GEOLOGIC HAZARDS AND PRELIMINARY GEOTECHNICAL EVALUATION HOMEWOOD MOUNTAIN RESORT HOMEWOOD, CALIFORNIA

November 1, 2007

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November 1, 2007
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Mr. Todd Wees
Associate Project Manager
Homewood Village Resorts, LLC
P.O. Box 165
Homewood, California 96141

SUBJECT: Geologic Hazards and Preliminary Geotechnical Evaluation
Homewood Mountain Resort
Homewood, California

Dear Mr. Wees:

Kleinfelder is pleased to provide this report to Homewood Village Resorts, LLC for a Geologic Hazards and Preliminary Geotechnical Evaluation of the Homewood Mountain Resort (HMR). The purpose of the evaluation was to identify and assess potential geologic hazards at the site in accordance with the requirements for such studies. In general, we followed the California Board for Geologists and Geophysicists (Board) Geologic Guidelines for Earthquake and/or Fault Hazard Reports, the Board Guidelines for Engineering Geologic Reports, California Geological Survey (CGS) Special Publication 42 (Fault-Rupture Hazard Zones in California), and CGS Special Publication 117 (Guidelines for Evaluating and Mitigating Seismic Hazards). A secondary purpose was to comply with Placer County Community Development Resource Agency guidelines for a Preliminary Geotechnical Report.

This report presents a summary of our findings regarding geologic hazards and preliminary geotechnical considerations at the HMR. Kleinfelder performed this evaluation in accordance with our proposal, dated November 7, 2006. The surface and subsurface soil conditions referenced in this report were obtained from the referenced published and unpublished sources.

Kleinfelder performed a site visit on October 15, 2007, and reviewed available geologic literature. Based on the research completed to date, we have drawn the following general conclusions:

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- The majority of the subject site is underlain by Quaternary glacial moraines and Miocene volcanic rocks. The area along the shore of Lake Tahoe and extending to the base of the mountains has been mapped as Quaternary-age lake deposits (Ql);
- The majority of site soil consists of granular soils (SM, SP, and GP). Fine grained soils composed of clay (CL) and silt (ML) are present in the area of the North Base gravel parking lot;
- Measured groundwater depths range from 0.89 to 7.22 feet below ground surface (bgs) at the North Base parking areas, from 11 to greater than 18 feet bgs on the slopes above the North Base area, greater than 18 feet in the South Base area, and from 1.72 to greater than 18 feet bgs on the slopes above the South Base area;
- Two Quaternary-age faults are mapped crossing the subject site. No age dating of these faults has been performed and no data regarding activity of these faults is available. The mapped faults do not cross the proposed development at the North Base and Mid–Mountain. One mapped fault crosses the upper portion of the proposed development at the South Base;
- Two mapped active faults, the North Tahoe and Incline Village faults, are located east of the subject site. A third fault, the West Tahoe fault is likely an active fault, and is also located east of the subject site;
- The site is located in a region that is traditionally characterized by moderate seismic activity. A major seismic event on faults in the vicinity of the site could cause moderate ground shaking at the site;
- Steep slopes and soil creep were observed at multiple on site locations;
- The subject site may be subject to possible inundation of low elevation areas of the site as a result of a large earthquake on a nearby active fault;
- Based on the results of the site visit and literature review, we believe that there are no severe geologic or geotechnical constraints that would preclude project development. However, additional site investigation should be performed to assess the age of faults crossing the upper portion of the South Base development area, to further assess slope stability near the areas of proposed future development, to further assess the liquefaction potential, and to provide a final geotechnical investigation prior to site development.

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We appreciate this opportunity to be of service to you, and look forward to future endeavors. If you have any questions regarding this report or need additional information or services, please feel free to call either of the undersigned.

Sincerely,

KLEINFELDER WEST, INC.

Joshua P. Fortmann, P.G.
Project Geologist

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HOMEWOOD, CALIFORNIA

1 INTRODUCTION AND SCOPE

1.1 Project Description

This report presents the results of our geologic hazards and preliminary geotechnical evaluation for the Homewood Mountain Resort (HMR) site with emphasis on the proposed development areas at the north and south base areas and at the mid-mountain area.

The HMR site is located on the west shore of Lake Tahoe in Placer County in the town of Homewood, California (Plate 1). The property is located approximately 19 miles north of South Lake Tahoe and 5 miles south of Tahoe City along Highway 89. The property lies within portions of Sections 1, 2, 10, 11, and 12 of Township 14 North and Range 16 East. Plate 2 presents an Illustrative Proposed Mountain Plan, Plate 3 presents a detailed topographic map of the property, and Plate 4 presents a detailed drawing of the North and South Base areas. Elevations on the property range from approximately 6,300 feet to 7,880 feet above mean sea level (msl). The surface of Lake Tahoe has an average elevation of about 6,225 feet msl (USGS, 2004).

Proposed development at the north and south base areas is presented in Plate 5, Preliminary Conceptual Master Plan and proposed development at the mid-mountain area is presented in Plate 6, Conceptual Mid-Mountain Master Plan.

The climate in the Lake Tahoe Basin is typically very dry with low humidity. The sun shines an average 75 percent or 274 days each year, but snow can fall during any month. At lake level, the area receives an average of 125 inches of snow annually. Higher elevations can receive an average of 300 to 500 inches annually.

1.2 Purpose and Scope of Work

Kleinfelder performed this evaluation in accordance with our proposal, dated November 7, 2006. The purpose of the work is to provide preliminary information regarding potential geologic hazards and a preliminary geotechnical evaluation. The scope of work included performing a site visit, a review of available literature, and preparation of this report.

Specifically, our scope of services is divided into the following tasks:

- Research and review of available geologic, geotechnical and seismologic publications and maps covering the site and vicinity;
- A review of aerial photographs covering the site area;
- A geologic reconnaissance of the site by a California-Certified Engineering Geologist to observe and map pertinent surface features indicative of potential geologic hazards;
- Evaluation of the researched data; and
- A report including a site plan with conclusions regarding potential geologic hazards affecting the site and the proposed project.

1.3 References

The following unpublished references were reviewed during preparation of this report:

- Kleinfelder, 2007, Groundwater Evaluation Report, Homewood Mountain Resort, Homewood, California, October 31, 2007, Project No. 74407.01

The following published references were reviewed during preparation of this report:

- dePolo, C.M. et al (1997), *Earthquake Occurrence in the Reno-Carson City Urban Corridor*, Seismological Research Letters, Volume 68, Number 3, May/June 1997.

- dePolo, C. M., "Local Quaternary Faults and Associated Potential Earthquakes in the Reno and Carson City, Urban Areas, Nevada." Final Technical Report National Earthquake Hazards Reduction Program (NEHRP), Nevada Bureau of Mines and Geology, Contract #1434-95-G-2612, Program Element II.4, 1996.

- Matthews, R. A., Geologic Map of the North Half of the Lake Tahoe Basin, California Division of Mines and Geology, Open File Report, 1968.

- Hyne, N. J., P. Chelminski, J. E. Court, D. S. Gorsline, and C. R. Goldman, Quaternary History of Lake Tahoe, California. Geological Society of America Bulletin, v. 83, p. 1435-1448, 1972.

- Jennings, C.W. (1994), *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions*, California Division of Mines and Geology.

- Ichinose, G.A. et al "The potential hazard from tsunami and seiche waves generated by future large earthquakes within the Lake Tahoe basin, California-Nevada", Nevada Siesmological Laboratory, University of Nevada Reno, March 8, 1999.

- Kent, G.M., et al, "60k.y. record of extension across the western boundary of the Basin and Range province: Estimate of slip rates from offset shoreline terraces and a catastrophic slide beneath Lake Tahoe", Geology May 2005, v. 33, no. 5, p.365-368

- Saucedo, G. J., Preliminary Map of Pleistocene to Holocene Faults in the Lake Tahoe Basin, California and Nevada. Department of Geological Sciences, University of Nevada, Reno and Nevada Seismology Laboratory, Nevada Bureau of Mines and Geology, 1992.

- Saucedo, G.A. (2005). Geologic Map of the Lake Tahoe Basin, California and Nevada. California Department of Conservation, California Geological Survey.

- Schweickert, Richard A. et al, "Lake Tahoe active faults, landslides and tsunamis", Geological Society of America Field Guide 2, 2000

- Soil Survey, Tahoe Basin Area, California and Nevada, US Department of Agriculture, March 1974.

- U.S. Geological Survey and California Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed October 2007 from USGS web site: http//earthquake.usgs.gov/regional/qfaults/.

2 FIELD RECONNAISSANCE

On October 15, 2007, Kleinfelder performed a field reconnaissance of the subject site. The reconnaissance was performed by observing most vehicle accessible areas of the site, with emphasis on the proposed areas of future development. A Kleinfelder Certified Engineering Geologist observed site areas including the north base, the south base, Quail Lake, top of the Quail Chair, Ellis Canyon, Mid-Loading Station, Madden Creek, Lake Louise, and the top and bottom of the quad chair. Selected site photographs are presented in Plates 9, 10, and 11.

In addition, walking observation of the Madden Creek drainage and the Ellis (Homewood) Creek drainage was performed. Walking observation was also performed at the north and south bases.

The majority of the site consists of relatively steep, forested slopes and ridges. Three perennial creeks, Ellis Creek, Madden Creek and Quail Creek were observed as well as an intermittent creek. Quail Lake Creek and Madden Creek drain from Quail Lake and Lake Louise, respectively. The two lakes are located on the boundaries of the site. The western portion of the site is located adjacent to Lake Louise and consists of relatively shallow slopes. Photo 3 on Plate 10 shows Quail Lake and a fault scarp on the west shore of the lake. Photo 4 on Plate 10 shows Lake Louise and an avalanche chute on the west side of the lake.

Evidence of soil creep was observed on "The Face" ski run near the top of the slope below the mid-loading station of the Madden Triple Chair. Photo 1 in Plate 9 shows bent tree trunks that indicate this soil creep. Photo 2 on Plate 9 shows a view down slope from the mid-loading station. Evidence of slope instability is also evident on the steep slope in the vicinity of the White Lightning ski run, Photo 5 on Plate 11.

Kleinfelder observed locations of mapped geologic features including faults and a landslide located north of the site and north of Madden Creek. Discussion of faulting and landsliding is included in Sections 3.4.1 and 3.5.3 of this report. Kleinfelder also observed an unmapped spring on the slope above the north base. The spring location is shown in Plate 7, Geologic Map. Observed site conditions that may contribute to geologic hazards include the spring, steep slopes, and high gradient streams.

3 DISCUSSION

3.1 Site Conditions

The property is used as an active ski resort with unpaved access roads, four major chair lifts, two lodge areas, and paved and gravel parking lots. The majority of the property is forested with mixed conifer stands with a shrub understory. Areas along the creeks are vegetated with mountain alder, dogwood, various willows and other riparian species. The ski runs are vegetated with grasses, forbs and low growing shrubs. Areas of future site development include the north and south base area and the mid-mountain area.

This is a preliminary assessment and additional investigation may provide additional data regarding the identified locations. In addition to geologic hazard considerations, geotechnical conditions should be assessed prior to design and construction of all structures, roads, trails and associated utilities in these areas.

3.2 Regional Geology

The site is located on the west shore of Lake Tahoe, which occupies a down-faulted graben near the crest of the Sierra Nevada. The Lake Tahoe Basin was formed by faulting and volcanism approximately two million years ago. Rock of the Lake Tahoe basin can be divided into three categories: granitic, metamorphic, and volcanic (Hyne, et. al, 1972). Cretaceous granodiorite of the Sierra Nevada batholith is the predominant basement bedrock in the basin. Pre-Cretaceous metamorphic rocks occur in localized areas as roof pendants in the granitic rocks. Most of the volcanic rocks are andesitic mudflows and lava, which extends from the top of Martis Peak to the northern and western lakeshore.

Much of the region has been affected by glaciation during the past 1.5 million years. This activity is responsible for many of the landforms surrounding Lake Tahoe. Geologic literature indicates that during glaciations, valley glaciers dammed the Truckee canyon, the lake's outlet, raising the lake level. During these periods of elevated lake levels, lacustrine sediments were deposited in many of the bays and canyons around the lake.

3.3 Site Geology, Hydrogeology, and Subsurface Conditions

A geologic map of the HMR is presented as Plate 7. A small area of recent alluvium (Q) surrounds the northwest side of Quail Lake. The area along the shore of Lake Tahoe and extending to the base of the mountains has been mapped as Quaternary-age lake deposits (Ql). Glacial moraines of Tioga age (Qti) and glacial deposits, undivided (Qg) comprised of a heterogeneous mixture of rock fragments in a matrix of fine-grained sand, silt, and rock flour is located within Madden Creek valley and east of Quail Lake.

Pliocene-age volcanic rocks composed of andesite and basaltic andesite flows are located in the area of Ellis Peak. The majority of the HMR is underlain by Miocene-age volcanic rocks consisting of andesitic and dacitic lahars, flows, breccias, and volcanoclastic sediments (Mva). This formation has been correlated with the Mehrten Formation that underlies Sacramento Valley. Cretaceous-age granodiorite is located along the west side of Quail Lake and pre-Cretaceous-age metamorphic roof pendants of the Ellis Peak Formation (Jlp and Jle) also occur along the west side of Quail Lake.

The following summary of site soil is based on the USDA Soil Survey reviewed. The majority of the site is underlain by Umpa and Tallac very stony sandy loam. The mapped soils at the site include: Ra – Rock land, SM – stony colluvial land, TcB – Tallac gravelly coarse sandy loam, TeE, TeG, TkC – Tallac very stony coarse sandy loam, UmE, UmF – Umpa very stony sandy loam.

3.3.1 Quad Chair Lift

A Geotechnical Investigation was performed in 2007 for the base station and top station of the Quad Chair Lift. A copy of the investigation report is included in Appendix A. Two test pits were excavated at the base station (TP-B1 and B2) and two test pits were excavated at the top station (TP-T1 and T2) at locations shown in Plate 3. Soils at the base station near Madden Creek consisted of three feet of fill material overlying silty sand with gravel and large boulders (SM) consistent with the mapped geologic unit (Qg, Glacial Deposits). Soils at the top station consisted of a surficial layer of silty sand with gravel (SM) overlying volcanic rocks composed of light blue dacite. This is consistent with the mapped geologic unit (Mva, Miocene age volcanic rocks). No groundwater was encountered during the investigation.

3.3.2 Quail Chair Lift

One test pit (TP-1) was excavated adjacent to Quail Chair Lift Tower T2 at a location shown in Plate 3. The test pit log is presented in Appendix B. Soils encountered consisted of interlayered sandy silt (ML), silty sand (SM), and sand (SP). This is consistent with the mapped geologic unit (Ql, Lake Sediments). Groundwater was encountered at a depth of 6.5 feet below ground surface (bgs).

3.3.3 North Base Area

Four monitoring wells (MW-1N through -4N) were drilled in the North Base parking lot at locations shown in Plate 4. Boring logs are presented in Appendix C. Soils encountered consisted of interlayered silty sand with gravel (SM), clayey sand (SC), and sand (SW). Groundwater was measured at depths ranging from 4.5 to 6 feet bgs. Twenty-six borings (GP-1 through GP-31) were drilled in the North Base area to depths ranging from 3 to 20 feet bgs at locations shown in Plate 4. Boring logs are presented in Appendix D.

Soils in the North Base paved parking lots (GP-1 through GP-8) generally consist of dark yellowish brown silty sand and gravel (SM) with groundwater measured at depths of 5.44 to 7.22 feet bgs. However, mottled soils indicative of seasonal groundwater were noted at depths ranging from 4.3 to 8.0 feet bgs. These soils are indicative of an interlayered colluvial and lake sediment depositional environment and are consistent with the mapped geologic unit (Ql, Lake Sediments).

Soils in the gravel parking lot located south of Sacramento Street (GP-9 through GP-14) consisted of black, olive gray, gray, and brown silty gravel (GC), silty sand (SM), clay (CL), sandy clay (CL), and sandy silt (ML) with high groundwater measured at depths of 0.89 to 5.3 feet bgs. These soils are indicative of a lake depositional environment and consistent with the mapped geologic unit (Ql, Lake Sediments).

Soils on the slopes above the North Base (GP-15 through GP-21, GP-25, -26, -27, -29, and 31) generally consisted of dark yellowish brown, brown, and pale brown silty sand (SM), gravelly sand (SP), gravel, cobbles, and boulders indicative of a colluvial depositional environment.

Groundwater was measured at depths of 11 to 12 feet bgs in borings GP-17, -25, -26, and -31 in the slopes above the North Base area. Borings in the slopes above the north portion of the North Base area did not encounter groundwater during Spring 2007 monitoring to depths of approximately 18 feet bgs.

Plate 4 shows seasonal high groundwater levels and groundwater contours. Groundwater contours generally follow topography and indicate groundwater flow to the east towards Lake Tahoe.

3.3.4 South Base Area

Five monitoring wells (MW-1S through -5S) were drilled in the South Base parking lot at locations shown in Plate 4. Boring logs are presented in Appendix E. Soils encountered consisted of interlayered sandy silt (ML), silty sand (SM), and sand (SW) consistent with the mapped geologic unit (Ql, Lake Sediments). Groundwater was measured at depths ranging from 15 to 28 feet bgs.

Fourteen borings (GP-36 through GP-58) were drilled in the South Base area to depths ranging from 3 to 20 feet bgs at locations shown in Plate 4. Boring logs are presented in Appendix D.

Soils encountered within the South Base area and on the slopes above the South Base area consisted of dark yellowish brown, brown, and pale brown silty sand (SM), gravelly sand (SP), gravel, cobbles, and boulders indicative of a colluvial depositional environment. Shallow groundwater ranging between 1.72 and 3.72 feet bgs was measured at the north end of Tahoe Ski Bowl Way (GP-36) and above the South Base area in borings GP-39 and -41. Two other borings on the slopes above the South Base area contained high groundwater levels at depths of approximately 9 feet bgs. All borings in the parking areas of the South Base area did not encounter groundwater during Spring 2007 to depths of 18 feet bgs.

Mottled soils possibly indicative of seasonal groundwater were noted at depths of 4.0 feet bgs in boring GP-51, and 5.0 feet bgs in borings GP-51 and GP-55. However, these wells did not contain measurable groundwater during Spring 2007 to depths of approximately 19 feet bgs.

Additionally, water levels measured in monitoring wells MW-1S through MW-5S from 1997 through 2001 recorded high groundwater levels at depths ranging from 15 to 17 feet bgs.

Groundwater flow is to the east towards Lake Tahoe as shown in Plate 4.

3.4 Geologic Hazard Evaluation

Potential geologic hazards at the site include active faults, mapped quaternary faults, landslides, debris flows, rock falls, avalanches, and liquefaction resulting from subsurface soil conditions.

3.4.1 Faulting

The Geologic Map of the Lake Tahoe Basin shown in Plate 7 (Saucedo 2005) shows two faults mapped across the site. One fault trends generally north-south across the site from the west side of Quail Lake past the mid-mountain area, and continues off site to the north. A second fault trends generally north-south across the eastern portion of the subject site. The second fault is mapped near the break in slope located to the west of the North and South base areas. Both of the faults are mapped as dashed lines indicating uncertain location. The faults are also queried indicating uncertain existence or continuation. The faults do not cut Quaternary-age deposits on the map.

The proposed structures at the North Base appear to be located approximately 300 feet to the east of the mapped fault trace. The four westernmost structures of the South Base appear to be located within the mapped fault trace. The Mid-Mountain structures appear to be located approximately 700 feet to the west of the mapped fault trace.

Saucedo (2005) also shows the West Tahoe-Dollar Point fault zone, the North Tahoe fault, and the Incline Village fault. These three faults are mapped as active and exhibit Holocene activity.

A review of the *Quaternary Fault and Fold Database for the United States* by the U.S. Geological Survey (2006), indicates that two fault zones are mapped crossing the project area. The faults coincide with the faults mapped on the Geologic Map (Plate 7), but show three fault strands at the eastern fault location. The western fault location is identified as the Tahoe-Sierra frontal fault zone.

The nearest mapped active faults by the USGS (2006) are the North Tahoe and Incline Village faults. The North Tahoe and Incline Village faults are located approximately 4.8 miles northeast and 10.3 miles northeast of the project site, respectively. Based on Saucedo (2005) the West Tahoe fault is also likely an active fault. The West Tahoe fault is located approximately 3 miles east of the project site. Schweickert et al (2000) included the Tahoe-Sierra frontal fault zone in the group of active faults in the Tahoe Basin. Kent et al (2000) did not find evidence of Holocene activity on the Tahoe-Sierra frontal fault zone.

The Fault Activity Map of California (1994) shows only the West Tahoe Fault and the North Tahoe Fault in the Tahoe Basin. The West Tahoe Fault is mapped with pre-quaternary activity, and the North Tahoe Fault is mapped as active in the Holocene.

Based on the Index to Official Maps of Earthquake Fault Zones, the site is not located in an Alquist-Priolo Earthquake Fault Zone.

We performed a review of aerial photographs available at the US Forest Service including photographs from the following years: 1939 (1:20,000 black and white), 1966 (1:15,480 black and white), 1987 (~1:20,000 color), 1995 (1:8,000 color), 2000 (1:15,840 color), 2005 (1:15,840 color). Stereo pairs were available for all dates, except 1939 had only coverage of the southern portion of the subject site. The 1939 photo showed development only along the portion of the site near the lake shore. The 1966 and more recent photos show development on the site. No evidence of fault rupture of Holocene features was observed on any of the photos.

3.4.2 Seismicity

The site is located in Seismic Zone 3 of the *California Building Code, 2001*. The site is located in a region traditionally characterized by moderate to high seismic activity.

The site has experienced moderate to strong shaking due to several earthquakes in the past. Some of the events in the area are the 1948 (M6.0) Dog Valley and 1966 (M6.0) Boca Valley earthquakes located approximately 50 km and 35 km to the north, respectively, and the 1998 (M4.9) earthquake in Incline Village located approximately 27 km to the northeast.

The North Tahoe and Incline Village faults have estimated maximum moment magnitudes of 7.0 and 6.6, respectively. The slip rate category for the North Tahoe and Incline Village Faults is 0.2 to 1.0 millimeter per year (mm/yr). The project site also lies within a zone of influence of numerous other regional fault systems in eastern California and western Nevada. Should a seismic event occur along any of the nearby faults or fault systems, the site could be significantly affected by ground shaking.

3.5 Secondary Seismic and Geologic Hazard Evaluation

3.5.1 Liquefaction and Earthquake Induced Settlement

Soil liquefaction is a condition where saturated, granular soils undergo a substantial loss of strength and deformation due to pore pressure increase resulting from cyclic stress application induced by earthquakes. In the process, the soil acquires mobility sufficient to permit both horizontal and vertical movements if the soil mass is not confined. Soils most susceptible to liquefaction are saturated, loose, clean, uniformly graded, and fine grained sand deposits.

The available literature review and boring logs (Appendix C) indicates that saturated, sandy soils are present below the North Base parking lots. These logs contain 25% gravel within the sand layers which indicate that these soils are not susceptible to liquefaction during a seismic event. However, locations where shallow groundwater and finer grained sandy soils are encountered may be susceptible to liquefaction. This should be evaluated further during a final geotechnical investigation.

The majority of the subject site is located in areas that will experience the least severity of shaking during an earthquake. These areas are typically underlain by shallow bedrock.

3.5.2 Near Fault Issues in Structural Design

In recent years, many modern structures located near the seismic source have been severely damaged or collapsed. Design of any structures on the subject site, including structures, bridges, roads and utilities, should be properly designed to account for near fault issues.

We reviewed the fault trace locations relative to the proposed structure locations based on the proposed structure locations shown in Plates 5 and 6. The structures of the North Base appear to be located approximately 300 feet to the east of the mapped fault trace. The four westernmost structures of the South Base appear to be located within the mapped fault trace. The Mid-Mountain structures appear to be located approximately 700 feet to the west of the mapped fault trace. Most faults encompass a zone rather than a narrow trace, so additional assessment of building locations relative to fault locations should be performed based on final structure and fault locations.

3.5.3 Landslides and Seismically-induced Slope Instability

The possibility of landslides and seismically-induced slope instability at the subject site is considered moderate due to the topography of the site area, and observed evidence of soil creep. A Quaternary landslide is mapped in the volcanic rocks (Mva) to the north of the subject site. The same rock type is mapped at the subject site, and may be prone to landslides.

Proposed structures at the North and South Bases are located at the toe of relatively steep slopes. As discussed in Section 5 of this report, additional slope stability assessment should be performed based on final structure locations.

Apparent avalanche run-out chutes were observed on the west side of Lake Louise. These features are not located on the subject site, but a potential exists for avalanches to occur on the subject site.

Multiple areas of rock outcrop were observed on the subject site and many additional outcrops are present on areas of the site not observed. A potential for seismically-induced rock fall exists.

3.5.4 Springs and Seeps

A previously unmapped spring was observed on the slope of "The Face" ski run. Based on observed wood structure and piping, this spring was previously developed for use as a water source. The presence of this spring may affect slope stability in a localized area. Additional unmapped springs may be present on the subject site.

3.5.5 Tsunamis and Seiches

Large earthquakes and landslides have occurred beneath Lake Tahoe, and may have caused tsunamis. Future earthquakes and or landslides have the potential to cause future tsunamis. A scenario M7.2 earthquake modeled on the West Tahoe fault produced maximum wave amplitudes of approximately 6 meters at Homewood. The study indicates that a lake sieche can cause large waves to arrive an hour after the tsunami.

3.5.6 Flood and Debris Flow Hazard

The Flood Insurance Rate Map (FIRM) for the subject site shows a Zone A area located along the lower reach of Ellis (Homewood) Creek. The lower reach of Madden Creek to the north of the subject site is also mapped as Zone A. Plate 8 shows the flood zones.

Debris flow hazards are not mapped for the subject site, but may exist in the Madden Creek, Ellis (Homewood) Creek, Quail Lake Creek and the unnamed creek drainages.

3.5.7 Recommended Permanent Slope Angles

For preliminary planning purposes, we recommend that permanent fill and cut slopes be designed to a maximum inclination of 3:1 H:V for maximum heights of 20 feet.

Satisfactory slope performance is primarily affected by drainage and runoff. Care must be taken that drainage is not directed to flow over slope faces. Interceptor (brow) ditches should be constructed at the tops of slopes in order to collect and divert runoff which otherwise would flow over the slope face. Slope faces should be protected against erosion resulting from direct rain impact and melting snow. Consideration should be given to permanent measures such as riprap or geosynthetics and vegetation.

3.5.8 Recommended Erosion Control Measures

All erosion control methods should be in compliance with the Tahoe Regional Planning Agency's "Handbook of Best Management Practices." Site soils are generally granular in nature and should be protected against erosion.

4 CONCLUSIONS

The following conclusions are based on the available literature reviewed during this assessment and are subject to the limitations stated in this report. Based on the results of our study, we believe that there are no severe geologic constraints that would preclude project development. These conclusions may change if additional information becomes available. The following is a summary of our conclusions;

- The majority of the subject site is underlain by Quaternary glacial moraines and Miocene volcanic rocks. The area along the shore of Lake Tahoe and extending to the base of the mountains has been mapped as Quaternary-age lake deposits (Ql);
- The majority of site soil consists of granular soils (SM, SP, and GP). Fine grained soils composed of clay (CL) and silt (ML) are present in the area of the North Base gravel parking lot;
- Measured groundwater depths range from 0.89 to 7.22 feet below ground surface (bgs) at the North Base parking areas, from 11 to greater than 18 feet bgs on the slopes above the North Base area, greater than 18 feet in the South Base area, and from 1.72 to greater than 18 feet bgs on the slopes above the South Base area;
- Two Quaternary-age faults are mapped crossing the subject site. No age dating of these faults has been performed and no data regarding activity of these faults is available. The mapped faults do not cross the proposed development at the North Base and Mid–Mountain. One mapped fault crosses the upper portion of the proposed development at the South Base;
- Two mapped active faults, the North Tahoe and Incline Village faults, are located east of the subject site. A third fault, the West Tahoe fault is likely an active fault, and is also located east of the subject site;
- The site is located in a region that is traditionally characterized by moderate seismic activity. A major seismic event on faults in the vicinity of the site could cause moderate ground shaking at the site;
- Steep slopes and soil creep were observed at multiple on site locations;
- The subject site may be subject to possible inundation of low elevation areas of the site as a result of a large earthquake on a nearby active fault; and

- Based on the results of the site visit and literature review, we believe that there are no severe geologic or geotechnical constraints that would preclude project development. However, additional site investigation should be performed to assess the age of faults crossing the upper portion of the South Base development area, to further assess slope stability near the areas of proposed future development, to further assess the liquefaction potential, and to provide a final geotechnical investigation prior to site development.

5 ADDITIONAL SERVICES

4.1 Geohazards Mapping

Based on the conclusions we recommend the following additional geohazards evaluation be performed:

- Perform detailed geomorphic mapping of site specific and adjacent fault features at selected mapped fault locations;
- Perform detailed aerial photograph analysis of the faults mapped on the subject site;
- Perform detailed geomorphic mapping of "The Face" ski run, "White Lightning" ski run, and "Martin's Lane" ski run to assess soil creep; and
- Perform detailed aerial photograph analysis of soil creep locations on site and in the mapped landslide area north of the site (north of Madden Creek) to assess the potential for on site landslides.

4.2 Final Geotechnical Investigation

After final building locations are selected, and depth of excavation and building loads are determined, a final design-level geotechnical investigation must be performed. The final geotechnical investigation should include field exploration and laboratory testing. Field exploration should consist of soil borings and geophysical surveys (seismic refraction) to evaluate the subsurface conditions and develop design parameters for foundation and retaining wall design.

4.3 Project Bid Documents

It has been our experience during the bidding process, that contractors often contact us to discuss the geotechnical aspects of the project. Informal contacts between Kleinfelder and an individual contractor could result in incorrect or incomplete information being provided to the contractor. Therefore, we recommend a pre-bid meeting be held to answer any questions about the report prior to submittal of bids. If this is not possible, questions or clarifications regarding this report should be directed to the project Owner or his designated representative. After consultation with Kleinfelder, the project Owner (or his representative) should provide clarifications or additional information to all contractors bidding the job.

4.4 Construction Observation/Testing and Plan Review

The recommendations made in our design-level geotechnical investigation report will be based on the assumption that an adequate program of tests and observations will be made during construction to verify compliance with these recommendations. These tests and observations should include, but not necessarily be limited to, the following:

- Observations and testing during site preparation and earthwork.
- Observation of footing trench excavations.
- Observation and testing of construction materials.
- Consultation as may be required during construction.

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

The review of plans and specifications and the field observation and testing by Kleinfelder are an integral part of the conclusions and recommendations made in this report. If we are not retained for these services, the Client agrees to assume Kleinfelder's responsibility for any potential claims that may arise during construction.

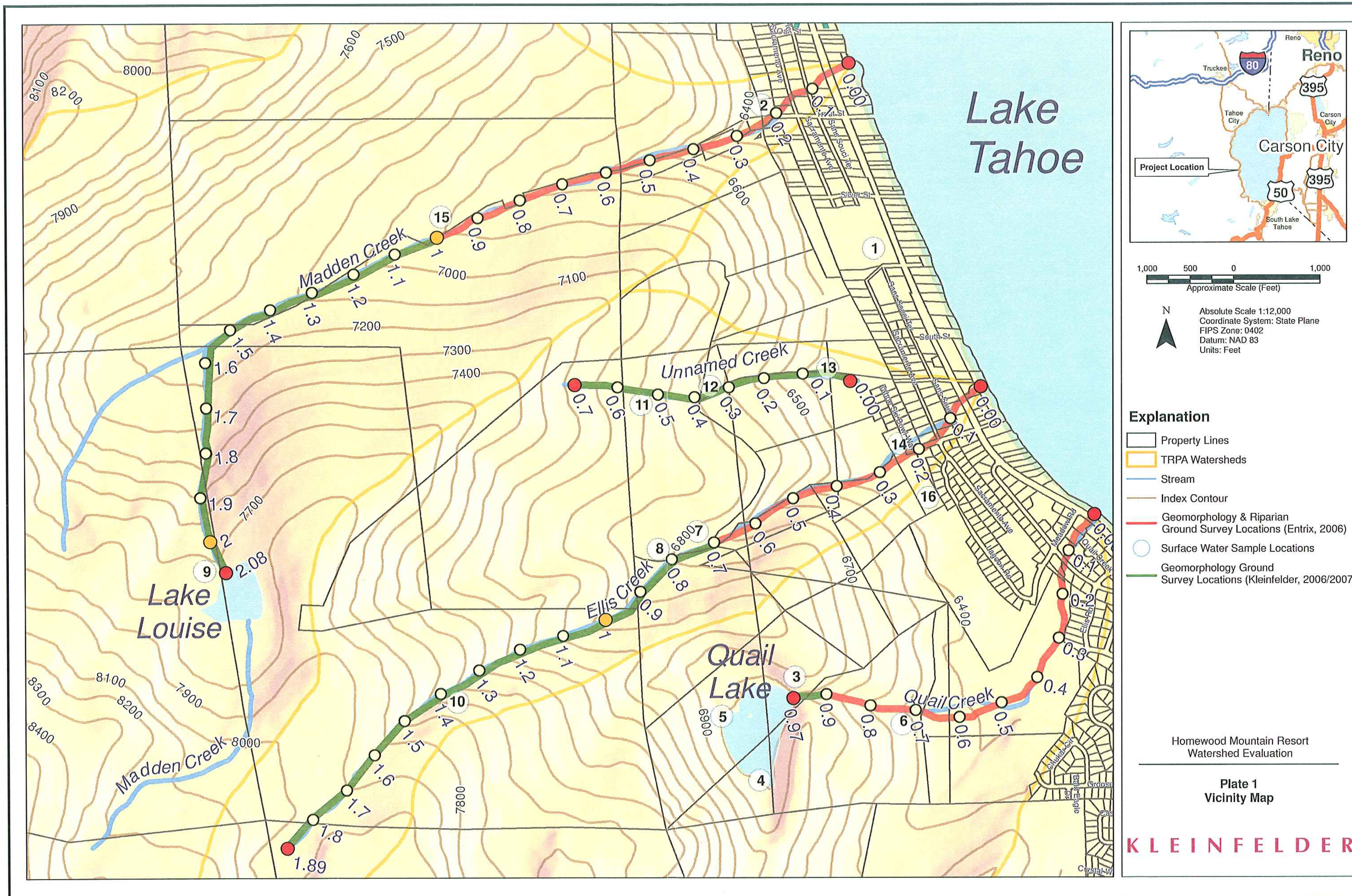
6 LIMITATIONS

Conclusions contained in this report are based on our field reconnaissance, literature review and our understanding of the proposed construction. The study was performed using a mutually agreed upon scope of work. More detailed, focused, and/or thorough investigations can be conducted. Further studies will tend to increase the level of assurance; however, such efforts will result in increased costs. If the Client wishes to reduce the uncertainties beyond the level associated with this study, Kleinfelder should be contacted for additional consultation.

The soils data used in the preparation of this report were obtained from borings and test pits made for previous investigations. It is possible that variations in soils exist between the points explored. No warranty, express or implied, is made.

This report may be used only by the Client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors including advances in man's understanding of applied science may change over time and could materially affect our findings.

PLATES



Lake Tahoe
Lake Louise
Quail Lake
Madden Creek
Unnamed Creek
Ellis Creek
Quail Creek
Reno
Truckee
Tahoe City
Carson City
South Lake Tahoe
80
395
50
Project Location
1,000 500 0 1,000
Approximate Scale (Feet)
N
Absolute Scale 1:12,000
Coordinate System: State Plane
FIPS Zone: 0402
Datum: NAD 83
Units: Feet
Explanation
Property Lines
TRPA Watersheds
Stream
Index Contour
Geomorphology & Riparian Ground Survey Locations (Entrix, 2006)
Surface Water Sample Locations
Geomorphology Ground Survey Locations (Kleinfelder, 2006/2007)
Homewood Mountain Resort
Watershed Evaluation
Plate 1
Vicinity Map
KLEINFELDER

Illustrative Proposed Mountain Plan

HOMEWOOD
Mountain Resort

DESIGNWORKSHOP

HOMEWOOD MOUNTAIN SKI FACILITIES

⬡	Hexagon (typical)
1	Maden bottom termianl
2	Madden bottom shack
3	tower footings
4	North Happy Platter Shack
5	North Happy Platter tower footings
6	Spring Chair deck bottom
7	Alpine Platter bull wheel top
8	Alpine Platter shack
9	Alpine Platter bull wheel
10	Spring Chair deck
11	Clivus
12	Warming Hut
13	Madden top shack
14	Madden top terminal
15	Tbar top terminal
16	Yellow shed building top Madden
17	Tower Footing Fox Antenna
18	Transformer at top of Tbar
19	House of Pain
20	Tbar top of shack
21	Tbar bottom terminal
22	Tbar bottom shack
23	Quad bottom of shack and terminal
24	Transformer at bottom of Quad
25	Transformer at top of Quad
26	Quad top of terminal
27	Chair not there motor room
28	Pro Shack
29	Container at top patrol
30	Mat shack
31	Quad top shack
32	Lake Louise cabin
33	Ellis top terminal
34	Ellis top shack
35	Quails Nest
36	Ellis bottom shack
37	Ellis counter weight building
38	Ellis bottom terminal
39	Quail top deck
40	Pomma above Mite Terminal
41	Pomma above Mite
42	Mighty Mite Top
43	Mighty Mite bottom
44	Mighty Mite shack
45	Quail bottom terminal
46	Quad Chair, tower footings
47	Ellis Chair tower footings
48	Quail Chair tower footings
49	Madden Chair tower footings
50	Spring Chair tower footings
51	Tbar tower footings
52	Hall Tbar tower footings
53	Hall Tbar terminal footing
54	Alpine Platter towers
55	Mid Mountain warming hut-new
NOTE	LOWER MOUNTAIN SKI FACILITIES NOT NOT ON THIS ALTA

NOTES

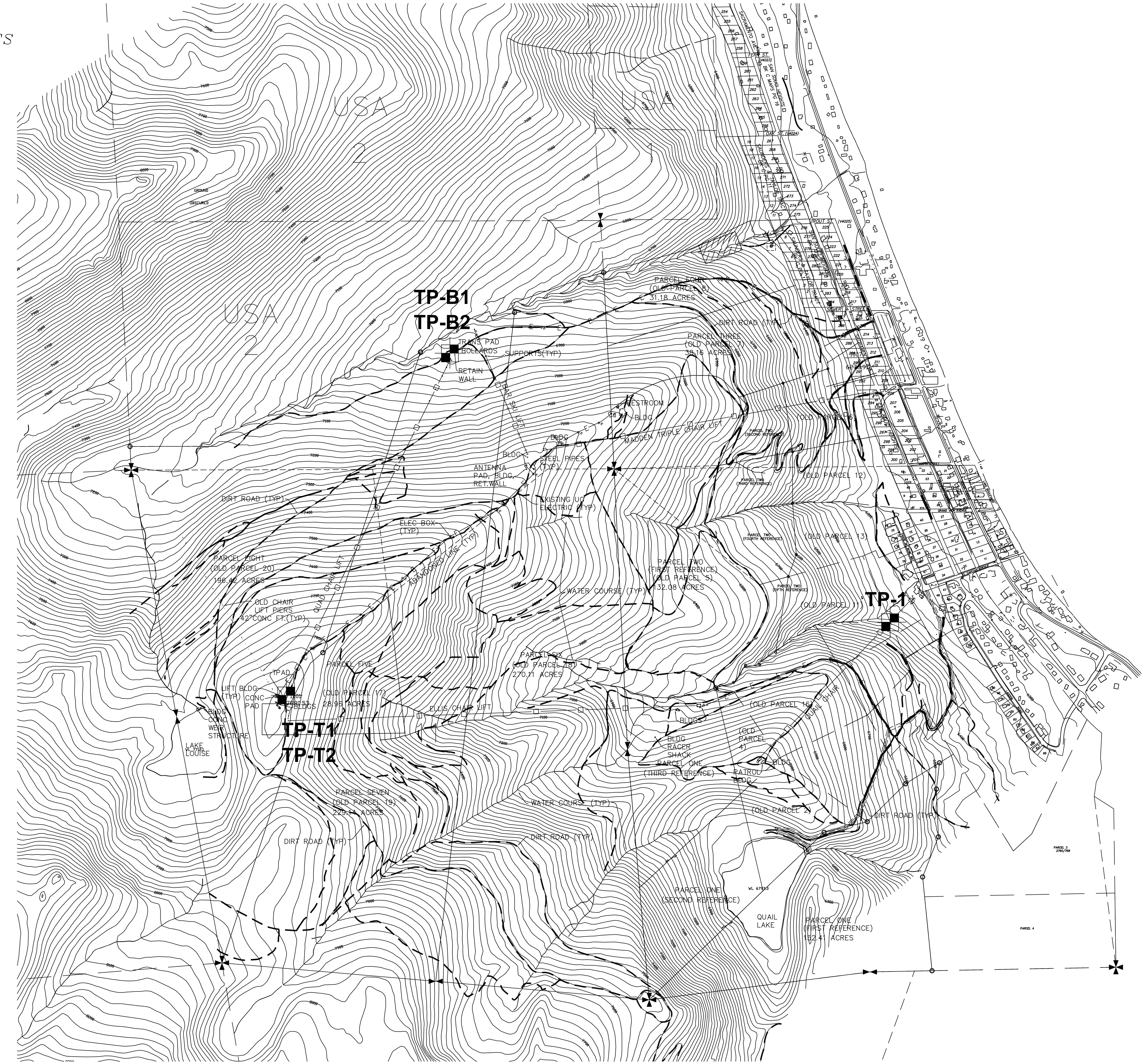
Roadway and drainage ways, shown hereon were taken from an aeiral survey compiled 1998 and 2003. All roads have been verified by GPS as to their location on this map.

BASIS OF BEARINGS

Identical to Record of Survey Map No. 2938, File No. 1976776 in the Official Records of Washoe County, Nevada

LEGEND

- BOLLARD
- FIRE HYDRANT
- DIRT ROAD
- SIGN POLE
- LIGHT POST
- IRRIGATION VALVE
- DROP INLET
- WATER VALVE
- WATER VALVE
- WATER METER
- GAS VALVE
- STORM DRAIN MANHOLE
- SANITARY SEWER MANHOLE
- CHAIR LIFT
- ELECTRICAL BOX
- TITLE REPORT EXCEPTION REFERENCE
- ELECTRICAL LINE
- SET 5/8" REBAR CAPPED LS 5870



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SPARKS, NEVADA 89434
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REVISIONS | MARK | DATE | NO.

BENCHMARK

DESIGNED BY RRH | DRAWN BY RRH
CHECKED BY GGL | DATE SURVEYED 10-10-05
APPROVED BY

ALTA/ACSM LAND TITLE SURVEY
FOR
HOMEWOOD MOUNTAIN PARTNERS, LLC & JAY, LLC
SITUATE WITHIN A PORTION OF SEC. 1, 11, AND 12
T 14 N., R.16 E., M.D.M.
HOMEWOOD PLACER COUNTY CALIFORNIA

JOB NO. 04353.01.C

DATE 10-11-05

PLATE

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