

Appendix D
Noise Assessment

MEMO

Date: **November 8, 2017**

To: **Steve Abbs, Davidon Homes**

From: **Michael Keinath, Ramboll Environ**

Subject: **NOISE ASSESSMENT FOR CEQA ANALYSIS
DANVILLE, CALIFORNIA**

Dear Mr. Abbs:

At the request of Davidon Homes, Ramboll Environ US Corporation (Ramboll Environ) conducted California Environmental Quality Act (CEQA) analyses of potential noise and groundborne vibration impacts related to their proposed Magee Ranch residential development project in Danville, California (the "Project"). The analysis was conducted as part of a Revised Draft Environmental Impact Report (EIR), which will update the EIR conducted for a previous version of the proposed development.¹ As noted in the Revised Notice of Preparation dated August 29, 2017, the focus of this assessment is on noise and vibration impacts to nearby sensitive uses (e.g., residences) related to construction of the development and cumulative impacts of construction noise.²

The Project Area location is presented in **Figure 1** (attached). The Project will be comprised of 69 new single family homes located within two separate parcels. 66 of the homes will be constructed on the larger Project area, located primarily south of Diablo Road/Blackhawk Road, as shown in **Figure 1**, while 3 of the homes will be constructed on the smaller Project area, located along McCauley Road, approximately 1 mile west of the larger Project area.

BACKGROUND

The Project's original 2012 Environmental Impact Report (EIR) assessed noise from the previous plan that was comprised of 78 single family homes established in three clusters. The previous plan housing clusters included a primary cluster south of Blackhawk Road, similar to the Project, a smaller cluster west of the primary site and south of Diablo Road, and a three home cluster south of McCauley Road, also similar to the Project. The Project contains 69 rather than 78 single family homes and eliminates the small cluster south of Diablo Road.

The EIR noise section for the previous project plan included an evaluation of impacts relative to noise and vibration from project construction and operation. The Revised Notice of Preparation indicates that the assessments of potential noise and groundborne vibration related to Project construction should be revisited for the revised Project. The 2012 EIR identified groundborne vibration impacts, generated during construction of the Project, as **LESS THAN SIGNIFICANT**. The same 2012 EIR identified noise from project construction as a **SIGNIFICANT SHORT-TERM NOISE IMPACT**, with mitigation identified to reduce these impacts to less than significant.

¹ Town of Danville. *Draft Environmental Impact Report for Magee Ranches*. November 2012.

² Town of Danville. Notice of Preparation (NOP) for the Revised Draft Environmental Impact Report for the Magee Ranches Project. August 29, 2017.

SUMMARY OF RESULTS

Construction-related groundborne vibration is expected to be 0.2 in/sec PPV or less at nearby residences and would not cause structural damage. Vibration levels may occasionally be perceptible, but vibration from construction activities would be anticipated and would occur for only short periods of time. Therefore, construction-related vibration impacts are expected to remain **LESS THAN SIGNIFICANT** with the Project. No mitigation is required.

Hourly noise levels from construction activities are expected to exceed 60 dBA Leq and result in greater than 5 dBA increases over ambient levels at residences adjacent to or near the project site during portions of the construction period. If construction activities were to affect individual residences with levels of noise exceeding 60 dBA for more than a year, this would result in significant, short-term noise impacts. However, elevated levels above 60 dBA are not expected to occur at any single location for a duration of a year or more, so that the impact would be **LESS THAN SIGNIFICANT**.

Furthermore, the applicant has agreed to implement as conditions of project approval the mitigation measures that had been identified in the 2012 EIR, which include restricting hours of construction, requiring maintenance of mufflers, minimizing idling, and requiring designating a Disturbance Coordinator (DC) for each phase of construction. These conditions of approval would further reduce construction noise impacts.

Cumulative impacts of the Project in regards to construction noise are **LESS THAN SIGNIFICANT**.

REGULATORY CRITERIA

Chapter 4 of the Danville Municipal Code (DMC) contains language restricting the hours of construction.³ Specifically, DMC 4-2.4(d) restricts construction (that creates noise) within or adjacent to a residential land use district to Monday through Friday between the hours of 7:30 AM and 7 PM, and on Saturdays, Sundays and holidays between the hours of 9 AM and 7 PM.

THRESHOLDS OF SIGNIFICANCE

As identified in the 2012 EIR, the following thresholds of significance, applicable to construction noise and vibration, were used to evaluate the potential for significant impacts from the Project:

- Exposure of persons to groundborne vibration levels exceeding 0.20 in/sec PPV (peak particle velocity)
- Generation of noise from construction activities or construction-related off-site traffic that would exceed 60 dBA Leq and result in an increase over ambient sound levels of at least 5 dBA Leq for a period of one year or more at exterior areas of uses sensitive to noise (e.g., residences, residential care facilities, schools)

EXISTING SOUND ENVIRONMENT

The assessment of significance of construction noise impacts is based, in part, on the potential for increases in noise levels over the existing ambient environment. Therefore, ambient sound levels were measured in the Project vicinity to quantify and characterize the existing noise environment. Although ambient levels were measured in 2011 for the 2012 EIR, new measurements were taken to ensure that increased traffic volumes on local roadways were accurately represented.

Long-term sound levels were measured at three locations from June 26 to 29, 2017. The sound level measurements were conducted with Larson Davis Lxt Class I sound level meters. Each meter had

³ Town of Danville. Municipal Code, Chapter 4.2 Noise Control. Available at: [http://library.amlegal.com/nxt/gateway.dll/California/danville_ca/danvillegaliforniamunicipalcode?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:danville_ca](http://library.amlegal.com/nxt/gateway.dll/California/danville_ca/danvillegaliforniamunicipalcode?f=templates$fn=default.htm$3.0$vid=amlegal:danville_ca)

been factory certified within the preceding 12 months and was calibrated in the field prior to deployment. Each meter was fitted with an acoustically neutral weather head and set at an approximate listening height (~5 feet above ground elevation). The resulting measured sound levels are summarized in **Table 1**.

Table 1. Existing Ambient Sound Levels During Hours of Construction (dBA)			
SLM #	Date	Hourly Leq 7AM to 7PM	
		Min	Max
LT1	June 26 - 29, 2017	42	52
LT2	June 26 - 29, 2017	58	63
LT3	June 26 - 29, 2017	49	53

Source: Ramboll Environ, 2017

GROUNDBORNE VIBRATION FROM CONSTRUCTION

The 2012 EIR indicated that residences in the vicinity of the original project site could at times be exposed to perceptible vibration levels from construction activities, but that vibration levels would not be considered excessive. This was identified as a less than-significant impact. Assessment of construction-related vibration levels is reconsidered here for the Project.

As noted in the 2012 EIR, the California Department of Transportation uses a vibration limit of 0.5 in/sec PPV (peak particle velocity) to avoid structural damage in buildings structurally sound and designed to modern engineering standards, 0.2 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. To be conservative, the threshold of significance for construction-related vibration is established in this EIR as exposure of buildings to groundborne vibration levels exceeding 0.20 in/sec PPV.

Construction activities related to Project development would include site preparation work such as grading and installation of utilities, paving, landscaping, and new building framing and finishing. Building framing, exterior and interior finishing, and landscaping activities are not anticipated to be sources of substantial vibration. Construction techniques that generate the highest vibration levels, such as impact or vibratory pile driving, are not required for this project. The primary source of construction-related vibration associated with the Project is expected to be mobile heavy equipment (e.g., dozers, vibratory rollers, etc.) associated with site preparation, grading, and paving. **Table 2** identifies typical vibration levels for various construction activities and equipment that are expected for the Project.

Construction activities on the majority of the Project site would occur at distances of 80 feet or more from the nearest residential buildings and are expected to result in groundborne vibration levels less than 0.2 in/sec PPV (**Table 2**).

Construction of the Project main entrance at Blackhawk Road would require grading and paving activities near existing residences. Grading and site preparation activities in this area would include

the use of a dozer operating as near as approximately 20 feet from the nearest existing residential buildings and may result in an estimated vibration level of up to 0.12 in/sec PPV. Paving of the entrance roadway and path may include use of a vibratory roller operating up to 50 feet from the nearest residential buildings, resulting in an estimated vibration level of up to 0.07 in/sec PPV. These worst-case vibration levels would not be expected to result in structural damage.

Table 2. Vibration Source Levels for Construction Equipment				
Equipment	PPV (in/sec)			
	At 25 ft^(a)	At 20 ft^(b)	At 50 ft^(b)	At 80 ft^(b)
Vibratory Roller	0.210	0.29	0.07	0.04
Large bulldozer	0.089	0.12	0.03	0.02
Loaded trucks	0.076	0.11	0.03	0.01
Small bulldozer	0.003	0.00	0.00	0.00
^(a) Source: Federal Transit Administration (FTA), <i>Transit Noise and Vibration Impact Assessment</i> , May 2006. ^(b) Calculated based on reference level at 25 feet and standard distance attenuation of $PPV_{(at\ receiver)} = PPV_{(reference\ at\ 25\ ft)} \times (25/distance\ to\ receiver)^{1.5}$				

Although vibration would not be expected to cause structural damage, vibration levels may still be perceptible. However, as with any type of construction, vibration from construction activities would be anticipated, and would occur for only short periods of time. Vibration from construction would not result in levels of 0.20 in/sec PPV at any building. Therefore, construction-related vibration impacts are expected to remain **LESS THAN SIGNIFICANT** with the Project. No mitigation is required.

NOISE FROM CONSTRUCTION

The 2012 EIR for the original project indicated that residences in the vicinity of the clustered development sites would be intermittently exposed to high noise levels. This was identified as a significant, short-term noise impact. Assessment of construction-related noise levels is reconsidered here for the Project.

As outlined in the 2012 EIR, a significant noise impact is defined as construction-related noise that exceeds 60 dBA Leq at sensitive receivers and results in an increase over ambient sound levels of at least 5 dBA Leq for a period of one year or more.

Ambient Sound Levels

When considering the potential for construction-related increases over ambient noise levels, it is necessary to first establish the applicable ambient levels at potentially affected receivers. Measured hourly sound levels in the vicinity of the Project are displayed in **Table 1**. Existing hourly sound levels measured at residences adjacent to the proposed primary cluster of residences and far from Blackhawk/Diablo Road (represented by LT-1 in **Figure 1**) ranged from 42 to 52 dBA during standard hours of construction. Hourly sound levels nearer to Blackhawk/Diablo Road (represented by LT-2 in **Figure 1**) ranged from 58 to 63 dBA. Measured hourly sound levels near the proposed smaller cluster of homes near McCauley Road (represented by LT-3 in **Figure 1**) ranged from 49 to 53 dBA.

At noise-sensitive receiving areas with existing hourly LeqS in the 40s to low 50s dBA, including residences that are represented by LT-1 and the Green Valley Elementary School represented by LT-3,

a construction noise level of 60 dBA or more would result in an increase of more than 5 dBA. For residences near Blackhawk/Diablo Road, as represented by LT-2, the ambient sound levels are higher, ranging from 58 to 63 dBA, allowing for construction-related sound levels up to 62 dBA before resulting in an overall increase of greater than 5 dBA.

Noise from On-site Equipment

Project construction will occur over two construction phases. The first phase would include demolition, site preparation, grading, and trenching, as well as construction of Project access roads, paths, and utilities. The second phase of construction would include construction of individual residences (i.e., houses). According to the developer's schedule, the first phase (site work) will be completed in less than 1 year (approximately ten months). During the second phase of work (individual home building), each home would be constructed individually and would be issued its own building permit. Estimated construction sound levels for the various construction phases are displayed in **Table 3**.

Phase	Activity	# Days	Level at 50 ft ^(a)	Distance to Nearest Receiver (ft)	Level at Nearest Receiver	Distance to 60 dBA (ft)
I	Demolition	15	84	85	79	750
	Site Preparation		83	20	91	750
	Grading	75	84	20	92	750
	Trenching	75	83	55	82	750
	Paving	16	77	50	77	375
	Landscaping	60	83	20	91	750
II	Building Construction	Dispersed over 3 years	83	150/20 ^(b)	74/91 ^(c)	750
	Architectural Coating		74	150/20 ^(b)	64/82 ^(c)	250

Source: Equipment usage for Site Preparation and Landscaping phases was provided by the project sponsor. Equipment usage for other phases was taken from CalEEMod default values.

^(a) Equipment sound levels from the FHWA *Roadway Construction Noise Model*.⁴ Representative sound levels for each phase of construction were calculated based on the conservative assumption that two loudest pieces of equipment during each phase would operate concurrently at the same location.

^(b) Distances to Off-site/On-site residences

^(c) Calculated levels at Off-site/On-site residences

Construction activities within the new Appaloosa Street corridor (access to Project from Blackhawk Road) would be the nearest activity to potentially affected sensitive receivers. Site preparation, grading, and landscaping activities could occur as near as 20 feet from residential buildings and outdoor use areas along the east side of the corridor, and as near as 50 feet from residential buildings on the west side. Note that outdoor use areas of homes on the west side of this corridor are located further than 50 feet away or are located on the west side of the residential building and

⁴ U.S. Federal Highway Administration (FHWA). *Roadway Construction Noise Model (RCNM) version 1.1*. December 8, 2008.

therefore shielded from activity within the corridor. Using worst-case assumptions (i.e., the two loudest pieces of equipment operating concurrently at the same location nearest the receiver), site preparation, grading, and landscaping could result in levels as high as 91 to 92 dBA at the nearest residences (see **Table 3**). However, these activities would only occur nearest each individual residence for short periods of time, and sound levels during most of the first construction phase would be much lower than are shown in **Table 3**. Using conservative assumptions (i.e., distance attenuation only with no reduction due to intervening structures, topography, or foliage), sound levels could exceed 60 dBA for residences within 750 feet of most site preparation activities. Given the large size of the overall site, elevated levels of construction noise would be expected to occur at individual noise-sensitive receivers for small durations of time relative to the overall construction program. And because all phase 1 construction work would occur for less than a year (approximately 10 months), elevated levels at individual noise-sensitive receivers would occur for substantially less than a year.

Construction of individual homes would occur after site work has been completed (with the exception of some landscaping activity that would occur as individual home construction is completed). Each home could take up to nine months to construct. The levels identified in **Table 3** indicate that sound levels of this activity would typically be as loud as grading or other site work. However, it should be noted that these are conservative estimates based on the assumption that two pieces of large diesel-powered equipment (e.g., cranes, excavators, forklift) would be operating concurrently at a single location during the building process. Although occasional use of a crane, forklift, or similar equipment may be required during construction of individual homes, such equipment would be required only occasionally and for short periods during each home's approximately nine-month construction period. Also, as with the site work most potentially affected noise-sensitive receivers would be located far from construction activity for individual new homes, and therefore would not be exposed to elevated construction noise levels during most of home construction activity.

In addition to the potential for construction noise impacts at existing off-site residences, new on-site residences built earlier in Phase 2 could be exposed to sound levels of 80 dBA or more if homes are constructed on immediately adjacent to these new occupied homes. However, as noted above, the loudest equipment associated with the construction of individual homes is expected to operate only intermittently and for relatively short periods of time, and the vast majority of home construction would be much quieter. Also, as more homes are constructed, recently constructed homes may act as effective noise barriers (i.e., would provide noise shielding) when located between an occupied home and ongoing construction activities. Therefore, it is unlikely that the first new residences would be exposed to elevated noise levels for extended periods of time.

In addition to on-site construction equipment, noise would be produced by vehicles and trucks carrying workers and materials to and from the active construction areas. Traffic data produced for the Project identified the peak daily trips during construction would occur during an overlap of landscaping and building construction on the primary cluster site.⁵ During the Project's worst-case construction traffic hour, there would be up to 19 worker vehicle trips, 3 medium-sized truck trips, and 1 heavy duty truck trip. The nearest roadways to potentially affected residences are the new Appaloosa Street, the centerline of which would be located approximately 70 feet from residential buildings west of this new Project entrance, and Brumby Street, approximately 100 feet from residential buildings. FHWA's TNM Lookup was used to calculate construction traffic sound levels along these roadways.⁶ At residences nearest Appaloosa Street and Brumby Street, construction traffic noise levels are expected

⁵ Stantec. 2017. *Traffic Impact Study for Magee Ranch in the Town of Danville*. June 5, 2017.

⁶ U.S. Federal Highway Administration (FHWA) Traffic Noise Model Lookup Program version 2.0. December 17, 2004.

to be 47 and 48 dBA, respectively, during the worst-case peak hour period. Construction traffic noise levels of this magnitude would result in a negligible contribution to the overall construction sound levels, and would not contribute to significant noise impacts.

For all potentially affected noise-sensitive receivers adjacent to or near the Project site, hourly sound levels during construction activities are expected to exceed 60 dBA Leq and result in greater than 5 dBA increases over ambient levels during portions of the construction period. However, elevated levels above 60 dBA (and greater than 5 dBA over ambient) are not expected to occur at any single location for a duration of one year or more, rendering this impact **LESS THAN SIGNIFICANT**.

Construction Noise Mitigation

- Because the Project's vibration and noise impacts would not be significant under the Town's significance thresholds, no mitigation is required under CEQA. However, the project applicant has agreed to implement mitigation measures that were previously identified in the 2012 EIR. These are: Muffle and maintain all equipment used on site. All internal combustion engine driven equipment shall be fitted with mufflers, which are in good condition.
- Use "quiet" models of air compressors and other stationary noise sources where technology exists.
- Locate stationary noise-generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area.
- Prohibit unnecessary idling of internal combustion engines.
- Prohibit audible construction workers' radios on adjoining properties.
- Restrict noise-generating activities at the construction site or in areas adjacent to the construction site to the hours between 8 AM and 5 PM, Monday through Saturday.
- Do not allow machinery to be cleaned or serviced past 6 PM or prior to 7 AM Monday through Friday.
- Limit the allowable hours for the delivery of materials or equipment to the site and truck traffic coming to and from the site for any purpose to Monday through Friday between 7 AM and 6 PM.
- Do not allow any construction or construction-related activities at the project site on weekends and holidays.
- Clearly post allowable construction hours on a sign at each construction site.
- Designate a Disturbance Coordinator for each of the clustered development sites for the duration of the Phase 1 (site work) and for each home site during the Phase 2 (home building) construction. Because each home would be constructed individually and would have its own building permit, a Disturbance Coordinator should be designated during the construction of each home. The requirement for a Disturbance Coordinator for each home site should be incorporated in the CCRs of the development, such that responsibility of the Property Owners' Association and/or home builder to designate this Disturbance Coordinator for each lot for the duration of construction until full site buildout. The Disturbance Coordinator shall:
 1. Receive and act on complaints about construction disturbances during infrastructure installation, landslide repair, road building, residential construction, and other construction activities.
 2. Determine the cause(s) and implement remedial measures as necessary to alleviate significant problems.

3. Clearly post his/her name and phone number(s) on a sign at each clustered development and home building site.
4. Notify area residents of construction activities, schedules, and impacts.

CUMULATIVE IMPACTS FROM CONSTRUCTION NOISE

Noise impacts during construction are relatively localized. The only currently proposed project that might be constructed at the same time as the Project, in the vicinity of receivers potentially affected by the Project construction, is a portion of the Central Contra Costa Sanitary District's Proposed Satellite Water Recycling Facility (SWRF) Project. The SWRF project, if approved, would place a pipeline along the north side of Diablo Road between Green Valley Road and Calle Arroyo. Because the pipeline construction would proceed at a pace of approximately 100 linear feet per day, noise from SWRF construction would not combine with noise from Project construction to cause a significant impact at any sensitive receptor. Therefore, no cumulative noise impacts are anticipated during construction.

CLOSING

If you have any questions about these analyses, please feel free to contact Kristen Wallace at 425.412.1807 or kwallace@ramboll.com. Thank you for the opportunity to assist you with this matter.

Attachments: Figure

FIGURE

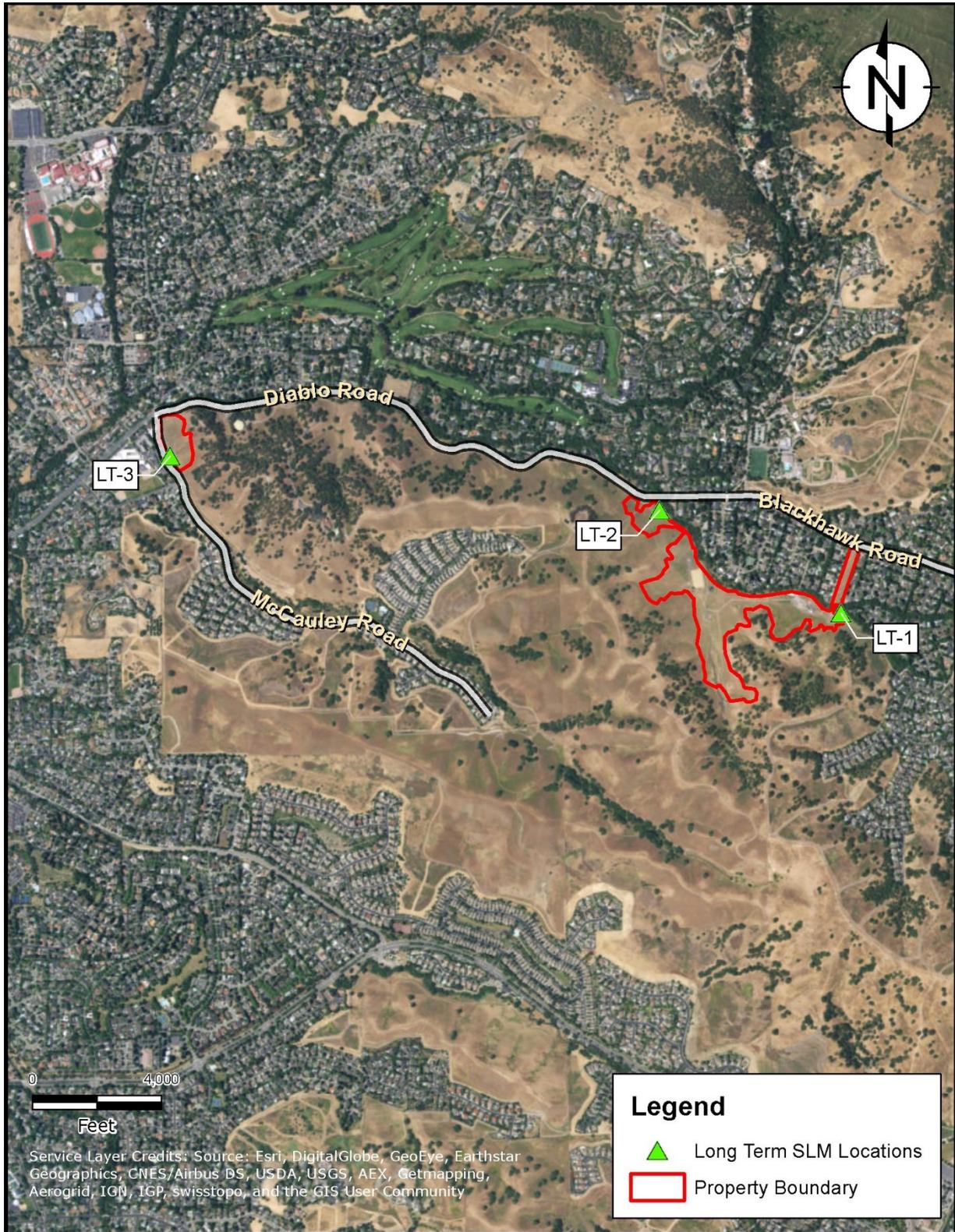


Figure 1. Project Vicinity and Sound Level Measurement (SLM) Locations