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Pacific Crest Engineering
Attention: Michael D. Kleames
444 Airport Boulevard, Suite 106
Watsonville, California 95076

Re: Continued geology report deficiencies and potential project impact mitigation
Proposed Paraiso Hot Springs Spa Resort
34358 Paraiso Springs Road
Soledad, California

Dear Mr. Kleames:

The purpose of this letter is to evaluate whether the updated letter titled " Response to geotechnical and geologic review comments" , Project LSW-0337-01, prepared by LandSet Engineers Inc. [LEI] on 22 May 2008, adequately addresses if the above-listed project would expose people or structures to major geologic hazards or would damage geological resources. Based on CEQA criteria a project would generally be considered to have a significant adverse impact on the environment if it would:

1. be located in an active earthquake fault zone or a State of California Earthquake Fault Study Zone (previously called an Alquist-Priolo Special Studies Zone);

2. be located in areas subject to secondary seismic hazards (such as liquefaction or lateral spreading), static hazards (such as excessively steep slopes or areas subject to landslides) or subsurface geologic hazards (such as soils with high shrink/swell potentials);

3. be located in a Mineral Resources Zone or result in the loss of availability of important mineral resources; or

4. result in fundamental changes to the terrestrial environment (such as the damage or destruction of unique geologic features).

LEI originally prepared a report titled "Geologic and Soil Engineering Feasibility Report for Paraiso Hot Springs Resort, Monterey County, California, Project LSW-0337-01" on December 2004. The above-listed report did not appear to be originally coordinated with the construction of the "Vesting Tentative Map" prepared by project civil engineer of record, David Michael Von Rueden of CH2M Hill [CH] (2005). At the time of our geological CEQA analysis, it also

appeared that LEI had not adequately characterized the landslide hazards and attendant risks to the proposed development.

OUR ROLE AS CEQA GEOLOGY REVIEWERS

It is important to understand that we are neither the Project Geologist Of Record, nor serving in the capacity as a peer reviewing geologist for the County of Monterey. As such, we cannot dictate whether the Project Geologist Of Record, LEI, has fulfilled all the statutes and ordinances, as well as standard of care for geological investigations in the County of Monterey as it pertains to design of the proposed developments. We can, however, assess how the work performed thus far by LEI fulfills the intent of the CEQA criteria for geological impacts as outlined at the beginning of this letter. The remainder of this letter addresses those issues in that vein, and recommendations for mitigation are provided where warranted to allow for the impacts to be lowered to no significant impact.

CONTINUED MAPPING DEFICIENCIES

We were provided with a digital copy of the "Revised Geological Hazards Map", Sheet 3 of 3, but not a revised copy of the "Site Geologic Map". We assume that the original "Site Geologic Map" was revised, since it is referenced in the 22 May 2008 letter by LEI. Without reviewing a revised geological map overlain on the proposed subdivision map, it is still difficult for the reviewer to assess whether the proposed development would expose people or structures to major geologic hazards.

If it has not already been done, we recommend that LEI plot their geological information upon the most current sub-division and grading maps and analyze the potential impacts according to the criteria referenced above. Once this information and analysis is provided, we can then adequately review whether or not the geology report and proposed sub-division fulfill the geological requirements dictated by CEQA.

CONTINUED GEOLOGICAL HAZARDS DEFICIENCIES

The original geology investigation and report by LEI, as well as 22 May 2008 response letter do not appear to have adequately characterized the debris flow and debris torrent hazard and the attendant risks to the proposed development. The noted discrepancies are as follows:

1. There appears to be internal descriptive inconsistencies on the boring logs accompanying the LEI report. The composition of the gravels encountered while drilling was described on some logs and left out on others. The published logs supplied to us with the original report remain unchanged as far as we can tell. The importance of this deficiency is discussed below.

3. There continues to be inadequate analysis and discussion of the scattered angular cobbles and ***boulders*** of ***schist*** and granitic rock "floating" in the sandy alluvial matrix that we observed in the vicinity of the proposed developments, particularly in the Indian Valley development area. As noted above, some of the boring logs also omitted clast composition. During our site

reconnaissance we noted that there were clusters of the schist and granitic boulders and cobbles too. The presence of the ***angular schist boulders*** and cobbles in the sandy matrix is indicative of a long transport distance from the bedrock outcrops upstream, as well as rapid deposition in a high velocity hydraulic environment (like debris flows or debris torrents). According to the most recent letter by LEI, they have concluded that the cobbles and boulders arrived at their current location via "seasonal short distance transport". We are unsure of the definition of this mode of transport, but it appears that the schist boulders and cobbles had to have traveled at least as far as approximately 2200 feet, via a hydraulic flow regime that is capable of moving ***boulders***. The best candidate for flows of this velocity that result in poorly sorted deposits which include boulders is a debris flow torrent. Without the appropriate geological subsurface program and analysis however, it will be impossible to ascertain if the debris flow hazards on the valley floors, particularly in the Indian Valley area, will subject to the proposed subdivision to a greater than ordinary risk within the design life of the development. If it turns out later in the project that structures will be potentially subjected to a greater than ordinary risk, where they are currently not designated as such, a mitigation measure or combination of measures will likely have to be pursued to lower the risk to ordinary.

We also noted that there are structures planned for area 3D on the Revised Relative Geologic Hazards Map. The designation "3D" indicates an area interpreted by LEI as being subject to a "moderate geological hazard potential" related to "debris flows". As such, it would appear that some form of mitigation must be pursued, possibly in conjunction with a supplemental investigation, in order to lower the risk to ordinary for the proposed structures. See item number five below for further discussion of this issue.

4. Since we were not supplied with a copy of the revised geologic map, it is unclear if the mapping of landslide deposits and scars appears continues to be schematic. In particular, more detailed mapping of debris flow scars, as well as the run-out areas for the debris flow deposits, may lead to a better understanding the prospective hazards and risks posed to the proposed developments with respect to landsliding.

5. The only type of sub-surface work performed by the project geologist of record was small-diameter borings. This type of sub-surface investigative method is typically inadequate for addressing the extent and depths of burial for past flooding and debris flow events. Careful logging of the cleaned sidewalls of backhoe or excavator test pits and trenches is the investigative method that is typically pursued by geologists when assessing the debris flow deposit areas and debris torrent areas. It is difficult to near impossible to identify the complete geological record of the near surface deposits in a small-diameter boring, particularly in absence of continuous sampling or soil coring.

LEI responded to this criticism as follows:

"Based on our surface mapping and subsurface exploration it is our opinion that site characterization and geology has been accurately mapped (see response to review comment no.3). It is our opinion that additional subsurface investigation is unnecessary."

It is difficult to understand LEI's position on this issue, particularly when they have clearly demonstrated with their own maps that portions of some structures will be located within areas designated "moderate geological hazard potential" related to "debris flows". In their original report on page 27,they noted that for zone 3D:

"Mitigation measures to protect development in this area should include appropriate grading techniques & methodology and adequate design of site drainage facilities for post development runoff. Debris flow basins and diversion structures are recommended to protect future development from debris flow source areas. Building foundations may consist of conventional cast-in-place footings. A site-specific design level engineering geologic and soil engineering investigation is recommended once the actual building locations and preliminary grading plans have been completed. This hazard area associated with an "ordinary level of risk.""

Aside from the fact that a structure sited in an area that requires protection from debris flows is incongruous with an ordinary level of risk, it is clear that at least some of the planned structures for the subdivision are at risk with respect to a hazard that poses significant potential for loss of life or serious physical injury. The field work, analysis, conclusions and recommendations thus far by LEI for this hazard and risk are not substantive enough to allow for an understanding of the magnitude of grading or the height of walls that would be required to protect the structures that might be at risk with respect to debris flows.

Based on the above-listed information, we cannot adequately assess if the CEQA criteria for this project would generally be considered to have a significant adverse impact on the environment, because the Project Geologist Of Record has not adequately characterized the landsliding hazard and risk to the proposed development . Additionally, it may be possible that after adequately assessing the landslide hazard the Project Geologist Of Record may recommend mitigation schemes that might result in fundamental changes to the terrestrial environment such as large excavated pond areas, debris flow impact walls or earthen debris flow impact berms. As was noted on page 27 of their original report, LEI already anticipates the construction of "debris flow basins and diversion structures", but they do not provide any design parameters such as volume, velocity, impact forces, runup height, etc. for the design debris flow event. Without knowing this information, it is impossible to ascertain the impacts that said grading or mitigation structures will have on the project.

On another note, it is also important for the debris flow hazards and risks to be adequately characterized with respect to the proposed drainage improvements for the project. This will require that the Project Geologist and Civil Engineer Of Record work closely together to ascertain the rheology, velocity, run-out distances and depths of future prospective debris flows and debris torrents so that the proposed drainage improvements will not clog and fail during large storms in the future.

We therefore continue to recommend that the Project Geologist Of Record pursue a more robust program of mapping and subsurface work in order to adequately address the prospective hazards and risks posed to the proposed developments by debris flows.

CONCLUSIONS REGARDING EXISTING WORK AND RESPONSE LETTER

Based on the review of the 22 May 2008 response letter, 22 May 2008 Revised Relative Geologic Hazards Map and the original geology report (2004) by LEI, we still cannot arrive at a firm conclusion that the report has fully analyzed the potential project impacts as defined by CEQA with respect to the geological hazards. As such, we continue to recommend that the Project Geologist Of Record pursue a more robust landslide investigation program as outlined above and closely coordinate the results of the that program with the Project Civil Engineer Of Record.

POTENTIAL PROJECT IMPACTS AND MITIGATION MEASURES

We have been asked to attempt to address the potential impacts and mitigation measures in spite of the continued identified deficiencies in prior geological investigations. They are as follows:

Fault Rupture

Rupture along faults can cause offset of the ground surface along the surface trace of the fault. The offset can damage roads and buildings and can break pipes or other underground utilities. No mapped fault traces crosses the area proposed for development (see Sheet 3 of 3 - Revised Relative Geologic Hazards Map by LEI, dated 22 May 2008). Therefore, the potential for ground surface rupture due to faulting is considered to be low and no significant impacts would occur.

Seismic Groundshaking

Seismic groundshaking at the site may occur during the next major earthquake on a regional fault system. Such shaking can cause severe damage to or collapse of buildings or other project facilities and may expose people to injury or death or result in significant economic loss to the project. Seismic shaking at the site presents a potentially significant impact.

The proposed project would be constructed in a region of high seismic risk, but the site is not located within a State of California Earthquake Fault Zone. The incorporation of project elements that properly implement mitigation measures (i.e., compliance with the most stringent applicable seismic codes and implementation of the recommendations of the geological and geotechnical report for seismic safety) would further ensure that seismic groundshaking impacts are reduced.

The seismic shaking hazard is ubiquitous for this region, and typically presents a significant impact that can be mitigated to a less-than-significant level. Without mitigation, strong seismic shaking in the project vicinity could produce serious damaging effects to the proposed project. The effects of groundshaking on future planned structures and other improvements can be reduced by earthquake-resistant design in accordance with the latest adopted editions of the California Building Code. Even with adequate design and construction, some damage to structures may occur during a great earthquake. However, the damage due to high intensity shaking may be reduced by careful placement and construction of the structure. Past experience has shown that the quality of design and construction is far more important than the precise

evaluation of ground motion parameters.

Many of the risks associated with earthquakes are not due to structural failure. Many injuries result from falling debris, overturned furniture, the disruption of utilities, and fires that occur as a result of broken utility lines, overturned gas stoves, and other hazards.

Project-Specific Mitigation Measure: The project structural engineer should provide seismic design for the project consistent with the most current version of the California Building Code, at a minimum. If other, more conservative design guidelines are determined to be applicable to the project, those design guidelines should be followed.

Project-Specific Mitigation Measure: Large appliances (i.e. refrigerators, freezers, pianos, wall units, water heaters, etc.), book shelves, storage shelves, and other large free-standing objects should be firmly attached to the floor or to structural members of walls.

These two mitigation measures would reduce the impact due to seismic groundshaking at the site to a less-than-significant level. Please note that the California Building Code design standard does not insure that the building will not be significantly damaged in the event of a great earthquake on a nearby fault. The California Building Code design standard is intended primarily to protect the lives of the building occupants and reduce the risk of major structural failures. A building designed to California Building Code standards may nevertheless suffer damage sufficient to render it unusable.

Seismic-Related Ground Failure (Including Liquefaction)

It is our understanding that Pacific Crest Engineering will address this issue in their forthcoming letter.

Landslides and Other Soil Instabilities

Impact: Potential landslide-related hazards may cause damage to some of the proposed structures. This is a potentially significant impact.

The potential landslide-related to the proposed developments concern the presence of debris flow fans and potentially debris torrent deposits within building footprints. If left unmitigated, hazards associated with the landslides include significant potential for loss of life or serious physical injury due to collapse of structures, as well as structural damage that will not be repairable.

We consider the landsliding hazard and risks to be uncharacterized for portions of the subdivision, due to a paucity of appropriate subsurface investigation (for debris flows), lack of detailed geological mapping (at a scale of one-inch equals 50-feet or larger), and lack of analysis.

Project-Specific Mitigation Measure: The Project Geologist and Geotechnical Engineer Of Record shall perform a more robust mapping and subsurface investigation program that is

appropriate for assessing the flow depths, runup heights, velocities and impact forces of past and future debris flow events in the areas of proposed development. A geologic map and geologic cross sections, reflecting the new subsurface data, should be constructed at a scale of one-inch equals 50-feet or larger. Identification of previously-unidentified hazardous landslide areas may require further subsurface characterization. At the end of this recommended supplemental investigation, the geologist and geotechnical engineer should confirm that the assumed design mitigation measures are adequate. If it is not, the recommendations should be revised to reflect the new design debris flow events to ensure that the structures at risk would not collapse if said design debris flow occurs.. Construction of the development project should occur only if, in the opinion of the Project Geologist and Geotechnical Engineer Of Record, the landsliding hazard has been adequately characterized and mitigated.

Project-Specific Mitigation Measure: At the time of construction of the project, all excavations shall be observed by Project Geologist Of Record prior to backfilling of the excavation. A geologic map portraying the distribution of rock and soil should be constructed by the Project Geologist Of Record. If previously unidentified debris flow deposits are mapped in the excavation, additional mitigation measures should be recommended by the Project Geologist Of Record.

It is possible that the outcome of the excavation mapping may result in no changes to the design of the debris flow mitigation. Even in the event of the recommended mitigation design for debris flows changing as the result of the excavation mapping, the end result may merely be minor structural, construction and excavation changes.

The combination of above-listed Mitigation Measures would reduce the landslide-related impact on the project to a less-than-significant level.

Flooding Hazards

Impact: Potential flooding-related hazards may cause damage to some of the proposed structures. This is a potentially significant impact.

It is our understanding that Nolan Associates is addressing the flooding- and hydraulic related CEQA issues for this project. Nonetheless, it is important to understand the role that future debris flows and debris torrents might play with respect to any proposed drainage improvements designed for the project. As such, we consider the flooding hazard and risk to the proposed developments to be uncharacterized, due to the close link between debris flows, debris torrents and flooding. Specifically, if the risks related to debris flows and debris torrents are not adequately mitigated, the deposits related to those events may occlude the drainage improvements, causing unanticipated flooding to the proposed developments during a rainfall event.

Project-Specific Mitigation Measure: The Project Geologist, Geotechnical Engineer and Civil Engineer Of Record shall work closely together to assess the impact that debris flows and debris torrents may have upon the performance of the proposed drainage improvements. The proposed

drainage improvements should be protected from design debris flow and torrent events dictated by the Project Geologist Of Record, or the drainage improvements should be designed to handle said debris flow or debris torrent events without triggering flooding of the proposed developments. It is important to understand, however, that the landsliding hazards and risks must first be adequately characterized by the Project Geologist Of Record, in order to appropriately design the drainage improvements. Completing the drainage design without the critical debris flow or debris torrent design parameters may necessitate significant changes to the drainage design later in the project after the landsliding hazards and risks have been adequately addressed.

Implementation of this mitigation measure would reduce the impact due to flooding at the site to a less-than-significant level.

If you have any questions or comments regarding this letter, please contact us at your earliest convenience.

Sincerely,
ZINN GEOLOGY

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