CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
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# M E M O R A N D U M

FROM: Jonna D. Engel, Ph.D.
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TO: Cassidy Teufel
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SUBJECT: Impacts of proposed toll road corridor on the Pacific pocket mouse, *Perognathus longimembris pacificus*

DATE: September 26, 2007

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TCA has proposed to build a toll road between the existing terminus of the State Rte. 241 (at Oso Parkway), Orange County, and I-5 (near Basilone Rd.), Marine Corps Base Camp Pendleton, San Diego. The toll road, as sited and designed, bisects two (San Mateo North and San Mateo South) of the four known extant populations of the Pacific pocket mouse, *Perognathus longimembris pacificus.* The Pacific pocket mouse is one of the most endangered animals in the United States. It was listed as federally endangered by the United States Fish and Wildlife Service (USFWS) on September 29, 1994 in accordance with the Endangered Species Act following the rediscovery of a single population at Dana Point Headlands. The USFWS final rule (59 FR 49752) identifying the endangered status of the Pacific pocket mouse states that "the Pacific pocket mouse is threatened with extinction due to documented depredation by domestic cats and habitat loss and fragmentation as a result of past and continuing land development projects." The Pacific pocket mouse is also listed as "Critically Endangered" by the International Union for Conservation of Nature and Natural Resources (ICUN) on its red list of worldwide endangered species (ICUN 2007). Critically endangered is the highest threat rating (with the exception of "Extinct in the Wild") on the IUCN red list and means that the species is "facing an extremely high risk of extinction in the wild in the near future." The purpose of this memorandum is to lay out the biological basis for why I have determined that the toll road, as sited and designed, is incompatible with the survival and recovery of the Pacific pocket mouse. I conclude my memorandum by discussing the inadequacies of TCA's proposed mitigations and by examining the inconsistencies of the proposed project in relation to the USFWS's Pacific pocket mouse recovery plan (Brylski et al. 1998) and sections of the Coastal Act related to protection of environmentally sensitive species and habitats.

The Pacific pocket mouse (*Perognathus longimembris pacificus*) is a tiny nocturnal mammal endemic to coastal southwestern California. Historically, the Pacific pocket mouse occurred up to 2.5 miles inland from Marina del Rey and El Segundo in Los

**EXHIBIT 13**
Application No.
CC-018-07
TCA

Angeles County south to the Mexican border. The Pacific pocket mouse was originally recorded and confirmed at eight locations encompassing some 29 specific trapping stations or sites (Erickson 1993). Starting in the 1940's the number of Pacific pocket mice declined rapidly as a result of coastal development and the concomitant habitat destruction and fragmentation. For more than 20 years, the species was considered extinct until biologists rediscovered a single population on the Dana Point Headlands in Orange County in 1993. Following the rediscovery of the Dana Point population, three additional populations were discovered on Camp Pendleton during small mammal surveys performed in 1995 (Spencer 2005a, Spencer 2005b). Two of these populations consist of small pockets of animals detected immediately north and south of San Mateo Creek – referred to as San Mateo North and San Mateo South. The third population occurs on a marine terrace north of the Santa Margarita River in the Oscar One troop training area and referred to as the Oscar One population.

In Los Angeles County, two of the three areas where the Pacific pocket mouse populations were historically recorded have since been developed and no suitable pocket mouse habitat remains. The third site has been significantly altered since the species was last detected there and while potential habitat remains at the El Segundo Dunes, extensive visual and trapping surveys have not found any Pacific pocket mice. Focused surveys in other parts of Los Angeles County including appropriate Pacific pocket mouse habitat patches in Palos Verdes have resulted in no sightings or captures. Williams (1986) stated that it was likely that all populations north of the San Joaquin Hills in Orange County were extirpated. The USFWS final rule (59 FR 49752) relates that in Los Angeles County, over 96 percent of potential gnatcatcher habitat below 250m (sandy soils and coastal sage scrub – the same habitat used by the Pacific pocket mouse) has been largely or entirely developed. The USFWS estimates in the final rule (59 FR 49752) that only one percent of the approximately 69,000 acres of original Pacific pocket mouse range in Los Angeles County remains.

According to the USFWS final ruling (59 FR 49752), two Pacific pocket mouse populations have been confirmed in Orange County; one in the San Joaquin Hills and one at Dana Point Headlands. Development of the “Spyglass Hill” area in the San Joaquin Hills began in 1972 and has resulted in the destruction of the site where the pocket mouse and a number of other small rodent species were studied for a three year period. Prior to the rediscovery of the Pacific pocket mouse at Dana Point Headlands in 1993, the last record of the species was from Spyglass Hill. Recent (Bryski 1993) trapping efforts totaling 1197 trap nights in the San Joaquin Hills and Laguna Canyon did not detect any Pacific pocket mice. Several additional trapping efforts have taken place in Orange County including efforts in Corona del Mar, Crystal Cove State Park, Laguna Beach, and San Clemente resulting in no Pacific pocket mouse captures. The USFWS final ruling (59 FR 49752) states that in Orange County, of the approximately 53,500 acres of original Pacific pocket mouse range, 81 percent has been developed.

The Pacific pocket mouse has historically been detected at three locations in San Diego County; the San Onofre area, Santa Margarita River Estuary, and the lower Tijuana River Valley. Despite extensive survey efforts, the only Pacific pocket mouse

populations detected in San Diego today are the three listed above that occur on Camp Pendleton. The USFWS final ruling (59 FR 49752) states that by 1988 72 percent of the original coastal sage scrub, 94 percent of native grasslands,100 percent of coastal strand and 92 percent of maritime sage scrub habitats in San Diego County had been converted to urban and agricultural uses. These findings suggest that the habitat and potential range of the Pacific pocket mouse has been significantly reduced in the recent past and that despite extensive efforts to find additional populations, Pacific pocket mice are apparently extremely limited due to the extent of land development in coastal southern California. It is no surprise that three of the four extant populations occur on a military base that provides tenuous habitat refugia.

The Pacific pocket mouse, *Perognathus longimembris pacificus,* is a member of the family Heteromyidae and is the smallest of 19 recognized subspecies of the little pocket mouse *Perognathus longimembris*. It ranges in size from 4.3 to 6 inches from nose to tip of the tail. The coloring is a light pinkish brown, with a lighter, even white underside. The ears are tipped with a patch of light hairs, the tail is bi-colored, and the soles of the hind feet are hairy, which are distinguishing marks of the Pacific pocket mouse (USFWS final ruling -59 FR 49752). Pacific pocket mice are characterized as nocturnal granivores; seeds are the staple of their diet, which they supplement with leafy material and occasionally insects (Brylski et al. 1998). They have not been reliably recorded more than approximately 2 miles (3 km) inland from the coast or above 600 feet (180 m) in elevation (Erickson 1993).

The USFWS final rule (59 FR 49752) states that the habitat requirements of the Pacific pocket mouse are not well understood, but that they are known to occur on fine-grain, sandy substrates in the immediate vicinity of the Pacific Ocean (Mearns 1898, vonBloeker 1931, Grinnell 1933, Bailey 1939, Brylski 1993). The pocket mouse has been described as an obligate resident of river and marine alluvium and coastal sage scrub plant communities in the immediate vicinity of the coast. The habitats where they have historically been found include coastal strand, coastal dunes, river alluvium, and coastal sage scrub growing on marine terraces (vonBloeker 1931, Grinnell 1933, Meserve 1972, M'Closkey 1972, Erickson 1993, Germano 1997). Brylski (1993) detected the only known, confirmed population extant on the Dana Point Headlands on loose sand substrates in a coastal sage scrub community dominated by California buckwheat *(Eriogonum fasiculatum)* and California sage *(Artemisia californica).* Brylski (1993) commented that the Pacific pocket mouse's preferred habitat "appears to be open coastal sage scrub on fine, sandy soil."

The USFWS recovery plan (Brylski et al. 1998) describes the Pacific pocket mouse as an extreme habitat specialist that lives only on very fine loamy soils with sparse vegetation within 3 or 4 miles of the coast. Available soils mapping for each of the extant populations suggests that pocket mice occur in areas with predominantly sandy loam soils (U.S. Soil Conservation Service 1973, 1978). Plant communities at the extant population locations are primarily coastal sage scrub, native grasslands, and non-native grasslands. Within the coastal zone portion of the project area, those habitats that are both contiguous with areas known to be occupied by a pocket mouse

population and are characterized by the specific soil types and vegetation communities required as habitat for the pocket mouse are identified in Attachment A (see Exhibit A, Pacific pocket mouse critical coastal zone habitat map, attached).

There are five factors that figure in to whether or not a species may be determined endangered or threatened. One of those factors is the present or threatened destruction, modification or curtailment of its habitat or range. The USFWS recognized the destruction, modification and curtailment of Pacific pocket mouse habitat and range and this was a major factor in affording it endangered status. Both physical and biological features figure in to an organism's critical habitat. In the case of the Pacific pocket mouse, its physical requirements are sandy loamy soil and its biological requirements are a suite of plant communities including coastal sage scrub and grassland.

As demonstrated by the studies cited above, the preferred vegetation type of the Pacific pocket mouse is coastal sage scrub. Sage scrub in and near the coastal zone differs fundamentally from more inland forms of sage scrub largely due to milder climatic conditions and influences of fog (O'Leary 1995, Taylor 2004). True coastal sage scrub supports a different collection of plants and animals than more inland sage scrub with different mixes of dominant, codominant, and understory plants (O'Leary 1995, Westman 1983, Taylor 2004). Coastal sage scrub has become exceedingly rare in the South Coast Ecoregion because it typifies those areas that were most rapidly converted to urban and suburban development since the 1930's (Spencer et al. 2001). The California Department of Fish and Game's Natural Community Conservation Program (NCCP) has made protection of remaining coastal sage scrub within the coastal zone of southern California a high priority, especially in the face of impending climate change and extended drought (CDFG 1993). The toll road is inconsistent with the NCCP goals of conserving coastal sage scrub vegetation with nearly 50 acres being directly removed within the coastal zone as a result of the project. Removing such a large proportion of this rare habitat will disrupt habitat value there for a large number of species, including the Pacific pocket mouse.

The proposed toll road bisects two of the four extant populations which raises a number of significant issues including impacts upon and loss of Pacific pocket mouse essential habitat and habitat fragmentation with the concomitant problems associated with the genetics of small populations and the disruption of metapopulation dynamics. In addition, considering the growing potential for climate change induced environmental fluctuations and habitat modification, preserving high genetic diversity among rare or endangered populations is especially vital to help ensure the existence and continuance of those traits that may best facilitate successful adaptation to changing conditions. Preservation of physical migration corridors and habitat linkages between the only two remaining Pacific pocket mouse populations capable of experiencing natural genetic exchange is therefore an essential component of the continuance of this species. The two populations bisected by the toll road are San Mateo North and San Mateo South. The toll road area of impact has been determined to encompass the entire San Mateo North population while San Mateo South population is outside but in close proximity to

the identified toll road impact area. Both of these populations are currently estimated to support less than 50 individuals, although Spencer (2005a) points out that this species does have the ability to quickly respond to favorable environmental conditions with orders of magnitude increases in population numbers. In spite of the inherent flexibility of this species, according to Terborgh and Winter (1982) "[r]arity proves to be the best index of vulnerability."

A genetic study conducted by Swei et al (2003) indicates that the San Mateo North and San Mateo South sites share the greatest number of genetic markers among the four extant populations suggesting these populations are the most recently connected by gene flow. This makes sense based on their proximity to one another. The toll road will eliminate the ability for these populations to exchange genes and thus put them at much greater risk for extinction based on the genetics of small populations and metapopulation dynamics discussed below.

Small populations are more susceptible to extinction than large populations due to interaction of demographic, genetic, and environmental factors. Siting the toll road between two Pacific pocket mouse populations that are already known to be extremely vulneralbe to extirpation based on their small population estimates and the existing habitat fragmentation and threats due to development, agriculture, recreational activities, and predation is a virtual death sentence. Prevention of genetic exchange via the toll road is likely to result in the extinction of San Mateo North and South populations for the following reasons; division of the two populations into even smaller populations - small populations have less genetic diversity and are thus less able to adapt to changing environments; elimination of gene flow between the populations (very small levels of gene flow result in high levels of genetic variation); vulnerability to genetic drift which is higher in small populations - by chance deleterious alleles can become more frequent leading to susceptibility to disease; sex ratio inequality (the extreme being only females or males) causing the effective population size to approach zero; and the effects of inbreeding that can alter the average fitness (Hartl and Clark 1997, Hedrick 2000).

The genetics of small populations combined with random variation in the environment (year to year variation in rainfall, temperature, seed production) can produce temporally correlated birth and death rates (i.e. 'good' years when birth rates are high and death rates are low and 'bad' years when birth rates are low and death rates are high) that lead to fluctuations in the population size. Again, smaller populations are more likely to go extinct due to these environmentally generated population fluctuations than are large populations.

Ongoing fragmentation and destruction of natural habitats are leading causes of species extinctions throughout the world. A small local population isolated from other conspecific populations is prone to local extinction, but the species may have a chance of survival in a network of habitat patches connected by dispersal. Population patchworks that are interconnected, also known as metapopulations, have been shown to be extremely important for the persistance of species. A metapopulation is an assemblage of local

populations inhabiting spatially distinct habitat patches. The importance of patches of populations is due to the vulnerability of isolated small populations discussed above – the interaction of demography, genetics, and environment all come into play with metapopulation dynamics. Many modeling studies have examined the dynamics of metapopulations and have shown that there are minimum populations numbers or thresholds below which populations are vulnerable to extinction (Bulman et al. 2007, McIntyre et al. 2007). This research has led to the recoginition of the imortance of landscape connectivity or habitat corridors in the prevention of extinction.

The sedentary nature of the Pacific pocket mouse (Meserve 1972) and the fragmentation of this species' existing and potential essential habitat increase the probability that localized extirpations caused by the destruction of habitat or movement corridors will be permanent. Kenagy (1973) reported that little pocket mice moved less than 50 m at night and Chew and Butterworth (1964) found that from one year to the next, 95 percent of recaptured little pocket mice moved 100 m or less. Burt and Grossenheider (1976), however, estimate that dispersal movements could be as far as 305 m. While migration between San Mateo North and San Mateo South populations is likely a rare event limited to times when the populations are peaking, population genetic theory informs us that all it takes is exchange of one individual to significantly increase the genetic diversity of a population (Hartl and Clark 1997, Hedrick 2000). The toll road will be a total barrier to genetic exchange between San Mateo North and San Mateo South populations. The presence of the toll road will significantly reduce the possibility of introgression between these populations thus reducing genetic variation and the overall fitness of the species which may potentially lead to the extirpation of these Pacific pocket mouse populations and the species in general.

Soule and Simberloff (1986) stated that “urban barriers including highways, streets, and structures impose a very high degree of isolation.” And Spencer (2005) discusses how small, fragmented populations are more subject to random extinction and that barriers to dispersal such as highways further exacerbate population collapse conditions. The Pacific pocket mouse it is extremely rare and, therefore, particularly vulnerable to the effects of continuing habitat destruction and fragmentation.

The importance of the existence of a number of populations is that while at any particular place and time one population may go extinct by chance due to “bad” synergy of environment and genetics, another population will thrive due to “good” synergy of environment and genetics. The blipping on and off of small populations is the dynamic of metapopulations and species persistence requires a minimum threshold number of populations, determined to be ten by the USFWS for the Pacific pocket mouse (Brylski et al. 1998). The proposed toll road will seriously jeopardize the existence of two of only four extant Pacific pocket mouse populations.

The proposed toll road will impact and eliminate Pacific pocket mouse essential habitat and realization of the toll road is in direct conflict with the goals of the Pacific pocket mouse recovery plan (Bryski et al. 1998) which consists of two components. The first is to stabilize existing populations by protecting currently occupied habitat and searching

for additional populations and providing protection to any that are found. The second component consists of establishing new populations via natural colonization and re-colonization into adjacent areas and transplantation of captive bred individuals. The recovery plan describes a number of criteria that will be required in order to consider reclassifying the pocket mouse to threatened status. These criteria include establishment of ten viable, independent, and stable or increasing populations with secure habitats that are free of risk of loss (presently only four populations known to exist including the two threatened by the proposed toll road); protected habitat totaling nearly 5,000 acres (currently the total existing habitat is estimated at less than 1,000 acres); programs in place to maintain Pacific pocket mouse genetic diversity; and finally that all pocket mouse populations and critical habitat are managed so that the current and potential threats (e.g. habitat fragmentation, predation, disease) are eliminated or managed to the extent that each population is not at risk of extirpation

Finally, there are a number of other impacts associated with the toll road that I did not analyze here but that nevertheless present serious threats to the survival and recovery of the Pacific pocket mouse and that are covered elsewhere (Erickson 1993, USFWS 1994, Brylski et al. 1998, Spencer 2005a, Spencer 2005b). These include noise associated with construction and with traffic, road strikes, increased lighting, increased predation by feral and domestic cats, and increased potential for wildfire.

## Conclusions

The USFWS final ruling (59 FR 49752) states that "Considering the extremely small population size and current range of the Pacific pocket mouse (no more than 36 individuals have been detected in the last 22 years), the current extent of the coastal strand, coastal dune, river alluvium, and coastal sage scrub habitats upon which it depends, further losses of habitat will have significant adverse effects on any extant populations of this species." The USFWS further found that the Pacific pocket mouse warranted protection under the endangered species act on the basis of continuing threats to the species, which include substantial habitat loss and fragmentation and depredation. The SOCTIIP EIS/SEIR acknowledges that "long-term impacts could occur to Pacific pocket mouse," and "[the FEC alignments] could result in indirect impacts to the species due to noise, lighting, and other edge effects." (SOCTIIP EIS/SEIR citation) In recognition of the vulnerability of the San Mateo Pacific pocket mouse populations and their occupied and potentially occupied habitat areas to the proposed toll road, TCA has proposed several mitigation measures. These measures include:

> *Measure TE-23. During final project design, an undercrossing shall be provided in the vicinity of the San Mateo North population of the Pacific pocket mouse for any alternative selected that occurs within this area. The undercrossing shall allow for potential movement of Pacific pocket mice under the alignment. The exact placement and design of the undercrossing shall be determined by the*

*Project Biologist, in consultation coordination with MCB Camp Pendleton and the with USFWS during the Section 7 consultation.*

The efficacy of this mitigation measure (Measure TE-23) remains uncertain and unproven. TCA has provided no evidence to suggest that wildlife undercrossings could or would be used by the Pacific pocket mouse. Given that pocket mice are relatively sedentary and their typical movements do not appear to exceed 50 to 100 m on a daily (Kenagy 1973) or even annual basis (Chew and Butterworth 1964) as well as their fidelity to specific soil and vegetation types, it is highly questionable as to whether pocket mice would traverse an undercrossing. Mitigation measure TE-35 implies that only one undercrossing will be provided; again, given the pocket mouse's movement patterns, one undercrossing is sorely inadequate. Maintaining potential genetic interchange between the San Mateo North and San Mateo South populations is essential to species survival, viability and recovery, as laid out above. The toll road would be a complete barrier to dispersal. The proposed mitigation of placing an undercossing "in the vicinity of San Mateo North population" is untested and uncertain to provide the desired movement corridor.

*Measure TE-24. Prior to the initiation of construction in areas within or proximal to known sites occupied by the Pacific pocket mouse, a Pacific Pocket Mouse Resource Management Plan (PPMRMP) shall be prepared and submitted to the USFWS for review and approval to determine compliance with the biological opinion and incorporated into the BRMP. This plan shall identify the strategies available for minimizing impacts and measures to restore impacted suitable habitat to comply with the no jeopardy standard of Section 7(a)2 of the Federal Endangered Species Act.*

*The PPMRMP shall identify conservation measures. These conservation measures will be consistent with the Biological opinion issued by the USFWS. Potential conservation measures may include:*

*a. Temporary construction measures—including temporary fencing:*
*• Invasive species control*
*• Habitat management and enhancement*
*• Predator control*
*• Control of public access*
*• PPM population monitoring*

*Implementation of these conservation measures will be completed in conjunction with USFWS and the landowner, Marine Corp, Camp Pendleton.*

*b. Project Design Features—PPM*
*• Barriers along the boundary*
*• Minimization of roadway lighting*
*• Minimization of fire risk*

The Pacific Pocket Mouse Resource Management Plan referenced in this mitigation measure (measure TE-24) has yet to be developed and submitted to Commission staff for review, therefore, an adequate assessment of this plan's ability to benefit the species is not possible. Furthermore, the USFWS has already gone to great lengths to study, design, and present a Pacific pocket mouse recovery plan (Brylski et al. 1998). A significant component of this plan is to protect all remaining Pacific pocket mouse populations; that means not allowing temporary or permanent construction impacts in "areas within or proximal to known sites occupied by the Pacific pocket mouse.." (Brylski et al. 1998). The recovery plan calls for the protection of any potential Pacific pocket mouse habitat in the vicinity of the four extant populations because that habitat is the most likely to provide future habitat as the population expands as a result of protection.

The toll road project is simply inconsistent with the recovery strategy laid out for the Pacific Pocket Mouse in the recovery plan (Brylski et al. 1998). Construction of the toll road is directly counter to all recovery criteria for the species and would therefore preclude its recovery. Recovery of the San Mateo North population requires increasing individual numbers and area of occupancy allowing for population expansions and dispersal and for maintaining the full extent of genetic diversity. Building the toll road runs completely counter to these goals. The toll road will reduce the size of the occupied area, prevent natural range expansions, impede dispersal, and contribute to loss of genetic diversity. These changes will all increase the likelihood of population extirpation.

The Pacific pocket mouse and its coastal sage scrub habitat are both environmentally sensitive as defined by Coastal Act section 30107. 5:

> *"Environmentally sensitive area" means 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.*

The pocket mouse is a federally endangered species and is therefore considered ESHA or an environmentally sensitive species by the Commission. The coastal sage scrub habitat that the Pacific pocket mouse depends on is rare in southern California (Spencer et al. 2001) and is critical to the survival of several other rare and endangered species and is therefore also considered ESHA. In addition, both the Pacific pocket mouse and its coastal sage scrub habitat are easily disturbed or degraded by human activities and developments. Therefore, both the Pacific pocket mouse and the coastal sage scrub habitat that supports it are ESHA.

Coastal Act section 30240 states that:

> *(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 30240 requires that only resource-dependent uses, such as habitat restoration, be allowed within ESHA, and all development within or adjacent to an ESHA must be sited and designed to prevent significant disruption of ESHA. Given that the toll road does not fit the definition of a resource-dependent use and that it has not been sited and designed to prevent significant disruptions to Pacific pocket mouse populations nor to its coastal sage scrub habitat, both considered ESHA, construction of the toll road is inconsistent with the Coastal Act.

**In conclusion, I have determined that the toll road, as sited and designed, is incompatible with the survival and recovery of the Pacific pocket mouse. The primary reasons are that the toll road;**
**1. directly impacts individual pocket mice, pocket mouse occupied habitat, and potentially occupied habitat that is essential to their survival and recovery;**
**2. increases the extirpation risk of the San Mateo North and South populations, which will significantly decrease the likelihood of survival and recovery of the species as a whole;**
**3. makes it impossible to meet the species recovery criteria mandated by the USFWS Pacific pocket mouse recovery plan (Bryski et al. 1998) and**
**4. is inconsistent with Coastal Act section 30240.**

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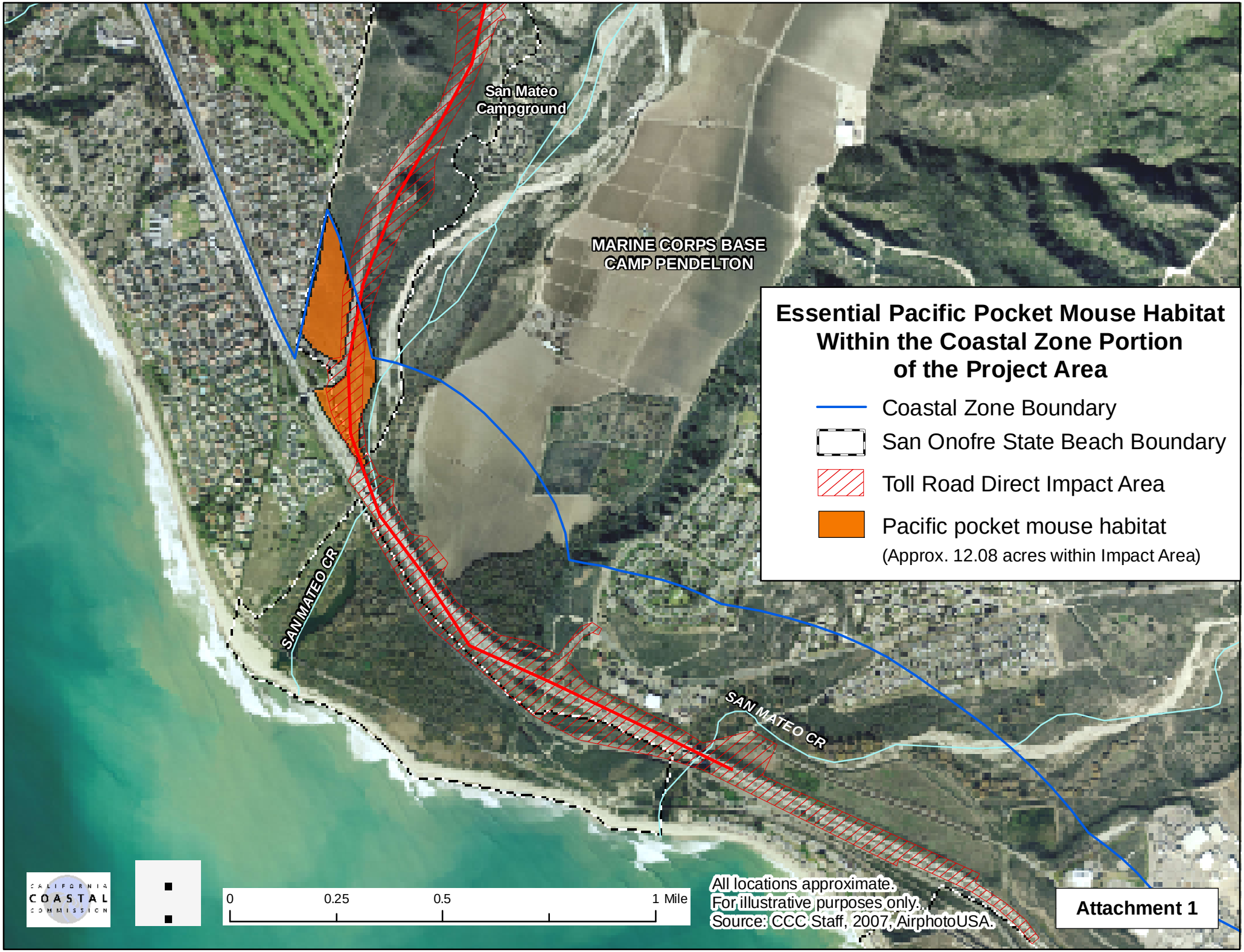
San Mateo
Campground
MARINE CORPS BASE
CAMP PENDELTON
SAN MATEO CR
SAN MATEO CR
Essential Pacific Pocket Mouse Habitat
Within the Coastal Zone Portion
of the Project Area
Coastal Zone Boundary
San Onofre State Beach Boundary
Toll Road Direct Impact Area
Pacific pocket mouse habitat
(Approx. 12.08 acres within Impact Area)
CALIFORNIA
COASTAL
COMMISSION
0
0.25
0.5
1 Mile
All locations approximate.
For illustrative purposes only.
Source: CCC Staff, 2007, AirphotoUSA.
Attachment 1

**EXHIBIT 14**
Application No.
CC-018-07
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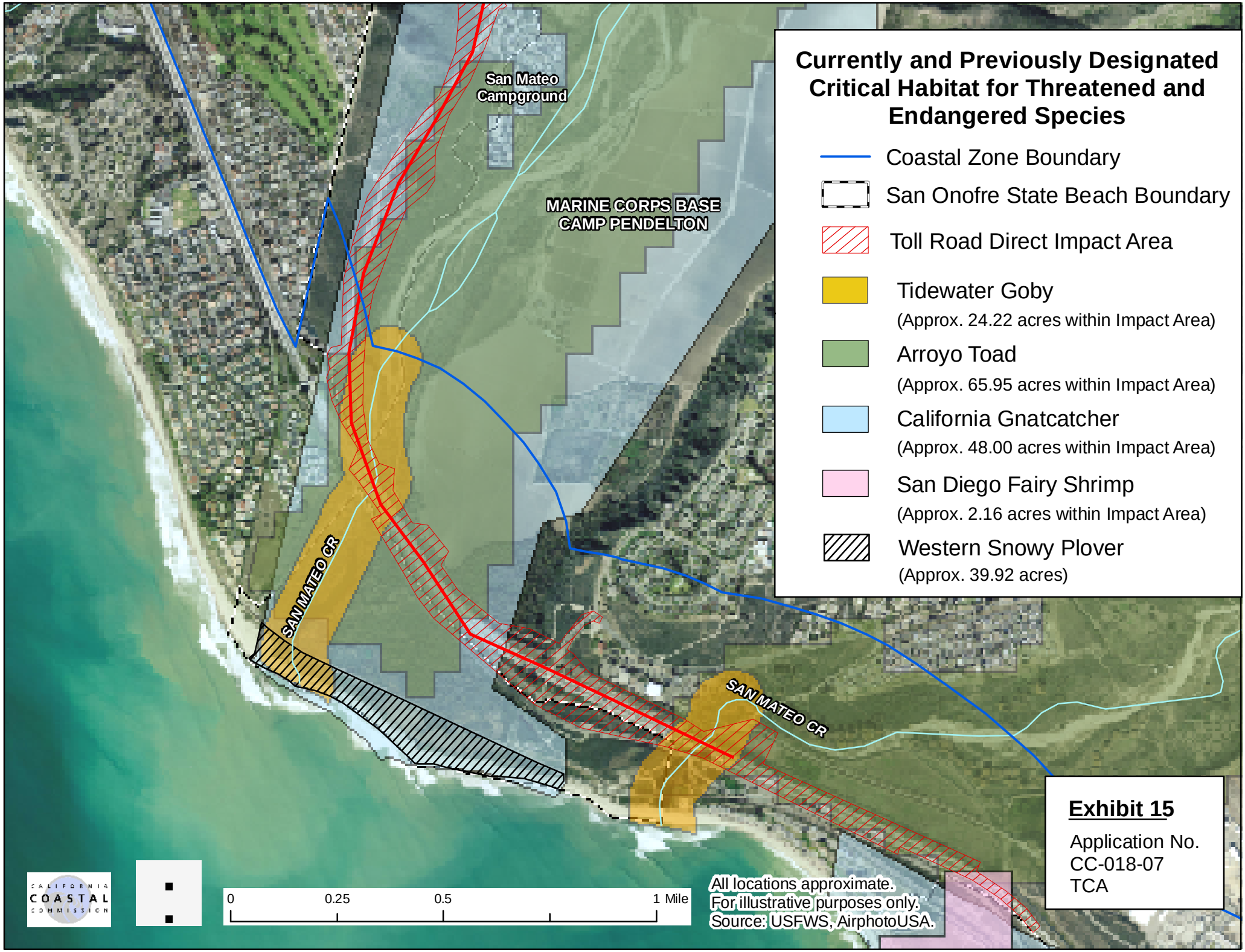
**Attachment A.** Location of San Mateo North and South Pacific pocket mouse sites showing limits of grading for SOCTIIP FEC alignments and habitat areas considered essential to the management and potential expansion of the San Mateo North population. (Source: SOCTIIP EIS/SEIR.)


San Mateo Campground
MARINE CORPS BASE CAMP PENDELTON
SAN MATEO CR
SAN MATEO CR
Currently and Previously Designated Critical Habitat for Threatened and Endangered Species
Coastal Zone Boundary
San Onofre State Beach Boundary
Toll Road Direct Impact Area
Tidewater Goby
(Approx. 24.22 acres within Impact Area)
Arroyo Toad
(Approx. 65.95 acres within Impact Area)
California Gnatcatcher
(Approx. 48.00 acres within Impact Area)
San Diego Fairy Shrimp
(Approx. 2.16 acres within Impact Area)
Western Snowy Plover
(Approx. 39.92 acres)
Exhibit 15
Application No.
CC-018-07
TCA
CALIFORNIA COASTAL COMMISSION
0
0.25
0.5
1 Mile
All locations approximate.
For illustrative purposes only.
Source: USFWS, AirphotoUSA.

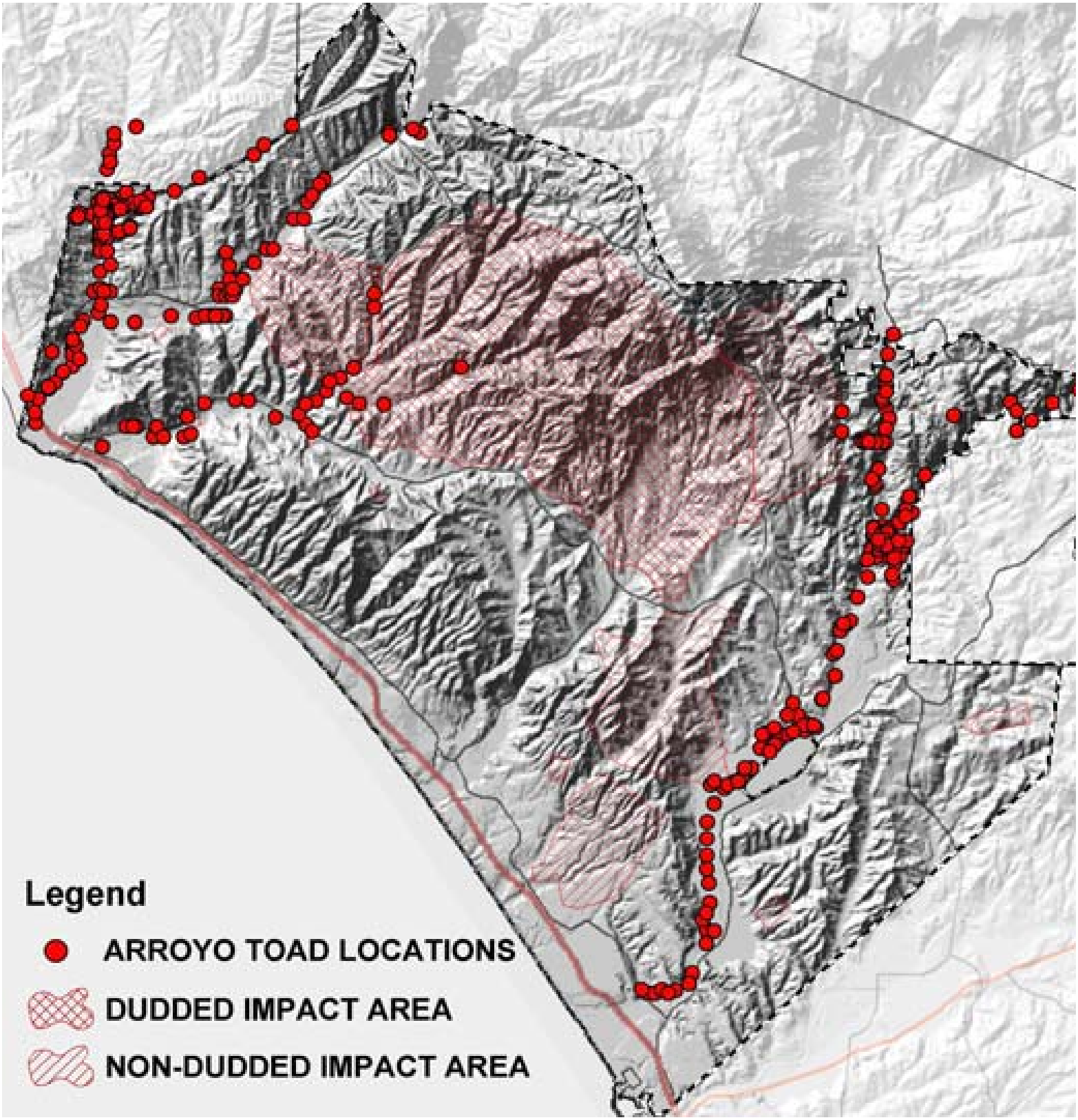
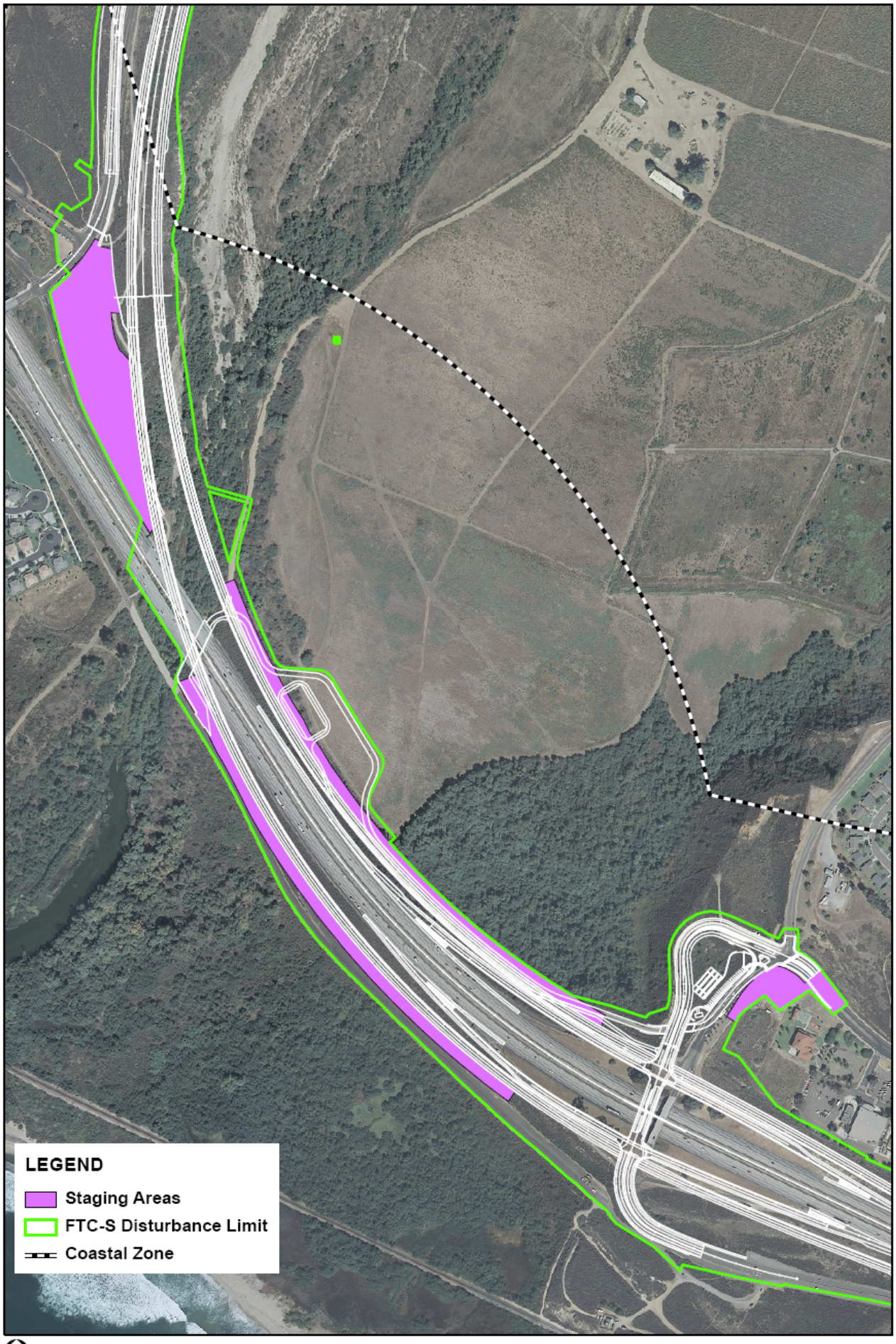



**EXHIBIT 16**
Application No.
CC-018-07
TCA




Staging Areas in Coastal Zone

Consistency Certification Response to Comments | Figure 1

M:\ENGINEERING\ARCGIS\COASTAL ZONE\CONSISTENCY RESPONSE\MXD\STAGING_091207.MXD

**EXHIBIT 17**
Application No.
CC-018-07
TCA

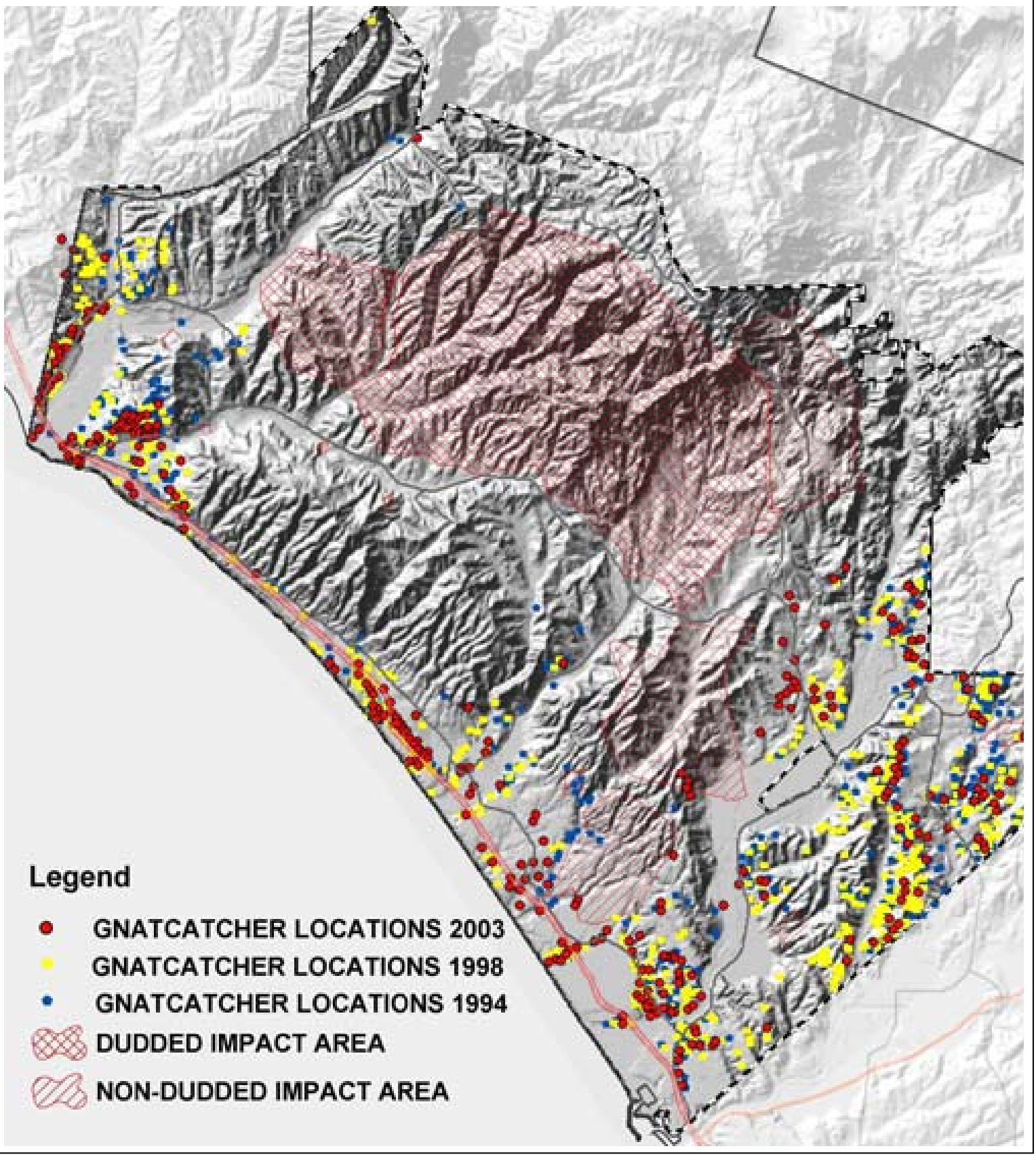



**EXHIBIT 18**
Application No.
CC-018-07
TCA

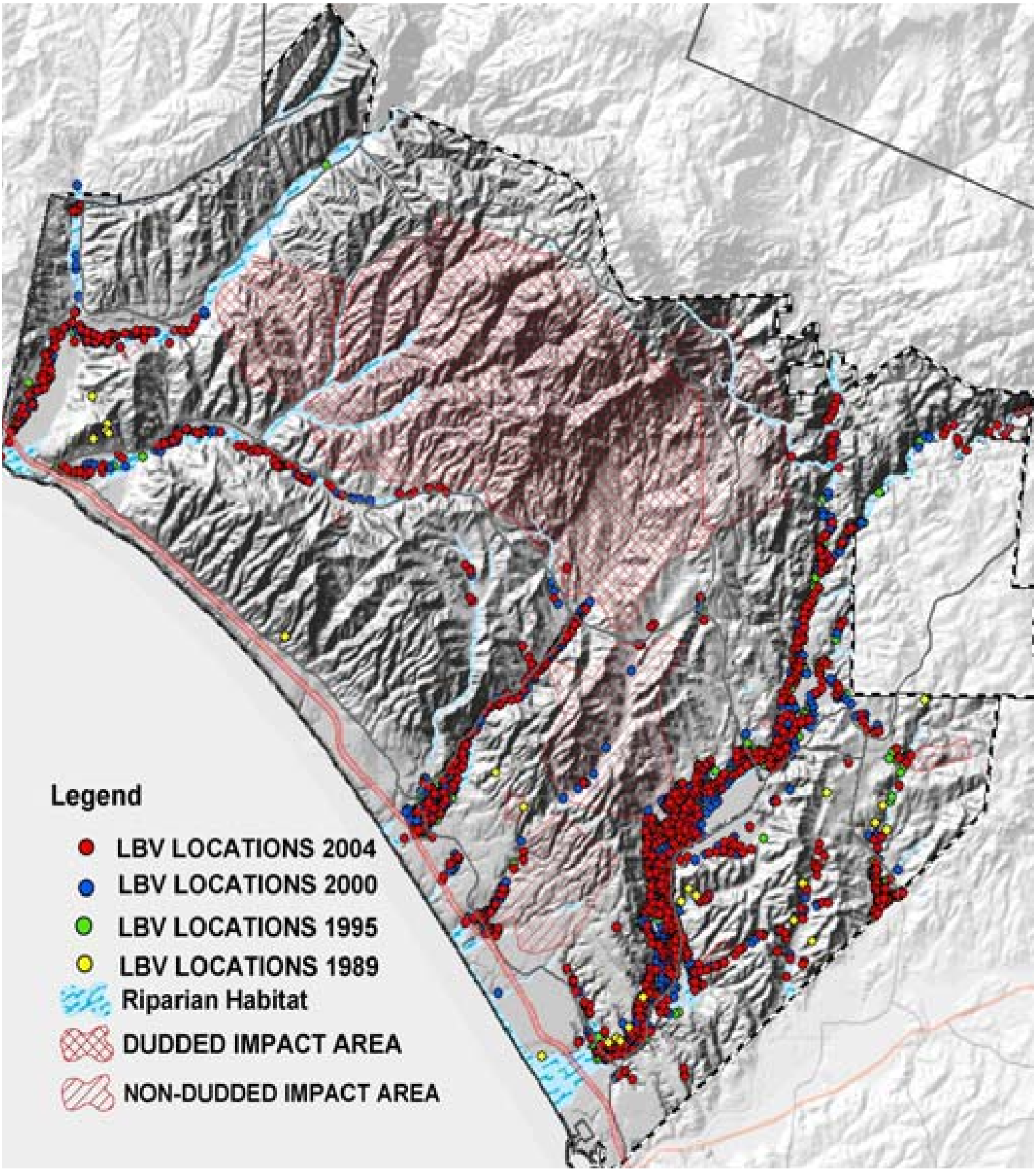
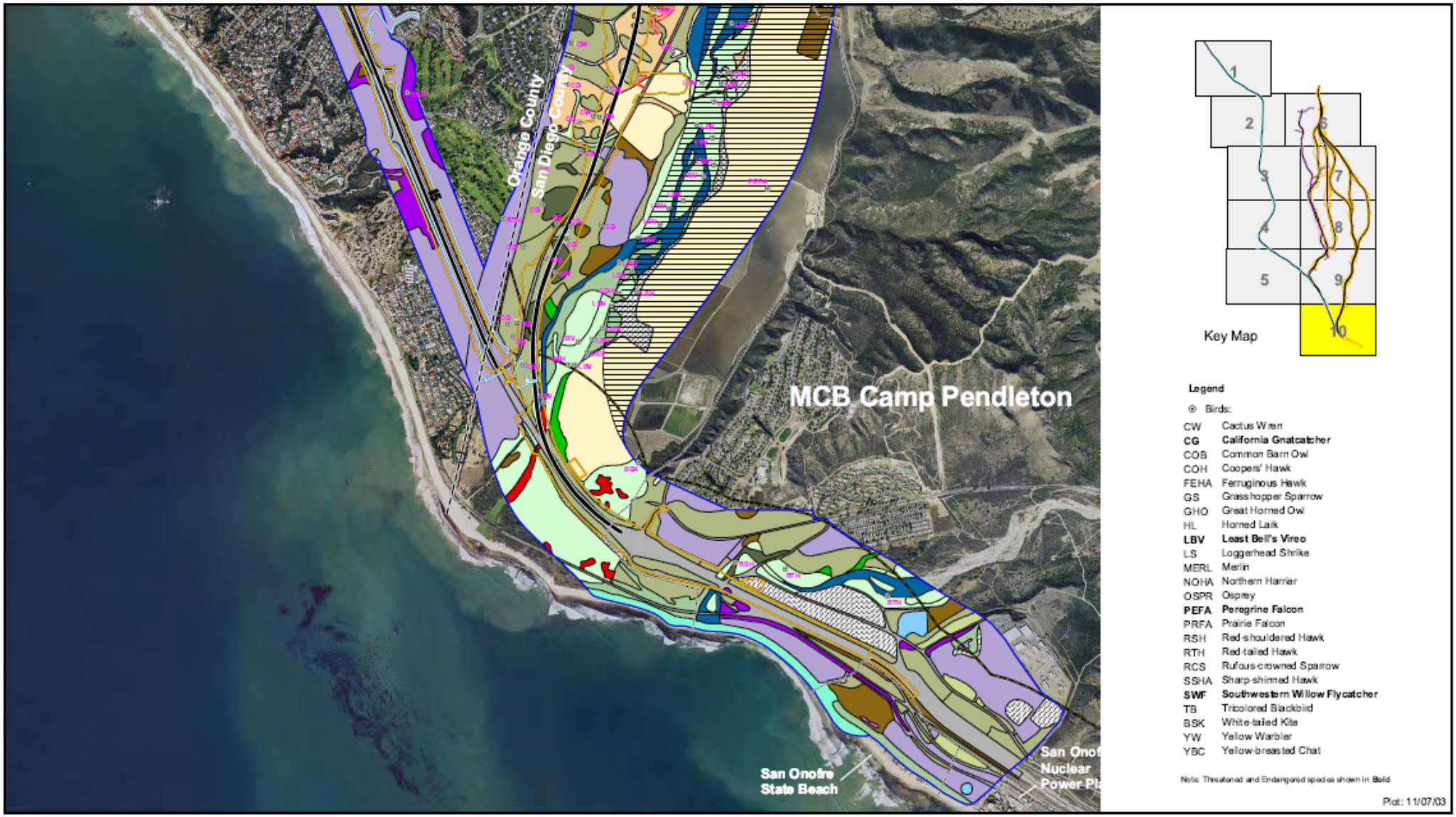



**EXHIBIT 19**
Application No.
CC-018-07
TCA




Source: P&D Consultants, 2001
Psomas, 2001

Legend
Alternative Centerlines
Connector Road
On-Ramp
Limits of Disturbance -- SOCTIIP
Limits of Disturbance -- I5
Limits of Disturbance -- Arterial Improvements

0 500 1000 Meters
0 1000 2000 3000 4000 Feet

Coastal Zone Boundary
Temporary Access Road
Study Area

**Birds**
**Sheet 10**

SOCTIIP

Figure 4.11-4i

**EXHIBIT 20**
Application No.
CC-018-07
TCA