DARWIN MYERS ASSOCIATES

ENVIRONMENTAL RESEARCH ■ ENGINEERING GEOLOGY

February 27, 2014

Will Nelson, Principal Planner
Contra Costa County
Department of Conservation & Development
Community Development Division
30 Muir Road
Martinez, CA 94553

Subject: **Geologic Peer Review – 30 Day Comments**
RZ 13-3224 and SD 13-9359
Boulevard Way/ Saranap Avenue Vicinity
APN 184-010-035 & -036; APN 184-450-025 &
APN 185-370-010, -012, -018 & -033
Saranap Area, Contra Costa County
DMA Project # 3009.14

Dear Will,

At your request we have reviewed a geotechnical report submitted by the project proponent,[1] along with the Preliminary Grading Plan prepared by Kier & Wright.[2] This review letter is organized to first explain our understanding of the project and our approach. Based on the data gatherer, we then provide a preliminary assessment of potential geologic, seismic and geotechnical hazards.

Understanding of Project

The property that is the subject of the pending application consists of seven parcels, located on three distinct "Sites." Site A consists of four parcels situated in the northeast corner of the Saranap Avenue/ Boulevard Way intersection. On Site A the plan is for a seven story building with a basement that is to serve as a below ground parking structure. The first and second levels will consist of parking and retail space. The upper levels will be devoted to residential use.

Sites B and C are situated on the southeast side of Boulevard Way, and are near the Saranap Avenue intersection. Site B consists of two parcels and is shaped like a meat axe. Site C is an irregularly shaped parcel that is a short distance southwest of Site B. Plans call for the construction of new mixed-use buildings on Site B. The plans for Site B indicate construction of a seven story building that consists of four levels of wood-frame residential units above three levels of concrete podium. The podium levels are partially below grade and will include parking and retail space. At Site C, the plan is to construct a four-story residential building, with the first story partially below grade.

Construction of basements on Sites A and B involve excavation up to about 20 ft. below the ground surface. Construction of the partial basement on Site C requires excavating about 10 ft. below grade.

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[1] Rockridge Geotechnical, 2013, *Geotechnical Investigation, Saranap Mixed-Use Development, Boulevard Way and Saranap Avenue, Contra Costa County, California,* RG Job #12-477 (report date stamped received by DCD on January 24, 2014).

[2] Kier & Wright, 2013, *Preliminary Grading Plan of Boulevard Way and Saranap Avenue for Hall Equities, Contra Costa County, California,* K&W Job #A12549-2 (plans date stamped received by DCD on January 23, 2014).

1308 PINE STREET ■ MARTINEZ, CA 94553 ■ 925/209-9994

Approach

We reviewed pertinent geologic reports and maps issued by the California Geological Survey (CGS) and the U.S. Geological Survey (USGS), along with the Soil Survey of Contra Costa County. With this background we a) analyzed a stereo pair of historic vertical-angle aerial photographs,[3] b) made a site visit (on February 22, 2014), c) reviewed Safety Element maps and policies and d) reviewed the grading, drainage and stormwater control plans submitted with the application. We then evaluated the data gathered in terms of potential geologic, seismic and geotechnical hazards and prepared this peer review letter, presenting our evaluation and recommendations.

Background

1. Active Faults

The site is located in the Saranap area, about ½ mile southwest of the State Route 24/ I-680 interchange (see Figure 1). The nearest faults that are considered active by the California Geological Survey (CGS; formerly California Division of Mines & Geology) are the Concord-Green Valley, Calaveras and Hayward faults. The CGS has delineated Alquist-Priolo (A-P) zones along the known active faults in California. The official A-P zones are indicates that the Concord-Green Valley fault A-P zone passes approximately 4½ miles east-northeast of the site. The A-P Zones along the Calaveras and Hayward faults pass approximately 7½ miles southeast and 8½ miles southwest of the site, respectively. (The A-P Zones of these faults are represented by brown-colored, northwest trending zones in Figure 1.) According to the State, recently active and potentially active traces of the active faults may be present anywhere in the A-P Zone. The location of surface rupture generally can be assumed to be along an active major fault trace. Because the subject property is not within the A-P Zone, the probability of the project experiencing surface rupture can be considered very low.

It should be recognized that the CGS does not delineate an A-P zone unless it believes that there is clear evidence of surface fault rupture has occurred during Holocene time (i.e. during the last 11,000 years). In the case of the Calaveras fault, review of technical data by CGS geologists determined that the northern portion of the Calaveras fault has no proven Holocene offset. So, although geologic maps have confirmed that the ancestral Calaveras fault closely coincides with the toe of Las Trampas Ridge (and a branch of this fault passes approximately 0.4 miles east of the site) it has not been placed in an A-P Zone. The ancestral trace of the Calaveras fault is a potential seismic source. Specifically, a 1998 report prepared by Geomatrix found evidence of activity during the Late Quaternary on this fault system within the Walnut Creek area (minor offset with a right-normal-oblique sense of displacement). The alluvium that was offset was dated 31,410 radio-carbon years before present.[4] In summary, there has been seismic activity and at least limited surface fault rupture on a branch of the Calaveras fault in the Saranap area.

2. Bedrock Geology

The most recent geologic map of Contra Costa County is a color, digitized bedrock geology map that was published by the U.S. Geological Survey in 1994 (see Figure 2) [5] This map, which is based on the compilation of previous published mapping, indicates the site is located in the outcrop belt of the Briones

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[3] Pacific Aerial Surveys, 1973, Photographs #CC3526-2-168 & -169; scale 1 in.= 1,000 ft. (flown on May 7, 1973).

[4] Geomatrix, 1998. *Final Report, Walnut Creek Water Treatment Plant Expansion, Seismic Study - Phase II.* Geomatrix Job #3970 (report dated October 30, 1998).

[5] Graymer, R., D.L. Jones & E.E. Brabb, 1994. *Preliminary Geologic Map Emphasizing Bedrock Formations in Contra Costa County, California.* U.S. Geological Survey Open File Report 94-622.

Formation (Tbr). Note that the seven parcels that make up the property are outlined in red. Tbr is a formation consisting of marine sedimentary rocks of Miocene age (chiefly interbedded sandstone, siltstone, conglomerate). According to Figure 2, the northern half of the subject property is mantled by surficial deposits (Qu).

Features that can be seen on the map can be summarized as follows:

- Ancestral traces of the Calaveras fault are shown passing approximately 1,800 ft. and 3,700 ft. east of the site (represented by a green lines trending NNW);
- The surficial deposits are chiefly semi-consolidated, poorly sorted stream channel and floodplain deposit; and near the toe or nearby hills, Qu may include alluvial fan deposits.

3. Quaternary Deposits

In 1997 the U.S. Geological Survey issued a map that divided Quaternary deposits of Contra Costa County into nine categories that vary in age, depositional environment and engineering properties.[6] Figure 3 presents a portion of this map, showing the site and vicinity. It indicates that the subject property is underlain by "undifferentiated continental gravels" (QTu), of Plio-Pleistocene age. They are described as semi-consolidated to unconsolidated and poorly sorted. The sediments consist of irregularly interbedded gravel, sand, silt and clay. The USGS report states that theses deposits are (a) unrelated to modern drainages, (b) there thickness is variable but locally ranges up to 50 meters, an (c) these deposits are considered evidence of the late Cenozoic uplift of the Coast Ranges. Other surficial deposits shown on Figure 3 are all younger in age than QTu. They include the following:

- Alluvial fan and fluvial deposits (Qpaf). These deposits are of Pleistocene age, and consist of dense, gravelly and clayey sand or clayey gravel that fine upward. These deposits are mapped chiefly south of the Las Trampas Creek channel (see Figure 3).
- Stream channel deposits (Qhaf). These are deposits of Holocene age (<13,000 years before present), and consist of stream channel deposits of Las Trampas Creek.
- Alluvial fan deposits (Qhaf). These deposits are of Holocene age and tend to be brown to tan and medium dense (never reddish).
- br. This symbol denotes the rocky upland areas that overlie the valley floor area.

4. Nilsen Surficial Deposits Mapping

In 1975 the U.S. Geological Survey released a set of surficial deposit maps of Contra Costa County that provide information on the distribution of landslide and other types of alluvial, colluvial and terrace deposits.[7] These maps, which were based chiefly on geologic interpretation of vertical angle aerial photographs flown in the 1960's, do not classify landslides according to the type of landslide deposit, depth of slide plane or activity status. Nevertheless, the map fulfills its function, which is to "red flag" properties where ground failure may be a potential hazard. According to the USGS map, the portion of the subject property north of Boulevard Way is mapped as colluvium, and the portion of the site south of Boulevard Way is mapped as bedrock. No landslides are mapped on or near the subject property. Figure 4, Landslide and Liquefaction Potential Map, shows the distribution of landslides in the site vicinity as delineated on the USGS map. The nearest mapped landslide is approximately ¼ mile north-northwest of the project. It is on the north side of State Highway 24, and does not pose a hazard to the project.

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[6] Helley E.J. and R.W. Graymer, 1997. *Quaternary Geology of Contra Costa County and Surrounding Parts of Alameda, Marin, Sonoma, Solano, Sacramento and San Joaquin Counties, California.* A Digital Database. U.S. Geological Survey, Open File Report 97-98.

[7] Nilsen, T.H., 1975. *Preliminary Photointerpretation Map of Landslide and Other Surficial Deposits of the Walnut Creek 7.5-Minute Quadrangle, Contra Costa County.* U.S. Geological Survey, Open File Map 75-277-55.

5. Soils

According to the Soil Survey of Contra Costa County,[8] the soil series mapped on the site is the Tierra loam (TaC, 2 to 9 percent slopes; and TaD, 9to 15 percent slopes). It is a non-prime agricultural soil (Class IV) with a Storie Index rating of 4. The primary limitations for agricultural use are nutrient level and erosion hazard. With regard to engineering properties, the expansivity of the soil varies with depth. Specifically, the AdC soil profile is 71 inches deep. The A-horizon is a loam and clay loam that extends from the surface to a depth of 25 inches. It is rated *low expansion potential.* The B1-horizon, extending from 25 to 59 inches, is a clay that is rated *highly expansive*. The B2-horizon is a silty clay loam that extends from 59 to 71 inches. It is rated *moderately expansive.* With regard to corrosivity, the entire soil profile is rated *highly corrosive.*

Expansive soils are soils that expand when water is added and shrink when they dry out. This continuous change in soils volume causes homes and other structures to move unevenly and crack. It should also be recognized that corrosive soils tend to damage concrete and/or uncoated steel that is in contact with the ground. Testing is needed to confirm foundation conditions, and the design-level geotechnical reports routinely provide specific criteria and standards to avoid/ minimize damage from expansive and corrosive soils.

Safety Element

1. Ground Failure Policies

The Safety Element of the General Plan includes a number of policies that require evaluation of geologic hazards for proposed land development projects in areas of potential hazards. On page 10-22 the Safety Element states that geologic conditions should be a primary determinant of land use. Table 1 presents ground failure and landslide hazard policies from the Safety Element. Because there are no landslides on the site, and the site is gently sloping, landslide risks are not substantial for this project. The mapping of landslides by the USGS (Nilsen, 1975) was incorporated into the Safety Element (General Plan Figure 10-6, on page 10-24). Figure 4 presents an enlargement of a portion of the landslide map in the Safety Element (scale 1 inch = 600 ft.).

Table 2
Safety Element Ground Failure and Landslide Policies

Policy 10-22. Slope stability shall be a primary consideration in the ability of land to be developed or designated for urban uses.
Policy 10-23. Slope stability shall be given careful scrutiny in the design of development and structures, and in the adoption of conditions of approval and required mitigation measures.
Policy 10-26. Approvals of public and private development projects in areas subject to slope failures shall be contingent on geologic and engineering studies which define and delineate potentially hazardous conditions and recommend adequate mitigation.
Policy 10-27. Soil and geological reports shall be subject to the review and approval of the County Planning Geologist.
Policy 10-28. Generally, residential density shall decrease as slope increases, especially above a 15 percent slope.
Policy 10-29. Significant very steep hillsides shall be considered unsuitable for types of development which require extensive grading or other land disturbances.
Policy 10-30. Development shall be precluded in areas when landslides cannot be adequately repaired.
Policy 10-32. The County shall not accept dedication of public roads in unstable hillside areas, or allow construction of private roads there which would require and excessive degree of maintenance and repair costs

[8] Welch, L.E. et. al., 1977, *Soil Survey of Contra Costa County, California,* USDA Soil Conservation Service

2. Liquefaction

With regard to liquefaction potential, the Safety Element of the General Plan presents a Liquefaction Potential Map on page 10-15. This map was prepared for the County by a geotechnical engineering firm. The approach taken by the consultant included reviewed of available technical data, which included (a) elevation of the water table, (b) soils and surficial deposits maps providing data on the distribution of unconsolidated sandy soils, (c) review of selected borehole logs for land development projects in the County and (d) evaluation of the data gathered and preparation of liquefaction potential maps of the entire County at a scale of 1 inch= 2,000 ft.. The resulting Liquefaction Potential Map divided the County into three liquefaction potential categories: "generally high," "generally moderate to low," and "generally low."

The Liquefaction Potential Map is used as a "screening criteria" during the processing of land development applications, on a project-by-project basis. The County has consistently required rigorous evaluation of liquefaction potential in areas of "high potential," and qualitative investigations are demanded in the "moderate to low" category. Assessment of liquefaction potential is minimal for sites in the "generally low" category. The classification "generally high" liquefaction potential does not imply the presence of liquefiable sands on a parcel. The map attempts to be conservative of the side of safety. Where geologically recent fluvial deposits or sand bars could exist in the subsurface, the map places such areas in the "generally high" category. Site specific investigations are needed to determine if liquefiable sands are present and to provide stabilization measures where liquefiable sands are confirmed. Figure 4 presents an enlargement of the portion of the General Plan Liquefaction Potential Map of the site and immediate vicinity (scale 1 inch = 600 ft.). According to this map, the subject property is in the "generally moderate to low" category. As noted above, project sites with this classification require only a qualitative evaluation of liquefaction potential. Normally this involves evaluation of the deposits penetrated in the borehole, utilizing blow count data and gradation testing of sand layers to draw a preliminary conclusion regarding the need for a more rigorous investigation. Ordinarily, a "screening investigation" of this type would include one or more boreholes that are 30-40 feet deep (or to bedrock, whichever is less).

In the experience of the County peer review geologist, only 1 acre of every 1,000 acres in the "generally moderate to low" category have the unique set of conditions required for liquefaction of sands to be a hazard, and geotechnical measures are available to avoid/control the risk of damage should liquefiable soils be present. The Safety Element includes a number of policies indicating that at-risk areas require evaluation of liquefaction potential and effective mitigation of the hazard posed to new development. Operative General Plan policies are presented in Table 2.

Table 2
Safety Element Liquefaction Potential Policies

Policy 10-18 This General Plan shall discourage urban or suburban development in areas susceptible to high liquefaction dangers and where appropriate subject to the policies of 10-20 below, unless satisfactory mitigation measures can be provided, while recognizing that there are low intensity uses such as water-related recreation and agricultural uses that are appropriate in such areas.
Policy 10-19 To the extent practicable, the construction of critical facilities, structures involving high occupancies, and public facilities shall not be sited in areas identified as having a high liquefaction potential, or in areas underlain by deposits classified as having a high liquefaction potential.
Policy 10-20 Any structures permitted in areas of high liquefaction damage shall be sited, designed and constructed to minimize dangers from damage due to earthquake-induced liquefaction. Policy 10-21 Approvals that allow the construction of public and private development projects in areas of high liquefaction potential shall be contingent on geologic and engineering studies which define and delineate potentially hazardous geologic and/or soils conditions, recommend means of mitigating these adverse conditions; and on proper implementation of the mitigation measures

Rockridge Geotechnical Investigation

1. Scope and Purpose

The purpose of the investigation was to explore subsurface conditions, perform engineering analyses and to develop conclusions and recommendations regarding potential geologic, geotechnical and seismic hazards, and provide recommendations regarding site grading, drainage and foundation design. The scope of work included a) review of geologic literature, b) exploratory drilling of eleven (11) test borings and one hand-auger boring, d) sampling and laboratory testing of engineering properties of materials penetrated, e) evaluation of the data gathered, and f) preparation of a report documenting the investigation and presenting the evaluation and recommendations of the project geotechnical engineers.

2. Location and Topography

Figure 5, Parcel Map Showing Boreholes, identifies the Rockridge study area (subject property identified with a pale blue color). The map provides Assessor Parcel Numbers and identifies the location of Sites A, B and C. The map also shows the local road network, and provides topographic contours (10 ft. contour interval) and shows the approximate location of the exploratory borings.

3. Subsurface Exploration

The test borings were drilled during the period May 9-13, 2013 using a truck-mounted auger drill rig. Each of the eleven boring were drilled to depths of 24 or 25 ft. below the ground surface (bgs). Figure 2 of the Rockridge report shows the location of the three sites and the location of the test borings. The logs of the test borings are presented in Appendix A of the geotechnical report. In addition to the eleven auger borings, Boring B-9 was advanced to a depth of 4 ft. bgs using a hand auger. This drilling method was employed because of inadequate access for the truck mounted drill rig. The Rockridge exploration program also included a dynamic penetrometer test (DPT) adjacent to boring B-9. The DPT was extended to a depth of 15 ft., and the data gathered was converted to SPT blow counts. Those blow counts provides insight to the in-situ strength of the soils.

4. Laboratory Testing

Selected soil samples were tested to measure a) moisture content, b) dry density, c) Atterberg Limits, d) gradation, e) resistance value (i.e. R-value) and f) corrosivity. The laboratory test results are presented in Appendix B.

5. Rockridge Soil and Geologic Evaluation

The consultant references a published map that indicates the site is mantled by old alluvium, with sedimentary rocks of Miocene age at depth. Based on the results of the subsurface exploration program, geologic conditions on the three sites (A, B &C) can be summarized as follows:

- Site A. This site is located in the northeast corner of the Saranap Ave./ Boulevard Way intersection. Borings B-1 through B-5 indicate the alluvial deposits on this site range from 8 to 22 ft. in thickness. The borehole logs indicate the alluvium is stiff to hard clay interbedded with variable amounts of sand and gravel. These clayey sediments are interfinger with medium dense to dense sand and gravel with variable amounts of clay. Testing of the near surface clay indicates it is highly expansive. The sedimentary rock underlying the alluvium is described by Rockridge as *siltstones and mudstones that are soft to low hardness, plastic to friable in strength, and deeply*

weathered. At the time of drilling, groundwater was encountered only in Boring B-1. Boring B-3 was left open overnight and the water level was 9 ft. bgs the next morning.

- Site B. This site is located southeast of the Saranap Ave./ Boulevard Way intersection. Data on subsurface conditions is provided by Borings B-6 through B-9 and DPT-1 . Boring B-8, located at the south end of Site B, penetrated alluvial deposits to the full depth explored (24½ ft.). Boring B-6 and B-7 penetrated 12 ft. of alluvium overlying severely weathered siltstone and mudstone bedrock. Groundwater was not encountered in Borings B-6, B-9 and DPT-1 at the time of drilling. Groundwater was observed in B-7 at 13 ft. bgs, and B-8 at 17½ ft. bgs.

- Site C. This site is located southwest of the Saranap Ave./ Boulevard Way intersection. Borings B-10 through B-12 indicate the alluvial deposits of this site are 21 ft. thick at the site of Boring B-10, and they exceed the full depth penetrated in Borings B-11 & B-12 (25 ft. bgs). The bedrock penetrated near the bottom of Boring B-10 consist of soft to low hardness claystone, plastic to friable strength, and deeply weathered. Groundwater was at a depth of 20.3 ft. at the end of drilling, and remained at that depth 2½ hours later, just prior to grouting. Groundwater was not encountered in Borings B-11 and B-12 during drilling.

6. Rockridge Seismic Evaluation

The following discussion is intended to highlight and summarize (not supersede) the comments of Rockridge on the seismic setting of the site. The report review the seismic history of the San Franciscon Bay Region, and a table presented on page 9 on the report lists 14 known active faults and provides the distance between the site and each listed fault. Also discussed is technical data developed by the USGS on the probability of a characteristic earthquake on each of the faults that pose the primary ground shaking hazard to the site. The report goes on to discuss the full range of potential seismic hazards, including a) earthquake ground shaking, b) surface fault rupture, c) liquefaction and related hazards (e.g. differential settlement, lateral spreading, ground fissures), and d) cyclic densification. Briefly summarized damage potential of ground shaking is addressed by the California Building Code, and the geotechnical report provides CBC seismic parameters that are utilized by the structural engineer in the design of structures. The risk of surface fault rupture and liquefaction is considered to be negligible because there are no known active faults crossing the site, and the borehole logs indicate the alluvium is well consolidated and too clayey to liquefy. The alluvial deposits are not considered candidates for cyclic densification because they are well consolidated and cohesive.

7. Rockridge Evaluation and Conclusions

For a geotechnical perspective, the geotechnical engineer considers the site suitable for the proposed mixed use project, provided the geotechnical recommendations of Rockridge are incorporated into the project plans, specifications, and implemented during construction. The primary issues are a) expansive soils, b) relatively shallow water table for a project constructed with basements, c) providing adequate foundation support of the proposed buildings, and d) providing adequate lateral support for adjacent improvements during excavation and construction of basement levels. Additionally, corrosivity testing found the near-surface soils to be highly corrosive to buried steel. Further corrosivity testing is warranted to confirm the corrosivity of soils that will be in contact with concrete and steel following site preparation and rough grading, but prior to commencement of foundation work (i.e. drainage, footings, pouring slabs).

The Rockridge report provides general guidance on foundation systems, groundwater control/ dewatering, temporary dewatering, permanent dewatering, temporary cut slopes and shoring, corrosion protection, and "excavation, monitoring and construction considerations."

8. Rockridge Geotechnical Recommendations

Commencing on page 18, Rockridge provides geotechnical recommendations for the project the address a) site preparation, b) grading, c) foundation design, d) basement walls, e) support of temporary cut slopes, f) permanent dewatering, g) floor slabs, h) soil subgrade stabilization, i) exterior flatwork design, j) utility trench backfill and k) pavement design, l) drainage, m) bio-retention design, and n) geotechnical services during grading. The recommendations are detailed but are not intended for the issuance of construction permits. The geotechnical engineer notes that buildings on Sites A and B are to have basements. Rockridge states that these structures may be supported on continuous or individual spread footings, provided that permanent dewatering system will be installed to reduce hydrostatic pressures on the building slabs and foundations. Specific criteria are provide for the design parameters. With regard to the building on Site C, isolated spread footings are recommended at interior column locations; and continuous, deepened perimeter footings.

Because of the proximity of offsite structures and safety of construction workers, the temporary support of construction excavations are an issue for the project. Rockridge indicates that the selection, design construction and performance of the shoring system should be the responsibility of the contractor. Rockridge goes on to state that (a) a structural engineer knowledgeable in this type of construction should design the shoring, (b) Rockridge provides specific criteria and standards for alternative systems, c) the geotechnical aspects of the proposed shoring system should be reviewed by Rockridge to ensure it meets their requirements, and (d) during construction, Rockridge should observe installation of the shoring system and check the condition of the soil encountered during excavation.

Grading and Stormwater Control

1. Topography and Grading

Relatively little grading will be required for the project. The detailed topographic survey map was prepared by Kier & Wright. It indicate that existing elevations in Site A vary from +217 ft. to +227 ft., with the high point on APN 185-370-018. Site B elevations vary from +231 ft. to +212 ft., with the highpoint near the south boundary, and the general direction of slope to the south-southeast. Site C elevations range from +231 ft. to +227 ft. Site preparation work will include demolition of existing structures and only minor grading. According to the grading plans for the project, there will be surplus earth material that will need to be removed from the site. This is chiefly due to the excavations made for below grade parking on Sites A and B. The earthwork summary indicates that for the total project, the surplus earth material generated by civil grading totals 68,142 cu. yds. This estimate does not include earth materials generated by utility trenches, footing excavations, or adverse foundation conditions that may require special geotechnical recommendations.

2. Drainage and Stormwater Control

The San Francisco Bay Regional Water Quality Control Board (RWQCB) issued NPDES Permit #CAS612008, revised Order # R2-2003-022 to the Contra Costa County Clean Water Program (CCCWP). It contains requirements to prevent stormwater pollution and to protect and restore creek and wetland habitat.. The County has jurisdiction over permits and approvals within its incorporated area, but the NPDES permit requirements must be implemented. (i.e. RWQCB has mandated implementation of new, more stringent requirements to control runoff from land development projects). The RWQCB added Provision C.3 in the permit, requiring that, as a condition development approvals, project drainage plans must include specific stormwater treatment measures (BMPs) as well as implement treatment features to reduce pollutants in stormwater discharges. Provision C.3 establishes thresholds and criteria for implementation of stormwater treatment measures. The C.3 requirements are not only intended to reduce

short-term construction related runoff and resultant pollution, but are also intended to reduce the long-term adverse effects by requiring permanent runoff control measures as a part of approvals. The plans submitted for the project includes "stormwater treatment planters" that are intended to satisfy C.3 requirements.

The Rockridge geotechnical report (pg. 38), indicates that the primary concerns with bio-retention structures are a) providing suitable support for foundations and curbs constructed near the bio-retention facilities, and b) potential for subsurface water from the bio-retention areas to migrate (and possibly build up) beneath pavements and the proposed buildings. Specific criteria and standards for the siting and design of such facilities are provided in the geotechnical report (see pgs. 38-39).

DMA Evaluation

1. Subdivision Map Act

The Subdivision Map Act, Article 7 provides a listing of requirements for geotechnical investigations. Specifically, Section 66490 states that a preliminary soil report, prepared by licensed professionals and based on adequate test borings is required for every subdivision for which a final map is required. Sections 66491(c) and 66491(d) go on to state that if expansive or corrosive soils are encountered, a soils investigation for each lot may be required by the local jurisdiction (in this case, Contra Costa County). Available information indicates that the soils on the site are expansive and corrosive. Additionally, the project site was previously graded to accommodate the existing improvements (including utility trench backfill and possibly old septic systems).This is a geotechnical issue for the project (e.g. old fills that were placed for other purposes may be unsuitable for support of the proposed project). It should also be recognized that old fills may contain material unsuitable for use in an engineered fill (organic material, large rocks or construction debris or contaminated soils). The geotechnical investigation specified by the Subdivision Map Act would address these aspects of the project.

The soils provisions of the subdivision map act do not specify the point in the planning process where the investigation should be triggered. In our opinion, the report of Rockridge Geotechnical is adequate to deem the application complete and is a suitable basis for preparation of the CEQA document for the project. It must also be acknowledged that it is not uncommon for project design to evolve during the processing of a subdivision application. For that reason, it would be appropriate for the Conditions of Approval of the proposed subdivision require an update geotechnical report prior to the recordation of the Final Map. The report may require additional subsurface data from critical areas of the site, further evaluation of existing fills, and final evaluation of potential geologic, geotechnical and seismic hazards.

2. Preliminary Geologic and Seismic Hazards Assessment

Table 3 presents our evaluation of Geologic and Soils hazards addressed in the State CEQA Guidelines, Appendix G. Based on our review of available information, the primary geotechnical constraints are a) expansive soils, b) relatively shallow water table for a project constructed with basements, c) providing adequate foundation support of the proposed buildings, and d) providing adequate lateral support for adjacent improvements during excavation and construction of basement levels, e) corrosive soils, f) earthquake ground shaking, and g) previous grading/ development of the subject property, which may have resulted in placement of undocumented fill on the subject property. Additionally, the existing drainage system in the neighborhood is known to be inadequate. Therefore pumping of groundwater during episodes of heavy runoff creates a potential flooding hazard, depending of the volume of water pumped. Finally, there is an unknown, but potentially significant, risk that vibrations associated with construction (or changes in groundwater levels during the construction period) could result in minor settlement and/or cracking of nearby buildings or paved surfaces.

Table 3
DMA Assessment of Potential Geologic Hazards Addressed by State CEQA Guidelines, Appendix G

- There are no known active faults in the vicinity of the site, and no inactive faults cross the subject property. Hence, the risk of surface fault rupture is negligible.
- The site is within a seismically active area where strong ground shaking can be anticipated within the useful life of the proposed buildings. Compliance with grading and building codes, along with conservative design and quality construction can be expected to keep damage within acceptable limits. The geotechnical report provides 2013 *Seismic Design Parameters*. Those parameters are used by the structural engineer in the design of structures.
- The site is gently sloping and the USGS mapping of surficial deposits indicates that the nearest landslide is ¼ mile north-northwest of the site and presents no risk of damage to the project.
- According to the Soil Survey of Contra Costa County, for bare soils (i.e. during construction) the erosion hazard moderate. However, the project will require submittal of an *Erosion Control Plan* prior to issuance of the grading permit. That plan will be subject to technical review and approval by the Building Inspection Division. Moreover, during construction, the contractor may be required to update the plan to more specifically address field conditions at the approach of the winter rainy season.
- With regard to liquefaction potential, it is our opinion that the investigation of Rockridge Geotechnical is an adequate to evaluate the liquefaction potential of the site. The soils overlying the bedrock are too cohesive and too well consolidated to liquefy. Further evaluation of liquefaction potential is not warranted.
- The surface soils on the site have been confirmed to be highly expansive by Rockridge Geotechnical. Geotechnical recommendations have been provided to mitigate the effects of expansive soils. Evaluation of these measures shall be addressed by the CEQA document.

Limitations

The purpose of our review was to provide a professional opinion on the adequacy of the documents provided by the applicant for deeming the application complete. Specifically, provide technical advice to assist the Current Planning Division with discretionary permit decisions. Our services have been limited to interpretation of 1973 aerial photographs and review of the referenced reports and maps. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the engineering geology profession. We trust this letter provides the evaluation and comments that you requested. Please call if you have any questions, or if we can be of assistance during the preparation of the CEQA document and Conditions of Approval.

Sincerely,
DARWIN MYERS ASSOCIATES

Darwin Myers

REGISTERED GEOLOGIST
W. DARWIN MYERS
NO. 946
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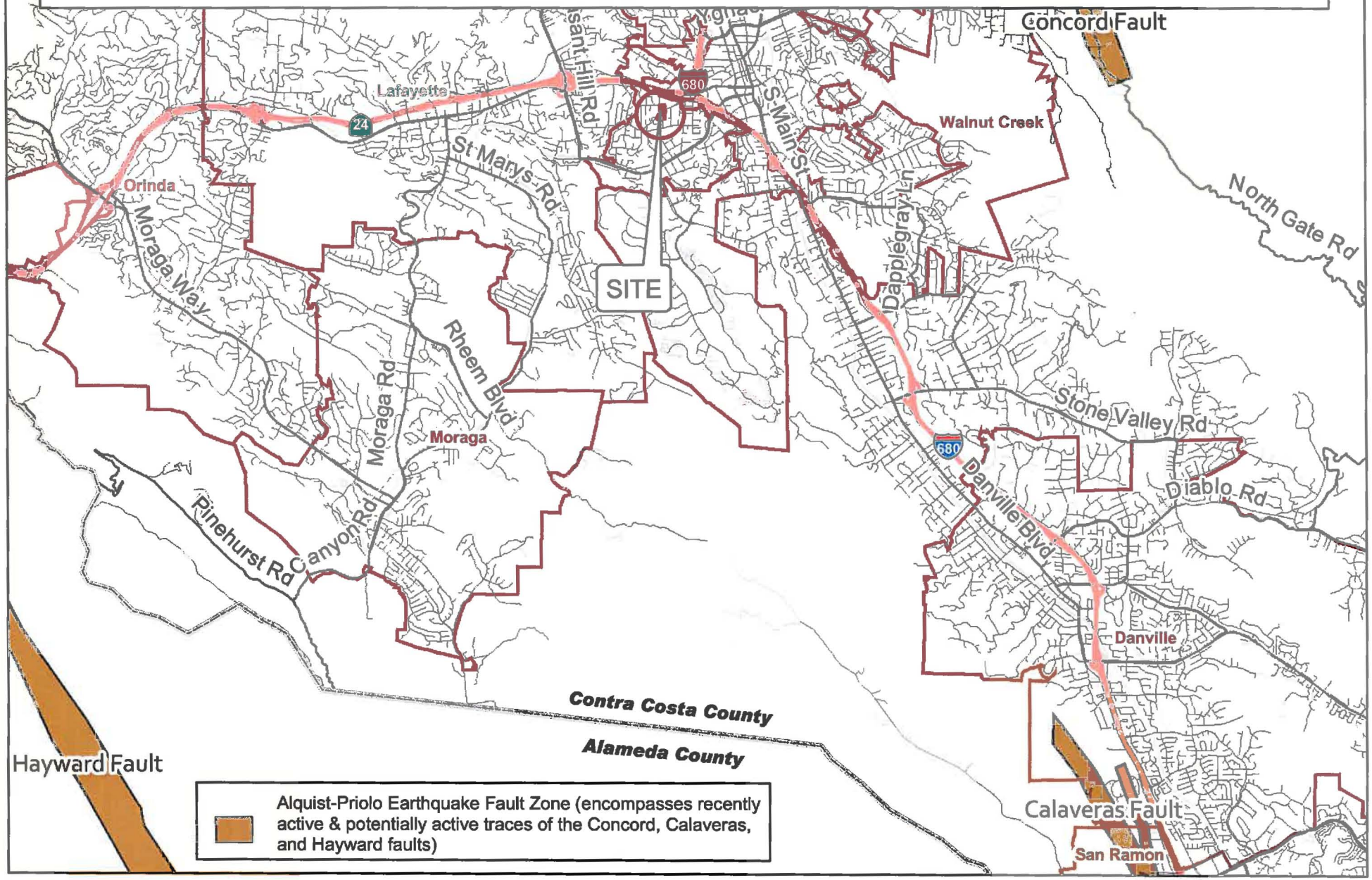
Principal

cc. Gary Faria, Sr. Grading Inspector, Building Inspection Division, DCD
Kier & Wright, 2850 Collier Canyon Road, Livermore, CA 94551
Linda H. J. Liang, Rockridge Geotechnical, 270 Grand Avenue, Oakland, CA 94610
Michael Smith, Hall Equities Group, 1855 Olympic Blvd., Walnut Creek, CA 94596

Figure 1: RZ13-3224 & SD139359 Vicinity Map with Alquist-Priolo Zones



Miles
0 0.5 1 2

Source: California Geologic Survey
2007 Special Publication 42

Map Created 5/16/2013
by Contra Costa County Department of Conservation and Development, GIS Group
30 Muir Road, Martinez, CA 94553
37:59:41.791N 122:07:03.756W

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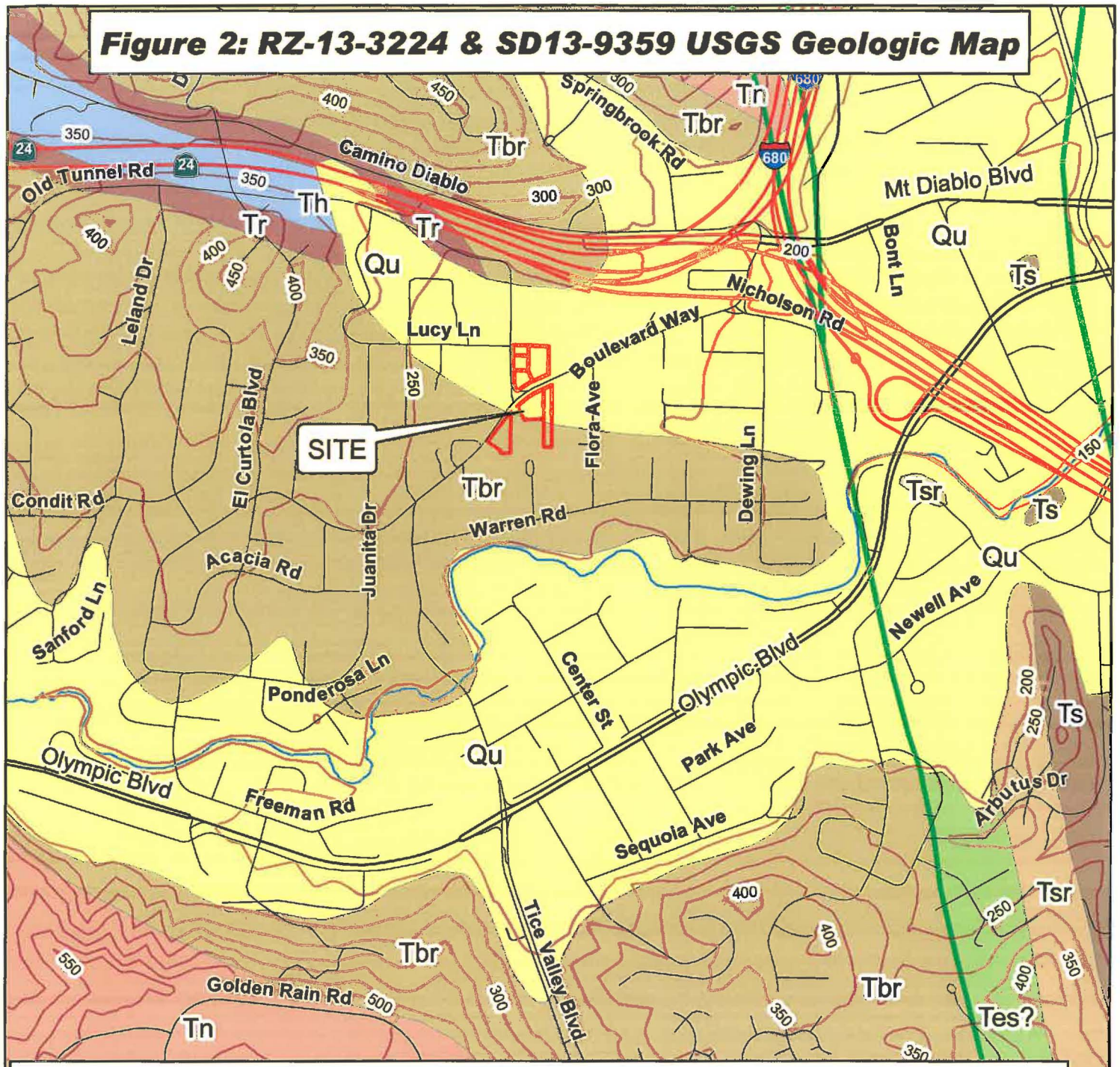
Figure 2: RZ-13-3224 & SD13-9359 USGS Geologic Map



USGS Geology

- Qu: Surficial Deposits (undivided)

Miocene Bedrock

- Tn: Neroly Sandstone (query indicates uncertainty)
- Ts: Sobrante Sandstone
- Tr: Rodeo Shale
- Tbr: Briones Formation (undivided)
- Th: Hambre Sandstone (query indicates uncertainty)

Oligocene or Miocene Bedrock

- Tsr: San Ramon Sandstone

Eocene Bedrock

- Tes?: Escobar Sandstone (queried where identification uncertain)

- Project Site
- Bedrock Fault
- 50ft Contours
- Creeks

0 500 1,000 2,000 Feet

Source: USGS Open File Report 94-622

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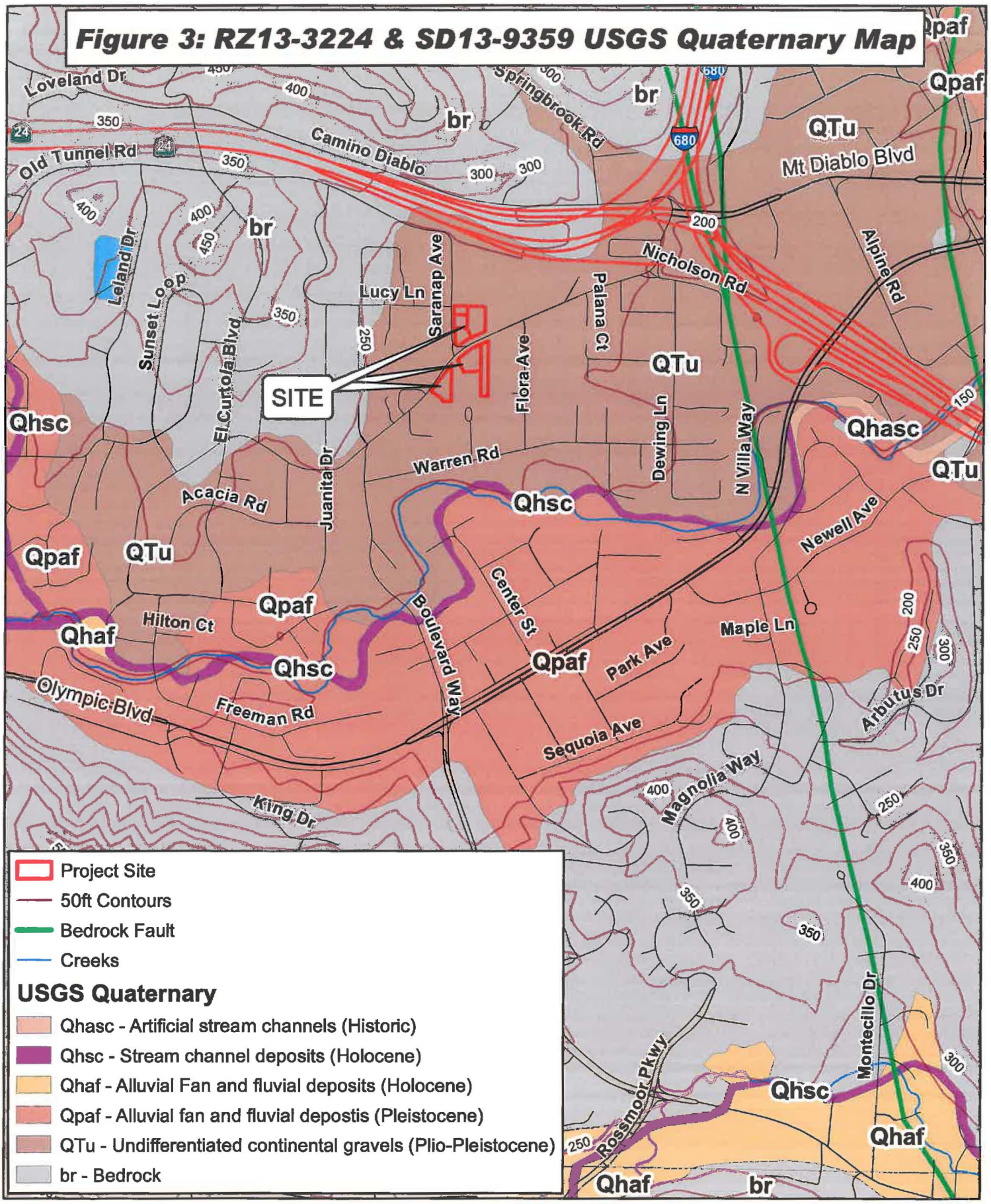
Figure 3: RZ13-3224 & SD13-9359 USGS Quaternary Map



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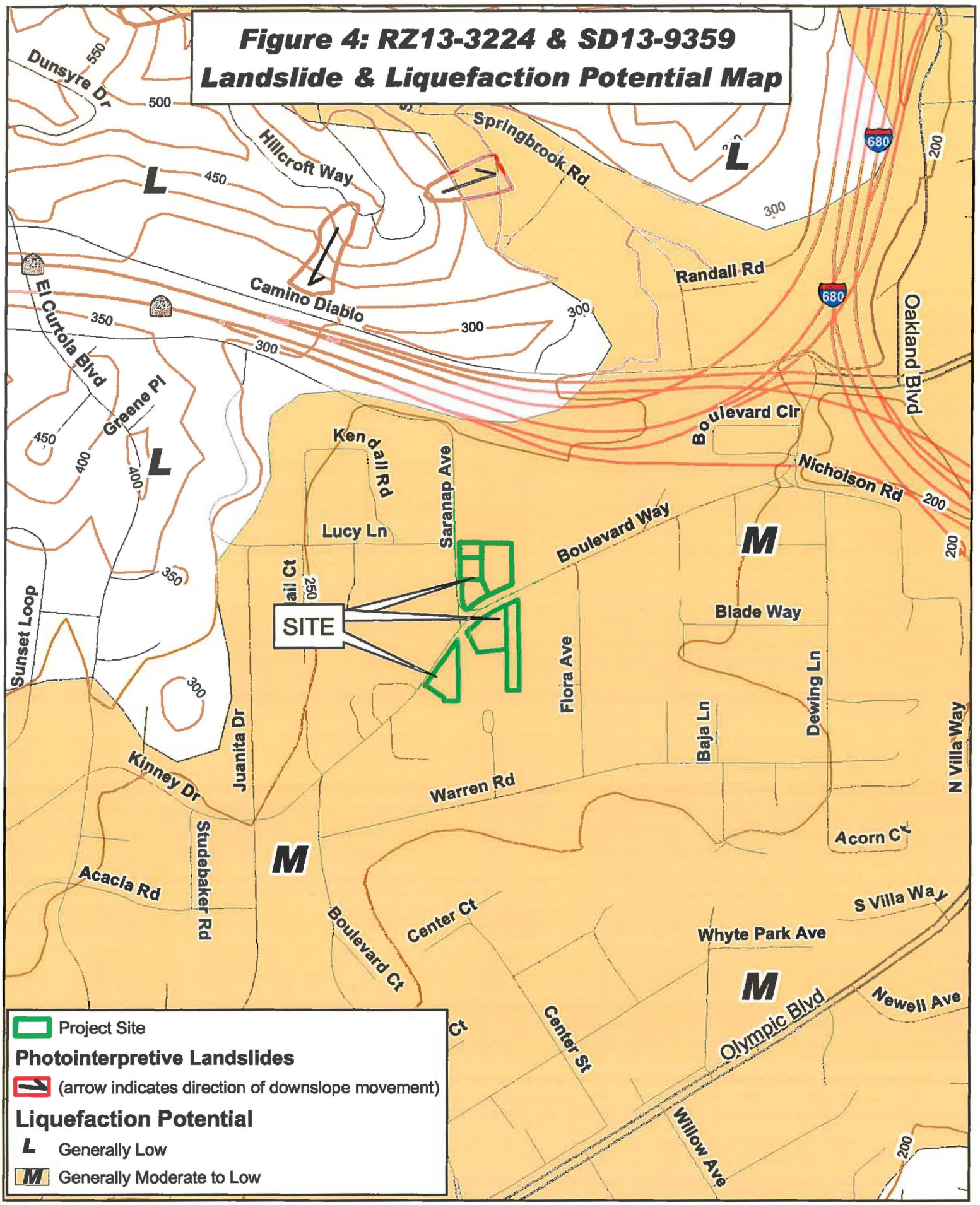
Source: USGS Open File Report 97-98

Figure 4: RZ13-3224 & SD13-9359
Landslide & Liquefaction Potential Map



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Source: USGS Open File Map 75-277-55 & Saftey Element

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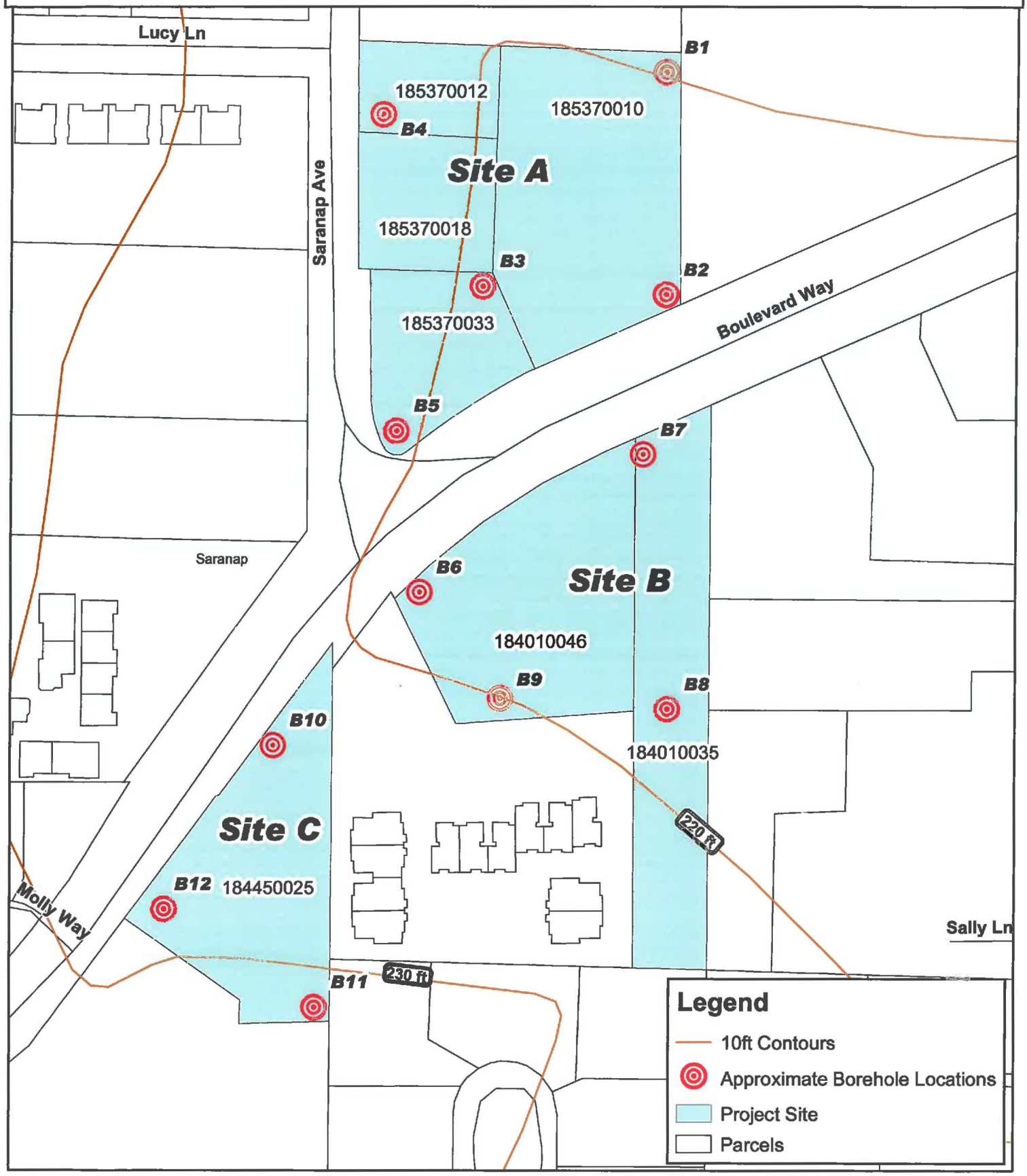
Figure 5: RZ-13-3224 & SD13-9359 Parcel Map showing Boreholes



0 50 100 200 Feet

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Source: Rockridge Geotechnical (2013)