4.5 NOISE

4.5.1 Introduction

This section of the Recirculated Draft SEIR (SEIR) describes the existing noise environment in the project area. The noise impacts associated with the implementation of the proposed 2020 LRDP are assessed with respect to the applicable significance thresholds specified in the state and local regulatory programs and adopted plans. Key noise issues include exposure of existing and proposed noise-sensitive land uses to construction noise and increases in traffic noise along the roadway network from project-related changes in traffic patterns.

4.5.2 Environmental Setting

Fundamentals of Noise

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary enormously within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called "A-weighting," written "dBA." In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level.

Different types of metrics are used to characterize the time-varying nature of sound. These metrics include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (L_{xx}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). Below are brief definitions of these metrics and other terminology used in this chapter:

- **Sound.** A vibratory disturbance created by a vibrating object which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Maximum Sound Level (L_{max}).** The maximum sound level measured during the measurement period.
- **Minimum Sound Level (L_{min}).** The minimum sound level measured during the measurement period.
- **Equivalent Sound Level (L_{eq}).** The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.
- **Day-Night Level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 PM to 7:00 AM.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 PM to 10:00 PM and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 PM to 7:00 AM.

L_{dn} and CNEL values differ by less than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this noise assessment.

Existing Conditions

The campus is located in eastern Merced County, east of Lake Yosemite and Lake Road, approximately 2 miles northeast of the corporate limits of the City of Merced, California. The Regents approved the establishment of the new campus on the site in 2002 and following the completion of the first set of campus facilities, the campus was inaugurated in 2005. Since then, campus development has continued, and new facilities are currently under construction as part of the 2020 Project which would allow the campus to accommodate an enrollment level of about 10,000 students.

Other than campus development and ongoing construction, the project site is largely undeveloped and no major fixed noise sources exist on the site. Noise sources include traffic on local roadways and noise from agricultural operations. Noise-sensitive receptors in the vicinity of the project site include a few residences located along the east side of Lake Road and Bellevue Avenue to the south of the project site.

Roadways and Freeways

No heavily traveled roads or freeways are within the vicinity of the campus. State Route (SR) 99, SR 59, and SR 140 are all located about 2.5 miles or further from the campus site and do not affect noise levels in

the project area. Nearby roadways tend to be light to moderately traveled, at moderate vehicle speeds, and do not handle large volumes of heavy-duty trucks or buses. As such, while motor vehicle traffic causes noise within the project area and tends to be the primary noise source in locations adjacent to traveled roadways, the resulting noise levels are not excessive.

The existing ambient noise levels were estimated for the segments of the two main roads leading to campus, Lake and Bellevue Roads, based on average daily trips provided in the traffic study for this project. The traffic noise was modeled using the Federal Highway Administration Highway (FHWA) Highway Noise Prediction Model (FHWA-RD-77-108). The highest traffic volumes during either the AM or PM peak hour were used as inputs to the model. The estimated ambient roadway noise levels are presented in **Table 4.5-1, Existing Roadway Modeled Noise Levels**. As shown, the modeled roadway noise level on Lake Road adjacent to the campus is 59.7 dB(A) CNEL at 75 feet while the modeled roadway noise level on Bellevue Road leading to the campus is 60.5 dB(A) CNEL at 75 feet. It is noted that noise levels along these roadways are likely slightly higher than these modeled levels due to the contribution of noise from other non-roadway noise sources. However, traffic is the dominant noise source in the area.

Table 4.5-1
Existing Roadway Modeled Noise Levels

Roadway Segment/Intersection	CNEL at 75 Feet	Distance to Noise Contour [a]		
		70 CNEL	65 CNEL	60 CNEL
Lake Road				
Between Bellevue and Cardella	59.7	--[b]	--[b]	--[b]
Between Cardella and Yosemite	59.5	--[b]	--[b]	--[b]
Bellevue Road				
Between Lake Road and G Street	60.5	--[b]	--[b]	81
Between G Street and State Route 59	60.5	--[b]	--[b]	81

*Source: Impact Sciences. Model results are contained in **Appendix 4.5**.*

[a] *Distances are in feet from roadway centerline. The identified noise level at 75 feet from the roadway centerline is for reference purposes only as a point from which to calculate the noise contour distances. It does not reflect an actual building location or potential impact location.*

[b] *Noise contour is located within the roadway right-of-way.*

Railroad Traffic

The Burlington Northern/Santa Fe (BNSF) Railroad main line passes through the City of Merced and is approximately 2.5 miles to the south of the project site. This rail line carries frequent north-south freight train traffic and daily Amtrak passenger trains. Because the railroad is sufficiently distant from the project area, noise from railroad traffic does not affect ambient noise levels on the campus.

Aircraft Overflights

The Merced Municipal Airport is approximately 7 miles to the southwest of the campus, and Castle Airport (the former Castle Air Force Base) is approximately 6 miles to the west. While noise from aircraft overflights is occasionally perceptible on the campus, it does not substantially affect the noise environment. A review of the County's Noise Element indicates that the 65 dBA L_{dn} noise contours associated with the airports in the region do not encompass or include any portion of the campus.

A private airstrip is located approximately 1.8 miles southeast of the built portion of the campus. The airstrip is used by planes involved in agriculture operations (e.g., fertilizing, seeding, and baiting). As the airstrip does not support commercial flights and is used for a limited number of agricultural flights, it is not anticipated that the airstrip would alter the ambient noise levels at or near the campus.

Stationary and Area Sources

Stationary and area noise sources include common building or home mechanical equipment, such as air conditioners, ventilation systems, or pool pumps, and industrial or agricultural operations. These noise sources become a concern when they are in close proximity to land uses where people would be noise-sensitive. No industrial or manufacturing facilities are located on the campus; however, some agricultural-related operations and land maintenance activities cause occasional, daytime noise within the southern portion of the campus (e.g., noise from farm equipment, crop-dusting, etc.). To the northwest of the campus, the Lake Yosemite facilities provide recreational boating opportunities, which generate noise primarily during the daytime hours of the warmer months.

4.5.3 Regulatory Considerations

State Regulations

The pertinent State of California regulations are contained in the California Code of Regulations (CCR). Title 24 "Noise Insulation Standards" establish the acceptable interior community noise level for multifamily dwellings (and may be extended by local legislative action to include single-family dwellings). Section 65302(f) of the CCR establishes the requirement that local land use planning jurisdictions prepare a General Plan. The Noise Element is a mandatory component of the General Plan. It includes general community noise guidelines developed by the California Department of Health Services and specific planning guidelines for noise/land use compatibility developed by the local jurisdiction. The state guidelines recommend that the local jurisdiction consider adopting a local nuisance noise control ordinance.

The California Department of Health Services has developed guidelines (1987) for community noise acceptability for use by local agencies. Selected relevant levels are the following:

- CNEL below 60 dBA—normally acceptable for low-density residential use.
- CNEL of 55 to 70 dBA—conditionally acceptable for low-density residential use.
- CNEL below 65 dBA—normally acceptable for high-density residential use.
- CNEL of 60 to 70 dBA—conditionally acceptable for high-density residential, transient lodging, churches, educational and medical facilities.
- CNEL below 70 dBA—normally acceptable for playgrounds, neighborhood parks.

"Normally acceptable" is defined as satisfactory for the specified land use, assuming that normal conventional construction is used in buildings. "Conditionally acceptable" may require some additional noise attenuation or special study. Under most of these land use categories, overlapping ranges of acceptability and unacceptability are presented, leaving some ambiguity in areas where noise levels fall within the overlapping range.

The State of California additionally regulates the noise emission levels of licensed motor vehicles traveling on public thoroughfares, sets noise emission limits for certain off-road vehicles and watercraft, and sets required sound levels for light-rail transit vehicle warning signals. The extensive state regulations pertaining to worker noise exposure are for the most part applicable only to the construction phase of any project.

Local Plans and Policies

Pursuant to the University of California's constitutional autonomy, development and uses on property owned or controlled by the University that are in furtherance of the University's educational purposes are not subject to local land use regulation, including general plans and zoning. However, the University seeks to cooperate with the local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible.

The campus is located in unincorporated Merced County. Some of the existing noise-sensitive receptors along Bellevue and Lake Roads that lead to the campus and could be affected by project traffic related noise increases are located in unincorporated Merced County. Therefore, Merced County noise regulations are pertinent and are summarized below.

Merced County

Noise is addressed in Chapter IV (Noise) of the Year 2000 Merced County General Plan. Chapter IV, Section C, sets forth goals, objectives, policies, and implementation guidelines to assure land use compatibility with respect to noise. Among these objectives is that citizens of the county are not significantly impacted by excessive noise levels. New residential land uses and projects should be located where noise will not exceed an existing or projected future exterior noise level standard of 65 dBA L_{dn}, and an interior noise level standard of 45 dBA L_{dn}.

The Merced County Zoning Code requires that no use shall create any disturbing ground vibration, heat, glare, and electrical disturbances based on typical human reaction beyond the boundaries of the site (Merced County Code Chapter 18.41.090).

Construction activity is exempt from the sound level limitations specified in the Noise Control Code, provided that all construction in or adjacent to urban areas is limited to the daytime hours between 7:00 AM and 6:00 PM, and all construction equipment is properly muffled and maintained. For construction occurring outside of these hours, the Code limits maximum noise levels from construction to 75 dBA L_{max} at any residential property or 80 dBA L_{max} at any non-residential property. The L_{dn} limit would not be applicable in this case because it is a day-night average noise level and the daytime construction activities would be considered exempt. The Code also specifies that no person shall generate a sound level that exceeds the background sound level by more than 10 dBA L_{eq} between the hours of 6:00 PM and 10:00 PM, or by more than 5 dBA L_{eq} between the hours of 10:00 PM and 7:00 AM.

The Code also limits the hourly average sound level not to be more than 10 dBA L_{eq} above the ambient sound level between the hours of 6:00 PM and 10:00 PM, or an hourly sound level more than 5 dBA L_{eq} above the ambient sound level between the hours of 10:00 PM and 7:00 AM.

4.5.4 Impacts and Mitigation Measures

Significance Criteria

This SEIR uses significance criteria derived from Appendix G of the *State CEQA Guidelines*. For the purpose of this SEIR, impacts related to noise would be significant if implementation of the 2020 LRDP would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies; or
- Generation of excessive ground borne vibration or ground borne noise levels.

Noise Standards and Thresholds used for Impact Evaluation

The areas surrounding the campus are in unincorporated Merced County. Although the University is not subject to local standards and ordinances, the University has elected to use the County's noise standards and construction noise ordinance to evaluate the potential for campus development under the proposed LRDP to adversely affect ambient noise levels in the vicinity of the campus, as set forth below.

Operational Noise

The Merced County standard for residential land uses is 65 dBA L_{dn} for exterior noise levels and 45 dBA L_{dn} for interior noise levels. For purposes of evaluating the significance of the project's operational noise impacts, the following numeric thresholds were used:

- An increase in noise which causes the thresholds (65 dBA L_{dn} for residential) to be exceeded and the project results in an increase in noise of 3 dBA or more;
- An increase of 3 dBA where the resulting outdoor noise levels with the project are above the thresholds (65 dBA L_{dn} for residential);
- An increase of 5 dBA, where the noise levels without the project are 50 to 65 dBA L_{dn} for residential uses and the increase in noise from the project does not cause the significance thresholds to be exceeded; or
- An increase of 10 dBA, where noise levels without the project are less than 50 dBA L_{dn} for residential uses.

Construction Noise

Merced County exempts noise from construction activity from the sound level limits, provided that all construction in or adjacent to urban areas is limited to the hours between 7:00 AM and 6:00 PM, and all construction equipment is properly muffled and maintained. County Ordinance 10.60.0303 applies to construction occurring outside of these hours. The following ordinance thresholds were used to evaluate the significance of the construction noise impacts:

- Construction occurring between the hours of 7:00 AM and 6:00 PM would result in a less than significant noise impact.
- Construction occurring between the hours of 6:00 PM and 10:00 PM would result in a significant construction noise impact if maximum noise levels exceed 75 dBA Lmax at any residential property or 80 dBA Lmax at any non-residential property or if construction activities result in a sound level that is more than 10 dB L_{eq} above the ambient sound level.
- Construction occurring between the hours of 10:00 PM and 7:00 AM would result in a significant construction noise impact if maximum noise levels exceed 75 dBA Lmax at any residential property

or 80 dBA Lmax at any non-residential property or if construction activities result in a sound level that is more than 5 dB L_{eq} above the ambient sound level.

Issues Not Discussed Further

The following CEQA checklist issue is not evaluated further in this SEIR because it is adequately addressed in the 2009 LRDP EIS/EIR.

- For a project located within the vicinity of a private airstrip or an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels.

Impacts related to the exposure of people residing or working in the project area to excessive noise levels from the operation of a public airport or a private airstrip were evaluated in the 2009 LRDP EIS/EIR. The campus is located approximately 7 miles to the northeast of the Merced Regional Airport and Castle Airport is approximately 6 miles to the west. Given these distances, noise generated by aircraft operations at these facilities would not expose receptors on the campus to excessive noise levels. A private airstrip is located approximately 1.8 miles southeast of the built portion of the campus. The airstrip is used by aircraft involved in agriculture operations (e.g., fertilizing, seeding, and baiting). As the airstrip does not support commercial flights and is used for a limited number of agricultural flights, it is not anticipated that the airstrip would alter the ambient noise levels at or near the campus. This impact is adequately addressed in the 2009 LRDP EIS/EIR.

Methodology

The primary noise issues associated with campus development under the 2020 LRDP are the exposure of existing and proposed noise-sensitive land uses to short-term construction activities and noise from project-related traffic and changes in traffic patterns (long term). Secondarily, noise would also be generated by daily activities on the campus, such as noise from landscaping, mechanical equipment, recreational activities, and parking lot activities, and from special events at the campus, that could affect nearby receptors.

As noted above, existing noise levels along the two main roadways that serve the campus were estimated based on traffic noise modeling conducted using traffic data developed for this SEIR. To estimate both existing and future traffic noise levels with the addition of traffic related to the campus, the Federal Highway Administration (FHWA) Traffic Noise Model (TNM v 2.5) was used. Noise modeling assumed soft ground type and did not take any shielding from barriers, structures, or terrain into account. Traffic noise was estimated for the following scenarios: Existing, 2030 No Project, 2030 with Proposed Project, 2035 No Project, and 2035 with Proposed Project. AADT traffic volumes, traffic speeds, and vehicle mix

(percentages of automobiles, buses, medium trucks, and heavy trucks) were provided by the transportation consultant for input into the traffic noise model.

4.5.5 LRDP Impacts and Mitigation Measures

LRDP Impact NOI-1: Implementation of the 2020 LRDP would not substantially increase ambient traffic noise levels at existing off-site noise-sensitive uses. (*Less than Significant)*

The 2009 LRDP EIS/EIR analyzed the potential for campus development under the 2009 LRDP to result in substantial traffic noise impacts on sensitive receptors located along roadways that would experience increases in campus-related traffic. That analysis, which was presented under Impact NOI-1, showed that the increase in traffic due to the 25,000 student Campus and adjacent University Community would add a substantial amount of traffic to Cardella and Kibby Roads such that traffic noise along these roads would increase by 5 dBA and a significant noise impact would result to receptors along those roadways. Traffic noise impacts along all other study roadways were found to be less than significant.

As noted in **Section 3.0, Project Description**, UC Merced is now expected to grow at a slower pace than originally anticipated, such that by 2030, the enrollment level is expected to be 15,000 students, and the faculty and staff projection for 2030 is also substantially lower than previously projected and analyzed in the 2009 LRDP EIS/EIR. Additionally, while a University Community to house the campus-related population was envisioned in the 2009 LRDP EIS/EIR, such a community has not developed near the campus and it is not foreseeable that such a community would develop within the timeframe of the 2020 LRDP. Given this change in the proposed project and the conditions in which it would be implemented, a revised analysis of the project's traffic noise impacts is presented below.

Campus development under the 2020 LRDP would increase traffic volumes on the local roadway network compared to existing conditions, which would have the potential to result in increased traffic noise levels at noise-sensitive receptors located along these roadways. Bellevue and Lake Roads are the two arterials that provide access to the campus and would experience the greatest increases in LRDP-related traffic. Although other roadways in the City and the County would also experience project traffic increases, the increase would be substantially less than previously analyzed in the 2009 LRDP EIS/EIR. Furthermore, as traffic generated by the proposed project would disperse with distance from the campus, it is unlikely that a sufficient volume of project-related traffic would be added to more distant roadways to result in a noise increase of 3 dBA or more along other roadways. With respect to Cardella and Kirby Roads, in the absence of the University Community, these roadways would not experience substantial

traffic increases and significant impacts along these roadways are not anticipated. The traffic noise impact analysis below is therefore focused on Bellevue and Lake Roads.

There are some existing residential receptors along Bellevue and Lake Roads that would be exposed to noise from traffic on the two roadways. Most homes on Lake Road and Bellevue Road are set back about 100 feet from the center of the road. However, a small number of homes along Bellevue Road are located about 80 feet from the roadway. Noise increases due to project-related traffic on Bellevue and Lake Roads were calculated by comparing project traffic noise levels to no-project traffic noise levels within the same time frame (i.e., 2030 No Project vs. 2030 with Proposed Project). **Table 4.5-2, 2030 Predicted Traffic Noise Levels and Increases**, summarizes the calculated L_{dn} noise levels at a distance of 100 feet from roadway links on the surrounding road network under Existing, 2030 No Project, and 2030 with Project traffic conditions. The calculated traffic-generated noise increases between existing conditions and 2030 both with and without the proposed project are also presented in the table.

Table 4.5-2
2030 Predicted Traffic Noise Levels and Increases
(at 100 feet from the Center of the Roadway)

Road	Location	Modeled L_{dn} Noise Level, dBA[1]			Increase over Existing, dBA		2030 with Project Increase over 2030 No Project
		Existing	2030 No Project	2030 with Project	2030 No Project	2030 with Project	
Lake Road	South of Bellevue	60.9	61.2	61.6	0.3	0.7	0.4
Lake Road	South of Cardella	61.0	61.1	62.6	0.1	1.6	1.5
Bellevue Road	East of SR 59	58.5	58.6	61.1	0.1	2.6	2.5
Bellevue Road	East of G St	59.6	59.7	62.6	0.1	3.0	2.9

*Source: Impact Sciences. Model results are contained in **Appendix 4.5**.*
Note: Noise level is calculated from the cumulative traffic noise resulting from Lake Road and Bellevue Road at actual nearest receptor locations. Distances to these receptors are approximately 100 feet from the center of the roadway.
[1] *Calculations assume an ambient background noise level of about 50 dBA L_{dn}.*

As **Table 4.5-2** above shows, background plus project traffic on Bellevue Road would cause the ambient noise levels to increase from less than 59 dBA L_{dn} at the present time to about 63 dBA L_{dn} under 2030 conditions. Noise levels at residences at a distance of up to 80 feet from this roadway would experience a slightly higher noise level increase. Along Lake Road, noise levels would increase from about 61 dBA L_{dn} at the present time to about 63 dBA L_{dn} in 2030. The resulting noise levels in 2030 along both roadways would not exceed the exterior noise standard of 65 dBA L_{dn} that is applicable to residential land uses in Merced County. Furthermore, as the table shows, although the project would cause a noise increase, the increase would be less than 3 decibels. As noted above, under the significance criteria, a noise impact would be considered significant if the project causes an increase of 5 dBA or more, where the noise levels

without the project are 50 to 65 dBA L_{dn} for residential uses and the increase in noise from the project does not cause the significance thresholds to be exceeded. The traffic added by the project would not cause the exceedance of this significance criteria.

In summary, implementation of the 2020 LRDP would not substantially increase ambient traffic noise levels at existing off-site noise-sensitive uses, and the impact would be less than significant.

With respect to small-scale projects that may be located within lands designated CMU, CBRSL or ROS, due to the small size and nature of these projects, they would be unlikely to substantially increase traffic and traffic-related noise levels at off-site noise sensitive uses. The impact would be less than significant.

Mitigation Measures: No mitigation is required.

LRDP Impact NOI-2: Daily operations on the campus under the 2020 LRDP would not expose existing off-site and future on-site noise-sensitive receptors to noise levels in excess of applicable standards. (*Less than Significant*)

The 2009 LRDP EIS/EIR analyzed the potential for campus operations under the 2009 LRDP to result in noise impacts on nearby sensitive receptors. That analysis, which was presented under Impact NOI-2, concluded that campus operations would not result in a significant noise impact on off-site receptors. However, on-site receptors on the campus and in the University Community could be significantly affected by stationary noise sources such as HVAC on large buildings or a large stadium on the campus. The EIS/EIR concluded that noise from a large stadium or a similar facility may not be reduced to a less than significant level with mitigation.

As noted above, UC Merced is now expected to grow at a slower pace than originally anticipated, such that by 2030, the enrollment level is expected to be 15,000 students, and the faculty and staff projection for 2030 is also substantially lower than previously projected and analyzed in the 2009 LRDP EIS/EIR. Additionally, UC Merced is proposing a much more compact development and it is envisioned that all new campus facilities under the 2020 LRDP would be located within lands designated CMU, in the central portions of the campus site. In view of these changes, the potential for noise from campus operations to affect nearby receptors is reevaluated below.

Daily noise-generating activities on the campus would include student gatherings and conversations, athletic and recreational activities, social events, landscaping and maintenance activities, on-site traffic, and mechanical equipment noise. The closest noise-sensitive receptors to the project site include residences

along Lake Road and Bellevue Road to the west. The closest off-site residences would be located directly across Lake Road from the campus' western boundary under the 2020 LRDP and about 500 feet from the campus' western boundary along Bellevue Road. However, a 400-foot strip of Campus Parkway Open Space as well as Lake Road would separate the nearby existing residences along both Lake Road and Bellevue Road from future development on the campus on lands designated Campus Mixed Use (CMU) on the 2020 LRDP land use map. As a result of the intervening distance and the fact that noise levels generated by these activities are generally low at the source, noise generated by daily campus activities is not expected to exceed the noise standard of 65 dBA L_{dn} exterior and 45 dBA L_{dn} interior at off-site residential locations. Off-site receptors are not expected to be exposed to noise levels in excess of the standards for noise-sensitive uses.

On-site noise-sensitive receptors, including student housing and academic buildings on the campus, could be exposed to excessive noise from other land uses that are developed within the campus. For instance, noise levels could be elevated from the operation of commercial-grade heating, ventilation, and air conditioning (HVAC) systems for large office and research facilities. However, noise levels associated with typical commercial grade HVAC systems can be reduced to below the noise standard for residences at a distance of less than 50 feet from the source with the use of standard attenuation barriers. As a result, on-site receptors are not expected to be exposed to noise levels in excess of the standards for noise-sensitive uses.

In summary, existing off-site sensitive receptors would not be substantially affected by noise generated by on-site noise sources. In addition, sensitive land uses within the campus would also not be substantially affected by noise generated at these facilities. This impact would be less than significant.

With respect to small-scale projects that may be located within lands designated CMU, CBRSL or ROS, due to the location, small size, and nature of these projects, they would be unlikely to substantially increase on-site noise levels and off-site sensitive receptors would not be affected. The impact would be less than significant.

Mitigation Measures: No mitigation is required.

LRDP Impact NOI-3: Construction activities associated with development under the 2020 LRDP could expose existing off-site and future on-site noise-sensitive receptors to elevated noise levels. (*Potentially Significant; Less than Significant)*

The 2009 LRDP EIS/EIR analyzed the potential for construction activities associated with projects under the 2009 LRDP to result in noise impacts on nearby sensitive receptors. That analysis, which was presented under Impact NOI-3, concluded that significant noise impacts would occur if construction activities were undertaken during nighttime hours.

As noted above, UC Merced is now expected to grow at a slower pace than originally anticipated. Additionally, UC Merced is proposing a much more compact development and it is envisioned that all new campus facilities under the 2020 LRDP would be located on lands designated CMU, in the central portions of the campus site. In view of these changes, the potential for noise from campus construction activities to affect nearby receptors is reevaluated below.

Intermittent construction under the 2020 LRDP would occur between 2020 and 2030 and would include ground clearing, earthmoving, foundations, erection of structures, and finishing. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance and shielding between construction noise sources and noise-sensitive areas. **Table 4.5-3, Construction Equipment Noise Emission Levels**, summarizes noise levels produced by commonly used construction equipment. Individual types of construction equipment are expected to generate noise levels ranging from 74 to 89 dBA at a distance of 50 feet.

Table 4.5-3
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Grader	85
Bulldozers	85
Truck	88
Loader	85
Roller	74
Air Compressor	81
Backhoe	80
Pneumatic Tool	85
Paver	89
Concrete Pump	82

Source: Federal Transit Administration 2006.

Noise generated by construction activities is anticipated to be greatest during site grading activities and excavation for underground utilities. Noise generated during foundation and building construction would be lower. Maximum noise levels at a distance of 50 feet from the source would typically range from 70 to 90 dBA during excavation and grading activities and from 65 to 85 dBA during building

construction. Hourly average construction noise levels measured at a distance of 50 feet from the center of the site are typically 75 dBA to 85 dBA during busy construction periods. Hourly average construction noise levels would typically range from 74 to 85 dBA at a distance of 50 feet from the center of construction activities and 56 to 71 at a distance of 400 feet, not taking into account shielding from buildings or terrain. Maximum noise levels would typically range from 70 to 90 dBA at a distance of 50 feet and 52 to 72 dBA at a distance of 400 feet. Construction noise levels decrease at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings or terrain often results in much lower construction noise levels at distant receptors.

Noise Impacts from On-Site Construction

The closest noise-sensitive receptors to the project site include residences along Lake Road and Bellevue Road to the west. However, as noted above, a 400-foot strip of land designated Campus Parkway Open Space would separate the closest existing residences from future CMU development on the campus, and the intervening distance between construction sites and other nearby residences would be even greater.

As discussed earlier in this section, daytime construction noise would be exempt from the County's Ordinance and would result in a less than significant impact. A significant noise impact would occur if construction activity is predicted to result in: (1) maximum noise levels exceeding 75 dBA L_{max} at any residential property or 80 dBA L_{max} at any non-residential property between the hours of 6:00 PM and 7:00 AM; (2) an hourly average sound level that is more than 10 dBA L_{eq} above the ambient sound level between the hours of 6:00 PM and 10:00 PM; or (3) an hourly sound level more than 5 dBA L_{eq} above the ambient sound level between the hours of 10:00 PM and 7:00 AM. Maximum noise levels are predicted to exceed 75 dBA within 300 feet from construction activities. Ambient sound levels are predicted to increase at the residences by more than 5 dB L_{eq} when construction is located within 500 feet of residences. Ambient sound levels are predicted to increase at the residences by 10 dB L_{eq} or more when construction is within 300 feet of residences.

Some of the off-site residences along Lake Road would be located within 500 feet of campus construction in the western portion of the campus. Construction occurring within 300 feet of residences between the hours of 6:00 PM and 10:00 PM and within 500 feet of residences between the hours of 10:00 PM and 7:00 AM would result in a significant noise impact. **LRDP Mitigation Measure NOI-3** is set forth below to address this impact.

Noise Impacts from Off-Site Construction

Providers of utilities to the campus would construct off-site utility connections and infrastructure improvements, which could include installation of electrical lines, gas pipelines, sewer and potable water

lines, and possibly roadway improvements. For linear projects such as these, the zone of potential noise impacts is continuously moving during the project's construction phase. Generally, the noisiest activities come and go (from the standpoint of a fixed noise-sensitive receiver) within a few days. Construction-phase noise would primarily result from the use of motorized construction equipment. Other short-term impacts from construction noise could result from construction traffic, including materials delivery. Noise impacts would be most noticeable in residential areas in the vicinity of project construction locations. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Standard excavation and installation equipment, such as graders, backhoes, loaders, side-boom tractors, welders, and trucks, would be used for construction of most project facilities.

Noise associated with infrastructure construction does not typically exceed 80 dBA L_{eq} at a distance of 50 feet. Noise levels from construction operations decrease at a rate of approximately 6 dBA per doubling of distance between the source and receptor. Therefore, at a distance of 100 feet (which is approximately the distance from many of the existing noise-sensitive land uses to the edges of the roadways), noise levels from infrastructure construction would be approximately 74 dBA L_{eq} or less. The noise levels from construction of infrastructure are predicted to be 5 dBA higher than existing noise levels and thus clearly audible. Construction activities would be limited to between the hours of 7:00 AM and 6:00 PM and the duration of construction adjacent to any individual receptors would be short. Construction taking place between the hours of 7:00 AM and 6:00 PM is exempt from the County's Ordinance. Therefore, noise impacts from off-site infrastructure would be less than significant.

In summary, construction activities occurring on the campus between the hours of 6:00 PM and 7:00 AM would result in significant noise impacts. Although daytime construction activities would not result in significant noise impacts as defined by the noise thresholds, because of the longer durations and higher noise levels that potentially could be involved in the construction of facilities within the campus, it is recommended that standard noise reduction techniques be used to further reduce the noise exposure of nearby noise-sensitive receptors both off and on-campus to construction noise. **LRDP Mitigation Measure NOI-3** is proposed to reduce the noise impact from nighttime construction and to further minimize the less than significant impact from daytime construction.

With respect to small-scale projects that may be located within lands designated CMU, CBRSL or ROS, due to the location, small size, and nature of these projects, construction activities associated with these small projects would be unlikely to substantially increase on-site noise levels and on- and off-site sensitive receptors would not be affected. The impact would be less than significant.

Mitigation Measures:

LRDP MM NOI-3: Prior to initiation of construction on a project that is within 500 feet of off-site residential receptors, UC Merced shall develop and implement a construction noise mitigation program for that project that includes but is not limited to the following:

- Construction activities within 500 feet of any residences shall be restricted to the hours of 7:00 AM and 6:00 PM on weekdays and Saturdays with no construction on Sundays and holidays.
- All noise-producing project equipment and vehicles using internal combustion engines shall be equipped where appropriate with exhaust mufflers and air-inlet silencers in good operating condition that meet or exceed original factory specifications.
- Mobile or fixed "package" equipment (e.g., arc-welders, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.
- All mobile or fixed noise-producing equipment used on the project that is regulated for noise output by local, state or federal agency shall comply with such regulation while engaged in project-related activities.
- Electrically powered equipment shall be used instead of pneumatic or internal combustion powered equipment, where practicable.
- Material stockpiles, mobile equipment staging, construction vehicle parking, and maintenance areas shall be located as far as practicable from noise-sensitive land uses.
- Stationary noise sources such as generators or pumps shall be located away from noise-sensitive land uses as feasible.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only. No project-related public address loudspeaker, two-way radio, or music systems shall be audible at any adjacent noise-sensitive receptor except for emergency use.
- The erection of temporary noise barriers shall be considered where project activity is unavoidably close to noise-sensitive receptors.
- The noisiest construction operations shall be scheduled to occur together to avoid continuing periods of the greatest annoyance, wherever possible.
- Construction vehicle trips shall be routed as far as practical from existing residential uses.

- The loudest campus construction activities, such as demolition, blasting, and pile driving, shall be scheduled during summer, Thanksgiving, winter, and spring breaks when fewer people would be disturbed by construction noise.
- Whenever possible, academic, administrative, and residential areas that will be subject to construction noise shall be informed a week before the start of each construction project.

Significance after Mitigation: Construction noise impacts at existing noise-sensitive uses would be reduced to a less than significant level with the implementation of **LRDP Mitigation Measure NOI-3**.

LRDP Impact NOI-4: Pile driving activities during construction could expose nearby receptors to perceptible levels of groundborne vibration. (*Potentially Significant; Less than Significant*)

The 2009 LRDP EIS/EIR analyzed the potential for construction activities associated with projects under the 2009 LRDP to result in groundborne vibration impacts on nearby sensitive receptors. That analysis, which was presented under Impact NOI-4, concluded that in the event that impact pile driving was employed in the construction of campus buildings, it could result in damage to structures when conducted within 50 feet of a structure and could also affect highly sensitive uses such as certain types of laboratories.

As noted above, UC Merced is projecting less growth and is proposing a much more compact development. It is envisioned that all new campus facilities under the 2020 LRDP would be located within lands designated CMU, in the central portions of the campus site. In view of these changes, the potential for vibrations from campus construction activities to adversely affect nearby receptors is reevaluated below.

Vibration levels generated by construction activities would vary depending on project conditions such as soil conditions, construction methods, and equipment used. Typical project construction activities would not generate substantial levels of vibration. Pile driving is not anticipated for the proposed project due to the geology that is typical for Merced County. However, in the event that pile driving is required during construction, it could produce groundborne vibration levels that might be perceptible to nearby sensitive receptors.

County Code 18.41.090 specifies that no use shall create any disturbing ground vibration based on typical human reaction beyond the boundaries of the site but does not provide specific vibration thresholds. However, the U.S. Department of Transportation suggests a vibration damage threshold of

0.50 inch/second of peak particle velocity (ppv) for reinforced buildings, 0.20 inch/second for non-engineered timber and masonry buildings, and 0.12 inches/second for buildings extremely susceptible to vibration damage (Federal Transit Administration 2006). The Transportation Research Board (Transportation Research Board 1997) suggests maximum allowable peak particle velocities from pile driving for various structure types and conditions. **Table 4.5-4, Transportation Research Board Building Structure Vibration Criteria**, summarizes these values. For the purposes of this assessment, pile driving will be considered to result in a significant ground vibration impact if fragile or historic building structures would be exposed to ground vibration in excess of 0.20 inch/second or if other building structures would be exposed to ground vibration in excess of 0.50 inch/second.

Table 4.5-4
Transportation Research Board Building Structure Vibration Criteria

Structure and Condition	Limiting PPV (in/sec)
Historic and some old buildings	0.2
Residential structures	0.5
New residential structures	1.0
Industrial buildings	2.0
Bridges	2.0

Source: Transportation Research Board 1997.

Impact pile drivers are estimated to generate an upper range of 0.537 inch/second, ppv, at a distance of 50 feet and vibratory pile drivers are estimated to generate an upper range of 0.260 inches/second, ppv. At a distance of 100 feet, impact pile drivers are estimated to generate an upper range of 0.190 inches/second, ppv, and vibratory pile drivers are estimated to generate an upper range of 0.092 inch/second, ppv. Groundborne vibration levels at distances of approximately 100 feet or more would not result in vibration levels exceeding 0.20 inch/second, ppv and would not, therefore, be anticipated to result in substantial effects. Impact pile driving within 50 feet of structures could cause structural damage to typical building structures and could cause annoyance to persons. Furthermore, at a few future campus facilities, such as laboratories, vibrations could have the potential to disrupt experiments. This is a potentially significant impact, and **LRDP Mitigation Measure NOI-4a** and **4b** are set forth below to mitigate this impact.

With respect to small-scale projects that may be located within lands designated CMU, CBRSL or ROS, due to the location, small size, and nature of these projects, construction activities associated with these small projects would be unlikely to result in substantial vibrations and on- and off-site sensitive receptors would not be affected. The impact would be less than significant.

Mitigation Measures:

LRDP MM NOI-4a: UC Merced shall avoid impact pile driving where possible in vibration-sensitive areas. Drilled piles or the use of vibratory pile driving will be used where geological conditions permit their use. For impact pile driving activities occurring within 50 feet of typical structures, limit groundborne vibration due to construction activities to 0.50 inch/second, ppv (limit of potential for damage to typical structures) in the vertical direction at sensitive receptors. Since in many cases the information available during the preliminary engineering phase would not be sufficient to define specific vibration mitigation measures, UC Merced shall describe and commit to a mitigation plan to minimize construction vibration damage using all feasible means available.

LRDP MM NOI-4b: For construction adjacent to highly sensitive uses such as laboratories, UC Merced shall apply additional measures as feasible, including advance notice to occupants of sensitive facilities to ensure that precautions are taken in those facilities to protect ongoing activities from vibration effects.

Significance after Mitigation: With the implementation of the proposed mitigation measures, the impact would be reduced to a less than significant level.

4.5.6 Cumulative Impacts and Mitigation Measures

Cumulative Impact C-NOI-1: Development on the campus under the 2020 LRDP, in conjunction with other past, present, and reasonably foreseeable future development in the project area, would not generate a substantial permanent increase in noise levels at off-site locations. (*Less than Significant)*

The year of analysis for the cumulative analysis in this SEIR is 2035. Although the horizon year used in this SEIR for the 2020 LRDP is 2030 and this plan does not provide land use planning for campus growth beyond that year, it is anticipated that UC Merced will continue to grow beyond 2030, although the rate and manner of that growth is not known at this time. For purposes of the cumulative impact analysis in this SEIR, it is assumed that enrollment will continue to increase at the same annual rate as is currently projected between 2020 and 2030. Based on this assumption, the enrollment is projected to increase to 17,500 students, and faculty and staff are projected to increase to 2,975 employees by 2035. Using this

enrollment and employment levels, traffic that would be generated by the campus in 2035 was estimated (see **Section 4.8** for 2035 Campus Scenario traffic analysis). The traffic data for the 2035 Campus Scenario combined with background traffic in 2035 was used to analyze the increases in noise levels at off-site receptors under cumulative conditions.

Table 4.5-5, 2035 Predicted Traffic Noise Levels and Increases, presents the calculated L_{dn} noise levels at a distance of 100 feet from roadway links on the surrounding road network under Existing, 2035 No Project, and 2035 with 2035 Campus Scenario traffic conditions. The calculated traffic-generated noise increases are also summarized.

Table 4.5-5
2035 Predicted Traffic Noise Levels and Increases
(at 100 feet from the Center of the Roadway)

Road	Location	Modeled L_{dn} Noise Level, dBA[1]			Increase over Existing, dBA		2035 Campus Scenario Increase over 2035 No Project
		Existing	2035 No Build	2035 Campus Scenario	2035 No Build	2035 Campus Scenario	
Lake Road	South of Bellevue	60.9	61.3	61.8	0.4	0.9	0.5
Lake Road	South of Cardella	61.0	61.1	63.1	0.1	2.1	2.0
Bellevue Road	East of SR 59	58.5	58.7	61.8	0.2	3.3	3.1
Bellevue Road	East of G St	59.6	59.7	63.4	0.1	3.8	3.7

*Source: Impact Sciences. Model results are contained in **Appendix 4.5**.*
Note: Noise level is calculated from the cumulative traffic noise resulting from Lake Road and Bellevue Road at actual nearest receptor locations. Distances to these receptors are approximately 100 feet from the center of the roadway.
[1] *Calculations assume an ambient background noise level of about 50 dBA L_{dn}.*

As **Table 4.5-5** above shows, background plus 2035 Campus Scenario traffic on Bellevue Road would cause the ambient noise levels to increase from less than 59 dBA L_{dn} at the present time to slightly more than 63 dBA L_{dn} under 2035 conditions. Along Lake Road, ambient noise levels would increase from about 61 dBA L_{dn} at the present time to about 63 dBA L_{dn} in 2035. The noise levels in 2035 along both roadways would not exceed the exterior noise standard of 65 dBA L_{dn} that is applicable to residential land uses in Merced County. Furthermore, as the table shows, the project would cause noise increases that would be less than 4 decibels. As noted above, under the significance criteria, a noise impact would be considered significant if the project causes an increase of 5 dBA, where the noise levels without the project are 50 to 65 dBA L_{dn} for residential uses and the increase in noise from the 2035 Campus Scenario traffic does not cause the significance thresholds to be exceeded. The traffic added by the 2035 Campus Scenario to the background traffic in 2035 would not cause the exceedance of this significance criteria. As a result, there would not be a significant cumulative impact with respect to traffic noise.

Mitigation Measures: No mitigation is required.

Cumulative Impact C-NOI-2: Noise from construction and/or stationary sources on the campus, in conjunction with other past, present, and reasonably foreseeable future development in the project area, would not combine to substantially affect the same sensitive receptors. (*Less than Significant)*

With respect to cumulative construction noise and vibration impacts, those would occur only if the projects proposed by others were to be under construction the same time as the projects on the campus and if these concurrent projects would be in close proximity of the same sensitive receptor. At this time, there are no other projects proposed in proximity to the campus that would be under construction at the same time as the projects on the campus. Similarly, in order for the on-site stationary noise (HVAC, generators, pumps, etc.) associated with the proposed project to accumulate with noise from other stationary noise sources, the noise sources would need to be in close proximity of the same sensitive receptor. At this time, there are no other projects proposed that would be in the vicinity of the same sensitive receptors as the projects on the campus. For this reason, there would not be a cumulative noise impact with respect to construction noise or noise from stationary sources.

Mitigation Measures: No mitigation is required.

4.5.7 References

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