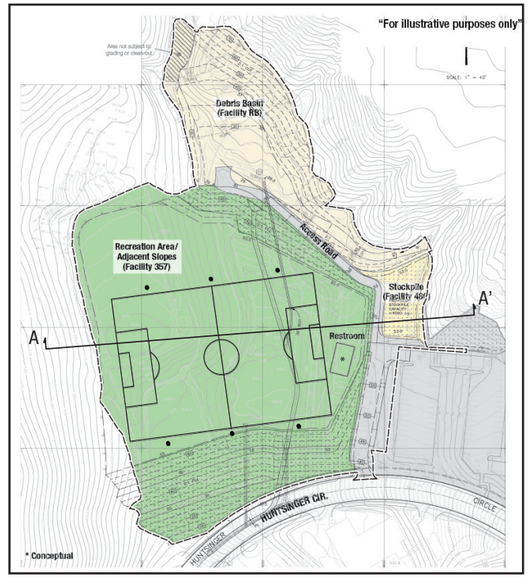


Pole and Arm Detail



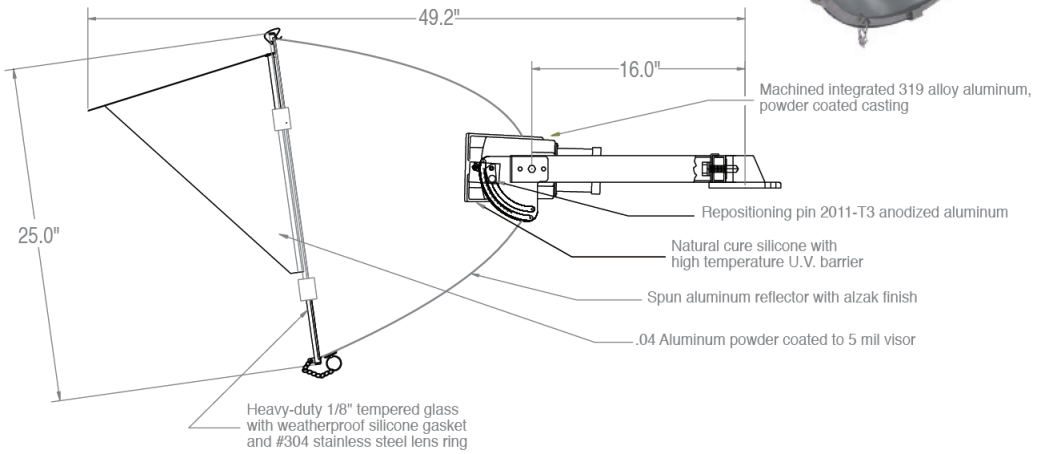
Note: Enhanced Recreation Area Proposed Field Lighting will consist of six poles with four shielded angled fixtures per pole. Each fixture will use 1500 watts for a total of 6000 watts per pole and 36000 watts for the entire system.

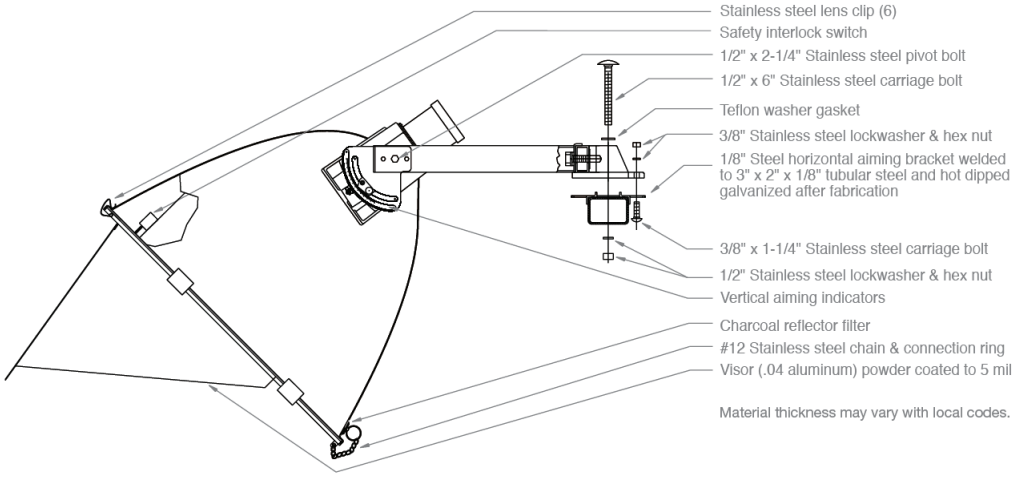
Final field dependent upon pad elevation.



August 19, 2013

Exhibit 6
Profile View of Enhanced Recreation Area and Proposed Field Lighting
LRDP Amendment 1-11, Part B
Pepperdine University





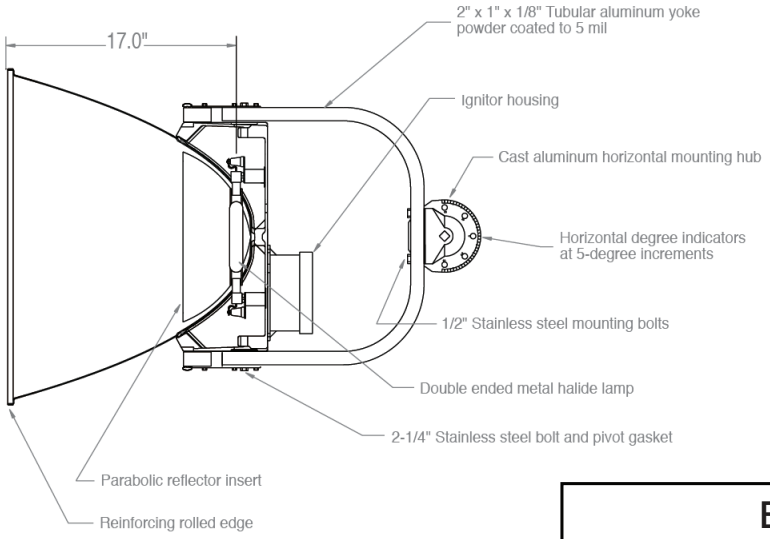


Exhibit 7
Proposed Qualite International Series Fixture Specifications
LRDP Amendment 1-11, Part B
Pepperdine University

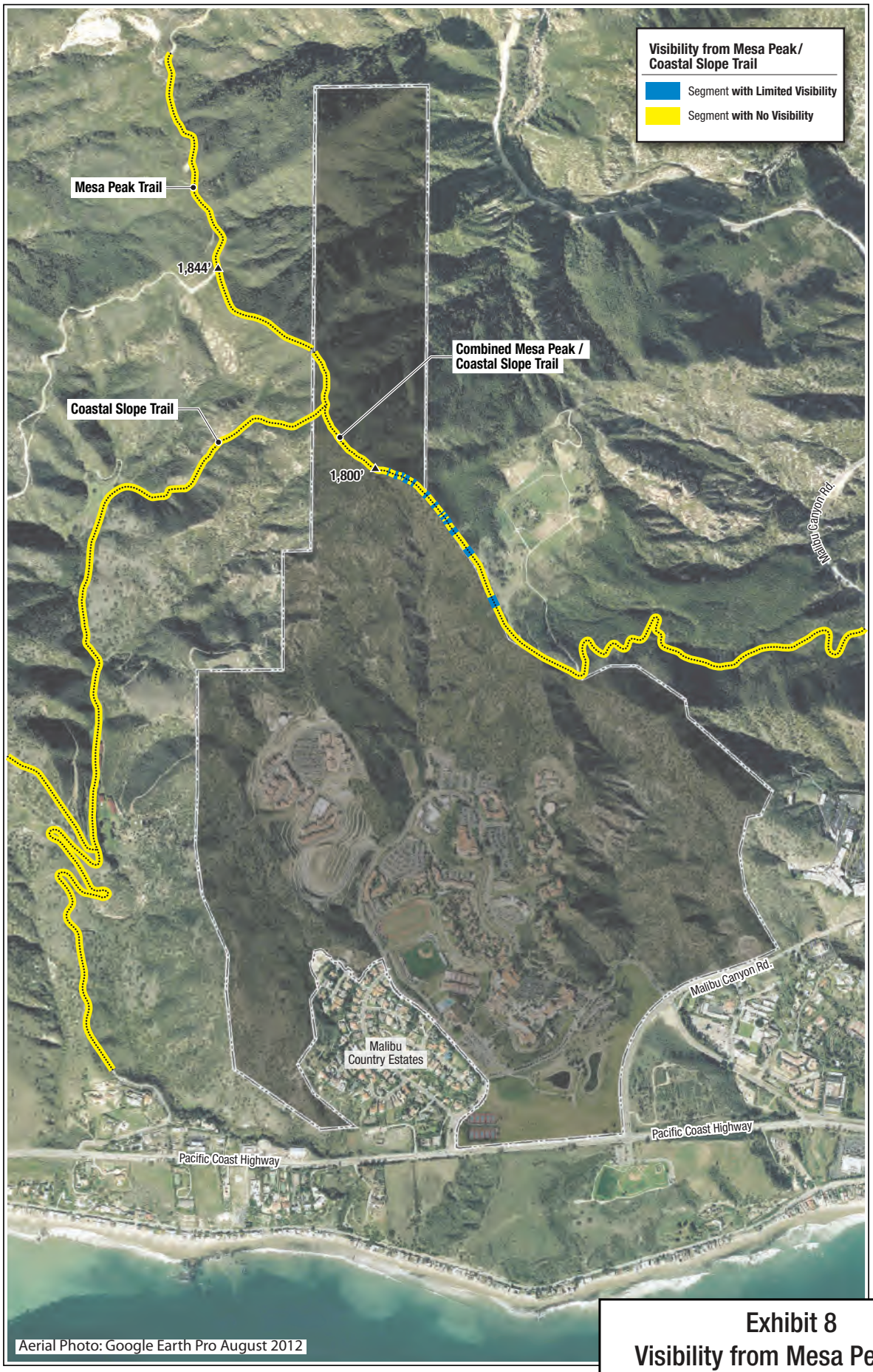


Exhibit 8
Visibility from Mesa Peak and Coastal Slope Trails
LRDP Amendment 1-11, Part B
Pepperdine University

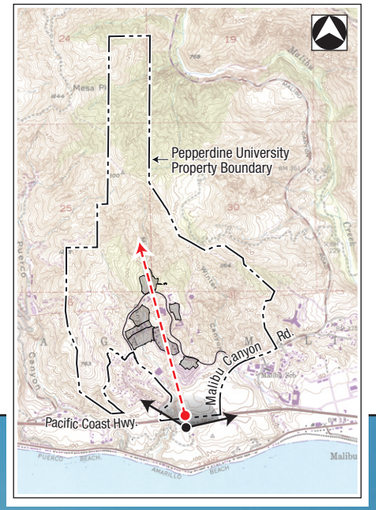
Existing View

Simulated View with Approved Enhanced Recreation Area and Proposed Recreation Lights

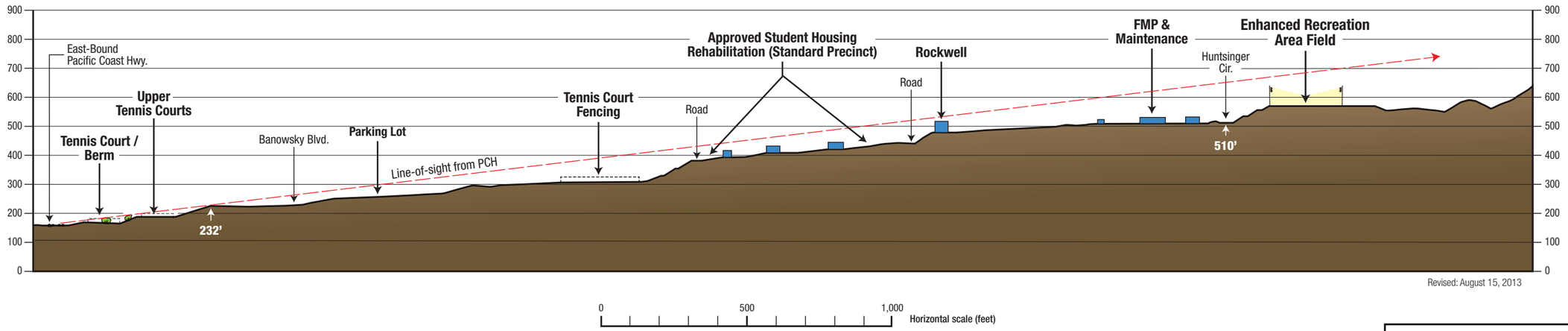
Note: Future poles depicted a lighter color than proposed to aid in identification. They will be painted to blend with the prevailing background colors.

Exhibit 9
Visual Simulation of Approved Enhanced Recreation Area with Proposed Lights
LRDP Amendment 1-11, Part B
Pepperdine University

Orientation of Lines-of-Sight



Terrain Cross-Section and Lines-of-Sight View Profile of Approved Facilities and Proposed Lights



Revised: August 15, 2013

Exhibit 10
Select View from Pacific Coast Highway
LRDP Amendment 1-11, Part B
Pepperdine University

Existing Light

Representative Replacement Lights

Note: The globe light replacement project does not include the historic lights located along Banowsky Boulevard & Baxter Drive, which will be retained.

Exhibit 11
Replacement of Existing Globe Lights
LRDP Amendment 1-11, Part B
Pepperdine University

CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
89 SOUTH CALIFORNIA ST., SUITE 200
VENTURA, CA 93001
(805) 585-1800

M E M O R A N D U M

FROM: Jonna D. Engel, Ph.D., Ecologist; and Nick Sadrpour, Graduate Student Intern

TO: Melanie Faust
Coastal Program Analyst

SUBJECT: Pepperdine University, Campus Life Project, Component 5: Enhanced Recreation Area – Biological Analysis of the Proposed Artificial Night Lighting, Intramural Field Orientation, and Restroom and Storage Facility Location

DATE: August 23, 2013

Documents Reviewed:

Commission Findings in Support of October 5, 2011 Certification, with Suggested Modifications, of City of Malibu Local Coastal Program Amendment No. MAL-MAJ-1-11-A, as shown in September 22, 2011 Staff Report and the October 4, 2011 Addendum[1].

Commission Findings in Support of December 13, 2012 Certification, with Suggested Modifications, of Pepperdine University's Long Range Development Plan Amendment No. 1-11-A (as shown in November 30, 2012 Staff Report and December 10, 2012 Addendum).

ENVICOM Corporation. March 12, 2012. Biological Assessment and Impact Analysis; Pepperdine University Campus Life Project Component 5 – Enhanced Recreation Area. Prepared for Pepperdine University.

ENVICOM Corporation. March 31, 2011. Final Environmental Impact Analysis, Pepperdine University, Campus Life Project. Prepared for County of Los Angeles, Department of Regional Planning.

ENVICOM Corporation. November 5, 2010. Draft Environmental Impact Analysis, Pepperdine University, Campus Life Project. Prepared for County of Los Angeles, Department of Regional Planning.

[1] At the October 5, 2011 Commission meeting, the Commission made minor changes to Suggested Modification No. 3 that are not reflected in the findings, but which are not relevant here.

Francis Krahe & Associates Inc. Architectural Lighting Design. August 3, 2010. Draft Environmental Impact Lighting Analysis; Pepperdine University, Campus Life Project. Prepared for Pepperdine University.

AIS (Aerial Information Systems, Inc.) and ESRI (Environmental Systems Research Institute. 2007. USGS-NPS Vegetation Mapping Program. Santa Monica Mountains National Recreation Area Photo Interpretation Report. Submitted to Santa Monica Mountains National Recreation Area, May 23, 2007.

CDFG (California Department of Fish and Game), California Native Plant Society, T. Keeler-Wolf, and J. Evens. 2006. Vegetation Classification of the Santa Monica Mountains National Recreation Area and Environs in Ventura and Los Angeles Counties, California. Submitted to National Park Service, January 2006.

Dixon, J. 2003. Memorandum to Ventura Staff (California Coastal Commission): Designation of ESHA in the Santa Monica Mountains. March 25, 2003.

Department of the Interior; National Park Service. March 1998. Santa Monica Mountains National Recreation Area Land Protection Plan.

In November 2012 the Commission approved the development at the Components 1 - 4 site and several features of the Component 5 site that compirse Pepperdine University's Long Range Development Plan (LRDP) Campus Life Project amendment[2] (Figure 1). In order to avoid approval delay for the majority of the Campus Life Project, several of the Component 5 site project elements requiring more in-depth biological analysis were held back. The features of the Component 5 site development that were approved are the intramural field, debris basin relocation, and parking lot improvements. The outstanding elements proposed at the Component 5 site are artificial night lighting for the new intramural field, orientation of the new intramural field, and location of a restroom and storage facility.

We have been asked to analyze and determine if artificially lighting the intramural field at night at the Component 5 site will have significant adverse impacts, the orientation of the new intramural field that minimizes environmental impacts, and the location for the restroom and storage facility that minimizes environmental impacts. In considering these questions Dr. Engel visited the site on October 30, 2012 along with other commission staff, Pepperdine University staff and their biological consultants and other representatives. Mr. Sadrpour also visited the site on Thursday, August 1, 2013. In addition we reviewed the documents listed above including the environmental impact report and associated documents prepared for the project, the National Park Service vegetation mapping for the area, current and historical aerial photographs, and peer-reviewed literature. It is critical to note that the potential biological impacts of artificial

[2] Commission Findings in Support of December 13, 2012 Certification, with Suggested Modifications, of Pepperdine University's Long Range Development Plan Amendment No. 1-11-A.

night lighting at the Component 5 site have never been analyzed and are potentially very significant.

To analyze the potential biological impacts of artificially lighting the new intramural field at night at the Component 5 site and to determine whether night lights would or would not pose a significant adverse impact at this site we evaluated the location of Component 5, the nature and condition of the habitat on and around the site, wildlife presence within and use of habitat on and around the site, the impacts of artificial night lights on animals, and the methodology and results of the Krahe and Assoc. Inc. lighting analysis. We also evaluated the two options for the field orientation and the restroom and storage facility location to determine which alternative would have the least environmentally damaging impacts.

Pepperdine University is located along the lower south flank of the Santa Monica Mountains immediately north of Pacific Coast Highway and approximately 0.5 miles from the Pacific Ocean. The university is built on coastal terraces and foothills and is surrounded by steep and rugged mountains with narrow north-to-south flowing creeks and associated ridges and canyons. The majority of the campus lies in Marie Canyon watershed and is bounded by large blocks of undeveloped public and private land including the university and Malibu Creek State Park protected open space (Figure 2). The dominant native vegetation on and around the campus is coastal sage scrub that transitions to chaparral at higher elevations with creeks and riparian habitat in the main and tributary canyons.

The Component 5 site lies at the upper and outer edge of the core campus at the base of the upper Marie Canyon watershed. It is surrounded to the west, north, and east by steep slopes of the Santa Monica Mountains that support pristine native habitat and is bounded to the south by Huntsinger Circle Drive which forms a perimeter around the main campus (Figure 1). The location of the proposed Component 5 development (Component 5) occupies a knoll and slopes descending to a stream channel that have been modified through the years so that the area consists of several more-or-less level pads that are set back in Marie Canyon with steep slopes on three sides and an open view to the south in an amphitheatre or bowl-like position (Figure 3).

While adjacent to pristine native habitat, the Component 5 site has a history of development and associated disturbance including grading, fill, construction staging, stockpiling, fuel modification, and restoration work. Development and disturbance also includes channelizing part of Marie Creek and eliminating the lower extent of Marie Creek on the site in the process of excavating a debris basin. Coastal sage scrub restoration of the slope below the equestrian facility was done as mitigation for creation of the debris basin. In c. 1999 the equestrian facilities were removed and converted to a sports field. As a result of past disturbance and ongoing fuel modification there has been a shift over the years from an area that supports a significant amount of native habitat to one that is dominated by non-native and invasive plant species.

Biological Characterization of the Component 5 Site and Surroundings

ENVICOM has conducted several biological surveys at the Component 5 site including one in each of 1998, 2010, and 2012. In 2010 ENVICOM mapped the vegetation at the Component 5 site (Figure 4). They found that majority of the site was occupied by exotic landscaping/weed infestation and that there was only small patches of native chaparral, coastal sage scrub, and riparian habitat.

The small patches of chaparral in the Component 5 site is dominated by greenbark ceanothus*, Ceanothus spinosus,* and mountain mahogany, *Cercocarpus betuloides*. A smaller percentage of the chaparral consisted of big pod ceanothus, *Ceanothus megacarpus;* chamise, *Adenostoma fasiculatum*; laurel sumac, *Malosoma laurina*, sugar bush, *Rhus ovata;* and toyon, *Heteromeles arbutifolia*. Our site visit observations confirmed these findings and we noted that the chaparral surrounding the Component 5 site was pristine in nature[3] and has the same suite of native species as the disturbed chaparral within the Component 5 site.

The small patch of coastal sage scrub in the Component 5 site is dominated by black sage, *Salvia mellifera* but also contains several other signature species including California sagebrush, *Artemesia californica;* coyote bush, *Baccharis pilularis*;; California sunflower, *Encelia californica*, Giant wild rye, *Leymus condensatus*; and deerweed, *Acmispon glaber.* Our site visit observations confirmed these findings and we noted that the coastal sage scrub surrounding the Component 5 site was pristine in nature[4] and has the same suite of native species as the disturbed coastal sage scrub within the Component 5 site.

The extremely small area riparian habitat on the Component 5 site is made up of mulefat (*Baccharis salicifolia*) scrub dominated by mulefat; mugwort, *Artemisia douglasiana;* and giant rye grass.

The western perimeter of the Component 5 site supports small patches of pristine greenbark ceanothus and mountain mahogany dominated chaparral outside and even within the fuel modification. The majority of the northern perimeter of the Component 5 site, with Marie Creek, a tributary creek, and riparian habitat, are disturbed from fuel modification as well as from creek channelization, broken concrete blocks in the creek beds, and non-native and invasive species. Just beyond the Component 5 site boundary and fuel modification zone the surrounding slopes support pristine native chaparral and riparian habitat. The eastern perimeter of the Component 5 site is dominated by non-native and invasive terracina spurge and acacia. However, again, just beyond the Component 5 site boundary and fuel modification the slope is covered with pristine native coastal sage scrub and chaparral habitat.

[3] We conducted a visual inspection of the habitat surrounding Component 5 from various locations on the site due to a lack of time, steepness of the slopes, and thickness of the native vegetation.
[4] Ibid

ENVICON did not map or describe the habitat surrounding the Component 5 site but in 2001 National Park Service (NPS) undertook an ambitious vegetation mapping effort that covers the entire Santa Monica Mountain's ecosystem including Pepperdine University and its surroundings. The NPS map identifies the native vegetation on the slope west of the Component 5 site as the laurel sumac-ashy buckwheat-black sage phase and birchleaf mountain mahogany alliance; the slope directly north of the Component 5 site dominated by the greenbark ceanothus alliance; and the slope to the east of the Component 5 site inhabited by the laurel sumac-ashy buckwheat-deerweed phase and the laurel sumac-black sage alliance (Figure 5). The NPS vegetation map comports with our site visit observations of the native habitat surrounding the Component 5 site.

Finally, the ENVICOM 2010 biological report states that "The Component 5 site's location adjacent to areas of habitat value to the north increases the likelihood that wildlife may temporarily utilize the site's resources, or move through the area." In their report ENVICOM identifies numerous species of native animals they observed on the Component 5 site as well as native animals they believe are likely to occur at the Component 5 site and its surrounding. ENVICOM observed over 16 species of native mammals including mule deer, bobcats, coyotes, raccoons, rabbits, big eared woodrats, and several species of mice. Additional mammals expected to occur in the area include badgers, mountain lions, and bats; all species that tend to be active at night and or dawn and dusk. Seth Riley, SMMNRA wildlife biologist, has been conducting mountain lion studies for over a decade. His tagging work shows that 9 mountain lions have been identified in Marie Canyon between 2002 and 2013 (Figures 6 & 7). ENVICOM did not conduct protocol level surveys for bats but lists eight species that are California species of special concern and that "to be conservative for the purposes of this analysis, ….are considered potentially present, primarily foraging above ground, and perhaps roosting in trees therein [component 5] or adjacent." Reptiles observed include side-blotched and fence lizards, and striped racer and gopher snakes. Among the reptiles ENVICOM expects to occur are alligator lizards, western skinks, common kingsnake and southern Pacific rattlesnake. The only amphibian ENVICOM observed is the Pacific chorus frog but they believe that California toads are likely in the area. A large number of birds have been observed on the site and in the area. Red-tailed hawks, Cooper's hawks, Amercian kestrels, great-horned owls, and Barn owls are year-round residents. These owls have been documented as nesting in the rock cliffs just beyond Component 5 north the waterfall in the main drainage of Marie Canyon. Numerous other birds are year round residents including California quail, killdeer, greater roadrunner, Nuttall's woodpecker, northern flicker, common poorwill, several species of hummingbirds, California thrasher spotted and California towhees, to name just a few. These animals and more are expected to occupy the ESHA surrounding component 5 and beyond.

Environmentally Sensitive Habitat Area (ESHA) Determination

Based on ENVICOM's biology reports, NPS vegetation mapping, and our site visits we have made an environmentally sensitive habitat area (ESHA) determination for the

Component 5 site and the slopes surrounding it. The definition of ESHA found in Section 30107.5 of the Coastal Act is:

> *Any area in which plants or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and development.*

And section 30240 of the Coastal Act provides direction for the protection of ESHA:

a) *Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
b) *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

In 2003, in the context of the Malibu LCP the Commission made the finding that unfragmented and continuous relatively pristine native habitat in the Santa Monica Mountains rise to the level of ESHA. Dr. Dixon's March 23, 2003 memorandum states in part:

> *In the context of the Malibu LCP, the Commission found that the Mediterranean Ecosystem in the Santa Mountains is rare, and especially valuable because of its relatively pristine character, physical complexity, and resultant biological diversity. Therefore, areas of undeveloped native habitat in the Santa Monica Mountains that are large and relatively unfragmented may meet the definition of ESHA by virtue of their valuable roles in that ecosystem, regardless of their relative rarity throughout the state. This is the only place in the coastal zone where the Commission has recognized chaparral as meeting the definition of ESHA….*
>
> *For habitats in the Santa Monica Mountains, particularly coastal sage scrub and chaparral, there are three site-specific tests to determine whether an area is ESHA because of its especially valuable role in the ecosystem. First, is the habitat properly identified, for example as coastal sage scrub or chaparral? The requisite information for this test generally should be provided by a site-specific biological assessment. Second, is the habitat largely undeveloped and otherwise relatively pristine? Third, is the habitat part of a large, contiguous block of relatively pristine native vegetation?*

We find that nearly all the native habitats within the Component 5 site fail to rise to the level of environmentally sensitive habitat (ESHA) as the area is dominated by non-native and invasive species and the little native habitat that is there consists of small, fragmented areas significantly disturbed by human activities, non-native species, and

fuel modification. We concur with ENVICOM's finding that the coastal sage scrub and chaparral within the boundary of the Component 5 site do not rise to the level of ESHA. The only portion of the Component 5 site that we find rises to the level of ESHA is a the small area of riparian habitat at Marie Creek and its western two tributaries at the very northern perimeter of the site that is connected to the pristine riparian habitat outside the Component 5 boundary. In a short distance the creek habitat becomes a graded/disturbed channel that flows into the debris basin that was approved in a prior LRDP amendment and receives regular maintenance.

While most of the Component 5 site does not support ESHA, we find the western, northern, and eastern slopes surrounding Component 5 do support habitat that meets the three tests for ESHA in the Santa Monica Mountains. First, we find that the slopes are properly delineated as supporting coastal sage scrub and chaparral habitats (Figure 5). Second we find that the habitats are undisturbed and nearly pristine stands of native plant communities. And last, we find that the habitats are large areas that are in turn connected to large, contiguous blocks of undeveloped and relatively pristine habitat. This is illustrated by the figures in the Santa Monica Mountains National Recreation Land Protection Plan which identifies core habitat areas and important linkages for wildlife movement within the Santa Monica Mountains and beyond. These figures shows that the Marie Canyon watershed is connected to larger unfragmented and contiguous blocks of native habitat that in turn form a networked zone of connection within the Santa Monica Mountains that also links to the Simi Hills, Santa Susanna and San Rafael Mountains (Figure 2).

It is the unique position and surroundings of the Component 5 site that set it apart from the other sports fields on Pepperdine University campus. The Component 5 site is positioned in a bowl or amphitheatre against the slopes of the Santa Monica Mountains at the apex and northern-most edge of the developed campus; at the urban-rural (artificial light-natural light) boundary (Figure 3). The slopes surrounding the Component 5 site support native habitat that rises to the level of ESHA that in turn supports numerous native animals. Because of its topographical setting the Component 5 site is actually more isolated than a plan-view map would suggest. Animals within and around the Component 5 site, especially at night, experience the area generally as an uninhabited and natural area suitable for conducting animal business as usual.

Properties of Light and Light Measurements

Light or electromagnetic radiation that is visible to the human eye is called "visible light" and has a wavelength range from approximately 380 nanometers (nm) to about 740 nm and occurs along the electromagnetic radiation spectrum between "invisible" infrared radiation, with longer wavelengths, and "invisible" ultraviolet radiation, with shorter wavelengths (Figure 8). All electromagnetic radiation is emitted and absorbed in tiny units called photons, and exhibits properties of both waves and particles which is referred to as the wave–particle duality. Two key characteristics of light are intensity and wavelength or frequency. Light varies in its intensity (the number of photons per

unit area) and in its spectral content (expressed by wavelength)[5]. The most common measure of light intensity (the amount of light falling on a specific area) is called illuminance; the standard measure of illuminance is footcandles which express the intensity of light incident on a surface weighted for the spectral sensitivity of the human eye. Footcandle (fc) measurements place more emphasis on wavelenths of light that human eyes detect best and less on wavelengths that humans do not see as well[6]. In other words, footcandles are correlated to human brightness perception. This inherent property of footcandles limits our ability to assess the impacts of light on wildlife which are known to exhibit a wide range of light intensity and wavelength sensitivities.

Adverse impacts from artificial night light can take several forms including light trespass or spill, sky glow, and glare. Light trespass occurs when unwanted artificial light spills onto an adjacent property lighting an area that would otherwise be dark[7]. Illuminance or illumination is the measure used to detect light trespass. Sky glow and glare are measured as luminance or physical brightness (measured in footlamberts[8]). Sky glow is the bright halo that appears over urban areas at night, a product of light being scattered by water droplets or particles in the air and from reflectance of lights on objects on the ground. Sky glow is intensified when there is a low cloud ceiling or foggy conditions because light refracts off water particles in the air. Sky glow may be perceived as the presence of brightness within a field of view and can include directly viewing a light source. Glare is created by light that shines horizontally.

Animals and Light (Electromagnetic Radiation)

The pivotal role of light (electromagnetic radiation) in organismal biology raises the potential that there will be significant impacts on plants and animals from artificial night lights. The source of natural light is the sun, moon, and stars. Light is used by plants and animals to infer a wide range of information from their environment. One of the most important roles of light for both plants and animals is regulation of their biological clocks or circadian rhythms on a daily, weekly, seasonal, and annual basis. Light information that contributes to the establishment of circadian rhythms includes daylength, light intensity, and light wavelength. In animals, eyes ranging from very simple to complex are the organ that collects light (electromagnetic radiation) from the environment.

Animals typically fall into one of several patterns of daily activity. Diurnal animals are active during the day; nocturnal animals are active at night; crepuscular animals are active at dawn and dusk; and 24-hour pattern animals have activity bursts during the night, dawn, and dusk. While humans are diurnal in nature, most other mammals are nocturnal (e.g. 80% of primates, all bats), crepuscular (e.g. rabbits, rodents), or have a

[5] Hecht, E. Optics (4th Edition). 2002. Addison-Wesley Longman, Inc. 698 pgs.
[6] Rich, C. & T. Longcore (Eds.) 2006. Ecological Consequences of Artificial Night Lighting. Island Press, Washington. 458 pgs.
[7] Chepesiuk, R. 2009. Missing the Dark: Health effects of light pollution. Environmental Health Perspectives. v. 117 (1): A20-A-27
[8] Footlamberts, like footcandles, are based upon the human perception of light; that is it is weighted for human light sensitivity and the wavelengths that humans see (visible light).

24 hour pattern where they are most active at night, dawn, and dusk (e.g. ungulates, large carnivores, some smaller carnivores)[9]. Thus daily behavioral activities such as sleeping, foraging, eating, moving, and resting occur at different times for different animals such that a single habitat is partitioned into temporal niches regulated by light. Most predators are specifically adapted to hunt under particular light conditions (intensity, wavelength) and in most natural habitats, there is a distinct "changing of the guard", from a suite of animals that are active during the day to a suite of animals that are active at dusk or dawn and/or at night. Introducing artificial night lights to an area will change the ambient setting and may adversely impact animals. Likely effects of artificial night lighting on mammals include avoidance, disorientation, disruption of foraging patterns, increased predation risk, disruption of biological clocks, increased mortality on roads, and disruption of dispersal movements through artificially lighted landscapes[10].

Many amphibians as well as insects become attracted to artificial light because it simulates a full moon. This can cause them to be preyed upon more easily. Trophic levels are dynamic by nature; however, the addition of anthropogenic impacts such as artificial night lighting can cause increased fluctuations and unexpected consequences. Of substantial importance are top predators of the system which regulate the trophic interactions of the ecosystem[11]. These predators include but are not limited to mountain lions, bobcats, and coyotes. NPS has been conducting mountain lion tracking studies since 2002 (27 animals have been tagged over the course of their work) which has provided a wealth of information including that the mountain lions are most active at night, dawn, and dusk; avoid developed areas (more than 2/3rds of the GPS data points are over 1 km away from development); and travel through dark wildlife corridors in the Santa Monica Mountains (pers. comm. Seth Riley, August 12, 2013; Figure 7). Avoidance of development (artificial night lights) effectively decreases the realized range of mountain lions which can limit prey availability, increase necessary travel, and ultimately impact survival success. Areas that are avoided by medium to large sized carnivores can have an increase in the number of smaller predators which can have a negative effect on avian species of scrub communities[12]. And whereas large animals such as mountain lions (Figure 6), bobcats, and coyotes have relatively large territories, many of the smaller animals have relatively small territories and are unable to avoid development (artificial night lights).

Daylength, light intensity, and light wavelength also play a significant role in regulating patterns of seasonal life-cycle activity such as flowering in plants and migration, dispersal, hibernation, and reproduction in animals. The internal mechanism of the biological clock is responsible for the hormonal, physiological, and anatomical preparation that these activities require[13]. Although not the only parameter, the

[9] Ibid
[10] Rich & Longcore. 2006. Op Cit.
[11] Ibid
[12] California State Parks, Inland Empire District. September 2002. Urban edge effects and their relationship with the natural environment.
[13] Gaston, K.J., T.W. Davies, J. Bennie & J. Hopkins. 2012. Reducing the ecological consequences of night-time light pollution: options and developments. Journal of Applied Ecology. v. 49:1256-1266

changing length of day (photoperiod) is the most predictive environmental cue for the seasonal timing of physiology and behavior[14]. Sensitivity to the length of day is often so acute that many species can detect discrepancies in natural light as short as one minute[15]. For many species the stages of their life cycle are set by daylength; research has shown that reproduction cycles are disrupted when artificial night light interferes with species' natural detection systems[16]. Artificial night lights may also interfere with the accurate discernment of seasonal periods of weather conditions, food availability and/or predator activity which is crucial for survival of many species.

Alternation of light and dark regulates and resets the biological clock and depending on the timing, light can advance or delay circadian rhythms. The illuminance required to reset biological clocks varies from species to species; lower light levels are required to reset the clocks in nocturnal rodents than in humans[17]. In addition to daylength and light intensity, wavelength of light is a factor in the regulation of the biological clock. Blue light gives a physiological signal to humans and other organisms that it is daytime; when artificial night lights include light in the blue wavelength range, circadian rhythms can be disrupted[18]. Blue wavelengths are present in virtually all light sources so their elimination requires special lights or filters which appear amber.

While some animals with nocturnal, crepuscular, and 24 hour activity patterns may have a highly-advanced sense of smell or specialized hearing abilities such as echolocation to assist them in the dark, most of them have eyes with adaptations for night vision. The primary adaptations are size of the eye, composition of the retina, and a mirror like membrane called the tapetum lucidum. Many animals that are active at night have big eyes, with a wider pupil, larger lens and increased retinal surface to collect more natural light. For example owl's eyes fill over half of their skull. In order to block light during the day, a number of pupil shapes have evolved, the most advanced is the vertical slit such as those of many reptiles and cats[19].

Two types of photosensitive cells make up the retina; rods and cones. Nocturnal animals tend to have retina almost entirely composed of rods which leads to almost no color vision. Rod cells also have high sensitivity but low acuity; rod cells can be stimulated by very few photons but objects may appear fuzzy because many rod cells connect to a single neuron. Cone cells, on the other hand, have lower sensitivity but high acuity because the cone to neuron ratio is closer to 1:1[20]. Rod cells have the photosensitive pigment rhodopsin which is particularly sensitive to low levels of light; a

[14] Zivkovic, B. July 9, 2007. Clock Tutorial #16: Photoperiodism - Models and Experimental Approaches". A Blog Around the Clock. ScienceBlogs.
[15] Ibid
[16] Kempenaers, B., P. Borgström, P. Loës, E. Schlicht and M. Valcu. September 16, 2010. Light is the Friend of Lovers: Artificial night lightin affects songbird behaviour and reproduction. Current Biology, Published online.
[17] Revell, V.L., H.J. Burgess, C.J. Gazda, M.R. Smith, L.F. Fogg & C.I. Eastman. January 2006. Advancing human circadian rhythms with afternoon melatonin and morning intermittent bright light. Journal of Clininical Endocrinology and Metabolism. v. 91(1): 54–59.
[18] Gaston et al. 2012. Op. Cit.
[19] Land, M.F. & D.E. Nilsson. 2002 Animal Eyes. Oxford University Press, New York. 221 pgs.
[20] Rich & Longcore. 2006. Op. Cit.

tiny fraction of the light required by cone rich eyes is required to activate a rod cell during the night[21]. The tapetum lucidum is a mirror-like reflective membrane directly beneath the retina. It collects and re-emits light back to the retina, giving the rods a second chance at light absorbtion thus maximizing the little light available to them. So, although nocturnal animals see mostly crude shapes, outlines and no color, by maximizing their sensitivity to low light levels with the above adaptations, they are able to successfully hunt, feed and survive in the dark, dawn, and dusk. During the day most crepuscular and nocturnal animals are inactive to avoid over-stimulating their highly sensitive eyes[22].

Human perception of light properties is an inadequate basis for an ecological understanding of the lit environment and the potential impacts of artificial night light on wildlife. Humans need artificial lights at night because we are adapted for day activity; the human visual system is one of the least sensitive to light intensity but most accurate known among animals. Human vision can be up to four orders of magnitude less sensitive than that of other animals[23]. If human vision were not so specialized for diurnal activity, artificial lighting would not be necessary. And while human vision is limited to the visible wavelength spectrum there are animals that are sensitive to wavelengths in the ultraviolet region and animals sensitive to wavelengths in the infrared region[24].

Most animals are nocturnal, crepuscular, or operate on a 24 hour pattern and have remarkable adaptations for night life such that adding light to the night environment can range from a moderate disruption to a significant risk to survival. An important fact is the time when night lighting is most important to humans, the hours at and just after dusk and just prior to dawn, are the same hours when changing natural light levels are critical to many animals. The majority of activity of many nocturnal and all crepuscular animals tends to occur during these hours[25]. Nocturnal animals, as the name implies, are active during the night. This means they conduct their business under varying darkness levels including under clear starry skies with an illuminance value of 0.001 fc as well as under overcast night skies with an illuminance value of 0.0001 fc[26]. And under a full moon (0.01 fc), nocturnal animals change their activity patterns; prey species stay under cover and predator species do not actively hunt as much[27].

In addition to the threat of artificial night lights at the new intramural field to the resident native animals in the Marie Canyon watershed, Pepperdine University is within the footprint of the Pacific Flyway (Figure 9), and potentially within the pathway of many of the more than 60 species of waterfowl, raptors, shorebirds, and songbirds known to regularly migrate through Ventura and Los Angeles counties; traveling at night and

[21] https://www.ebiomedia.com/how-do-animals-see-in-the-dark.html
[22] Ibid
[23] Land & Nilsson. 2002. Op. Cit.
[24] Ibid
[25] Gaston et al. 2012. Op. Cit.
[26] Rich & Longcore. 2006. Op. Cit.
[27] Ibid

stopping for a time by inland and coastal creeks, wetlands, woods, and neighborhoods[28] on their northward spring and southward fall migrations. Spring migration occurs during the months of late March through May and fall migration occurs during September, October, and the first part of November. Birds migrating along this route are heading to the Canadian Arctic, Canadian plains, and Canadian boreal forest in the spring, and Mexico, South America, and Pacific Islands in the fall. It is important to note that "Pacific Flyway" is a descriptor for a phenomenon that encompasses the entire state of California and beyond and that not all areas of the state are as important as others. However, depending on the types of migrating birds, certain pathways (e.g. bordering the ocean, along valleys, etc.) will be more frequented, and certain habitats (woodlands, riparian areas, wetlands) will be more important stopovers, than others. The Component 5 site and surroundings may be used by migratory birds as a stopover site because the intramural field turf and Marie Creek and the associated riparian habitat would be attractive to migrating birds that need to rest.

The main concern with artificial night lighting at the new intramural field is its location at the outer edge of campus at the urban-rural (artificial light-natural light) boundary and the potential for night migrating birds to become confused and attracted to the lights during inclement/foggy weather. Most migratory movement occurs early in the evening so any impacts to migrating birds due to the intramural field night lighting are likely to occur during the first two to three hours after sunset[29]. Birds that migrate at night use the moon and stars for navigation. During clear weather they appear to be able to distinguish artificial lighting from light emanating from planets and stars. However, during inclement weather, birds can become confused and drawn to artificial lights. This phenomenon has been observed on numerous occasions at lighted buildings, oil platforms, and athletic fields. Once drawn into an artificial light source a number of negative outcomes including mortality can occur; birds may crash into something, circle the light source becoming exhausted, or become confused and drawn off course.

Potential Impacts of Artificial Night Lights at the Component 5 Site

The proposed artificial night-lighting for the new intramural field at Component 5 consists of six 80 foot tall poles that will each support luminaires fitted with four 1500 watt metal halide bulbs and visors that shield vertical light and limit light trespass. The elevation of the pad is 565 feet which will put the top of the lights at roughly 645 feet. There will be three poles on each side of the field. The approved area for the field will be several times larger than the existing area. The new intramural field itself will be two acres on an overall pad that is four acres in size. Existing conditions are a small field

[28] See: http://www.borealbirds.org/birdguide/map_losangeles.shtml#anchor. The Boreal Songbird Initiative is a network of conservation and birding groups interested in raising awareness in the U.S. and Canada about the importance of the boreal forest and other locations for migratory birds. They conduct migratory bird research and manage and maintain a migratory bird database.

[29] McCrary, M.D., R.L. McKernan, R.E. Landry, W.D. Wagner & R.W. Schreiber. 1982. Nocturnal Avian Migration Assessment of the San Gorgonio Wind Resource Study Area. Report Prepared for Research and Development, Southern California Edison Company, Rosemead, California through the Los Angeles County Natural History Museum Foundation, Section of Ornithology, Los Angeles, California.

with poor turf conditions and temporary lights that require a diesel generator to operate. The existing lights consist of four 25 foot tall poles each fitted with two obsolete metal halide bulbs. The new field will be illuminated by 24 new metal halide lamps while the old field is lit by a total of eight metal halide lamps. Metal halide lamps give off light across the full spectrum of visible wavelengths as well as wavelengths in the UV range and are bright white in color; they are required by the NCAA for collegiate athletic facilities based on their brightness and color character and televised broadcast needs.

In 2010 Francis Krahe & Associates Inc., Architectural Lighting Design (Krahe & Assoc.), performed an environmental lighting analysis for the Campus Life Project[30]. The executive summary of the report states "This report identifies whether the proposed CLP Components result in significant potential glare or light trespass impacts based on illumination industry standards." The report goes on to say that "The methods of analysis utilized for this evaluation are based upon the County of Los Angeles CEQA thresholds, as informed by standard practices and procedures established by the Illuminating Engineering Society of North America (IESNA)".

IESNA standards are a system of specifications related to the general lighting environment that suggest illumination limitations in footcandles (fc) or lux based upon the light level at the human eye[31]. IESNA illumination standards are widely recognized and accepted as the best design practice minimums and are used as the basis for establishing the amount and direction of light for development projects as well as for defining significant impacts. The system includes four environmental area classifications, E1-E4, with regard to ambient lighting. E1 pertains to the most naturally lit areas and is defined as "areas with intrinsically dark landscapes. Examples are national parks, areas of outstanding natural beauty, or residential areas where inhabitants have expressed a strong desire for strict limitation of light trespass"[32]. The specified limiting human eye illuminance for E1 night lighting (pre-curfew, before lights are required to be turned off) is 0.1 fc. To relate this light level to familiar visual situations, 0.1 fc is the pre-dawn light level, 0.01 fc is the light level of a clear night with a full moon, and 0.0001 is the light level of a clear starry night[33]. As discussed in detail above, most animals are active at night and/or dawn and dusk and have numerous night vision adaptations including high sensitivity to very low light levels. While laboratory research is limited, many studies have demonstrated that animals exhibit different behaviors under a full moon versus a clear starry night. Many predators don't hunt under bright moonlight because their prey stay under cover[34]. Using a threshold of 0.1 fc as the criteria for determining whether wildlife will or will not be impacted by artificial night lights is just plain wrong because many critical biological processes and animal behaviors are influenced by light levels well below this value; in fact orders of

[30] Francis Krahe & Associates Inc. Architectural Lighting Design. August 3, 2010. Draft Environmental Impact Lighting Analysis; Pepperdine University, Campus Life Project. Prepared for Pepperdine University

[31] Lewin, Ian. April 2000. Light Trespass Research. Final report to the Lighting Research Office of EPRI, (Electrical Producers' Research Institute) 3574 Atherstone Road, Cleveland Heights, OH 44121

[32] Ibid

[33] Rich & Longcore. 2006. Op. Cit.

[34] Ibid

magnitude lower (nocturnal animals are active at night at light levels as low as 0.0001 fc – see discussion above).

Krahe & Assoc. set up seven receptor sites (D, E, F, G, P, R, & S) on and around the Component 5 site to measure the illuminance and luminance of the existing lights and to model the expected values for the proposed lights (Figure 10). Their analysis assumes that the new artificial night lights at the new intramural field at the Component 5 site will create a significant impact only if they create light trespass greater than 0.1 fc into the natural areas surrounding the field. They provide no review, analysis, or basis for the 0.1 fc criteria in terms of impacts to wildlife. Instead, the value is stated to be an industry standard and is left at that. Figures 11 and 12 show the 0.1 fc threshold line (dashed red line) around the new intramural field in the east-west and north-south orientations, respectively. The 0.1 fc threshold extends minimally beyond the intramural field pad. However, illumination values for light trespass between 0.1 and 0.001 fc extend well into the ESHA surrounding Component 5[35]. Krahe and Assoc. light modeling of the proposed lights show light trespass values equivalent to brighter than moonlight emanating into the surrounding ESHA only decreasing to values equivalent to a clear starry night high on the surrounding slopes[36]. We believe that illumination in this range does pose significant adverse impacts to animals inhabiting the ESHA for the reasons discussed above and below.

We believe that brightness or luminance (sky glow and glare) of the new artificial night lights will also cause a significant adverse impact to the native animals inhabiting the ESHA on the slopes surrounding the new intramural field. Krahe & Assoc. measure brightness or luminance in footlamberts which is another metric that is weighted for human perception of light. Their analysis of luminance includes measuring the luminance of existing visible light sources and the illuminated surfaces from the view of the receptor sites. They record the most intense brightness or maximum luminance and the overall average brightness of illuminated surfaces for each receptor site. They describe contrast as the maximum luminance divided by the average brightness of illuminated surfaces. They define 30 and above as a high contrast situation and establish 30 as the threshold above which environmental impacts are expected and below which no environmental impacts are expected. And while Krahe and Assoc. calculated contrast measurements for existing lights and modeled contrast values for the proposed lights[37] they fail to provide any biological basis for the contrast of 30 criteria except that apparently contrast values above 30 are disruptive to humans. Furthermore, the Krahe & Assoc. analysis does not take into account the contribution of scattered and reflected light caused by atmospheric particles such as dust and water vapor to sky glow and glare. Pepperdine's proximity to the coast ensures that there will be many days when the air has a high volume of water vapor. Scatter and reflection are

[35] Krahe and Assoc. May, 14, 2012. Pepperdine Recreation Field North-South Lighting Calculation. Drawn by MG. Project No. EVO10. Scale ½" = 1'.
[36] Ibid
[37] Krahe and Assoc. contrast value results are as follow: 86.6, 46, 88.2, 97.3, 49.4, and 55.5 for the existing lights at receptor sites D, F, G, P, R, and S, respectively. They modeled contrast values of 23.1, 8.1, 16.1, 12.2, 13.4, and, 14.9 for the proposed artificial night lights at receptor sites D, F, G, P, R, & S, respectively.

amplified by the use of metal halide lights which put out a lot of short wavelength light (blue light) which tends to cause more scatter and reflectance than longer wavelenths of light[38].

In addition to Krahe and Assoc.'s lighting report lacking analysis specific to light impacts upon wildlife, the report also does not evaluate the unique location and topography of Component 5[39]. Night lights in this location push negative impacts associated with development and human activities farther into pristine habitat. The Component 5 area and surroundings are very dark at night. Photos of the Component 5 site taken from receptor site locations D, E, and G demonstrate the dark nature of the surrounding area (Figure 13). In our view, regardless of the exact contrast values, the proposed artificial night lights at the Component 5 site will create a large dome of light highly visible to the wildlife inhabiting the immediate slopes around the new intramural field and the greater Marie Canyon watershed area that will disrupt, deter, and disturb their natural behavior and activities. Given the topography of the area, all views of the lighted field from the adjacent habitat will be either looking down or straight-on to the dome of light. This dome of light, especially under inclement conditions, would be the defining feature at night in the Marie Canyon watershed. The effects of night lighting on wildlife are not limited to shining light into the habitat; the effects include the sheer presence of the light. Based on the location of the Component 5 site and our knowledge of the light sensitivity of animals, we find that artificial night lighting at the new intramural field will adversely impact wildlife that occupy ESHA.

In addition to the direct adverse impacts upon native animals of the artificial night lights, the lights indirectly pose the risk of significant and adverse impacts by providing the key parameter enabling high-disturbance night activities to Marie Canyon, such as competitive sports events drawing participants and spectators. These impacts include the combination of noise, lights, increased use of the adjacent parking lot, and increased traffic on Huntsinger Circle Road for attendance of events at the new intramural field. Event attendance may also produce litter and food wastes that attract wildlife, in addition to other impacts on wildlife corridor use of the riparian canyon.

Malibu High School and "Beach Chalet" (Appeal A-2-SNF-12-020, approved as proposed) are two recent examples of projects where the Commission approved sport field lighting. There are several significant differences between those cases and the proposed artificial night lighting at the Component 5 site. The most important difference is location; neither Malibu High School nor Beach Chalet are located adjacent to ESHA and both are surrounded by development. Malibu High School is surrounded by residential development and Beach Chalet is in Golden Gate Park in San Francisco surrounded by residential development on three sides. Dr. Engel evaluated the use of lights for Malibu High School and found that there were no concerns involving ESHA and associated animals. However Dr. Engel did find that migrating birds could potentially be adversely impacted by the Malibu High School football field artificial night

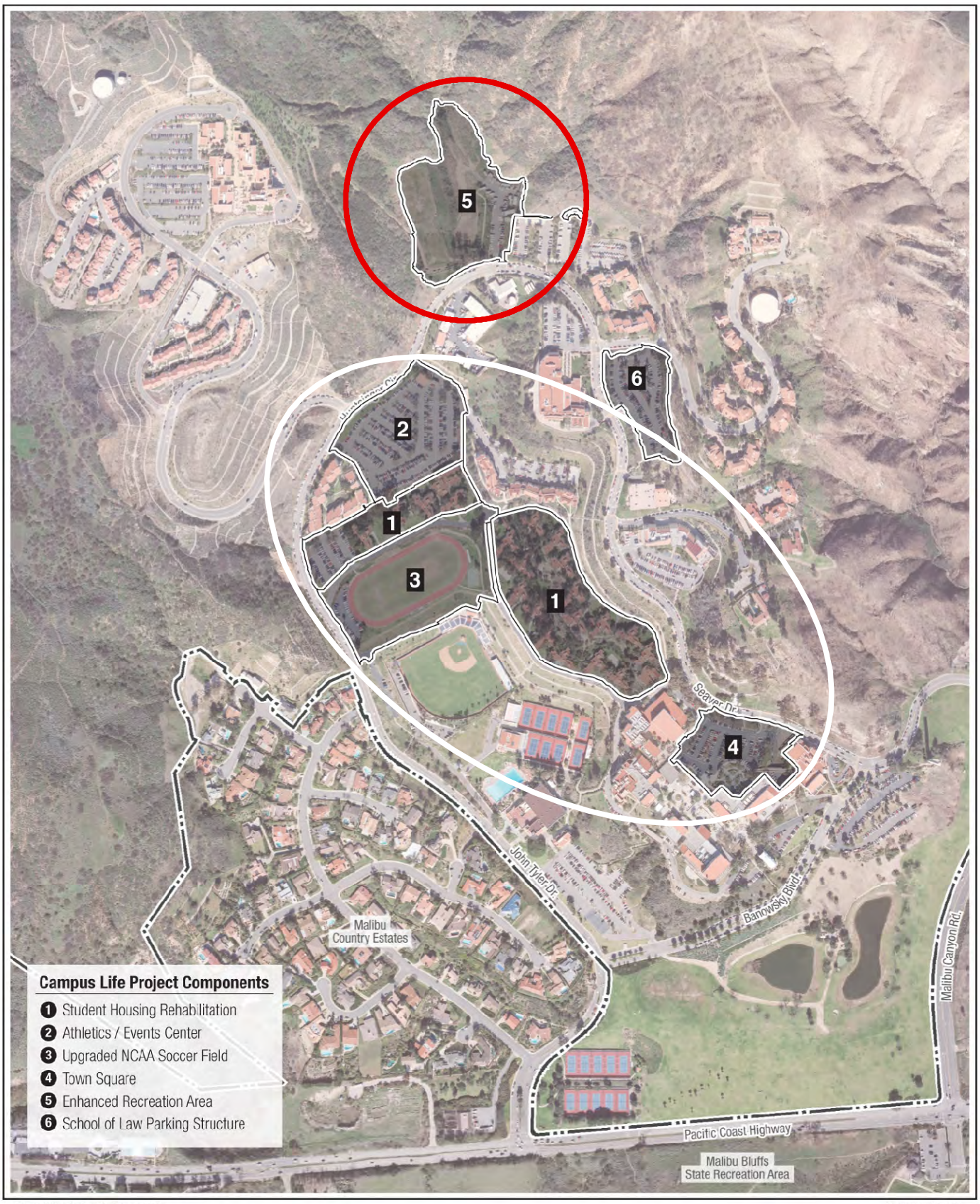
[38] The increased scatter from short wavelength blue light is known as Rayleigh Scatter.
[39] Urban-rural (artificial light-natural light) boundary at the northern edge of campus, at the base of the Santa Monica Mountains, surrounded by steep slopes of ESHA that support numerous native animals

lights. While the Commission did approve the artificial night lights for the Malibu High School football field, several special conditions were required including a one year avian monitoring program, a limited number of nights that the lights could be used and a limit on the number of hours of use.

In conclusion, we have determined that night lights will adversely impact the numerous species of nocturnal, crepuscular, and 24 hour activity pattern animals that occupy the ESHA surrounding the Component 5 site. Significant adverse impacts include lit area avoidance, disorientation, disruption of foraging patterns, increased predation risk, disruption of biological clocks, disruption of reproduction, and disruption of dispersal, to name a few. Any one or a combination of these impacts can lead to reduced survival and/or an increase in mortality. While the impacts of light trespass and sky glow and glare may be deemed inconsequential from a human perspective, we believe the impacts of artificial night lights at the Component 5 site will be very significant and adverse from a wildlife perspective, based on their high sensitivity to light levels and their numerous adaptations to making a living at night.

Component 5 Intramural Field Orientation and Restroom and Storage Facility Location

We recommend that the recreational amenities proposed for Component 5 be limited to day use only. Contingent to this recommendation, either field orientation is acceptable; east-west or north-south. Finally, we support the proposed location of the restroom and storage facility between the field and parking lot because it will not require additional fuel modification and reduces noise impacts and other disturbance to the surrounding ESHA.



Source: I.K. Curtis Aerial Photograph 2008.

Revised: Sep. 28, 2010

ENVICOM CORPORATION

PEPPERDINE UNIVERSITY CAMPUS LIFE PROJECT – DRAFT EIR

Aerial View of Pepperdine University Campus

FEET 0 300 600

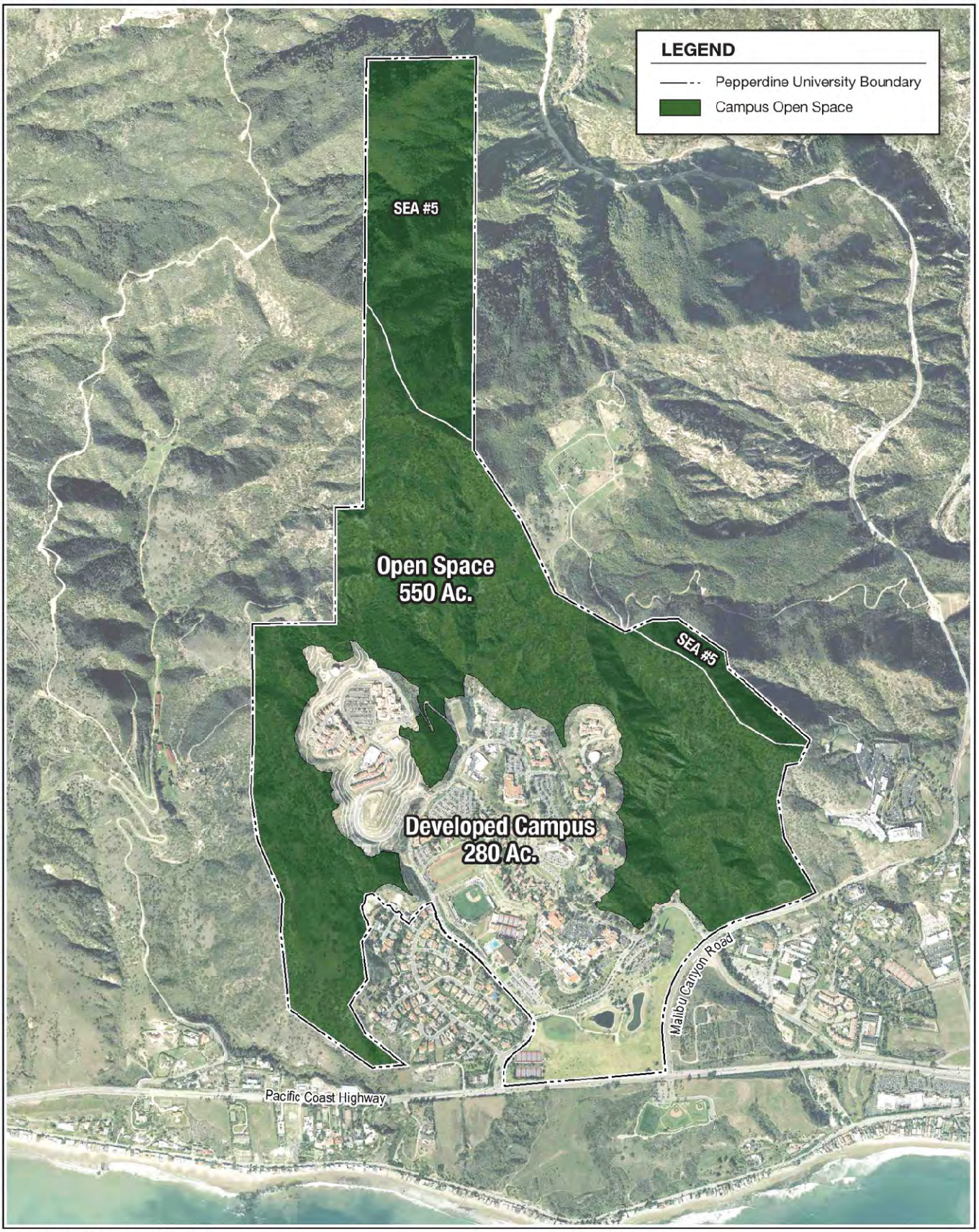
CALIFORNIA COASTAL COMMISSION

Technical Services Division - GIS Unit

DSM 8/2013

All Locations Approximate.
For Illustrative Purposes Only.
Source: Pepperdine Universidy CLP Draft EIR.

Figure 1. Campus Life Project Components 1 - 4 Circled in White; Component 5 Circled in Red.



Aerial Source: I.K. Curtis Services Inc., 2006.

PEPPERDINE UNIVERSITY CAMPUS LIFE PROJECT

ENVICOM CORPORATION

Developed Campus & Open Space

0 750 1,500 Feet

FIGURE 1

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All Locations Approximate.
For Illustrative Purposes Only.
Source: Pepperdine Draft EIR.

Figure 2. Aerial Photograph of Pepperdine University Campus and Surroundings

Aerial photograph taken in 1984 showing the topography and amphitheatre-like position of the Component 5 site (circled in red).

Aerial photograph taken in 2006 showing the topography and amphitheatre-like position of the Component 5 site.

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All Locations Approximate.
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Figure 3.

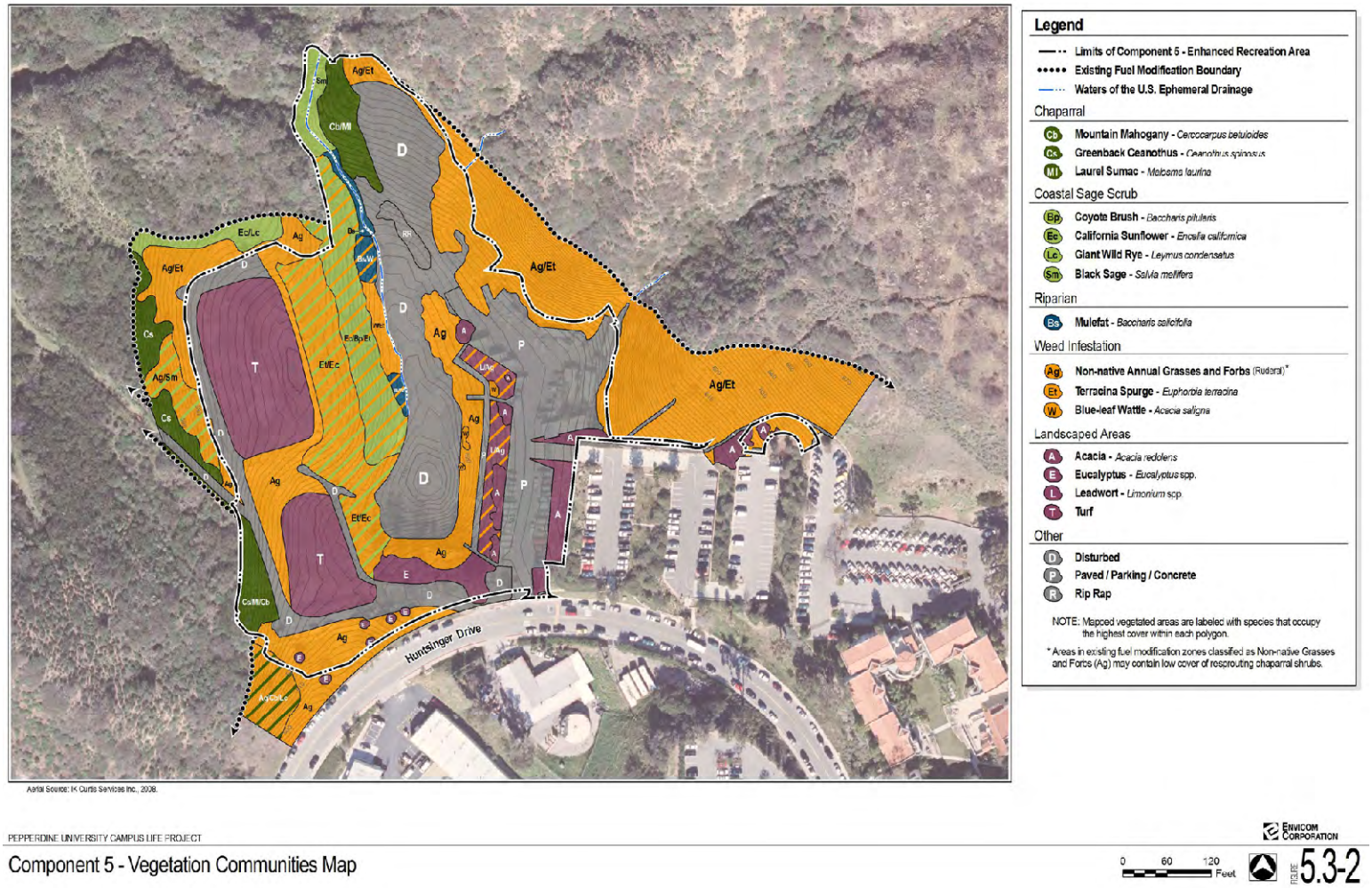

Figure 4. ENVICOM (figure 5.3-2 from CLP Draft EIR Bio Section) Vegetation Map of the Component 5 Site.

All Locations Approximate.
For Illustrative Purposes Only.

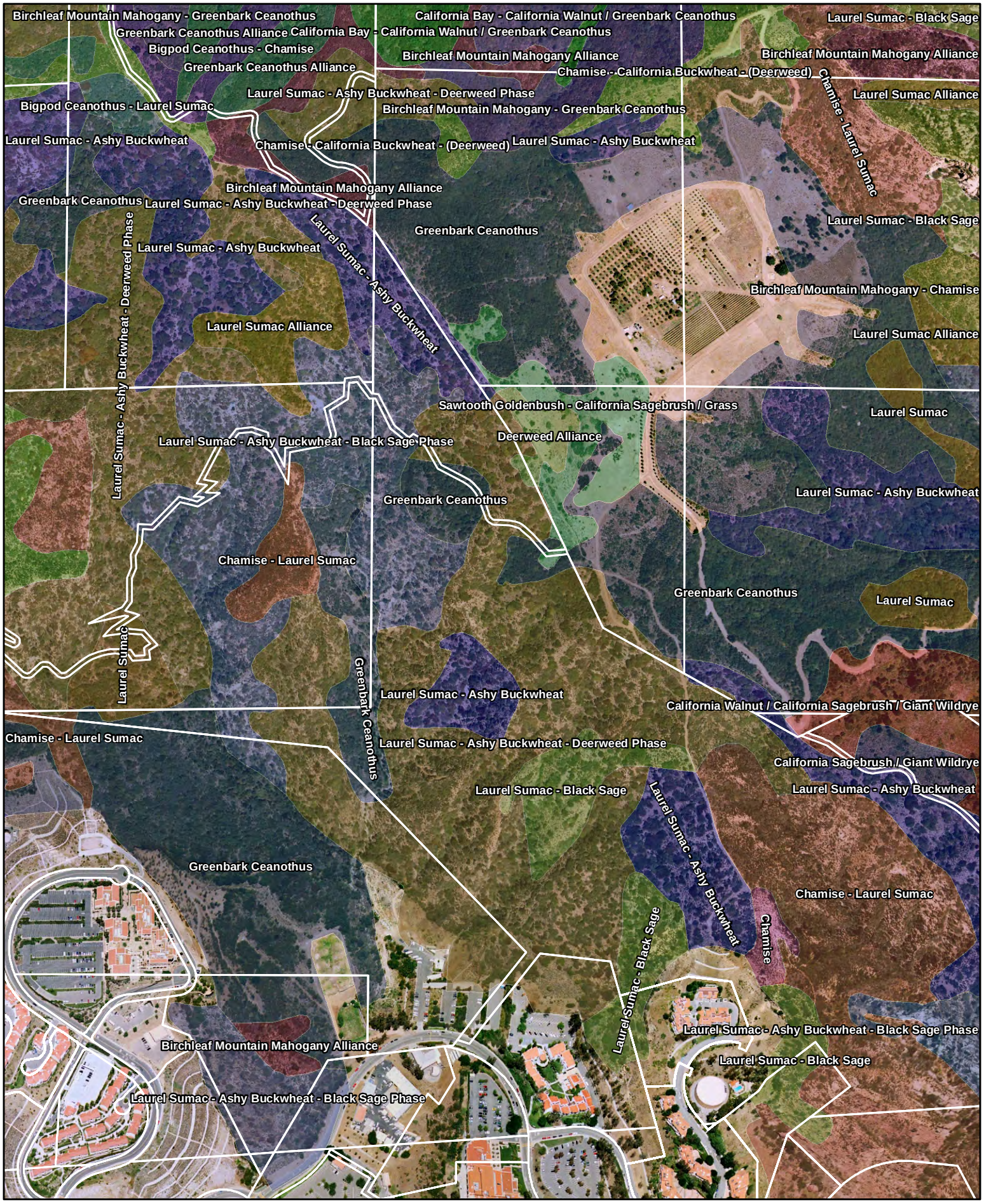

Figure 5. National Park Service vegetation map of area surrounding the Component 5 site.

Priliminary Draft.
All Locations Approximate.
For Illustrative Purposes Only.
Source: NPS 2007, NAIP 2005.

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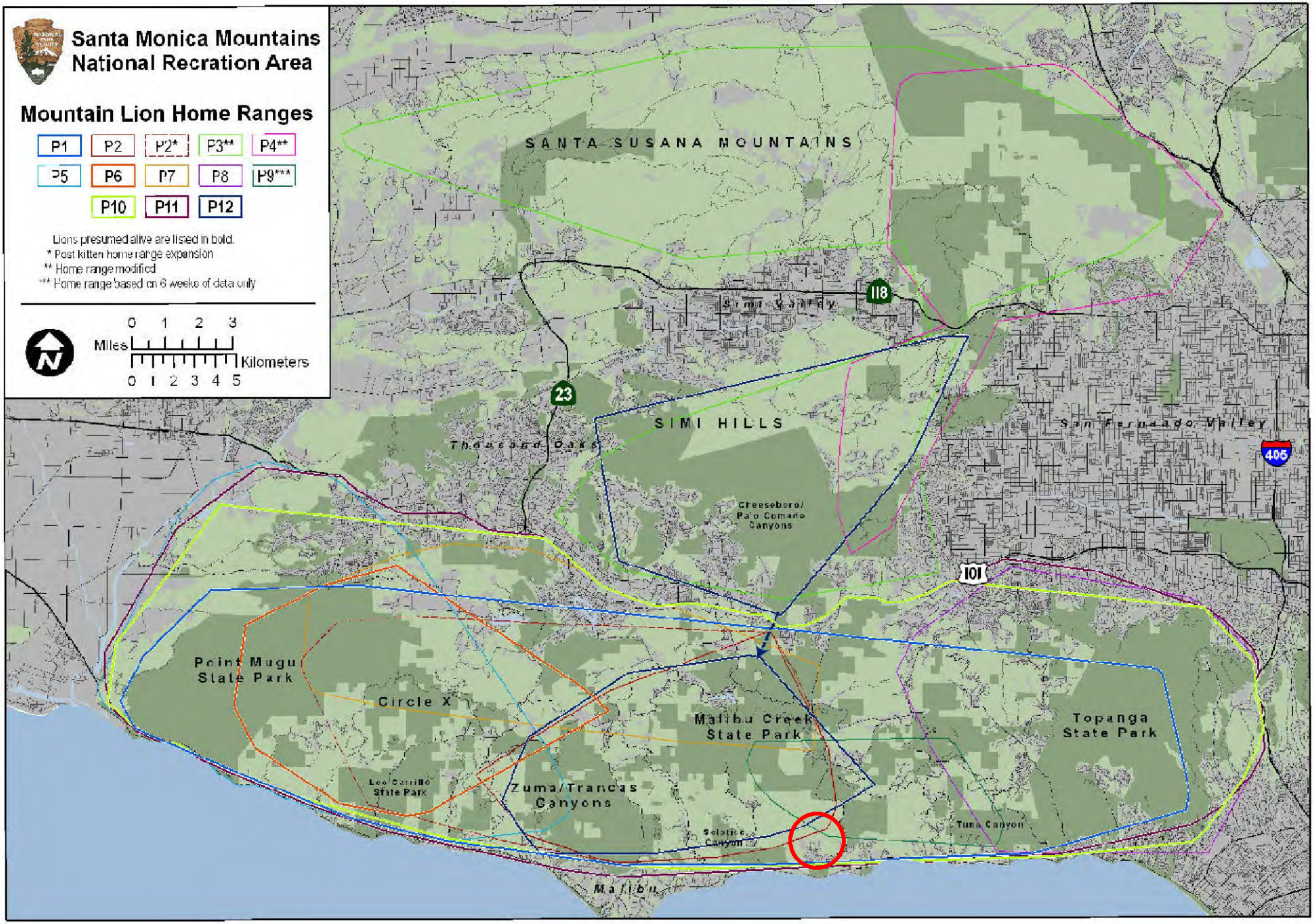

Figure 6. Mountain lion territories (homeranges) within the SMMs derived from tagged mountain lions. Location of Pepperdine Unitversity circled in red.

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All Locations Approximate.
For Illustrative Purposes Only.
Source: SMMNRA

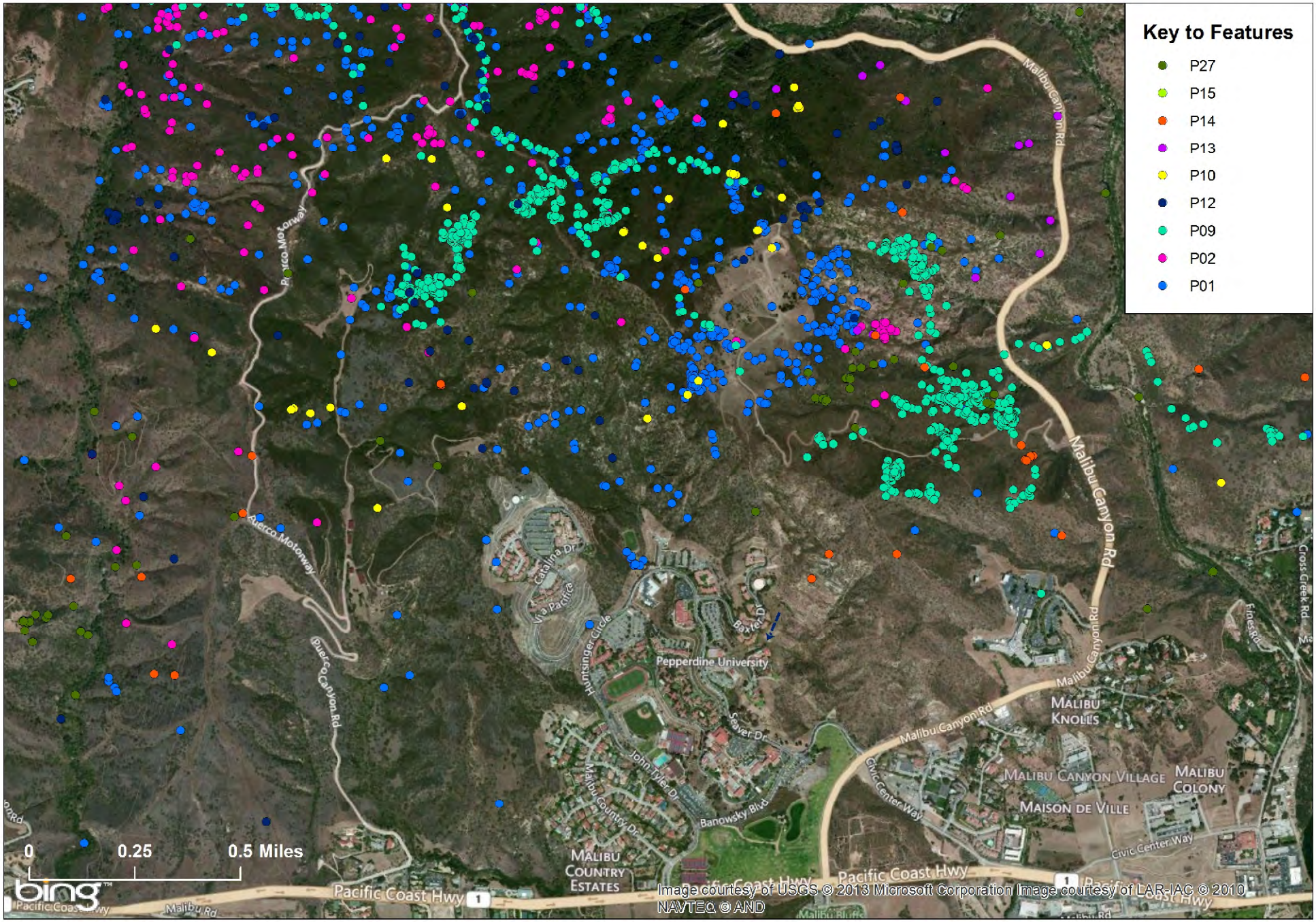

Figure 7. Mountain lion point locations in Marie Canyon watershed – data obtained from NPS – from tagged mountain lion program.

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All Locations Approximate.
For Illustrative Purposes Only.
Source: SMMNRA

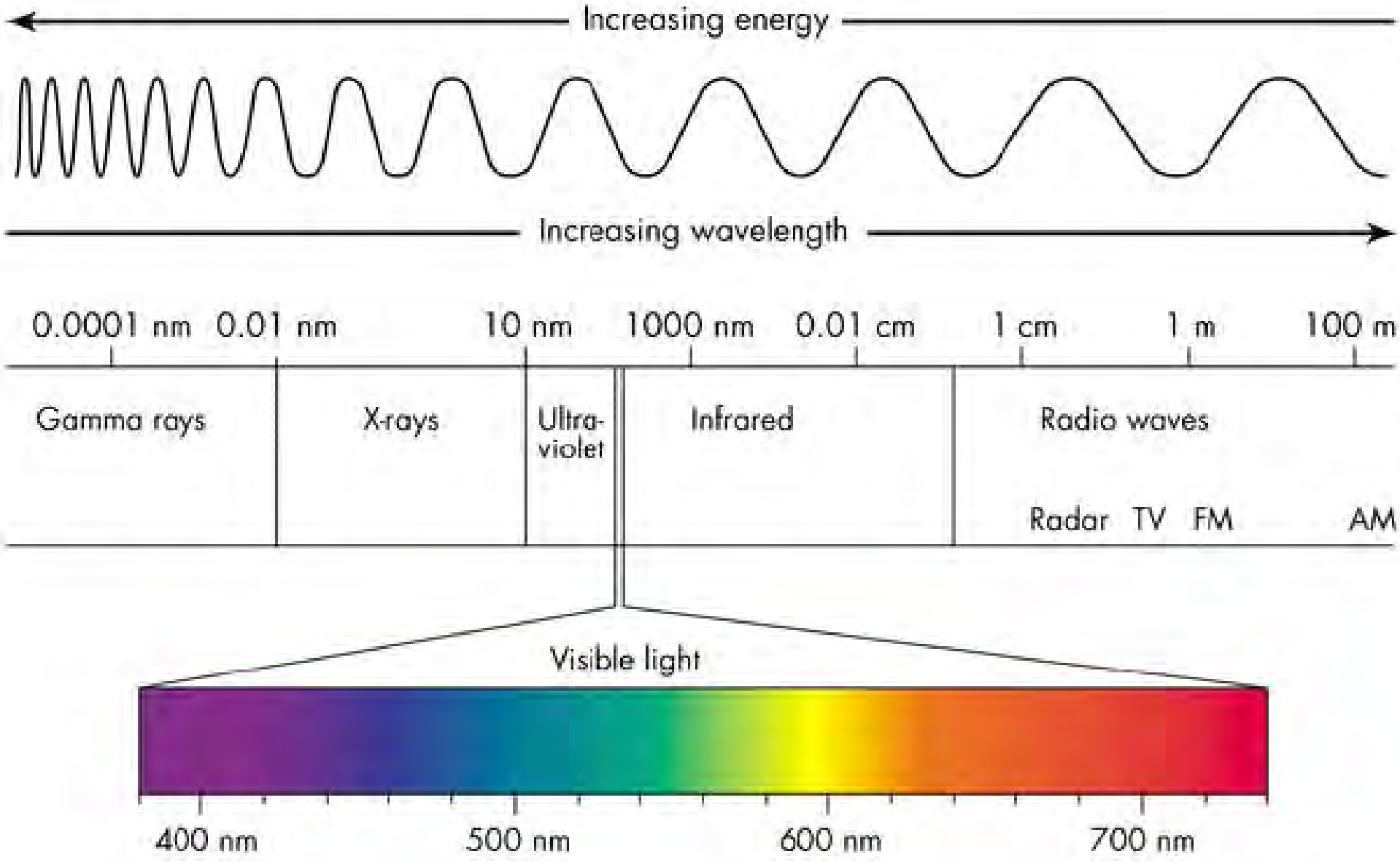

Figure 8. Electromagnetic radiation spectrum.

All Locations Approximate.
For Illustrative Purposes Only.

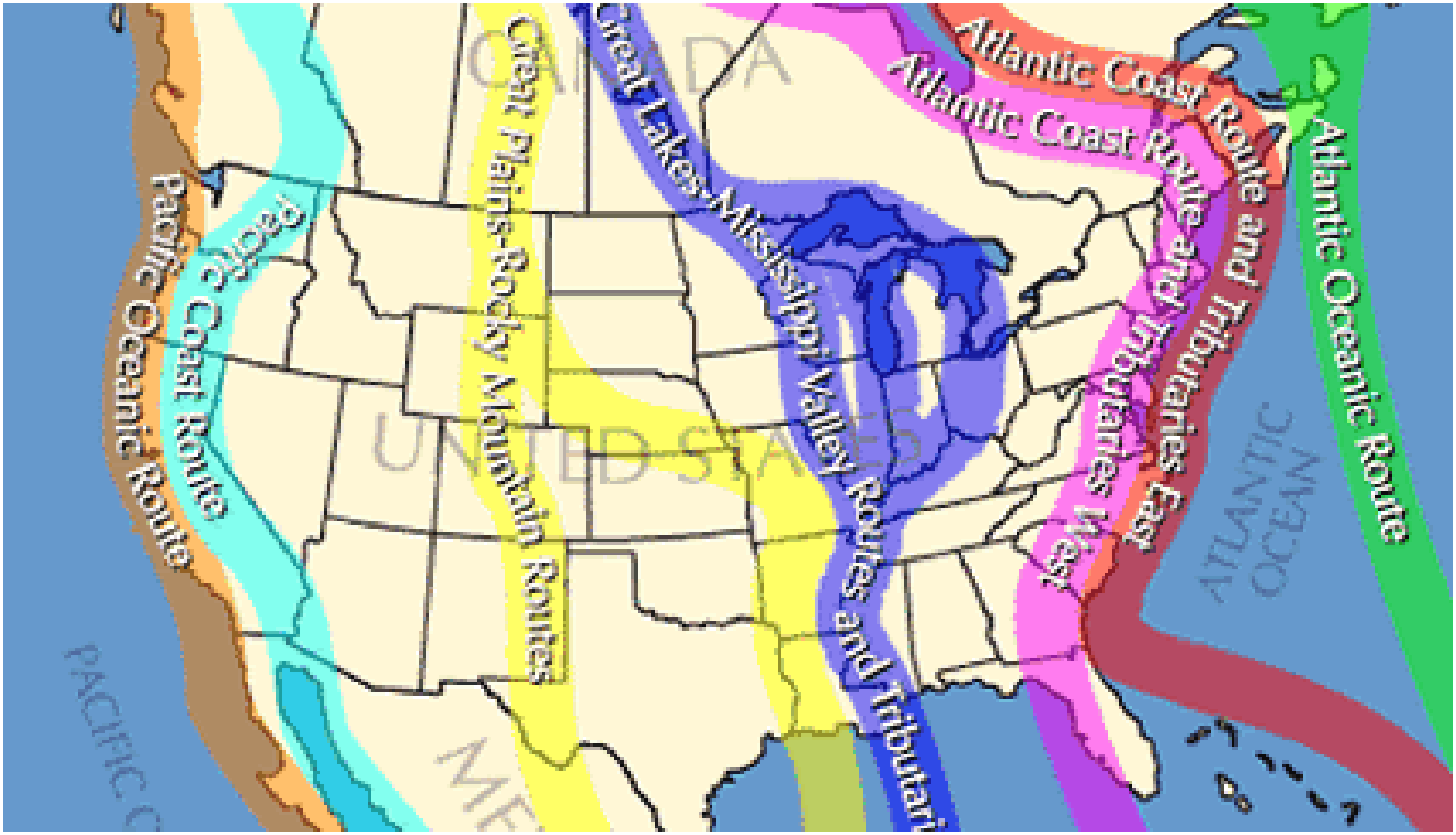

Figure 9. Pacific Flyway, note Coastal and Oceanic routes.

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All Locations Approximate.
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Sourcehttp://www.borealbirds.org/birdguide/map_losangeles.shtml#anchor

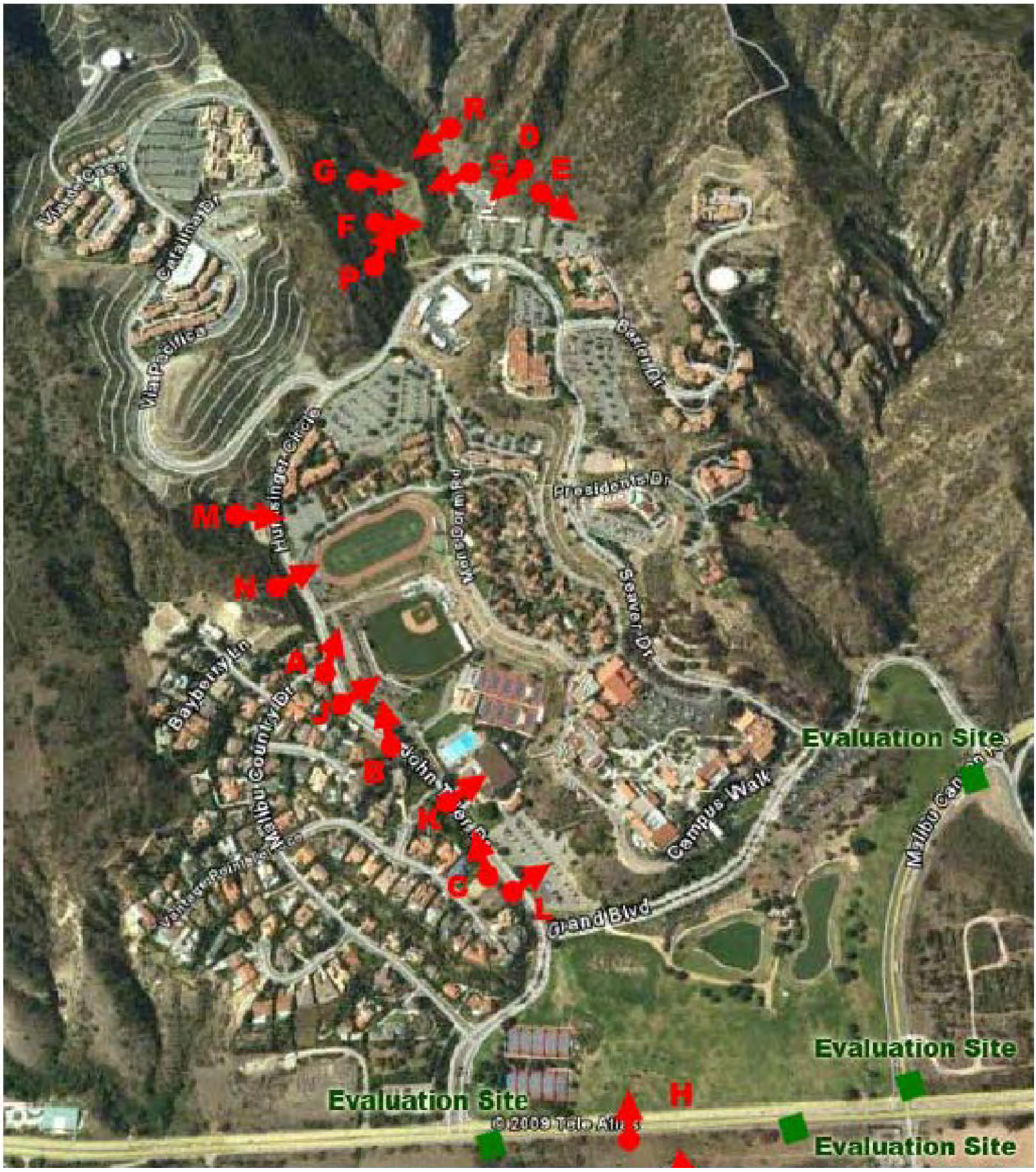

Figure 10. Receptor site locations. Figure 4 from Krahe & Assoc. Inc. Lighting Analysis.

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All Locations Approximate.
For Illustrative Purposes Only.
Source: Krahe & Assoc. Inc. Lighting Analysis.

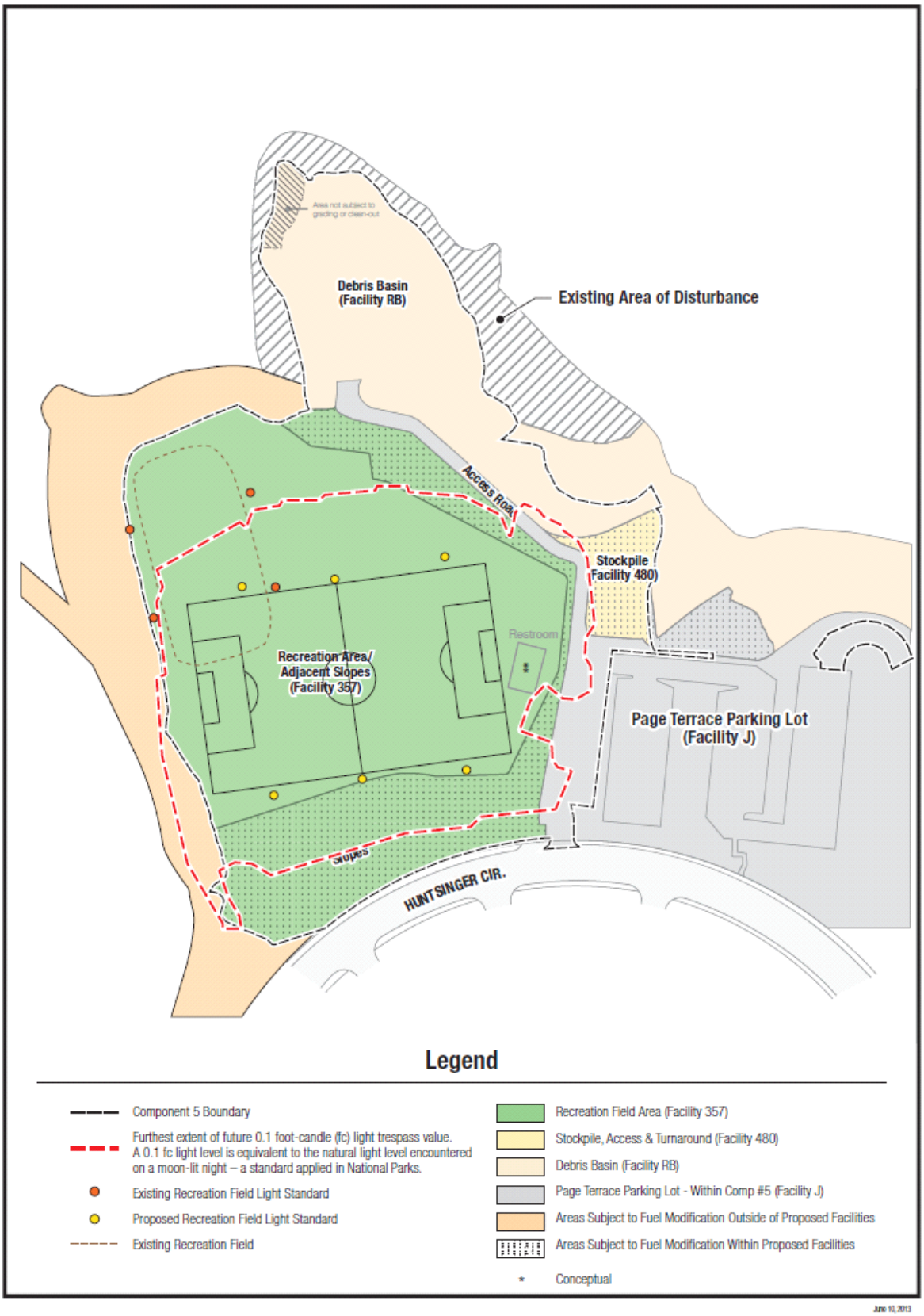

Figure 11. 0.1 fc line (red dashed) around proposed E-W intramural field orientation.

All Locations Approximate.
For Illustrative Purposes Only.
Source: Krahe & Assoc. Inc. Lighting Analysis.

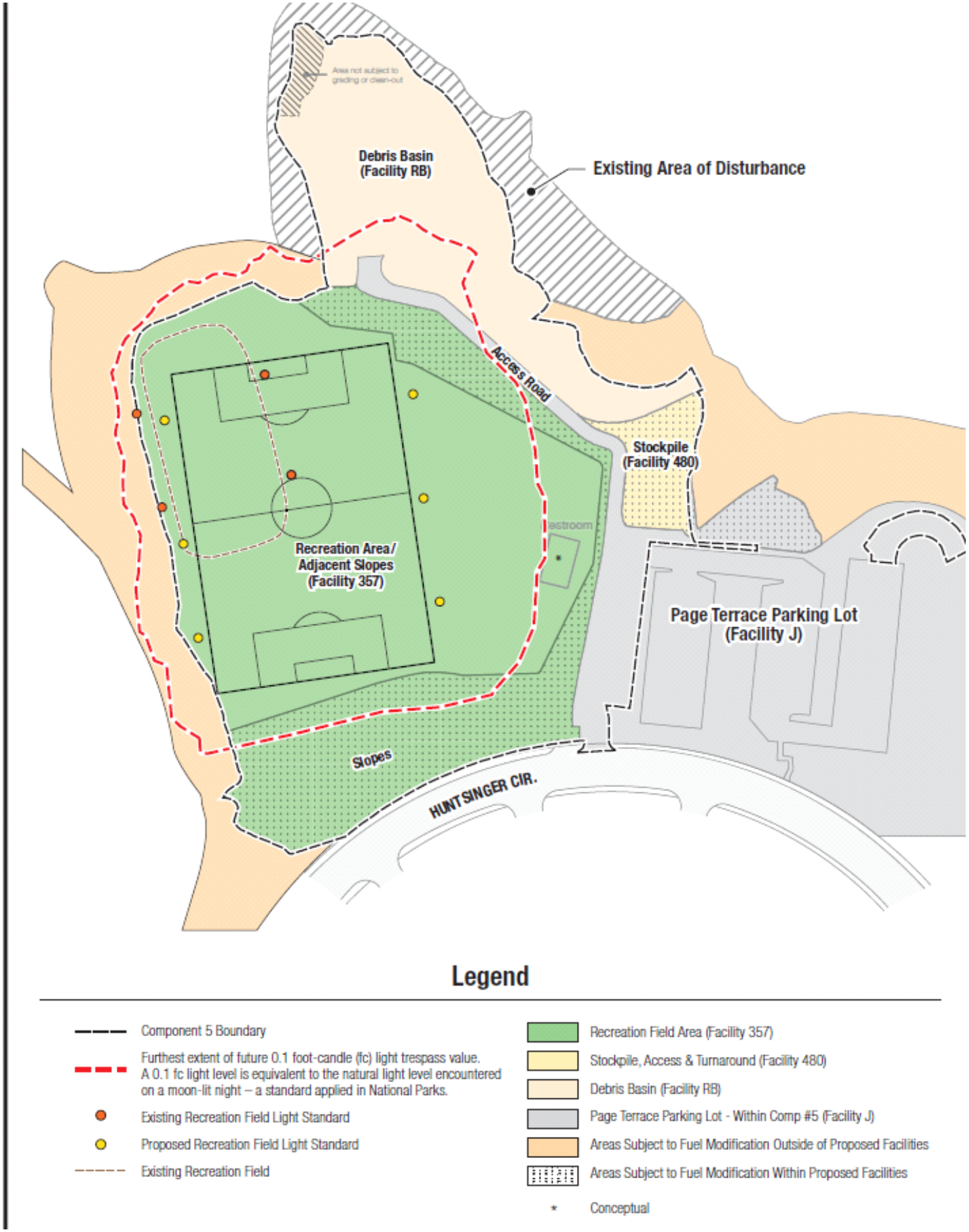

Figure 12. 0.1 fc line (dashed red) around proposed N-S intramural field orientation.

All Locations Approximate.
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Source: Krahe & Assoc. Inc. Lighting Analysis.

Figure 18: Receptor Site D, Nighttime View (component site 5 indicated by dashed box)

Figure 22: Receptor Site E, Nighttime View

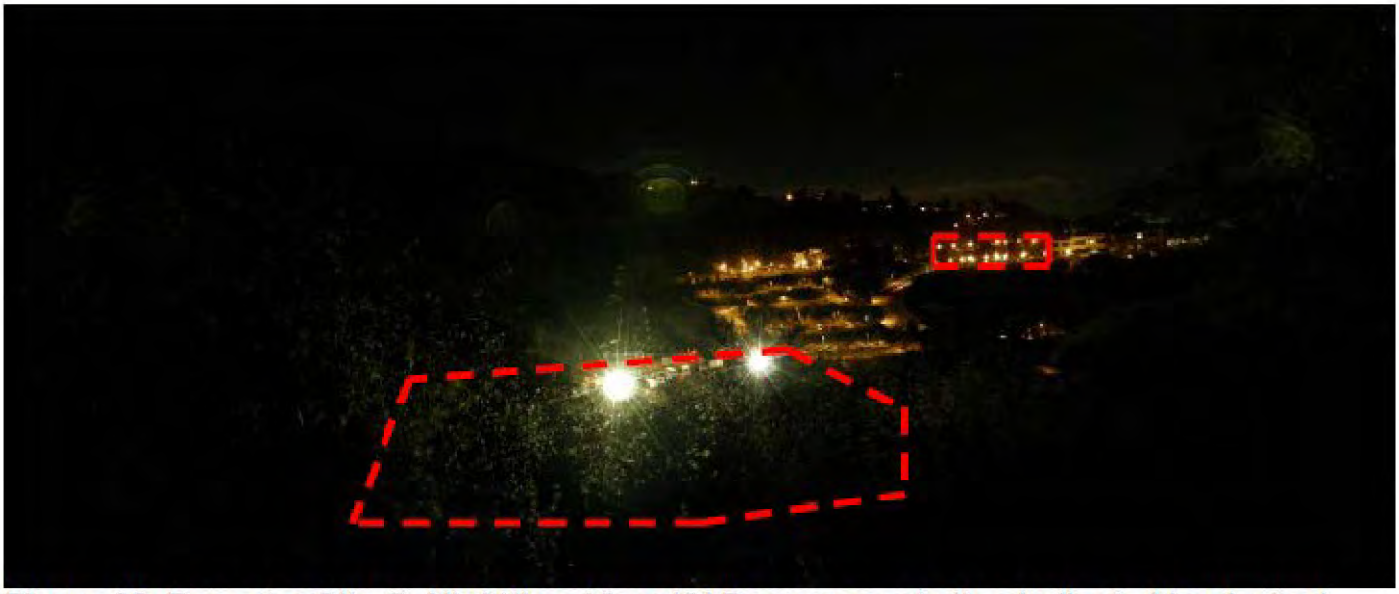

Figure 30: Receptor Site G, Nighttime View (CLP component sites indicated by dashed box)

Figure 13. Photographs from three receptor site (D, E and G) views around the Component 5 site illiustrating the dark nature of the surroundings.

All Locations Approximate.
For Illustrative Purposes Only.
Source: Krahe & Assoc. Inc. Lighting Analysis.

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M E M O R A N D U M

FROM: Jonna D. Engel, Ph.D., Ecologist

TO: Melanie Faust, Coastal Program Analyst

SUBJECT: Update and Further Biological Analysis of the Proposed Artificial Night Lighting at Pepperdine University's Proposed Component 5 Intramural Field

DATE: September 26, 2013

Documents Reviewed:

August 23, 2013. Coastal Commission Staff Report re: Pepperdine University Major LRDP Amendment No. 1-11, Part B.

Engel, J. & N. Sadrpour. 2013. Pepperdine University, Campus Life Project, Component 5: Enhanced Recreation Area – Biological Analysis of the Proposed Artificial Night Lighting, Intramural Field Orientation, and Restroom and Storage Facility Location. Memorandum to M. Faust dated August 23, 2013.

Francis Krahe & Associates Inc. Architectural Lighting Design. March 6, 2012. Environmental Impact Lighting Analysis, Final Addendum 1; Pepperdine University, Campus Life Project. Prepared for Pepperdine University.

Commission Findings in Support of December 13, 2012 Certification, with Suggested Modifications, of Pepperdine University's Long Range Development Plan Amendment No. 1-11-A (as shown in November 30, 2012 Staff Report and December 10, 2012 Addendum).

Francis Krahe & Associates Inc. Architectural Lighting Design. March 6, 2012. Environmental Impact Lighting Analysis, Final Addendum 1; Pepperdine University, Campus Life Project. Prepared for Pepperdine University.

Commission Findings in Support of October 5, 2011 Certification, with Suggested Modifications, of City of Malibu Local Coastal Program Amendment No. MAL-MAJ-1-11-A, as shown in September 22, 2011 Staff Report and the October 4, 2011 Addendum[1].

[1] At the October 5, 2011 Commission meeting, the Commission made minor changes to Suggested Modification No. 3 that are not reflected in the findings, but which are not relevant here.

International Dark-Sky Association- Illuminating Engineering Society. June 15, 2011. Joint IDA-IES Model Lighting Ordinance (MLO) with User's Guide. 44 pgs.

Illuminating Engineering Society. 2011. The Lighting Handbook: Reference & Application, Tenth Edition. 1328 pgs.

Francis Krahe & Associates Inc. Architectural Lighting Design. August 3, 2010. Draft Environmental Impact Lighting Analysis; Pepperdine University, Campus Life Project. Prepared for Pepperdine University.

United States Green Building Council. 2009. LEED v3. 2101 L St NW, Suite 500, Washington, D.C. 20037

Illuminating Engineering Society of North America. 2000. The IESNA Lighting Handbook: Reference & Application. Ninth Edition.

Dixon, J. 2003. Memorandum to Ventura Staff (California Coastal Commission): Designation of ESHA in the Santa Monica Mountains. March 25, 2003.

In our August 23, 2013 memorandum, Mr. Sadrpour and I discussed the potential impacts of the proposed sports field lighting on the biology of the native wildlife that utilize the environmentally sensitive habitat areas on the steep hillsides that closely bound the sports field on three sides (Figure 1). Since issuance of that memorandum, Pepperdine University responded by noting the Commission's approval of sports field night lighting in two other locations, Commission precedence, and that the lighting thresholds they used were based on accepted guidelines. The Component 5 area at issue in the August 23, 2013 memorandum is a very different and far more sensitive landscape than the more urbanized areas the Commission has recently considered in the context of light pollution at sports fields in Malibu (Malibu High School) and at Golden Gate Park (Beach Chalet). Also, additional research has shown that more protective lighting standards than those proposed by Pepperdine University should be applied given the environmental sensitivity of the Component 5 area.

Recognition of the potential habitat impacts of the proposed artificial night lighting at the intramural field in upper Marie Canyon is one of the main reasons that this component (Long Range Development (LRDP) Amendment #1-11 B) of Pepperdine University's Campus Life Project (CLP) was separated from the main project application (LRDP Amendment #1-11 A) and set aside for further biological review.

It is clear that the three slopes immediately adjacent to component 5 and the intramural field (western, northern, and eastern) support native habitat that rises to the level of environmentally sensitive habitat (ESHA) and that supports many species of native animals (Figure 2, Dr. Dixon's 2003 Memorandum)[2]. In our earlier memorandum, Mr.

[2] Engel, J. & N. Sadrpour. 2013. Pepperdine University, Campus Life Project, Component 5: Enhanced Recreation Area – Biological Analysis of the Proposed Artificial Night Lighting, Intramural Field

Sadrpour and I discussed technical issues related to light and its measurement, animal adaptations to various light regimes, and the ecological impacts of artificial night light.

Recently I contacted Mr. James R. Benya one of the co-chairs of the International Dark-Sky Association (IDA) – Illuminating Engineering Society (IES, formerly IESNA) Joint Task Force. Mr. Benya is a Certified Professional Electrical Engineer and principal of Benya-Burnett Consulting. Mr. Benya is an expert in lighting design, illuminating engineering, and lighting applications. I asked Mr. Benya to review the August 23, 2013 staff report, Mr. Sadrpour and my August 23, 2013 memorandum, and the Krahe & Assoc. 2010 and 2012 lighting reports. Mr. Benya stated that by its very nature, sports field lighting cannot be completely mitigated unless it is contained, for example by a sports dome. The effects of open lighting can be reduced, but not eliminated. A salient design principle is that the greater the contrast between the sports lighting and the darkness of the surrounding environment, the greater the impact. Therefore, bringing sports lights into a naturally dark area of native habitat has a much greater environmental impact than bringing sports lights into the middle of a campus or the middle of a city (J. Benya personal communication to J. Engel, September 17, 2013).

Mr. Benya also noted that the Krahe & Assoc. (August 2010) report used outdated documents including the Illuminating Engineering Society of North America's (IESNA) *Lighting Handbook* (9th Ed.)[3] and the IESNA RP-33-99[4] for establishing environmental lighting standards (J. Benya personal communication to J. Engel, September 12, 2013). The 4-Zone Lighting System used in those documents (E1-E4, also referred to as LZ1-LZ4) has more recently been replaced by a 5-Zone Lighting System (LZ0-LZ4). Mr. Benya recounted the development of the system as follows: The 4-Zone Lighting System was presented by the International Commission on Illumination (abbreviated as CIE from its French title) in the 1990's and subsequently formed the basis of international lighting standards. In 2005-2006 the need for a system with a more environmentally sensitive lighting zone, (LZ0), was recognized. The first published document that officially adopted the 5-Zone Lighting System was LEED 3.0[5]. Mr. Benya was co-chair of the International Dark-Sky Association (IDA) – Illuminating Engineering Society (IES, formerly IESNA) Joint Task Force (working with the CIE), that developed the *Joint IDA-IES Model Lighting Ordinance*[6] published in June 2011, which also adopted the 5-Zone Lighting System. The most recent version (10th Ed.) of the IES Lighting Handbook [7] has also adopted the 5-Zone Lighting System. The initial lighting analysis prepared by Krahe & Assoc. for the entire Campus Life Project was completed

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Orientation, and Restroom and Storage Facility Location. Memorandum to M. Faust dated August 23, 2013.

[3] Illuminating Engineering Society of North America. 2000. The IESNA Lighting Handbook: Reference & Application. Ninth Edition.

[4] Illuminating Engineering Society of North America. RP-33-99. 1999. Lighting For Exterior Environments, Recommended Practice.

[5] United States Green Building Council. 2009. LEED 3.0. 2101 L St NW, Suite 500, Washington, D.C. 20037

[6] International Dark-Sky Association- Illuminating Engineering Society. June 15, 2011. Joint IDA-IES Model Lighting Ordinance (MLO) with User's Guide. 44 pgs.

[7] Illuminating Engineering Society. 2011. The Lighting Handbook: Reference & Application, Tenth Edition. 1328 pgs.

in August 2010 after the release of LEED 3.0 but prior to the published adoption of the 5-Zone Lighting System by IES and IDA. However, Krahe & Assoc. conducted additional analysis of the lighting proposed for Component 5 and still relied on outdated versions of IES documents in their *Environmental Impact Lighting Analysis; Final Addendum 1*, dated March 2012, even though updated IES and new documents that adopted the 5-Zone Lighting system had been published by that time.

Just as our understanding of the impacts of artificial lighting on organisms (including humans) continues to expand and improve, the policies regarding the limitations and thresholds regulating artificial lighting evolve and improve. Prior to the addition of LZ0, LZ1 (E1) was the most environmentally sensitive zone. However, in the new lighting system, LZ0 is the most environmentally sensitive zone. The lighting limitation for LZ0 is "no ambient lighting" and the pre-curfew[8] threshold is 0.01 fc[9]. The definition of LZ0 in the IDA-IES *Model Lighting Ordinance User's Guide* is:

> *Areas where the natural environment will be seriously and adversely affected by lighting. Impacts include disturbing the biological cycles of flora and fauna and/or detracting from human enjoyment and appreciation of the natural environment. Human activity is subordinate in importance to nature. The vision of human residents and users is adapted to the darkness, and they expect to see little or no lighting. When not needed, lighting should be extinguished.*

The IDA-IES *Model Lighting Ordinance User's Guide* states the following for LZ0 recommended uses or areas:

> *Lighting Zone 0 should be applied to areas in which permanent lighting is not expected and when used, is limited in the amount of lighting and the period of operation. LZ-0 typically includes undeveloped areas of open space, wilderness parks and preserves, areas near astronomical observatories, or any other area where the protection of a dark environment is critical. Special review should be required for any permanent lighting in this zone. Some rural communities may choose to adopt LZ-0 for residential areas.*

Regarding zoning considerations in LZ0 the IDA-IES *Model Lighting Ordinance User's Guide* states:

[8] This alternative "pre-curfew" standard is of limited value, as it begs the question as to whether a curfew is appropriate and, if so, when the curfew should be set. Even assuming both the propriety of a curfew and that the curfew would not apply until after the University would have voluntarily turned off the field lights, the University's own documents (Exhibit 5, LRDP Part B_Supp Response 3 Exhibits_Final (3261484_1_LA[4]; Slide 15 of Pepperdine's Briefing Books entitled "The Campus Life Project: The Next Step in Fulfilling our Long Range Development Plan LRDP Amendment 1-11, Part B) show that the field lighting would result in an exceedance of this limit to the west. Moreover, that assumes that the measurements are accurate (see discussion on page 5 of this memorandum) and that these standards are sufficiently protective of wildlife, despite having been designed for humans. In any event, the main standard is the "no ambient lighting" limitation.

[9] IES. 2011. Op. Cit. (pg. 26.13, Table 26.4 & 26.5)

> *Recommended default zone for wilderness areas, parks and preserves, and undeveloped rural areas. Includes protected wildlife areas and corridors.*

The lighting limitation for LZ1 is "low ambient lighting" and the pre-curfew threshold is 0.1 fc[10]. The definition of LZ1 is:

> *Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety and convenience but it is not necessarily uniform or continuous. After curfew, most lighting should be extinguished or reduced as activity levels decline.*

Following Mr. Benya's review of the August 23, 2013 staff report and Mr. Sadrpour and my August 23, 2013 memorandum, Mr. Benya stated that the component 5 area in upper Marie Canyon would "definitely be considered a LZ0 area" (J. Benya personal communication with J. Engel, September 17, 2013). Based on my assessment of the component 5 area in upper Marie Canyon and the definition of LZ0, I concur with Mr. Benya. The significance of this determination is that no ambient lighting is considered appropriate for the Component 5 area in upper Marie Canyon. The recommendation put forth in our August 23, 2013 memorandum, that no artificial night lighting should occur at the intramural field in upper Marie Canyon, is consistent with the new lighting standards.

Mr. Benya also provided technical review of the Krahe & Associates 2010 and 2012 lighting reports (Figure 3). In addition to raising the issue of the lighting reports relying on dated IES documents for their lighting standards, Mr Benya also questions the validity of the light trespass (illuminance) and sky glow and glare (luminance) measurements. Mr. Benya concludes that:

> *…standards used in the [Environmental Impact Analysis] are far too lenient and do not correspond to the lighting impact metrics contained in the tenth edition IES Lighting Handbook. The environmental team should have been aware of these new standards and should have used them, if not in their EIA, certainly in the their addendum. I also believe that the EIA and [the lighting consultant's Addendum #1] reports were based on incorrect use of lighting measurements of illuminance by not being taken at the property line, and luminance by not being taken with the proper instrument and proper distance. These shortcomings underreported the lighting impact of current and future proposed lighting and should be corrected before any conclusions about the environmental impact of lighting are drawn.*

On September 18, 2013, Pepperdine University submitted *Select Pepperdine University Positions in Response to the August 23, 2013 Pepperdine University Major LRDP Amendment No. 1-11, Part B Staff Report.* In this submission they state:

[10] IES. 2011. Op. Cit. (pg. 26.13, Table 26.4 & 26.5)

> *Specifically, IESNA Technical Memorandum-11-00, Light Trespass: Research, Results and Recommendations concludes that areas may be classified into one of four (E1, E2, E3, E4) "environmental zones," based upon the extent to which control of light trespass is considered necessary or desirable. The E1 zone is defined as follows: "areas with intrinsically dark landscapes. Examples are national parks, areas of outstanding natural beauty, or residential areas where inhabitants have expressed a strong desire for strict limitation of light trespass." While the location of the approved Enhanced Recreation Area does not meet the E1 definition because of the site characteristics and location within the developed campus core, the EIR nevertheless utilized IESNA Technical Memorandum-11-00's most conservative standard and utilized the recommended light trespass limitation of 0.1 fc for the threshold due to the field's proximity to natural areas of the campus.*

First, although the EIR may have used the most conservative standard in IESNA Technical Memorandum-11-00 , that memorandum is obsolete, its standards having been replaced by the standards provided in the most recent version (10th Ed.) of the IES Lighting Handbook[11], including the 5-Zone Lighting System. Los Angeles County's approval of the Campus Life Project, including certification of the EIR, occurred in May 2011, prior to the adoption of the most recent IES Lighting Handbook in June 2011, and was therefore based on the recommendations in the *IESNA Technical Memorandum-11-00, Light Trespass: Research, Results and Recommendations.* But the industry standards have evolved since then.

Pursuant to section 30240(b) of the Coastal Act, the standard the Commission applies for the protection of the sensitive habitat adjacent to the project site is that the adjacent development must be "designed to prevent impacts which would significantly degrade" that ESHA. In order to implement that charge, it is my professional opinion that it is now appropriate for the Commission to use the recommendations of the IES Lighting Handbook (10th ed.) adopted over two years ago, including the 5-Zone Lighting System.

Second, the proposed "Enhanced Recreation Area" is not within the developed campus core and does not meet the E1 (LZ1) definition. Rather, the intramural field within Component 5 is at the very upper edge of campus immediately adjacent to, and nearly surrounded by, undeveloped and unlighted native habitat (Figure 1) as stated in our August 23, 2013 memorandum:

> *The Component 5 site lies at the upper and outer edge of the core campus at the base of the upper Marie Canyon watershed. It is surrounded to the west, north, and east by steep slopes of the Santa Monica Mountains that support pristine native habitat and is bounded to the south by Huntsinger Circle Drive which forms a perimeter around the main campus (Figure 1). The location of the proposed Component 5 development (Component 5) occupies a knoll and slopes descending to a stream channel that have been modified through the years so that the area consists of several more-or-less level pads that are set back in*

[11] IES. 2011. Op. Cit.

> *Marie Canyon with steep slopes on three sides and an open view to the south in an amphitheatre or bowl-like position (Figure 1).*

In the submission cited above under the heading "Appropriateness of the University's Use of 0.1 Footcandle ("fc") Trespass Line for Determining Significant Impacts", Pepperdine also states:

> *The University also strongly disagrees with Dr. Engel's rejection of the 0.1 fc line that Pepperdine and the County EIR relied on to determine whether or not light trespass from the field lights would result in significant adverse impacts to natural areas in the vicinity of the field. The University's proposed lighting package for the site is based on design principles and recommendations by the International Dark Sky Association ("IDA") and the Illuminating Engineering Society of North America ("IESNA") to significantly limit and reduce light trespass and to protect the natural areas in the vicinity of the proposed field from potentially adverse light impacts.*

First, it seems there is some confusion as to the appropriate natural light comparison for 0.1 fc. Pepperdine defines[12] 0.1 fc as a light level "equivalent to the natural light level encountered on a moon-lit night – a standard applied in National Parks." This is not correct; 0.1 fc is an order of magnitude (10X) brighter than a moon-lit night; 0.01 fc is the equivalent light level of a moon-lit night[13].

Second, 0.1 fc is experienced as very bright light for crepuscular, nocturnal, and 24-hour-pattern animals that inhabit the ESHA immediately surrounding the Component 5 site. Crepuscular animals are most active as light levels begin and continue to decrease at dusk, just when sports field night lighting is turned on. Nocturnal and 24-hour-pattern animals are active under a range of very low light levels including overcast nights (0.00001fc), clear starry nights (0.0001 fc), quarter moons (0.001 fc) and full moons (0.01 fc)[14]. Nocturnal and 24-hour-pattern adapted animals exhibit very different behavior under dark nights versus moonlit nights and, therefore, light levels 10 times greater than moon-light translate into significant impacts. Using 0.1 fc as the no impact/impact environmental threshold simply does not make biological sense, it turns out, given that animals behave differently under light levels 10 times lower.

Third, as detailed above, the University's proposed lighting package for the Component 5 site is based on obsolete lighting design standards that have been replaced with more conservative standards based on new scientific understanding of the adverse impacts of light on the natural environment (humans and other organisms). While our knowledge of animal light perception is increasing, it is still a young and emerging area of science.

[12] In the legend of the exhibits called "Changes of Lighting Conditions at Component 5 (East/West Orientation)" and "Changes of Lighting Conditions at Component 5 (North/South Orientation)" submitted by Pepperdine University to Commission staff within a pdf package called "LRDP Part B_Supp Response 3 Exhibits_Final(3261484_1_LA[4]"

[13] Rich, C. & T. Longcore (Eds.) 2006. Ecological Consequences of Artificial Night Lighting. Island Press, Washington. 458 pgs.

[14] Ibid

We do know that most animals are active at dusk and dawn, night, or during a 24-hour time period and they are extremely sensitive to low light levels. Section 30240 of the Coastal Act directs the protection of ESHA:

> a) *Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
>
> b) *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

Given our knowledge of light impacts on animals and the fact that the intramural field in upper Marie Canyon at Component 5 is immediately adjacent to ESHA that supports a number of native animal species, I find that the proposed artificial night lighting will pose a significant disruption of habitat values and that artificial night lighting in this location is not appropriate.

Lastly, independent of the light trespass discussed up to this point in this memorandum, there are other aspects of artificial night lighting that would have negative effects in this area. Those other types of impacts are in the nature of sky glow and glare. Sky glow and glare are defined in the Krahe & Assoc (2010) report as follows:

> *Sky glow is created when light is reflected and scattered by dust and gas particles in the atmosphere. Nighttime sky glow is caused primarily by light that is emitted upward, but can also be caused by light that is reflected from the ground, or by natural sources such as the moon and stars. Sky glow is inherently inconsistent, and can vary widely depending on weather conditions, the amount of dust and gas in the atmosphere and even the viewing angle. Sky glow creates increased background luminance (or brightness) and therefore results in decreased contrast.*
>
> *Glare is defined as visual discomfort resulting from high contrast in brightness levels. Each visible luminaire source or surface relative to the surrounding background (sky, hills, and foreground) has the potential to result in "glare". There are two types of glare: 1) Disability Glare, which is glare that reduces the ability to see or identify objects, and 2) Discomfort Glare, which is glare that produces ocular discomfort, but does not reduce the ability to see. Substantial glare impacts can adversely affect day or nighttime views. The magnitude of the sensation of glare depends on such factors as the size, position, and luminance of a source; the number of sources; and the luminance to which the eyes are adapted.*

While there are ways to mitigate sky glow and glare such as luminaire shielding, these aspects of light pollution cannot be eliminated entirely, and in an otherwise very dark

night setting within an amphitheatre or bowl-like canyon along the coast, such as that at Component 5, the negative aspects of both sky glow and glare are amplified. Approximately 30% (depending on the type of surface) of all light directed to a surface is reflected and contributes to sky glow. In addition, a portion of the light directed to a surface is reflected off air particulates including dust and water vapor and this also contributes to sky glow (J. Benya personal communication with J. Engel, September 17, 2013). Short wave-length blue light is the largest contributer of this scatter known as 'rayleigh scatter'. Metal halide lights, like the ones proposed at the Component 5 site, are rich in short wave-length blue light.

Aerial photograph taken in 1984 showing the topography and amphitheatre-like position of the Component 5 site (circled in red).

Aerial photograph taken in 2006 showing the topography and amphitheatre-like position of the Component 5 site.

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Figure 1.

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M E M O R A N D U M

FROM: John Dixon, Ph.D.
Ecologist / Wetland Coordinator

TO: Ventura Staff

SUBJECT: Designation of ESHA in the Santa Monica Mountains

DATE: March 25, 2003

In the context of the Malibu LCP, the Commission found that the Mediterranean Ecosystem in the Santa Mountains is rare, and especially valuable because of its relatively pristine character, physical complexity, and resultant biological diversity. Therefore, areas of undeveloped native habitat in the Santa Monica Mountains that are large and relatively unfragmented may meet the definition of ESHA by virtue of their valuable roles in that ecosystem, regardless of their relative rarity throughout the state. This is the only place in the coastal zone where the Commission has recognized chaparral as meeting the definition of ESHA. The scientific background presented herein for ESHA analysis in the Santa Monica Mountains is adapted from the Revised Findings for the Malibu LCP that the Commission adopted on February 6, 2003.

For habitats in the Santa Monica Mountains, particularly coastal sage scrub and chaparral, there are three site-specific tests to determine whether an area is ESHA because of its especially valuable role in the ecosystem. First, is the habitat properly identified, for example as coastal sage scrub or chaparral? The requisite information for this test generally should be provided by a site-specific biological assessment. Second, is the habitat largely undeveloped and otherwise relatively pristine? Third, is the habitat part of a large, contiguous block of relatively pristine native vegetation? This should be documented with an aerial photograph from our mapping unit (with the site delineated) and should be attached as an exhibit to the staff report. For those habitats that are absolutely rare or that support individual rare species, it is not necessary to find that they are relatively pristine, and are neither isolated nor fragmented.

Designation of Environmentally Sensitive Habitat in the Santa Monica Mountains

The Coastal Act provides a definition of “environmentally sensitive area” as: “Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments” (Section 30107.5).

Figure 2.

There are three important elements to the definition of ESHA. First, a geographic area can be designated ESHA either because of the presence of individual species of plants or animals or because of the presence of a particular habitat. Second, in order for an area to be designated as ESHA, the species or habitat must be either rare or it must be especially valuable. Finally, the area must be easily disturbed or degraded by human activities.

The first test of ESHA is whether a habitat or species is rare. Rarity can take several forms, each of which is important. Within the Santa Monica Mountains, rare species and habitats often fall within one of two common categories. Many rare species or habitats are globally rare, but locally abundant. They have suffered severe historical declines in overall abundance and currently are reduced to a small fraction of their original range, but where present may occur in relatively large numbers or cover large local areas. This is probably the most common form of rarity for both species and habitats in California and is characteristic of coastal sage scrub, for example. Some other habitats are geographically widespread, but occur everywhere in low abundance. California's native perennial grasslands fall within this category.

A second test for ESHA is whether a habitat or species is especially valuable. Areas may be valuable because of their "special nature," such as being an unusually pristine example of a habitat type, containing an unusual mix of species, supporting species at the edge of their range, or containing species with extreme variation. For example, reproducing populations of valley oaks are not only increasingly rare, but their southernmost occurrence is in the Santa Monica Mountains. Generally, however, habitats or species are considered valuable because of their special "role in the ecosystem." For example, many areas within the Santa Monica Mountains may meet this test because they provide habitat for endangered species, protect water quality, provide essential corridors linking one sensitive habitat to another, or provide critical ecological linkages such as the provision of pollinators or crucial trophic connections. Of course, all species play a role in their ecosystem that is arguably "special." However, the Coastal Act requires that this role be "especially valuable." This test is met for relatively pristine areas that are integral parts of the Santa Monica Mountains Mediterranean ecosystem because of the demonstrably rare and extraordinarily special nature of that ecosystem as detailed below.

Finally, ESHAs are those areas that could be easily disturbed or degraded by human activities and developments. Within the Santa Monica Mountains, as in most areas of southern California affected by urbanization, all natural habitats are in grave danger of direct loss or significant degradation as a result of many factors related to anthropogenic changes.

Ecosystem Context of the Habitats of the Santa Monica Mountains

The Santa Monica Mountains comprise the largest, most pristine, and ecologically complex example of a Mediterranean ecosystem in coastal southern California.

California's coastal sage scrub, chaparral, oak woodlands, and associated riparian areas have analogues in just a few areas of the world with similar climate. Mediterranean ecosystems with their wet winters and warm dry summers are only found in five localities (the Mediterranean coast, California, Chile, South Africa, and south and southwest Australia). Throughout the world, this ecosystem with its specially adapted vegetation and wildlife has suffered severe loss and degradation from human development. Worldwide, only 18 percent of the Mediterranean community type remains undisturbed[1]. However, within the Santa Monica Mountains, this ecosystem is remarkably intact despite the fact that it is closely surrounded by some 17 million people. For example, the 150,000 acres of the Santa Monica Mountains National Recreation Area, which encompasses most of the Santa Monica Mountains, was estimated to be 90 percent free of development in 2000[2]. Therefore, this relatively pristine area is both large and mostly unfragmented, which fulfills a fundamental tenet of conservation biology[3]. The need for large contiguous areas of natural habitat in order to maintain critical ecological processes has been emphasized by many conservation biologists[4].

In addition to being a large single expanse of land, the Santa Monica Mountains ecosystem is still connected, albeit somewhat tenuously, to adjacent, more inland ecosystems[5]. Connectivity among habitats within an ecosystem and connectivity among ecosystems is very important for the preservation of species and ecosystem integrity. In a recent statewide report, the California Resources Agency[6] identified wildlife corridors and habitat connectivity as the top conservation priority. In a letter to governor Gray Davis, sixty leading environmental scientists have endorsed the

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[1] National Park Service. 2000. Draft general management plan & environmental impact statement. Santa Monica Mountains National Recreation Area – California.

[2] Ibid.

[3] Harris, L. D. 1988. Edge effects and conservation of biotic diversity. Conserv. Biol. 330-332. Soule, M. E, D. T. Bolger, A. C. Alberts, J. Wright, M. Sorice and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. Conserv. Biol. 2: 75-92. Yahner, R. H. 1988. Changes in wildlife communities near edges. Conserv. Biol. 2:333-339. Murphy, D. D. 1989. Conservation and confusion: Wrong species, wrong scale, wrong conclusions. Conservation Biol. 3:82-84.

[4] Crooks, K. 2000. Mammalian carnivores as target species for conservation in Southern California. p. 105-112 *in*: Keeley, J. E., M. Baer-Keeley and C. J. Fotheringham (eds), 2nd Interface Between Ecology and Land Development in California, U.S. Geological Survey Open-File Report 00-62. Sauvajot, R. M., E. C. York, T. K. Fuller, H. Sharon Kim, D. A. Kamradt and R. K. Wayne. 2000. Distribution and status of carnivores in the Santa Monica Mountains, California: Preliminary results from radio telemetry and remote camera surveys. p 113-123 *in*: Keeley, J. E., M. Baer-Keeley and C. J. Fotheringham (eds), 2nd Interface Between Ecology and Land Development in California, U.S. Geological Survey Open-File Report 00-62. Beier, P. and R. F. Noss. 1998. Do habitat corridors provide connectivity? Conserv. Biol. 12:1241-1252. Beier, P. 1996. Metapopulation models, tenacious tracking and cougar conservation. *In*: Metapopulations and Wildlife Conservation, ed. D. R. McCullough. Island Press, Covelo, California, 429p.

[5] The SMM area is linked to larger natural inland areas to the north through two narrow corridors: 1) the Conejo Grade connection at the west end of the Mountains and 2) the Simi Hills connection in the central region of the SMM (from Malibu Creek State Park to the Santa Susanna Mountains).

[6] California Resources Agency. 2001. Missing Linkages: Restoring Connectivity to the California Landscape. California Wilderness Coalition, Calif. Dept of Parks & Recreation, USGS, San Diego Zoo and The Nature Conservancy. Available at: http://www.calwild.org/pubs/reports/linkages/index.htm

conclusions of that report[7]. The chief of natural resources at the California Department of Parks and Recreation has identified the Santa Monica Mountains as an area where maintaining connectivity is particularly important[8].

The species most directly affected by large scale connectivity are those that require large areas or a variety of habitats, e.g., gray fox, cougar, bobcat, badger, steelhead trout, and mule deer[9]. Large terrestrial predators are particularly good indicators of habitat connectivity and of the general health of the ecosystem[10]. Recent studies show that the mountain lion, or cougar, is the most sensitive indicator species of habitat fragmentation, followed by the spotted skunk and the bobcat[11]. Sightings of cougars in both inland and coastal areas of the Santa Monica Mountains[12] demonstrate their continued presence. Like the "canary in the mineshaft," an indicator species like this is good evidence that habitat connectivity and large scale ecological function remains in the Santa Monica Mountains ecosystem.

The habitat integrity and connectivity that is still evident within the Santa Monica Mountains is extremely important to maintain, because both theory and experiments over 75 years in ecology confirm that large spatially connected habitats tend to be more stable and have less frequent extinctions than habitats without extended spatial structure[13]. Beyond simply destabilizing the ecosystem, fragmentation and disturbance

[7] Letters received and included in the September 2002 staff report for the Malibu LCP.

[8] Schoch, D. 2001. Survey lists 300 pathways as vital to state wildlife. Los Angeles Times. August 7, 2001.

[9] Martin, G. 2001. Linking habitat areas called vital for survival of state's wildlife Scientists map main migration corridors. San Francisco Chronicle, August 7, 2001.

[10] Noss, R. F., H. B. Quigley, M. G. Hornocker, T. Merrill and P. C. Paquet. 1996. Conservation biology and carnivore conservation in the Rocky Mountains. Conerv. Biol. 10: 949-963. Noss, R. F. 1995. Maintaining ecological integrity in representative reserve networks. World Wildlife Fund Canada.

[11] Sauvajot, R. M., E. C. York, T. K. Fuller, H. Sharon Kim, D. A. Kamradt and R. K. Wayne. 2000. Distribution and status of carnivores in the Santa Monica Mountains, California: Preliminary results from radio telemetry and remote camera surveys. p 113-123 in: Keeley, J. E., M. Baer-Keeley and C. J. Fotheringham (eds), 2nd Interface Between Ecology and Land Development in California, U.S. Geological Survey Open-File Report 00-62. Beier, P. 1996. Metapopulation models, tenacious tracking and cougar conservation. In: Metapopulations and Wildlife Conservation, ed. D. R. McCullough. Island Press, Covelo, California, 429p.

[12] Recent sightings of mountain lions include: Temescal Canyon (pers. com., Peter Brown, Facilities Manager, Calvary Church), Topanga Canyon (pers. com., Marti Witter, NPS), Encinal and Trancas Canyons (pers. com., Pat Healy), Stump Ranch Research Center (pers. com., Dr. Robert Wayne, Dept. of Biology, UCLA). In May of 2002, the NPS *photographed* a mountain lion at a trip camera on the Back Bone Trail near Castro Crest – Seth Riley, Eric York and Dr. Ray Sauvajot, National Park Service, SMMNRA.

[13] Gause, G. F. 1934. The struggle for existence. Balitmore, William and Wilkins 163 p. (also reprinted by Hafner, N.Y. 1964). Gause, G. F., N. P. Smaragdova and A. A. Witt. 1936. Further studies of interaction between predators and their prey. J. Anim. Ecol. 5:1-18. Huffaker, C. B. 1958. Experimental studies on predation: dispersion factors and predator-prey oscillations. Hilgardia 27:343-383. Luckinbill, L. S. 1973. Coexistence in laboratory populations of *Paramecium aurelia* and its predator *Didinium nasutum*. Ecology 54:1320-1327. Allen, J. C., C. C. Brewster and D. H. Slone. 2001. Spatially explicit ecological models: A spatial convolution approach. Chaos, Solitons and Fractals. 12:333-347.

can even cause unexpected and irreversible changes to new and completely different kinds of ecosystems (habitat conversion)[14].

As a result of the pristine nature of large areas of the Santa Monica Mountains and the existence of large, unfragmented and interconnected blocks of habitat, this ecosystem continues to support an extremely diverse flora and fauna. The observed diversity is probably a function of the diversity of physical habitats. The Santa Monica Mountains have the greatest geological diversity of all major mountain ranges within the transverse range province. According to the National Park Service, the Santa Monica Mountains contain 40 separate watersheds and over 170 major streams with 49 coastal outlets[15]. These streams are somewhat unique along the California coast because of their topographic setting. As a "transverse" range, the Santa Monica Mountains are oriented in an east-west direction. As a result, the south-facing riparian habitats have more variable sun exposure than the east-west riparian corridors of other sections of the coast. This creates a more diverse moisture environment and contributes to the higher biodiversity of the region. The many different physical habitats of the Santa Monica Mountains support at least 17 native vegetation types[16] including the following habitats considered sensitive by the California Department of Fish and Game: native perennial grassland, coastal sage scrub, red-shank chaparral, valley oak woodland, walnut woodland, southern willow scrub, southern cottonwood-willow riparian forest, sycamore-alder woodland, oak riparian forest, coastal salt marsh, and freshwater marsh. Over 400 species of birds, 35 species of reptiles and amphibians, and more than 40 species of mammals have been documented in this diverse ecosystem. More than 80 sensitive species of plants and animals (listed, proposed for listing, or species of concern) are known to occur or have the potential to occur within the Santa Monica Mountains Mediterranean ecosystem.

The Santa Monica Mountains are also important in a larger regional context. Several recent studies have concluded that the area of southern California that includes the Santa Monica Mountains is among the most sensitive in the world in terms of the number of rare endemic species, endangered species and habitat loss. These studies have designated the area to be a local hot-spot of endangerment in need of special protection[17].

Therefore, the Commission finds that the Santa Monica Mountains ecosystem is itself rare and especially valuable because of its special nature as the largest, most pristine,

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[14] Scheffer, M., S. Carpenter, J. A. Foley, C. Folke and B. Walker. 2001. Catastrophic shifts in ecosystems. Nature 413:591-596.

[15] NPS. 2000. op.cit.

[16] From the NPS report (2000 op. cit.) that is based on the older Holland system of subjective classification. The data-driven system of Sawyer and Keeler-Wolf results in a much larger number of distinct "alliances" or vegetation types.

[17] Myers, N. 1990. The biodiversity challenge: Expanded hot-spots analysis. Environmentalist 10:243-256. Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. B. da Fonseca and J. A. Kent. 2000. Biodiversity hot-spots for conservation priorities. Nature 403:853-858. Dobson, A. P., J. P. Rodriguez, W. M. Roberts and D. S. Wilcove. 1997. Geographic distribution of endangered species in the United States. Science 275:550-553.

physically complex, and biologically diverse example of a Mediterranean ecosystem in coastal southern California. The Commission further finds that because of the rare and special nature of the Santa Monica Mountains ecosystem, the ecosystem roles of substantially intact areas of the constituent plant communities discussed below are "especially valuable" under the Coastal Act.

Major Habitats within the Santa Monica Mountains

The most recent vegetation map that is available for the Santa Monica Mountains is the map that was produced for the National Park Service in the mid-1990s using 1993 satellite imagery supplemented with color and color infrared aerial imagery from 1984, 1988, and 1994 and field review[18]. The minimum mapping unit was 5 acres. For that map, the vegetation was mapped in very broad categories, generally following a vegetation classification scheme developed by Holland[19]. Because of the mapping methods used the degree of plant community complexity in the landscape is not represented. For example, the various types of "ceanothus chaparral" that have been documented were lumped under one vegetation type referred to as "northern mixed chaparral." Dr. Todd Keeler-Wolf of the California Department of Fish and Game is currently conducting a more detailed, quantitative vegetation survey of the Santa Monica Mountains.

The National Park Service map can be used to characterize broadly the types of plant communities present. The main generic plant communities present in the Santa Monica Mountains[20] are: coastal sage scrub, chaparral, riparian woodland, coast live oak woodland, and grasslands.

Riparian Woodland

Some 49 streams connect inland areas with the coast, and there are many smaller drainages as well, many of which are "blue line." Riparian woodlands occur along both perennial and intermittent streams in nutrient-rich soils. Partly because of its multi-layered vegetation, the riparian community contains the greatest overall biodiversity of all the plant communities in the area[21]. At least four types of riparian communities are discernable in the Santa Monica Mountains: walnut riparian areas, mulefat-dominated riparian areas, willow riparian areas and sycamore riparian woodlands. Of these, the

[18] Franklin, J. 1997. Forest Service Southern California Mapping Project, Santa Monica Mountains National Recreation Area, Task 11 Description and Results, Final Report. June 13, 1997, Dept. of Geography, San Diego State University, USFS Contract No. 53-91S8-3-TM45.
[19] Holland R. F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California, The Resources Agency, Dept. of Fish and Game, Natural Heritage Division, Sacramento, CA. 95814.
[20] National Park Service. 2000. Draft: General Management Plan & Environmental Impact Statement, Santa Monica Mountains National Recreation Area, US Dept. of Interior, National Park Service, December 2000. (Fig. 11 in this document.)
[21] Ibid.

sycamore riparian woodland is the most diverse riparian community in the area. In these habitats, the dominant plant species include arroyo willow, California black walnut, sycamore, coast live oak, Mexican elderberry, California bay laurel, and mule fat. Wildlife species that have been observed in this community include least Bell's vireo (a State and federally listed species), American goldfinches, black phoebes, warbling vireos, bank swallows (State listed threatened species), song sparrows, belted kingfishers, raccoons, and California and Pacific tree frogs.

Riparian communities are the most species-rich to be found in the Santa Monica Mountains. Because of their multi-layered vegetation, available water supply, vegetative cover and adjacency to shrubland habitats, they are attractive to many native wildlife species, and provide essential functions in their lifecycles[22]. During the long dry summers in this Mediterranean climate, these communities are an essential refuge and oasis for much of the areas' wildlife.

Riparian habitats and their associated streams form important connecting links in the Santa Monica Mountains. These habitats connect all of the biological communities from the highest elevation chaparral to the sea with a unidirectional flowing water system, one function of which is to carry nutrients through the ecosystem to the benefit of many different species along the way.

The streams themselves provide refuge for sensitive species including: the coast range newt, the Pacific pond turtle, and the steelhead trout. The coast range newt and the Pacific pond turtle are California Species of Special Concern and are proposed for federal listing[23], and the steelhead trout is federally endangered. The health of the streams is dependent on the ecological functions provided by the associated riparian woodlands. These functions include the provision of large woody debris for habitat, shading that controls water temperature, and input of leaves that provide the foundation of the stream-based trophic structure.

The importance of the connectivity between riparian areas and adjacent habitats is illustrated by the Pacific pond turtle and the coast range newt, both of which are sensitive and both of which require this connectivity for their survival. The life history of the Pacific pond turtle demonstrates the importance of riparian areas and their associated watersheds for this species. These turtles require the stream habitat during the wet season. However, recent radio tracking work[24] has found that although the Pacific pond turtle spends the wet season in streams, it also requires upland habitat for refuge during the dry season. Thus, in coastal southern California, the Pacific pond turtle requires both streams and intact adjacent upland habitats such as coastal sage

[22] Walter, Hartmut. Bird use of Mediterranean habitats in the Santa Monica Mountains, Coastal Commission Workshop on the Significance of Native Habitats in the Santa Monica Mountains. CCC Hearing, June 13, 2002, Queen Mary Hotel.

[23] USFWS. 1989. Endangered and threatened wildlife and plants; animal notice of review. Fed. Reg. 54:554-579. USFWS. 1993. Endangered and threatened wildlife and plants; notice of 1-year petition finding on the western pond turtle. Fed. Reg. 58:42717-42718.

[24] Rathbun, G.B., N.J. Scott and T.G. Murphy. 2002. Terrestrial habitat use by Pacific pond turtle in a Mediterranean climate. Southwestern Naturalist. (*in Press*).

scrub, woodlands or chaparral as part of their normal life cycle. The turtles spend about four months of the year in upland refuge sites located an average distance of 50 m (but up to 280 m) from the edge of the creek bed. Similarly, nesting sites where the females lay eggs are also located in upland habitats an average of 30 m (but up to 170 m) from the creek. Occasionally, these turtles move up to 2 miles across upland habitat[25]. Like many species, the pond turtle requires both stream habitats and the upland habitats of the watershed to complete its normal annual cycle of behavior. Similarly, the coast range newt has been observed to travel hundreds of meters into upland habitat and spend about ten months of the year far from the riparian streambed[26]. They return to the stream to breed in the wet season, and they are therefore another species that requires both riparian habitat and adjacent uplands for their survival.

Riparian habitats in California have suffered serious losses and such habitats in southern California are currently very rare and seriously threatened. In 1989, Faber estimated that 95-97% of riparian habitat in southern California was already lost[27]. Writing at the same time as Faber, Bowler asserted that, *"[t]here is no question that riparian habitat in southern California is endangered."*[28] In the intervening 13 years, there have been continuing losses of the small amount of riparian woodlands that remain. Today these habitats are, along with native grasslands and wetlands, among the most threatened in California.

In addition to direct habitat loss, streams and riparian areas have been degraded by the effects of development. For example, the coast range newt, a California Species of Special Concern has suffered a variety of impacts from human-related disturbances[29]. Human-caused increased fire frequency has resulted in increased sedimentation rates, which exacerbates the cannibalistic predation of adult newts on the larval stages.[30] In addition impacts from non-native species of crayfish and mosquito fish have also been documented. When these non-native predators are introduced, native prey organisms are exposed to new mortality pressures for which they are not adapted. Coast range newts that breed in the Santa Monica Mountain streams do not appear to have adaptations that permit co-occurrence with introduced mosquito fish and crayfish[31]. These introduced predators have eliminated the newts from streams where they previously occurred by both direct predation and suppression of breeding.

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[25] Testimony by R. Dagit, Resource Conservation District of the Santa Monica Mountains at the CCC Habitat Workshop on June 13, 2002.

[26] Dr, Lee Kats, Pepperdine University, personal communication to Dr J. Allen, CCC.

[27] Faber, P.A., E, Keller, A. Sands and B.M. Massey. 1989. The ecology of riparian habitats of the southern California coastal region: a community profile. U.S. Fish and Wildlife Service Biological Report 85(7.27) 152pp.

[28] Bowler, P.A. 1989. Riparian woodland: An endangered habitat in southern California. Pp 80-97 *in* Schoenherr, A.A. (ed.) Endangered plant communities of southern California. Botanists Special Publication No. 3.

[29] Gamradt, S.C., L.B. Kats and C.B. Anzalone. 1997. Aggression by non-native crayfish deters breeding in California newts. Conservation Biology 11(3):793-796.

[30] Kerby, L.J., and L.B. Kats. 1998. Modified interactions between salamander life stages caused by wildfire-induced sedimentation. Ecology 79(2):740-745.

[31] Gamradt, S.C. and L.B. Kats. 1996. Effect of introduced crayfish and mosquitofish on California newts. Conservation Biology 10(4):1155-1162.

Therefore, because of the essential role that riparian plant communities play in maintaining the biodiversity of the Santa Monica Mountains, because of the historical losses and current rarity of these habitats in southern California, and because of their extreme sensitivity to disturbance, the native riparian habitats in the Santa Monica Mountains meet the definition of ESHA under the Coastal Act.

Coastal Sage Scrub and Chaparral

Coastal sage scrub and chaparral are often lumped together as "shrublands" because of their roughly similar appearance and occurrence in similar and often adjacent physical habitats. In earlier literature, these vegetation associations were often called soft chaparral and hard chaparral, respectively. "Soft" and "hard" refers to differences in their foliage associated with different adaptations to summer drought. Coastal sage scrub is dominated by soft-leaved, generally low-growing aromatic shrubs that die back and drop their leaves in response to drought. Chaparral is dominated by taller, deeper-rooted evergreen shrubs with hard, waxy leaves that minimize water loss during drought.

The two vegetation types are often found interspersed with each other. Under some circumstances, coastal sage scrub may even be successional to chaparral, meaning that after disturbance, a site may first be covered by coastal sage scrub, which is then replaced with chaparral over long periods of time.[32] The existing mosaic of coastal sage scrub and chaparral is the result of a dynamic process that is a function of fire history, recent climatic conditions, soil differences, slope, aspect and moisture regime, and the two habitats should not be thought of as completely separate and unrelated entities but as different phases of the same process[33]. The spatial pattern of these vegetation stands at any given time thus depends on both local site conditions and on history (e.g., fire), and is influenced by both natural and human factors.

In lower elevation areas with high fire frequency, chaparral and coastal sage scrub may be in a state of flux, leading one researcher to describe the mix as a "coastal sage-chaparral subclimax."[34] Several other researchers have noted the replacement of chaparral by coastal sage scrub, or coastal sage scrub by chaparral depending on fire history.[35] In transitional and other settings, the mosaic of chaparral and coastal sage

[32] Cooper, W.S. 1922. The broad-sclerophyll vegetation of California. Carnegie Institution of Washington Publication 319. 124 pp.
[33] Longcore, T and C. Rich. 2002. Protection of environmentally sensitive habitat areas in proposed local coastal plan for the Santa Monica Mountains. The Urban Wildlands Group, Inc., P.O. Box 24020 Los Angeles, CA 90024. (See attached comment document in Appendix).
[34] Hanes, T.L. 1965. Ecological studies on two closely related chaparral shrubs in southern California. Ecological Monographs 41:27-52.
[35] Gray, K.L. 1983. Competition for light and dynamic boundary between chaparral and coastal sage scrub. Madrono 30(1):43-49. Zedler, P.H., C.R. Gautier and G.S. McMaster. 1983. Vegetation change in response to extreme events: The effect of a short interval between fires in California chaparral and coastal sage scrub. Ecology 64(4): 809-818.

scrub enriches the seasonal plant resource base and provides additional habitat variability and seasonality for the many species that inhabit the area.

Relationships Among Coastal Sage Scrub, Chaparral and Riparian Communities

Although the constituent communities of the Santa Monica Mountains Mediterranean ecosystem can be defined and distinguished based on species composition, growth habits, and the physical habitats they characteristically occupy, they are not independent entities ecologically. Many species of plants, such as black sage, and laurel sumac, occur in more than one plant community and many animals rely on the predictable mix of communities found in undisturbed Mediterranean ecosystems to sustain them through the seasons and during different portions of their life histories.

Strong evidence for the interconnectedness between chaparral, coastal scrub and other habitats is provided by "opportunistic foragers" (animals that follow the growth and flowering cycles across these habitats). Coastal scrub and chaparral flowering and growth cycles differ in a complimentary and sequential way that many animals have evolved to exploit. Whereas coastal sage scrub is shallow-rooted and responds quickly to seasonal rains, chaparral plants are typically deep-rooted having most of their flowering and growth later in the rainy season after the deeper soil layers have been saturated[36]. New growth of chaparral evergreen shrubs takes place about four months later than coastal sage scrub plants and it continues later into the summer[37]. For example, in coastal sage scrub, California sagebrush flowers and grows from August to February and coyote bush flowers from August to November[38]. In contrast, chamise chaparral and bigpod ceanothus flower from April to June, buck brush ceanothus flowers from February to April, and hoaryleaf ceanothus flowers from March to April.

Many groups of animals exploit these seasonal differences in growth and blooming period. The opportunistic foraging insect community (e.g., honeybees, butterflies and moths) tends to follow these cycles of flowering and new growth, moving from coastal sage scrub in the early rainy season to chaparral in the spring[39]. The insects in turn are followed by insectivorous birds such as the blue-gray gnatcatcher[40], bushtit, cactus wren, Bewick's wren and California towhee. At night bats take over the role of daytime insectivores. At least 12 species of bats (all of which are considered sensitive) occur in

[36] DeSimone, S. 2000. California's coastal sage scrub. Fremontia 23(4):3-8. Mooney, H.A. 1988. Southern coastal scrub. Chap. 13 *in* Barbour, M.G. and J. Majors; Eds. 1988. Terrestrial vegetation of California, 2nd Edition. Calif. Native Plant Soc. Spec. Publ. #9.
[37] Schoenherr, A. A. 1992. A natural history of California. University of California Press, Berkeley. 772p.
[38] Dale, N. 2000. Flowering plants of the Santa Monica Mountains. California Native Plant Society, 1722 J Street, Suite 17, Sacramento, CA 95814.
[39] Ballmer, G. R. 1995. What's bugging coastal sage scrub. Fremontia 23(4):17-26.
[40] Root, R. B. 1967. The niche exploitation pattern of the blue-gray gnatcatcher. Ecol. Monog.37:317-350.

the Santa Monica Mountains[41]. Five species of hummingbirds also follow the flowering cycle[42].

Many species of 'opportunistic foragers', which utilize several different community types, perform important ecological roles during their seasonal movements. The scrub jay is a good example of such a species. The scrub jay is an omnivore and forages in coastal sage scrub, chaparral, and oak woodlands for insects, berries and notably acorns. Its foraging behavior includes the habit of burying acorns, usually at sites away from the parent tree canopy. Buried acorns have a much better chance of successful germination (about two-fold) than exposed acorns because they are protected from desiccation and predators. One scrub jay will bury approximately 5000 acorns in a year. The scrub jay therefore performs the function of greatly increasing recruitment and regeneration of oak woodland, a valuable and sensitive habitat type[43].

Like the scrub jay, most of the species of birds that inhabit the Mediterranean ecosystem in the Santa Monica Mountains require more than one community type in order to flourish. Many species include several community types in their daily activities. Other species tend to move from one community to another seasonally. The importance of maintaining the integrity of the multi-community ecosystem is clear in the following observations of Dr. Hartmut Walter of the University of California at Los Angeles:

> "Bird diversity is directly related to the habitat mosaic and topographic diversity of the Santa Monicas. Most bird species in this bio-landscape require more than one habitat for survival and reproduction." "A significant proportion of the avifauna breeds in the wooded canyons of the Santa Monicas. Most of the canyon breeders forage every day in the brush- and grass-covered slopes, ridges and mesas. They would not breed in the canyons in the absence of the surrounding shrublands. Hawks, owls, falcons, orioles, flycatchers, woodpeckers, warblers, hummingbirds, etc. belong to this group. Conversely, some of the characteristic chaparral birds such as thrashers, quails, and wrentits need the canyons for access to shelter, protection from fire, and water. The regular and massive movement of birds between riparian corridors and adjacent shrublands has been demonstrated by qualitative and quantitative observations by several UCLA students[44]."

Thus, the Mediterranean ecosystem of the Santa Monica Mountains is a mosaic of vegetation types linked together ecologically. The high biodiversity of the area results

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[41] Letter from Dr. Marti Witter, NPS, dated Sept. 13, 2001, in letters received and included in the September 2002 staff report for the Malibu LCP.

[42] National Park Service. 1993. A checklist of the birds of the Santa Monica Mountains National Recreation Area. Southwest Parks and Monuments Assoc., 221 N. Court, Tucson, AZ. 85701

[43] Borchert, M. I., F. W. Davis, J. Michaelsen and L. D. Oyler. 1989. Interactions of factors affecting seedling recruitment of blue oak (*Quercus douglasii*) in California. Ecology 70:389-404. Bossema, I. 1979. Jays and oaks: An eco-ethological study of a symbiosis. Behavior 70:1-118. Schoenherr, A. A. 1992. A natural history of California. University of California Press, Berkeley. 772p.

[44] Walter, Hartmut. Bird use of Mediterranean habitats in the Santa Monica Mountains, Coastal Commission Workshop on the Significance of Native Habitats in the Santa Monica Mountains. CCC Hearing, June 13, 2002, Queen Mary Hotel.

from both the diversity and the interconnected nature of this mosaic. Most raptor species, for example, require large areas and will often require different habitats for perching, nesting and foraging. Fourteen species of raptors (13 of which are considered sensitive) are reported from the Santa Monica Mountains. These species utilize a variety of habitats including rock outcrops, oak woodlands, riparian areas, grasslands, chaparral, coastal sage scrub, estuaries and freshwater lakes[45].

When the community mosaic is disrupted and fragmented by development, many chaparral-associated native bird species are impacted. In a study of landscape-level fragmentation in the Santa Monica Mountains, Stralberg[46] found that the ash-throated flycatcher, Bewick's wren, wrentit, blue-gray gnatcatcher, California thrasher, orange-crowned warbler, rufous-crowned sparrow, spotted towhee, and California towhee all decreased in numbers as a result of urbanization. Soule[47] observed similar effects of fragmentation on chaparral and coastal sage scrub birds in the San Diego area.

In summary, all of the vegetation types in this ecosystem are strongly linked by animal movement and foraging. Whereas classification and mapping of vegetation types may suggest a snapshot view of the system, the seasonal movements and foraging of animals across these habitats illustrates the dynamic nature and vital connections that are crucial to the survival of this ecosystem.

Coastal Sage Scrub

"Coastal sage scrub" is a generic vegetation type that is inclusive of several subtypes[48]. In the Santa Monica Mountains, coastal sage scrub is mostly of the type termed "Venturan Coastal Sage Scrub." In general, coastal sage scrub is comprised of dominant species that are semi-woody and low-growing, with shallow, dense roots that enable them to respond quickly to rainfall. Under the moist conditions of winter and spring, they grow quickly, flower, and produce light, wind-dispersed seeds, making them good colonizers following disturbance. These species cope with summer drought by dying back, dropping their leaves or producing a smaller summer leaf in order to reduce water loss. Stands of coastal sage scrub are much more open than chaparral and contain a greater admixture of herbaceous species. Coastal sage scrub is generally restricted to drier sites, such as low foothills, south-facing slopes, and shallow soils at higher elevations.

[45] National Park Service. 1993. A checklist of the birds of the Santa Monica Mountains National Recreation Area. Southwest Parks and Monuments Assoc., 221 N. Court, Tucson, AZ. 85701. *and* Letter from Dr. Marti Witter, NPS, Dated Sept. 13, 2001, in letters received and included in the September 2002 staff report for the Malibu LCP.

[46] Stralberg, D. 2000. Landscape-level urbanization effects on chaparral birds: A Santa Monica Mountains case study. p 125-136 *in*: Keeley, J. E., M. Baer-Keeley and C. J. Fotheringham (eds), 2nd Interface Between Ecology and Land Development in California, U.S. Geological Survey Open-File Report 00-62.

[47] Soule, M. E, D. T. Bolger, A. C. Alberts, J. Wright, M. Sorice and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. Conserv. Biol. 2: 75-92.

[48] Kirkpatrick, J.B. and C.F. Hutchinson. 1977. The community composition of Californian coastal sage scrub. Vegetatio 35:21-33; Holland, 1986. op.cit.; Sawyer and Keeler-Wolf, 1995, op.cit.

The species composition and structure of individual stands of coastal sage scrub depend on moisture conditions that derive from slope, aspect, elevation and soil type. Drier sites are dominated by more drought-resistant species (e.g., California sagebrush, coast buckwheat, and *Opuntia* cactus). Where more moisture is available (e.g., north-facing slopes), larger evergreen species such as toyon, laurel sumac, lemonade berry, and sugar bush are common. As a result, there is more cover for wildlife, and movement of large animals from chaparral into coastal sage scrub is facilitated in these areas. Characteristic wildlife in this community includes Anna's hummingbirds, rufous-sided towhees, California quail, greater roadrunners, Bewick's wrens, coyotes, and coast horned lizards[49], but most of these species move between coastal sage scrub and chaparral during their daily activities or on a seasonal basis.

Of the many important ecosystem roles performed by the coastal sage scrub community, five are particularly important in the Santa Monica Mountains. Coastal sage scrub provides critical linkages between riparian corridors, provides essential habitat for species that require several habitat types during the course of their life histories, provides essential habitat for local endemics, supports rare species that are in danger of extinction, and reduces erosion, thereby protecting the water quality of coastal streams.

Riparian woodlands are primary contributors to the high biodiversity of the Santa Monica Mountains. The ecological integrity of those riparian habitats not only requires wildlife dispersal along the streams, but also depends on the ability of animals to move from one riparian area to another. Such movement requires that the riparian corridors be connected by suitable habitat. In the Santa Monica Mountains, coastal sage scrub and chaparral provide that function. Significant development in coastal sage scrub would reduce the riparian corridors to linear islands of habitat with severe edge effects[50], reduced diversity, and lower productivity.

Most wildlife species and many species of plants utilize several types of habitat. Many species of animals endemic to Mediterranean habitats move among several plant communities during their daily activities and many are reliant on different communities either seasonally or during different stages of the their life cycle. Without an intact mosaic of coastal sage scrub, chaparral, and riparian community types, many species will not thrive. Specific examples of the importance of interconnected communities, or habitats, were provided in the discussion above. This is an essential ecosystem role of coastal sage scrub.

A characteristic of the coastal sage scrub vegetation type is a high degree of endemism. This is consonant with Westman's observation that 44 percent of the species he sampled in coastal sage scrub occurred at only one of his 67 sites, which were

[49] National Park Service. 2000. Draft: General Management Plan & Environmental Impact Statement, Santa Monica Mountains National Recreation Area, US Dept. of Interior, National Park Service, December 2000.

[50] Environmental impacts are particularly severe at the interface between development and natural habitats. The greater the amount of this "edge" relative to the area of natural habitat, the worse the impact.

distributed from the San Francisco Bay area to Mexico[51]. Species with restricted distributions are by nature more susceptible to loss or degradation of their habitat. Westman said of this unique and local aspect of coastal sage scrub species in California:

> "While there are about 50 widespread sage scrub species, more than half of the 375 species encountered in the present study of the sage scrub flora are rare in occurrence within the habitat range. In view of the reduction of the area of coastal sage scrub in California to 10-15% of its former extent and the limited extent of preserves, measures to conserve the diversity of the flora are needed."[52]

Coastal sage scrub in southern California provides habitat for about 100 rare species[53], many of which are also endemic to limited geographic regions[54]. In the Santa Monica Mountains, rare animals that inhabit coastal sage scrub[55] include the Santa Monica shieldback katydid, silvery legless lizard, coastal cactus wren, Bell's sparrow, San Diego desert woodrat, southern California rufous-crowned sparrow, coastal western whiptail, and San Diego horned lizard. Some of these species are also found in chaparral[56]. Rare plants found in coastal sage scrub in the Santa Monica Mountains include Santa Susana tarplant, Coulter's saltbush, Blockman's dudleya, Braunton's milkvetch, Parry's spineflower, and Plummer's mariposa lily[57]. A total of 32 sensitive species of reptiles, birds and mammals have been identified in this community by the National Park Service.[58]

One of the most important ecological functions of coastal sage scrub in the Santa Monica Mountains is to protect water quality in coastal streams by reducing erosion in the watershed. Although shallow rooted, the shrubs that define coastal sage scrub have dense root masses that hold the surface soils much more effectively than the exotic annual grasses and forbs that tend to dominate in disturbed areas. The native shrubs of this community are resistant not only to drought, as discussed above, but well adapted to fire. Most of the semi-woody shrubs have some ability to crown sprout after

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[51] Westman, W.E. 1981. Diversity relations and succession in Californian coastal sage scrub. Ecology 62:170-184.
[52] Ibid.
[53] Atwood, J. L. 1993. California gnatcatchers and coastal sage scrub: The biological basis for endangered species listing. pp.149-166 *In*: Interface Between Ecology and Land Development in California. Ed. J. E. Keeley, So. Calif. Acad. of Sci., Los Angeles. California Department of Fish and Game (CDFG). 1993. The Southern California Coastal Sage Scrub (CSS) Natural Communities Conservation Plan (NCCP). CDFG and Calif. Resources Agency, 1416 9th St., Sacramento, CA 95814.
[54] Westman, W.E. 1981. op. cit.
[55] Biological Resources Assessment of the Proposed Santa Monica Mountains Significant Ecological Area. Nov. 2000. Los Angeles Co., Dept. of Regional Planning, 320 West Temple St., Rm. 1383, Los Angeles, CA 90012.
[56] O'Leary J.F., S.A. DeSimone, D.D. Murphy, P.F. Brussard, M.S. Gilpin, and R.F. Noss. 1994. Bibliographies on coastal sage scrub and related malacophyllous shrublands of other Mediterranean-type climates. *California Wildlife Conservation Bulletin* 10:1–51.
[57] Biological Resources Assessment of the Proposed Santa Monica Mountains Significant Ecological Area. Nov. 2000. Los Angeles Co., Dept. of Regional Planning, 320 West Temple St., Rm. 1383, Los Angeles, CA 90012.
[58] NPS, 2000, op cit.

fire. Several CSS species (e.g., *Eriogonum cinereum*) in the Santa Monica Mountains and adjacent areas resprout vigorously and other species growing near the coast demonstrate this characteristic more strongly than do individuals of the same species growing at inland sites in Riverside County.[59] These shrub species also tend to recolonize rapidly from seed following fire. As a result they provide persistent cover that reduces erosion.

In addition to performing extremely important roles in the Mediterranean ecosystem, the coastal sage scrub community type has been drastically reduced in area by habitat loss to development. In the early 1980's it was estimated that 85 to 90 percent of the original extent of coastal sage scrub in California had already been destroyed.[60] Losses since that time have been significant and particularly severe in the coastal zone.

Therefore, because of its increasing rarity, its important role in the functioning of the Santa Monica Mountains Mediterranean ecosystem, and its extreme vulnerability to development, coastal sage scrub within the Santa Monica Mountains meets the definition of ESHA under the Coastal Act.

Chaparral

Another shrub community in the Santa Monica Mountain Mediterranean ecosystem is chaparral. Like "coastal sage scrub," this is a generic category of vegetation. Chaparral species have deep roots (10s of ft) and hard waxy leaves, adaptations to drought that increase water supply and decrease water loss at the leaf surface. Some chaparral species cope more effectively with drought conditions than do desert plants[61]. Chaparral plants vary from about one to four meters tall and form dense, intertwining stands with nearly 100 percent ground cover. As a result, there are few herbaceous species present in mature stands. Chaparral is well adapted to fire. Many species regenerate mainly by crown sprouting; others rely on seeds which are stimulated to germinate by the heat and ash from fires. Over 100 evergreen shrubs may be found in chaparral[62]. On average, chaparral is found in wetter habitats than coastal sage scrub, being more common at higher elevations and on north facing slopes.

The broad category "northern mixed chaparral" is the major type of chaparral shown in the National Park Service map of the Santa Monica Mountains. However, northern mixed chaparral can be variously dominated by chamise, scrub oak or one of several species of manzanita or by ceanothus. In addition, it commonly contains woody vines and large shrubs such as mountain mahogany, toyon, hollyleaf redberry, and sugarbush[63]. The rare red shank chaparral plant community also occurs in the Santa Monica Mountains. Although included within the category "northern mixed chaparral" in

[59] Dr. John O'Leary, SDSU, personal communication to Dr. John Dixon, CCC, July 2, 2002
[60] Westman, W.E. 1981. op. cit.
[61] Dr. Stephen Davis, Pepperdine University. Presentation at the CCC workshop on the significance of native habitats in the Santa Monica Mountains. June 13, 2002.
[62] Keely, J.E. and S.C. Keeley. Chaparral. Pages 166-207 in M.G. Barbour and W.D. Billings, eds. North American Terrestrial Vegetation. New York, Cambridge University Press.
[63] Ibid.

the vegetation map, several types of ceanothus chaparral are reported in the Santa Monica Mountains. Ceanothus chaparral occurs on stable slopes and ridges, and may be dominated by bigpod ceanothus, buck brush ceanothus, hoaryleaf ceanothus, or greenbark ceanothus. In addition to ceanothus, other species that are usually present in varying amounts are chamise, black sage, holly-leaf redberry, sugarbush, and coast golden bush[64].

Several sensitive plant species that occur in the chaparral of the Santa Monica Mountains area are: Santa Susana tarplant, Lyon's pentachaeta, marcescent dudleya, Santa Monica Mountains dudleya, Braunton's milk vetch and salt spring checkerbloom[65]. Several occurring or potentially occurring sensitive animal species in chaparral from the area are: Santa Monica shieldback katydid, western spadefoot toad, silvery legless lizard, San Bernardino ring-neck snake, San Diego mountain kingsnake, coast patch-nosed snake, sharp-shinned hawk, southern California rufous-crowned sparrow, Bell's sparrow, yellow warbler, pallid bat, long-legged myotis bat, western mastiff bat, and San Diego desert woodrat.[66]

Coastal sage scrub and chaparral are the predominant generic community types of the Santa Monica Mountains and provide the living matrix within which rarer habitats like riparian woodlands exist. These two shrub communities share many important ecosystem roles. Like coastal sage scrub, chaparral within the Santa Monica Mountains provides critical linkages among riparian corridors, provides essential habitat for species that require several habitat types during the course of their life histories, provides essential habitat for sensitive species, and stabilizes steep slopes and reduces erosion, thereby protecting the water quality of coastal streams.

Many species of animals in Mediterranean habitats characteristically move among several plant communities during their daily activities, and many are reliant on different communities either seasonally or during different stages of their life cycle. The importance of an intact mosaic of coastal sage scrub, chaparral, and riparian community types is perhaps most critical for birds. However, the same principles apply to other taxonomic groups. For example, whereas coastal sage scrub supports a higher diversity of native ant species than chaparral, chaparral habitat is necessary for the coast horned lizard, an ant specialist[67]. Additional examples of the importance of an interconnected communities, or habitats, were provided in the discussion of coastal sage scrub above. This is an extremely important ecosystem role of chaparral in the Santa Monica Mountains.

Chaparral is also remarkably adapted to control erosion, especially on steep slopes. The root systems of chaparral plants are very deep, extending far below the surface and

[64] Ibid.
[65] Biological Resources Assessment of the Proposed Santa Monica Mountains Significant Ecological Area. Nov. 2000. Los Angeles Co., Dept. of Regional Planning, 320 West Temple St., Rm. 1383, Los Angeles, CA 90012.
[66] Ibid.
[67] A.V. Suarez. Ants and lizards in coastal sage scrub and chaparral. A presentation at the CCC workshop on the significance of native habitats in the Santa Monica Mountains. June 13, 2002.

penetrating the bedrock below[68], so chaparral literally holds the hillsides together and prevents slippage.[69] In addition, the direct soil erosion from precipitation is also greatly reduced by 1) water interception on the leaves and above ground foliage and plant structures, and 2) slowing the runoff of water across the soil surface and providing greater soil infiltration. Chaparral plants are extremely resistant to drought, which enables them to persist on steep slopes even during long periods of adverse conditions. Many other species die under such conditions, leaving the slopes unprotected when rains return. Since chaparral plants recover rapidly from fire, they quickly re-exert their ground stabilizing influence following burns. The effectiveness of chaparral for erosion control after fire increases rapidly with time[70]. Thus, the erosion from a 2-inch rain-day event drops from 5 yd^3/acre of soil one year after a fire to 1 yd^3/acre after 4 years.[71] The following table illustrates the strong protective effect of chaparral in preventing erosion.

Soil erosion as a function of 24-hour precipitation and chaparral age.

Years Since Fire	Erosion (yd^3/acre) at Maximum 24-hr Precipitation of:		
	2 inches	5 inches	11 inches
1	5	20	180
4	1	12	140
17	0	1	28
50+	0	0	3

Therefore, because of its important roles in the functioning of the Santa Monica Mountains Mediterranean ecosystem, and its extreme vulnerability to development, chaparral within the Santa Monica Mountains meets the definition of ESHA under the Coastal Act.

Oak Woodland and Savanna

Coast live oak woodland occurs mostly on north slopes, shaded ravines and canyon bottoms. Besides the coast live oak, this plant community includes hollyleaf cherry, California bay laurel, coffeeberry, and poison oak. Coast live oak woodland is more

[68] Helmers, H., J.S. Horton, G. Juhren and J. O'Keefe. 1955. Root systems of some chaparral plants in southern California. Ecology 36(4):667-678. Kummerow, J. and W. Jow. 1977. Root systems of chaparral shrubs. Oecologia 29:163-177.
[69] Radtke, K. 1983. *Living more safely in the chaparral-urban interface*. General Technical Report PSW-67. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Berkeley, California. 51 pp.
[70] Kittredge, J. 1973. Forest influences — the effects of woody vegetation on climate, water, and soil. Dover Publications, New York. 394 pp. Longcore, T and C. Rich. 2002. Protection of environmentally sensitive habitat areas in proposed local coastal plan for the Santa Monica Mountains. (Table 1). The Urban Wildlands Group, Inc., P.O. Box 24020 Los Angeles, CA 90024. Vicars, M. (ed.) 1999. FireSmart: protecting your community from wildfire. Partners in Protection, Edmonton, Alberta.
[71] Ibid.

tolerant of salt-laden fog than other oaks and is generally found nearer the coast[72]. Coast live oak also occurs as a riparian corridor species within the Santa Monica Mountains.

Valley oaks are endemic to California and reach their southern most extent in the Santa Monica Mountains. Valley oaks were once widely distributed throughout California's perennial grasslands in central and coastal valleys. Individuals of this species may survive 400-600 years. Over the past 150 years, valley oak savanna habitat has been drastically reduced and altered due to agricultural and residential development. The understory is now dominated by annual grasses and recruitment of seedlings is generally poor. This is a very threatened habitat.

The important ecosystem functions of oak woodlands and savanna are widely recognized[73]. These habitats support a high diversity of birds[74], and provide refuge for many species of sensitive bats[75]. Typical wildlife in this habitat includes acorn woodpeckers, scrub jays, plain titmice, northern flickers, cooper's hawks, western screech owls, mule deer, gray foxes, ground squirrels, jackrabbits and several species of sensitive bats.

Therefore, because of their important ecosystem functions and vulnerability to development, oak woodlands and savanna within the Santa Monica Mountains met the definition of ESHA under the Coastal Act.

Grasslands

Grasslands consist of low herbaceous vegetation that is dominated by grass species but may also harbor native or non-native forbs.

California Perennial Grassland

Native grassland within the Santa Monica Mountains consists of perennial native needlegrasses: purple needlegrass, (Nassella pulchra), foothills needlegrass, (Nassella lepida) and nodding needlegrass (Nassella cernua). These grasses may occur in the same general area but they do not typically mix, tending to segregate based on slope

[72] NPS 2000. op. cit.
[73] Block, W.M., M.L. Morrison, and J. Verner. 1990. Wildlife and oak-woodland interdependency. *Fremontia* 18(3):72–76. Pavlik, B.M., P.C. Muick, S. Johnson, and M. Popper. 1991. *Oaks of California*. Cachuma Press and California Oak Foundation, Los Olivos, California. 184 pp.
[74] Cody, M.L. 1977. Birds. Pp. 223–231 *in* Thrower, N.J.W., and D.E. Bradbury (eds.). *Chile-California Mediterranean scrub atlas*. US/IBP Synthesis Series 2. Dowden, Hutchinson & Ross, Stroudsburg, Pennsylvania. National Park Service. 1993. A checklist of the birds of the Santa Monica Mountains National Recreation Area. Southwest Parks and Monuments Assoc., 221 N. Court, Tucson, AZ. 85701
[75] Miner, K.L., and D.C. Stokes. 2000. Status, conservation issues, and research needs for bats in the south coast bioregion. Paper presented at *Planning for biodiversity: bringing research and management together*, February 29, California State University, Pomona, California.

and substrate factors[76]. Mixed with these native needlegrasses are many non-native annual species that are characteristic of California annual grassland[77]. Native perennial grasslands are now exceedingly rare[78]. In California, native grasslands once covered nearly 20 percent of the land area, but today are reduced to less than 0.1 percent[79]. The California Natural Diversity Database (CNDDB) lists purple needlegrass habitat as a community needing priority monitoring and restoration. The CNDDB considers grasslands with 10 percent or more cover by purple needlegrass to be significant, and recommends that these be protected as remnants of original California prairie. Patches of this sensitive habitat occur throughout the Santa Monica Mountains where they are intermingled with coastal sage scrub, chaparral and oak woodlands.

Many of the raptors that inhabit the Santa Monica Mountains make use of grasslands for foraging because they provide essential habitat for small mammals and other prey. Grasslands adjacent to woodlands are particularly attractive to these birds of prey since they simultaneously offer perching and foraging habitat. Particularly noteworthy in this regard are the white-tailed kite, northern harrier, sharp-shinned hawk, Cooper's hawk, red-shouldered hawk, red-tailed hawk, golden eagle, American kestrel, merlin, and prairie falcon[80].

Therefore, because of their extreme rarity, important ecosystem functions, and vulnerability to development, California native perennial grasslands within the Santa Monica Mountains meet the definition of ESHA under the Coastal Act.

California Annual Grassland

The term "California annual grassland" has been proposed to recognize the fact that non-native annual grasses should now be considered naturalized and a permanent feature of the California landscape and should be acknowledged as providing important ecological functions. These habitats support large populations of small mammals and provide essential foraging habitat for many species of birds of prey. California annual grassland generally consists of dominant invasive annual grasses that are primarily of Mediterranean origin. The dominant species in this community include common wild oats (Avena fatua), slender oat (Avena barbata), red brome (Bromus madritensis ssp. Rubens), ripgut brome, (Bromus diandrus), and herbs such as black mustard (Brassica nigra), wild radish (Raphanus sativus) and sweet fennel (Foeniculum vulgare). Annual grasslands are located in patches throughout the Santa Monica Mountains in previously disturbed areas, cattle pastures, valley bottoms and along roadsides. While many of

[76] Sawyer, J. O. and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society, 1722 J St., Suite 17, Sacramento, CA 95814.
[77] Biological Resources Assessment of the Proposed Santa Monica Mountains Significant Ecological Area. Nov. 2000. Los Angeles Co., Dept. of Regional Planning, 320 West Temple St., Rm. 1383, Los Angeles, CA 90012.
[78] Noss, R.F., E.T. LaRoe III and J.M. Scott. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. Biological Report 28. National Biological Service, U.S. Dept. of Interior.
[79] NPS 2000. op. cit.
[80] NPS 2000. op. cit.

these patches are dominated by invasive non-native species, it would be premature to say that they are never sensitive or do not harbor valuable annual native species. A large number of native forbs also may be present in these habitats[81], and many native wildflowers occur primarily in annual grasslands. In addition, annual grasslands are primary foraging areas for many sensitive raptor species in the area.

Inspection of California annual grasslands should be done prior to any impacts to determine if any rare native species are present or if any rare wildlife rely on the habitat and to determine if the site meets the Coastal Act ESHA criteria.

Effects of Human Activities and Development on Habitats within the Santa Monica Mountains

The natural habitats of the Santa Monica Mountains are highly threatened by current development pressure, fragmentation and impacts from the surrounding megalopolis. The developed portions of the Santa Monica Mountains represents the extension of this urbanization into natural areas. About 54% of the undeveloped Santa Monica Mountains are in private ownership[82], and computer simulation studies of the development patterns over the next 25 years predict a serious increase in habitat fragmentation[83]. Development and associated human activities have many well-documented deleterious effects on natural communities. These environmental impacts may be both direct and indirect and include the effects of increased fire frequency, of fire clearance, of introduction of exotic species, and of night lighting.

Increased Fire Frequency

Since 1925, all the major fires in the Santa Monica Mountains have been caused by human activities[84]. Increased fire frequency alters plant communities by creating conditions that select for some species over others. Strong resprouting plant species such as laurel sumac, are favored while non-sprouters like bigpod ceanothus, are at a disadvantage. Frequent fire recurrence before the non-sprouters can develop and reestablish a seed bank is detrimental, so that with each fire their chances for propagation are further reduced. Resprouters can be sending up new shoots quickly, and so they are favored in an increased fire frequency regime. Also favored are weedy and invasive species. Dr. Steven Davis in his abstract for a Coastal Commission

[81] Holstein, G. 2001. Pre-agricultural grassland in Central California. Madrono 48(4):253-264. Stromberg, M.R., P. Kephart and V. Yadon. 2001. Composition, invasibility and diversity of coastal California grasslands. Madrono 48(4):236-252.
[82] National Park Service. 2000. Draft: General Management Plan & Environmental Impact Statement, Santa Monica Mountains National Recreation Area, US Dept. of Interior, National Park Service, December 2000.
[83] Swenson, J. J., and J. Franklin. 2000. The effects of future urban development on habitat fragmentation in the Santa Monica Mountains. Landscape Ecol. 15:713-730.
[84] NPS, 2000, op. cit.

Workshop stated[85] "*We have evidence that recent increases in fire frequency has eliminated drought-hardy non-sprouters from chaparral communities near Malibu, facilitating the invasion of exotic grasses and forbs that further exacerbate fire frequency*." Thus, simply increasing fire frequency from about once every 22 years (the historical frequency) to about once every 12 years (the current frequency) can completely change the vegetation community. This has cascading effects throughout the ecosystem.

Fuel Clearance

The removal of vegetation for fire protection in the Santa Monica Mountains is required by law in "Very High Fire Hazard Severity Zones"[86]. Fuel removal is reinforced by insurance carriers[87]. Generally, the Santa Monica Mountains are considered to be a high fire hazard severity zone. In such high fire hazard areas, homeowners must often resort to the California FAIR Plan to obtain insurance. Because of the high risk, all homes in "brush areas" are assessed an insurance surcharge if they have less than the recommended 200-foot fuel modification zone[88] around the home. The combination of insurance incentives and regulation assures that the 200-foot clearance zone will be applied universally[89]. While it is not required that all of this zone be cleared of vegetation, the common practice is simply to disk this zone, essentially removing or highly modifying all native vegetation. For a new structure not adjacent to existing structures, this results in the removal or modification of a minimum of three acres of vegetation[90]. While the directly impacted area is large, the effects of fuel modification extend beyond the 200-foot clearance area.

Effects of Fuel Clearance on Bird Communities

The impacts of fuel clearance on bird communities was studied by Stralberg who identified three ecological categories of birds in the Santa Monica Mountains: 1) local and long distance migrators (ash-throated flycatcher, Pacific-slope flycatcher, phainopepla, black-headed grosbeak), 2) chaparral-associated species (Bewick's wren, wrentit, blue-gray gnatcatcher, California thrasher, orange-crowned warbler, rufous-crowned sparrow, spotted towhee, California towhee) and 3) urban-associated species

[85] Davis, Steven. Effects of fire and other factors on patterns of chaparral in the Santa Monica Mountains, Coastal Commission Workshop on the Significance of Native Habitats in the Santa Monica Mountains. CCC Hearing, June 13, 2002, Queen Mary Hotel.
[86] 1996 Los Angeles County Fire Code Section 1117.2.1
[87] Longcore, T and C. Rich. 2002. Protection of environmentally sensitive habitat areas in proposed local coastal plan for the Santa Monica Mountains. The Urban Wildlands Group, Inc., P.O. Box 24020 Los Angeles, CA 90024. Vicars, M. (ed.) 1999. FireSmart: protecting your community from wildfire. Partners in Protection, Edmonton, Alberta.
[88] Fuel Modification Plan Guidelines. Co. of Los Angeles Fire Department, Fuel Modification Unit, Prevention Bureau, Forestry Division, Brush Clearance Section, January 1998.
[89] Longcore, T and C. Rich. 2002. Protection of environmentally sensitive habitat areas in proposed local coastal plan for the Santa Monica Mountains. The Urban Wildlands Group, Inc., P.O. Box 24020 Los Angeles, CA 90024.
[90] Ibid.

(mourning dove, American crow, Western scrub-jay, Northern mockingbird)[91]. It was found in this study that the number of migrators and chaparral-associated species decreased due to habitat fragmentation while the abundance of urban-associated species increased. The impact of fuel clearance is to greatly increase this edge-effect of fragmentation by expanding the amount of cleared area and "edge" many-fold. Similar results of decreases in fragmentation-sensitive bird species are reported from the work of Bolger et al. in southern California chaparral[92].

Effects of Fuel Clearance on Arthropod Communities

Fuel clearance and habitat modification may also disrupt native arthropod communities, and this can have surprising effects far beyond the cleared area on species seemingly unrelated to the direct impacts. A particularly interesting and well-documented example with ants and lizards illustrates this point. When non-native landscaping with intensive irrigation is introduced, the area becomes favorable for the invasive and non-native Argentine ant. This ant forms "super colonies" that can forage more than 650 feet out into the surrounding native chaparral or coastal sage scrub around the landscaped area[93]. The Argentine ant competes with native harvester ants and carpenter ants displacing them from the habitat[94]. These native ants are the primary food resource for the native coast horned lizard, a California "Species of Special Concern." As a result of Argentine ant invasion, the coast horned lizard and its native ant food resources are diminished in areas near landscaped and irrigated developments[95]. In addition to specific effects on the coast horned lizard, there are other Mediterranean habitat ecosystem processes that are impacted by Argentine ant invasion through impacts on long-evolved native ant-plant mutualisms[96]. The composition of the whole arthropod community changes and biodiversity decreases when habitats are subjected to fuel modification. In coastal sage scrub disturbed by fuel modification, fewer arthropod

[91] Stralberg, D. 2000. Landscape-level urbanization effects on chaparral birds: a Santa Monica Mountains case study. Pp. 125–136 *in* Keeley, J.E., M. Baer-Keeley, and C.J. Fotheringham (eds.). *2nd interface between ecology and land development in California*. U.S. Geological Survey, Sacramento, California.
[92] Bolger, D. T., T. A. Scott and J. T. Rotenberry. 1997. Breeding bird abundance in an urbanizing landscape in coastal Southern California. Conserv. Biol. 11:406-421.
[93] Suarez, A.V., D.T. Bolger and T.J. Case. 1998. Effects of fragmentation and invasion on native ant communities in coastal southern California. Ecology 79(6):2041-2056.
[94] Holway, D.A. 1995. The distribution of the Argentine ant (*Linepithema humile*) in central California: a twenty-year record of invasion. Conservation Biology 9:1634-1637. Human, K.G. and D.M. Gordon. 1996. Exploitation and interference competition between the invasive Argentine ant, (*Linepithema humile*), and native ant species. Oecologia 105:405-412.
[95] Fisher, R.N., A.V. Suarez and T.J. Case. 2002. Spatial patterns in the abundance of the coastal horned lizard. Conservation Biology 16(1):205-215. Suarez, A.V. J.Q. Richmond and T.J. Case. 2000. Prey selection in horned lizards following the invasion of Argentine ants in southern California. Ecological Applications 10(3):711-725.
[96] Suarez, A.V., D.T. Bolger and T.J. Case. 1998. Effects of fragmentation and invasion on native ant communities in coastal southern California. Ecology 79(6):2041-2056. Bond, W. and P. Slingsby. Collapse of an Ant-Plant Mutualism: The Argentine Ant (*Iridomyrmex humilis*) and Myrmecochorous Proteaceae. Ecology 65(4):1031-1037.

predator species are seen and more exotic arthropod species are present than in undisturbed habitats[97].

Studies in the Mediterranean vegetation of South Africa (equivalent to California shrubland with similar plant species) have shown how the invasive Argentine ant can disrupt the whole ecosystem.[98] In South Africa the Argentine ant displaces native ants as they do in California. Because the native ants are no longer present to collect and bury seeds, the seeds of the native plants are exposed to predation, and consumed by seed eating insects, birds and mammals. When this habitat burns after Argentine ant invasion the large-seeded plants that were protected by the native ants all but disappear. So the invasion of a non-native ant species drives out native ants, and this can cause a dramatic change in the species composition of the plant community by disrupting long-established seed dispersal mutualisms. In California, some insect eggs are adapted to being buried by native ants in a manner similar to plant seeds[99].

Artificial Night Lighting

One of the more recently recognized human impacts on ecosystem function is that of artificial night lighting as it effects the behavior and function of many different types of organisms[100]. For literally billions of years the only nighttime sources of light were the moon and stars, and living things have adapted to this previously immutable standard and often depend upon it for their survival. A review of lighting impacts suggests that whereas some species are unaffected by artificial night lighting, many others are severely impacted. Overall, most impacts are negative ones or ones whose outcome is unknown. Research to date has found negative impacts to plants, aquatic and terrestrial invertebrates, amphibians, fish, birds and mammals, and a detailed literature review can be found in the report by Longcore and Rich[101].

Summary

In a past action, the Coastal Commission found[102] that the Santa Monica Mountains Mediterranean Ecosystem, which includes the undeveloped native habitats of the Santa Monica Mountains, is rare and especially valuable because of its relatively pristine

[97] Longcore, T.R. 1999. Terrestrial arthropods as indicators of restoration success in coastal sage scrub. Ph.D. Dissertation, University of California, Los Angeles.
[98] Christian, C. 2001. Consequences of a biological invasion reveal the importance of mutualism for plant communities. Nature 413:635-639.
[99] Hughes, L. and M. Westoby. 1992. Capitula on stick insect eggs and elaiosomes on seeds: convergent adaptations for burial by ants. Functional Ecology 6:642-648.
[100] . Longcore, T and C. Rich. 2002. Protection of environmentally sensitive habitat areas in proposed local coastal plan for the Santa Monica Mountains. The Urban Wildlands Group, Inc., P.O. Box 24020 Los Angeles, CA 90024.
[101] Ibid, and Ecological Consequences of Artificial Night Lighting, Conference, February 23-24, 2002, UCLA Los Angeles, California.
[102] Revised Findings for the City of Malibu Local Coastal Program (as adopted on September 13, 2002) adopted on February 6, 2003.

character, physical complexity, and resultant biological diversity. The undeveloped native habitats within the Santa Monica Mountains that are discussed above are ESHA because of their valuable roles in that ecosystem, including providing a critical mosaic of habitats required by many species of birds, mammals and other groups of wildlife, providing the opportunity for unrestricted wildlife movement among habitats, supporting populations of rare species, and preventing the erosion of steep slopes and thereby protecting riparian corridors, streams and, ultimately, shallow marine waters.

The importance the native habitats in the Santa Monica Mountains was emphasized nearly 20 years ago by the California Department of Fish and Game[103]. Commenting on a Draft Land Use Plan for the City of Malibu, the Regional Manager wrote that, "It is essential that large areas of land be reclassified to reflect their true status as ESHAs. One of the major needs of the Malibu LUP is that it should provide protection for entire drainages and not just stream bottoms." These conclusions were supported by the following observations:

> "It is a fact that many of the wildlife species of the Santa Monica Mountains, such as mountain lion, deer, and raccoon, have established access routes through the mountains. They often travel to and from riparian zones and development such as high density residential may adversely affect a wildlife corridor.
>
> Most animal species that exist in riparian areas will, as part of their life histories, also be found in other habitat types, including chapparal (sic) or grassland. For example, hawks nest and roost in riparian areas, but are dependent on large open areas for foraging. For the survival of many species, particularly those high on the food chain, survival will depend upon the presence of such areas. Such areas in the Santa Monica Mountains include grassland and coastal sage scrub communities, which have been documented in the SEA studies as supporting a wide diversity of plant and animal life."

This analysis by the Department of Fish and Game is consonant with the findings of the Commission in the case of the Malibu LCP, and with the conclusion that large contiguous areas of relatively pristine native habitat in the Santa Monica Mountains meet the definition of ESHA under the Coastal Act.

[103] Letter from F. A. Worthley, Jr. (CDFG) to N. Lucast (CCC) re Land Use Plan for Malibu dated March 22, 1983.

Pro bono Review and Comments
Pepperdine CLP Project Environmental Impact Analysis
Lighting Analysis and Addendum

9-26-13

The following comments concern the CLP project's lighting environmental report included in the November, 2010 Environmental Impact Analysis (hereinafter "EIA") and the lighting consultant's Addendum #1 on March 6, 2012 (hereinafter "ELIA-1"). The EIA "describes existing light and glare conditions on the Pepperdine University campus and its surroundings and evaluates the changes resulting from implementation of the CLP."

Interest in the technology and impact of light pollution is in a period of rapid change due to the discovery of intrinsically photo-reponsive ganglion nerve cells (iPRG cells) in human eyes made public in 2002. These cells, which in basic terms trigger the circadian systems of mammals and are related to similar neurochemical processes in all living beings, are sensitive to light in the short visible wavelengths prevalent in metal halide, LED, fluorescent and induction lighting technologies. The American Medical Association has adopted a policy (2012) warning against the potential impacts of these wavelengths at night on humans. There are a number of studies now showing causal impact to wildlife health and wellbeing from the same light sources. In part inspired by the same research, the International Dark Sky Association (IDA) published a white paper in 2010 identifying the issues with evolving LED lighting and calling for greater environmental attention to this problem. However, there is no mention of spectral impact in the EIA or the ELIA-1.

About the same time, the IDA and IES jointly developed and published the Model Lighting Ordinance. The work on this publication began in 2005 and among its revelations included the BUG (backlight-uplight-glare) lighting systems for rating luminaires and the co-development, along with IES and the International Commission on Illumination (CIE) of a FIVE lighting zone system for describing appropriate lighting and limitations on light pollution. The fifth zone, not included in the lighting consultant's report, is lighting zone zero (LZ-0), a totally natural zone in which lighting at night is essentially intolerable for environmental reasons. The Five Zone system was introduced to international standards systems in 2009 and is used in the IES Lighting Handbook 10th Edition issued in 2011, and the BUG system was standardized for outdoor lighting in IES TM15-11. No reference was made to any of this work in the EIA or the ELIA-1.

All of this is evolving understanding and technology. Since the iPRG cell revelations post date the 9th Edition IES Lighting Handbook published in 2000 and the IES Recommended Practice for Environmental Lighting RP-33-1999, these original

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resources used for developing the EIA are dated and their findings should have been thoroughly updated in ELIA-1. As a minimum, the ELIA-1 should have been based on the 5-zone system. If they had used it, they would have revised table 5.7.2-2 in the Environmental Impact Analysis dated 11-5-2010. The question is the proper characterization of the Malibu site and its surrounding areas in a lighting-specific environmental rating system, and what is means in terms of light pollution metrics. The criterion of 0.5 footcandles used in ELIA-1 and the EIA is 50 times the full moon (.01 fc) and in my opinion far too bright for this environment.

Using the 5-zone system properly, I believe that the campus site is a lighting zone 1 or 2, and the neighboring natural spaces are lighting zone zero. This would limit offsite impacts to environmentally sensitive areas to 0.01 footcandles (pre-curfew) and other adjacent spaces to 0.1 footcandle pre-curfew, as contrasted to the current choice of 0.5 footcandles as the threshold of impact. Moreover, I believe that the illuminance measurement is being used incorrectly. In the report, the measured values of illuminance are not being made at the property line, but rather, at selected observation points. Current anti-light pollution theory, including that contained in RP-33-99, is that the measurement is made at the property line in a vertical place extending upwards. This prevents using arbitrary observation points that favor an otherwise unacceptable outcome.

The importance of this point can be illustrated with the following example. A very a powerful sports light luminaire is typically aimed down at the ground. But if it were aimed directly at the viewer, the outcome would meet the 0.5 fc threshold in the vertical plane at an observation point about 1700 feet away. This relatively short distance would allow a very significant environmental impact to occur and still meet project criteria. But if the observation point were at the boundary of the sports field's equivalent "property line" (about 300 feet from the luminaire), the luminaire would of course cause a vertical plane light level of roughly 16 footcandles, easily calling attention to this unacceptable lighting situation.

I am also concerned about the use of "luminance". Luminance is the measurable brightness of a surface or a light source. The documents are unclear about how the luminance is measured. The report uses "footlamberts" in presenting luminance data. The following is from Wikipedia:

*"A **foot-lambert** or **footlambert** (fL, sometimes fl or ft-L) is a unit of luminance in United States customary units and some other unit systems. A foot-lambert equals $1/\pi$ candela per square foot, or 3.426 candela per square meter (the corresponding SI unit). The foot-lambert is named after Johann Heinrich Lambert (1728–1777), a Swiss-German mathematician, physicist and astronomer. **It is rarely used by electrical and lighting engineers** (emphasis added), in favor of the candela per square foot or candela per square meter."*

One of the few practical field instruments for measuring luminance is the Minolta LS-

100. It reports luminance measurements in candelas per square meter (or "nits"). The consultant's use of footlamberts suggests that these field meters did not make the measurements. This brings into question the types of meters used and their calibration. Such data were not presented in either document.

I am familiar with field measurements of luminance. The acceptance angle of the LS-100 is 1 degree, which means a proper reading for the brightness of a large luminaire, like a sports luminaire, must be taken no more than about 100 feet away, and for smaller luminaries, even closer. Illustrations such as Figure 132 and corresponding Table 176 in the ELIA-1 suggest much greater distances were used for luminance measurements and they would therefore drastically underreport the luminance of lighting systems and understate their impact on the environment. Properly measured, I believe that the values will be much greater than reported, and will change the consultant's conclusions.

In summary, I believe that standards used in the EIA are far too lenient and do not correspond to the lighting impact metrics contained in the tenth edition IES Lighting Handbook. The environmental team should have been aware of these new standards and should have used them, if not in their EIA, certainly in the their addendum. I also believe that the EIA and ELIA-1 reports were based on incorrect use of lighting measurements of illuminance by not being taken at the property line, and luminance by not being taken with the proper instrument and proper distance. These shortcomings underreported the lighting impact of current and future proposed lighting and should be corrected before any conclusions about the environmental impact of lighting are drawn.

These comments were prepared *probono* for the California Coastal Commission by James R Benya, PE, FIES, FIALD, Benya Burnett Consultancy, Davis, CA

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Curriculum Vitae

JAMES ROBERT BENYA, PE, FIES, FIALD

Principal, Benya Lighting Design, West Linn, OR

"At the leading edge of light" Metropolis, 1999

"One of the top lighting designers in the US", Departures by American Express, 1999

"Top 25 Retail Lighting Designers in US", Display and Design Ideas, 2002

"Hot designer", SNAP Magazine, 2011

*"Jim has been at the forefront from the start, specializing in integrated daylighting strategies and sustainable lighting approaches long before most designers knew what that was, "*Architectural Lighting, 2011

OVERVIEW

Jim Benya is a professional lighting designer and consultant with 39 years of experience. He is a Registered Professional Electrical Engineer, Fellow of the Illuminating Engineering Society of North America (FIES), and Fellow of the International Association of Lighting Designers (IALD). A member of the legendary Smith Hinchman & Grylls Lighting Group, he established and led California's seminal lighting design firm Luminae Souter Lighting Design as Principal and CEO before relocating to Oregon. His design work has been published in every major lighting design and architectural journal, including Architecture, Architectural Record, Architectural Lighting, Progressive Architecture, LD&A, Lighting Dimensions, Interiors, Interior Design, Designers West, Northern California Home and Garden, Architectural Digest, and Building Design and Construction. He has won numerous lighting design awards, including the Edison Award, the Edison Award of Excellence (7 times), the Edison Award for Environmental Design (twice), the International Illumination Design Award of Excellence, and the Source Awards First Place Award. He is the author of **Lighting Design Basics** (Wiley 2012) and **Lighting Retrofits and Relighting (**Wiley 2011) and his work is featured in nine books, including the Best of Lighting Design.

PROFESSIONAL HISTORY

Principal, Benya Lighting Design, West Linn, OR	1994-2011
Principal, Pacific Lightworks, Portland, OR	1996-1998
Principal, Luminæ Souter Lighting Design, San Francisco	1983-1994
Associate and Chief Electrical Engineer, the Smith Group, Detroit	1980-1983
Electrical Engineer and Project Manager, the Smith Group, Detroit	1973-1980

EDUCATIONAL HISTORY

BSE, University of Michigan, Electrical Engineering	1973
BS, University of Michigan. Computer Science	1973
Graduate work in Computer Science, University of Michigan	1973
Professional Development work in Building Energy Systems, Iowa State	1978
Professional Development work in Daylighting, Harvard Graduate School	2009

ACADEMIC TEACHING HISTORY

Most appointments included 10-14 classes per semester. Total of approx. 350 classes

Adjunct Professor of Architecture, Lawrence Technological Institute	1974-1978
Adjunct Professor of Architecture, Wayne State University	1979
Adjunct Professor of Design, University of Michigan	1980-1983
Adjunct Professor of Architecture, University of California at Berkeley	1984-1985
Adjunct Professor of Architecture, California College of Art	1986-1995
Artist in Residence, University of Nebraska School of Architecture	1998
Adjunct Professor of Interior Design, Marylhurst University	2002
Guest Lecturer, Oregon State University Interior Design Lighting Class	1999-2010
Special studio in Daylighting, Daylectric Lighting, Ball State University	2007-2009

PROFESSIONAL DEVELOPMENT TEACHING HISTORY

Total of over 500 classes and seminars

LightFair– 35 presentations (New York, San Francisco, Las Vegas)	1990-2011
Professional Lighting Design Conference, 3 presentations (Berlin, Madrid)	2009, 2011
Professional Lighting Design programs (Alingsås, Copenhagen, Wismar, Venice)	2011
Pan Pacific Lighting Conference, 3 presentations (San Francisco)	1984-1989
Intl. Daylighting Conference (Bilbao, Rotterdam, Lausanne)	2007,2009,2011
AIA Annual Conference Professional Development Programs	2001,2005,2007
ASID Annual Conference Professional Development Programs	1985,1986,198 1990,1994,1998
Green Build Presentations (Austin, Pittsburgh, Boston, Chicago, Phoenix)	2002,2003,2007 2008, 2009
Neocon Chicago	1998,2002,2009
Strategies in Light (LED and OLED conferences)	2009-2011
Lighting Academy, Southern California Edison (5 classes, multiple times)	2007-2011
AIA Professional Development Classes Presented (local level)	2001-2011
ASID Professional Development Classes presented (82 programs local level)	1983-2009
APEM Professional Development Classes presented (local level)	1985-1995
IES Regional and Sectional Meetings -75 programs	1975-2011

Professional Development Classes for Commercial Clients 1983-2011

Commercial presentation and program clients include Acuity Brands Lighting, Cooper Lighting, GE Lighting, Sylvania Lighting, Lutron Electronics, ELP Lighting, Efficiency Vermont, Southern California Edison, Pacific Gas & Electric, LA DWP, Southern California Gas Co, San Diego Gas & Electric, California Lighting Technology Center, Oklahoma Gas & Electric, Edison Electric Institute, American Lighting Association, Oregon Energy Trust. Pacific Power Company, BC Hydro, Connecticut Power and Light, Con Edison, Com Edison, Atlantic Electric, Georgia Power, Lucifer Lighting, NEEA, NEEP, CHPS, ASHRAE, Energy Center of Wisconsin, ACEEE, NRDC, Professional Lighting Design magazine, Architectural Lighting magazine, Architect magazine, AMC Trade Shows, the Atlanta Mart, the Merchandise Mart, LA Design Center, SF Mart, the Miami Merchandise Mart, Dallas Mart, Specs Retail Conference, the Electric Show, Electric West, EWEB, IIDA

College Lectures 1983-2011

Programs include University of Oregon, Oregon State University, Mt. Hood Community College, University of Washington, University of California at Davis, University of California Berkeley, Cal Poly Ponoma, Cal Poly San Luis Obispo, University of California Santa Barbara, University of California San Diego, Cal State Chico, Cal State Sacramento, California Art Institute, La Canada College, UCLA, University of Nevada, Las Vegas, University of Texas, UT San Antonio, Venice School of Architecture, Hochschule Wismar, University of Montana, University of Idaho, Arizona State University, Oklahoma State University, University of Nebraska, Lawrence Technological Institute, University of Alabama, Memphis State University, Rhode Island School of Design, Louisiana Tech, University of Colorado, University of Virginia, Parsons School of Design, Fashion Institute of Design, University of Vermont, University of Wisconsin, University of Minnesota, Parsons School of Design, University of Rochester, Chaminade College, Ball State University

Papers Presentations

IES, IALD, ASHRAE, USGBC, ACEEE, AIA, various programs.

Internet Classes

Federal Energy Management Program (FEMP) Lighting Class 1997-2002

KEYNOTE ADDRESSES

IES Conference Philadelphia	2012
NECA Conference, Las Vegas	2012
IES Conference Australia New Zealand, Auckland	2011
IES Conference Australia New Zealand, Queenstown	2008
International Daylighting Conference, Bilbao	2007
Trade Commission of Spain, Barcelona	2005
IES Annual Conference	1997

MEMBERSHIPS

Illuminating Engineering Society (IES)	1975-2011
Board of Fellows	1994-1998, 2003-2007
ASHRAE AEDG Schools	2005-2007
Technical review committee	2007
Spectral effects committee	1998-200
ASHRAE/IES90.1 representative	1992-1997
Elected Fellow	1991
Energy Management committee	1983-2008
Health Care Committee	1979-1983
Chair, annual meeting program committee	1985
Annual conference papers	1975-1983
Elected member	1975
International Association of Lighting Designers (IALD)	1987-2011
Fellows Selection Committee	2010-2011
Elected Fellow	2005
Special presidential citation	2003
LightFair Management Board	2002-2004
NCQLP Board	2002-2003
Member of Board, Director of External Affairs	2002-2003
Member of Board, Director of Education	2001
LightFair Program Committee	1998-2001
Elected Professional Member	1987
International Dark Sky Association (IDA)	2001-2011
Chair, Model Lighting Ordinance Task Force	2001-2011
Board of Directors	2001-2011
Treasurer	2008-2009
Technical Committee	2001-2011
American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)	
Member, SPC 189.1	2009-2010
Member SPC 90.1	1992-1997
AEDG Schools	2005-2007
Super Efficient Buildings Conference Presenter	2010, 2012
US Green Buildings Council (USGBC)	2002-2011
Institute of Electrical and Electronic Engineers (IEEE)	2005-2009
National Council on Qualifications for the Lighting Professions (NCLQP)	
Chairman, Examination Committee	2000
Chairman, Test Committee	1997-1999
Member, organizing committee	1995-1996
General Electric Consumer Advisory Council (GE CAC)	2001-2011
California Energy Commission (CEC)	
Advanced Lighting Professional Advisory Committee	1987-1994
Advanced Lighting Advisory Committee	1995-1998

PUBLICATIONS

Books

Lighting Design Basics (with Karlen), Wiley	2012, 2004
Lighting Retrofits and Relighting (with Leban), Wiley	2011
Lighting Fundamentals, EPRI	1997
Lighting Retrofit Handbook, EPRI	1997

Contributing Editor and Author

Advanced Lighting Guidelines, CEC and New Buildings	1990,1993, 2001,2003 2011
Lighting Controls Patterns for Design, EPRI	1997

Author and Columnist

Architectural Lighting Magazine	1988-1992
Architectural Record Magazine	1992-1997
Architectural Lighting Magazine	2001-2011
Blog, Architectural Lighting	2008-2009
Lighting Design and Application	Centennial

Articles and papers

Architectural Lighting	42 articles and columns
Architectural Record	16 articles and columns
Progressive Architecture	1 article (1983)
Building Operating Management	3 articles
Better Bricks Website	4 articles
EC&M (McGraw Hill)	2 articles
Building Design and Construction	2 articles

REGISTRATIONS AND CERTIFICATIONS

Professional Engineer, California 12078	1984-current
Professional Engineer, Michigan 24679	1977
Class A Energy Auditor,, Iowa	1978
Certified Lighting Efficiency Professional (CLEP)	1992-1995
Lighting Certified (NCQLP)	1998-2010

AWARDS

Please refer to the Benya Lighting Design firm profile, attached.

EXPERT WORK

Cases by Type and Location

Professional Misconduct, Lighting
London, 2003
Chicago, 2003

Professional Malpractice, Lighting (non-injury)
Chicago, 2000
San Diego, 1990
California 2010

Personal Injury (Lighting Related)
California, 1988, 1989, 1991, 1993, 1996, 1998, 1999, 2005, 2010
Oregon 2002, 2003
Montana, 2004

Zoning Approvals – Dark Sky related
Tennessee, 2007
Oregon, 2008, 2009, 2010
California 1997, 1998, 2003, 2004, 2005, 2007, 2008, 2009, 2011
Colorado 2004

Environmental Impact Reports
Arizona, 2011
California, 2000, 2002, 2005, 2009, 2011
Washington, 2004, 2006, 2008
Idaho, 2008

Environmental Impact Challenges
Alberta, 2008, 2010
California, 2000, 2002, 2003, 2006, 2009, 2010
British Columbia, 2002
Oregon, 2009
Michigan 1993
New Jersey, 2006

Lighting patents and trade dress
California 1998, 2002, 2004
Alabama, 1996
Florida, 2010

PERSONAL

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jbenya@benyalighting.com

(503) 519-9631 cell and SMS

Three grown children