O-6.5 GRIFFIN COVE TRANSPORTATION CONSULTING, PLLC

Comment Letter O-6.5

Griffin Cove Transportation Consulting, PLLC

March 30, 2018

Mr. Dan Silver, Executive Director
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267

Subject: ***Review of Wildland Fire Evacuation Plan***
Otay Ranch Village 14 and Planning Areas 16/19
County of San Diego, California

Dear Mr. Silver:

As requested, Griffin Cove Transportation Consulting, PLLC (GCTC) has completed a review of the "Wildland Fire Evacuation Plan" completed with respect to the proposed Otay Ranch Village 14 and Planning Areas 16/19 project in San Diego County, California. The proposed project is the subject of a Draft Environmental Impact Report (DEIR) prepared for the County of San Diego (Reference: Dudek, *Draft Environmental Impact Report - Otay Ranch Village 14 and Planning Areas 16/19 Project*, February 2018). The DEIR incorporates (as Appendix 3.1.1-3) a "Wildland Fire Evacuation Plan," also prepared by Dudek and dated February 2018. O-6.5-1

Our review focused on the technical adequacy of the "Wildland Fire Evacuation Plan," particularly with respect to traffic operations.

BACKGROUND

The proposed project will consist of 1,119 single-family residences, each of which is assumed in the Wildland Fire Evacuation Plan to have 2.2 vehicles, resulting in a total of 2,462 vehicles within the project. Further, the plan addressed two evacuation scenarios, both of which focused on Proctor Valley Road as the primary evacuation route:

- Scenario 1, in which evacuating traffic would be split 70 percent to the south on Proctor Valley Road (toward Chula Vista) and 30 percent to the north (toward Jamul), and
- Scenario 2, in which all of the evacuating traffic would head south toward Chula Vista on Proctor Valley Road. O-6.5-2

Thus, for Scenario 1, 1,723 vehicles would travel toward Chula Vista and 739 vehicles would head toward Jamul. In Scenario 2, all 2,462 project-related vehicles would travel toward Chula Vista.

The Wildland Fire Evacuation Plan addressed the amount of time needed to implement a full evacuation of the project site, including whether the evacuation could be accomplished within an acceptable time period. As part of that analysis, a determination was made regarding the adequacy of the primary evacuation route, Proctor Valley Road. This letter presents the results of our review of that analysis.

WILDLAND FIRE EVACUATION PLAN REVIEW

Our review of the Wildland Fire Evacuation Plan revealed several issues affecting the validity of the analysis results. These issues, which are presented below, must be addressed prior to certification of the environmental document and approval of the proposed project by the County of San Diego. O-6.5-3

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1. ***Inadequate Mobilization Time Assumed*** – The evacuation time estimates presented in the Dudek analysis consist of three components:

   - Mobilization time (i.e., pre-evacuation notification and preparation),
   - Evacuation time (i.e., travel time), and
   - A buffer or safety factor.

   The analysis assumed that adequate time would be available to allow for notification and mobilization activities; in effect, it assumed that the fire will initially be located some distance away from the proposed project site. This approach, however, ignores the potential impacts of a fire that starts in the vicinity of the project site. In fact, the Wildland Fire Evacuation Plan acknowledges this (p. 13):

   > *If a wildfire ignited closer to the Proposed Area during weather that facilitates fire spread and where multiple hours are not available for evacuation, a different evacuation approach would need to be explored.*

   No such alternate approach was explored in the plan, however. The evacuation plan must be revised to address the evacuation requirements associated with a fire that ignites in close proximity to the project site, such that available mobilization time will be limited.

2. ***Flawed Road Capacity Assumptions*** – A key element of the Wildland Fire Evacuation Plan is an analysis of the ability of Proctor Valley Road to accommodate the volume of traffic that would occur during an evacuation. In this regard, the plan specifically notes (p. 13):

   > *As evidenced by mass evacuations in San Diego County and elsewhere, even with roadways that are designed to the code requirements, it may not be possible or necessary to move large numbers of persons at the same time. Road infrastructure throughout the United States, including San Diego County, is not designed to accommodate a short-notice, mass evacuation.*

   The evacuation time estimates were based, in part, on road capacity values provided by Chen Ryan Associates, the consultant who prepared the traffic impact analysis incorporated into the project's draft environmental impact report (DEIR). Chen Ryan determined that the directional capacity of Proctor Valley Road at the critical locations between the project site and Chula Vista will be either 1,800 or 1,900 vehicles per hour (VPH) after project-related improvements are made. (The proposed cross section for Proctor Valley Road includes two lanes (one in each direction, 12-feet wide), a 14-foot-wide raised median, and 8-foot shoulders on each side of the road.) The road capacity values assumed in the analysis were presented in Table 1 of the Wildland Fire Evacuation Plan. For reference, that table is presented here as Attachment A.

   However, the *Highway Capacity Manual* (Transportation Research Board, 2010), which is the most widely-accepted authority on matters relating to road capacity, specifically says (p. 15-5):

   > *The capacity of a two-lane highway under base conditions is 1,700 pc/h [passenger cars/hour] in one direction, with a limit of 3,200 pc/h for the total of the two directions.*

   Moreover, the analysis ignores several factors that directly affect roadway capacity, including:

   - The possibility that the road will be obscured by smoke or that other fire-related factors (such as visible flames) will exist that will have the effect of reducing roadway capacity;

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O-6.5-7
O-6.5-8
O-6.5-9
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- The effects of trucks or recreational vehicles in the evacuating traffic stream. Because those vehicles have lower operating characteristics (i.e., slower acceleration and longer stopping distances) than passenger cars, they reduce the effective capacity of the road; and O-6.5-11

- The emotional state of the evacuees, which could lead to irrational or unpredictable behavior by drivers. O-6.5-12

In summary, the analysis is overly-optimistic with regard to the capacity of Proctor Valley Road, which results in estimated evacuation times that are shorter than can reasonably be expected. The analysis must be revised to reflect more realistic road capacity values. O-6.5-13

3. ***Flawed Traffic Demand Estimates*** – The traffic demand estimates assume that only Otay Ranch Village 14 and Planning Areas 16/19 traffic will be using Proctor Valley Road as an evacuation route to Chula Vista. This ignores the fact that the Jamul community (east of Otay Ranch) will also use Proctor Valley Road to evacuate in the event of a wildfire approaching from the north, northeast, or east, such as that evaluated in the Dudek document. Other existing and planned communities might also need to use Proctor Valley Road as the primary evacuation route. O-6.5-14

   In addition, ambient traffic (i.e., not evacuation-related) will also likely be on Proctor Valley Road when an emergency is declared and evacuation commences. As described in the Chen Ryan traffic study, the magnitude of that traffic is not insignificant:

   - The Chen Ryan traffic study indicates that 17,900 vehicles/day will use Proctor Valley Road between the project site and the eastern edge of Chula Vista in 2025 and 2030. (Reference: Chen Ryan Associates, *Transportation Impact Study – Otay Ranch Village 14 and Planning Areas 16 & 19*, February 9, 2018, Figure 6-6 – Daily Roadway Segment Traffic Volumes – Year 2025 Cumulative Conditions (p. 85) and Figure 7-6 – Daily Roadway Segment Traffic Volumes – Year 2030 Cumulative Conditions (p. 117))
   - In the weekday peak hours, Chen Ryan shows 1,300 – 1,650 vehicles per hour in 2025 and 1,500 – 2,100 vehicles per hour in 2030 on that same road segment. (Reference: Chen Ryan, Figure 6-7 – Peak Hour Intersection Traffic Volumes – Year 2025 Cumulative Conditions (p. 87) and Figure 7-7 – Peak Hour Intersection Traffic Volumes – Year 2030 Cumulative Conditions (p. 119)) O-6.5-15

   This substantial volume of ambient traffic results in degraded traffic operations along the evacuation route, even on a typical day when no emergency is occurring. For example, the intersection of Agua Vista Drive/Northwoods Drive/Proctor Valley Road, which is the first intersection that evacuating traffic would encounter in Chula Vista, is projected to operate at Level of Service (LOS) F in the AM peak hour and LOS E in the PM peak hour in 2025. In 2030, it is expected to be at LOS F in both peak hours. O-6.5-16

   Note that LOS E signifies operation at the capacity of the intersection and LOS F indicates that traffic demand exceeds the capacity of the intersection, resulting in excessive vehicular delays. Thus, if an evacuation coincided with the AM or PM peak hour, traffic flow would be substantially impeded.

   The effect of non-project traffic (both evacuation-related and ambient) on traffic flow along Proctor Valley Road must be considered, and the results must be reported in a revised environmental document. O-6.5-17

4. ***Flawed Evacuation Time Estimates*** – Although the specific methodology employed in developing the evacuation time estimates documented in the Wildland Fire Evacuation Plan was not divulged, it appears that those times were determined by dividing the estimated traffic volume (in vehicles per hour, VPH) by the assumed capacity (1,800 or 1,900 VPH) of Proctor Valley Road to develop a volume/capacity (V/C) ratio. The resulting V/C ratio was then assumed to represent the fraction of one hour that represents the approximate evacuation (or travel) time. For example, a V/C ratio of 1.00 would suggest a travel time of exactly one hour and a ratio of 0.50 would suggest a travel time of one-half hour (i.e., 30 minutes).

   Thus, for Scenario 1, the estimated project-related traffic volume of 1,723 vehicles headed southerly toward Chula Vista was divided by the assumed Proctor Valley Road capacity of 1,900 vehicles per hour, which resulted in a V/C ratio of 0.91. This finding was interpreted to mean that 91 percent of the hour (i.e., 55 minutes) would be needed to accommodate evacuating traffic, which was simply reported as an hour.

   For Scenario 2, in which all project-related traffic was assumed to travel toward Chula Vista, the estimated volume of 2,462 vehicles was again divided by the assumed road capacity (1,900 VPH), with a resulting V/C ratio of 1.30, which was documented as 75 minutes of travel time.

   However, as noted above, because the assumed road capacity exceeds the maximum value for two-lane highways stated in the *Highway Capacity Manual* (HCM), the resulting evacuation time estimates are too low.

   Furthermore, the analysis implicitly assumes that traffic is evenly distributed over the course of the hour. In effect, therefore, it provides an average value for the hour. But it is extremely unlikely that traffic will be evenly distributed over time in the event of an evacuation. Instead, there will be variable pulses in traffic demand, just as there are in everyday traffic flows. The effect of this variability in the uniformity of traffic patterns can be tested using a parameter known as the "peak hour factor" (PHF).

   The PHF represents a relationship between the hourly traffic volume and the volume that occurs in the peak fifteen minutes within the hour. It, therefore, provides an indication of the uniformity of traffic flow over the course of the hour. The value of PHF ranges from 0.25 to 1.00. A PHF value of 1.00 indicates that traffic is perfectly uniformly distributed across the hour; this is what was effectively assumed in the evacuation plan. At the other extreme, a PHF value of 0.25 indicates that all of the hourly traffic occurs in a single 15-minute period within the hour. Values between those two extremes represent typical levels of variability. As an example, the *Highway Capacity Manual* identifies a PHF of 0.88 as the default value for analysis of two-lane highways. (Reference: HCM, Exhibit 15-5, p. 15-9.)

   Table 1 summarizes the results of a roadway capacity analysis for Proctor Valley Road using PHF values from 0.50 to 1.00. This analysis was conducted using the "two-lane highway" procedure documented in the *Highway Capacity Manual*, with the evacuation time estimates based on the resulting V/C ratios, as in the Dudek analysis. Attachment B contains the calculation worksheets.

   Depending upon the specific assumption regarding traffic patterns (i.e., PHF value), the estimated evacuation travel time (excluding mobilization, etc.) could be as high as almost three hours under Scenario 2. The Scenario 1 results also show the potential for substantially increased evacuation time – up to two hours, which is double the Dudek estimate.

O-6.5-18

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Table 1
Modified Evacuation Time Analysis[1]
Proctor Valley Road – Project Site to Chula Vista

	Analysis Scenario 1 (1,723 Vehicles/Hour)			Analysis Scenario 2 (2,462 Vehicles/Hour)		
PHF[2]	V_{15}[3]	V/C[4]	Estimated Evacuation Time[5] (Minutes)	V_{15}	V/C	Estimated Evacuation Time (Minutes)
1.00	431	1.01	61	616	1.45	87
0.90	479	1.13	68	684	1.61	97
0.80	538	1.27	76	769	1.81	109
0.70	615	1.45	87	879	2.07	124
0.60	718	1.69	101	1,026	2.41	145
0.50	862	2.03	122	1,231	2.90	174

Notes:
1 Performed using *HCS 2010* "Two-Lane Highway Segment" analysis software (Reference: Transportation Research Board, *Highway Capacity Manual*, 2010).
2 Peak hour factor.
3 Peak 15-minute traffic volume on Proctor Valley Road.
4 Volume/capacity.
5 Derived by multiplying V/C ratio by 60 minutes, as per Dudek "Wildland Fire Evacuation Plan," February 2018.

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This analysis (like the Dudek analysis) ignores possible issues related to abnormal driver behavior due to the emotional factors associated with an evacuation, which (while difficult to estimate) will certainly affect the efficiency of the evacuation process.

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The quality of flow on a road is described in terms of "level of service" (LOS), which ranges from LOS A (free-flowing conditions) to LOS F (highly congested). The V/C ratios presented in Table 1 all exceed 1.00, which indicates operation in excess of the road's capacity and, by definition, represents LOS F. According to the *Highway Capacity Manual* (p. 15-8):

> *LOS F exists whenever demand flow in one or both directions exceeds the capacity of the segment. Operating conditions are unstable, and heavy congestion exists on all classes of two-lane highway.*

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Unstable flow will be manifested in high levels of congestion and stop-and-go traffic, which will increase not only the time needed to evacuate, but also the levels of stress and anxiety for evacuees.

By underestimating the evacuation time, the Wildland Fire Evacuation Plan has failed to recognize the full impact of an emergency situation on the residents of the proposed project. The analysis must be modified to incorporate realistic assumptions regarding traffic flow patterns during the course of an evacuation.

O-6.5-24

CONCLUSION

Our review of the "Wildland Fire Evacuation Plan" completed in connection with the proposed Otay Ranch Village 14 and Planning Areas 16/19 project in San Diego County, California revealed several issues affecting the validity of the conclusions presented in that document. These issues must be addressed prior to approval of the proposed project and its environmental documentation by the County of San Diego. O-6.5-25

We hope this information is useful. If you have questions concerning any of the items presented here or would like to discuss them further, please feel free to contact me at (906) 847-8276. O-6.5-26

Sincerely,

GRIFFIN COVE TRANSPORTATION CONSULTING, PLLC

Neal K. Liddicoat, P.E.
Principal

Attachments