Photo of the noise monitoring equipment used to measure noise levels for this report.

4.3.1 ENVIRONMENTAL ISSUE

This section examines the existing and project-related noise levels within the environs of the proposed Stock Ranch Project. In addition, this document also identifies potential noise-related land use conflicts resulting from the project. This section is based on a noise analysis prepared for the project by Bollard and Brennan, Inc. Acoustical Consultants (September 2000).

4.3.2 METHODOLOGY

To quantify existing ambient noise levels on the project site and in the project vicinity, both continuous 24-hour noise level measurements and short-term noise level measurements were conducted. Continuous hourly noise level measurements were conducted at two locations on the project site for a period of 24-hours, on January 27-28, 2000. In addition, short-term noise level measurements were conducted at six locations adjacent to, and on the project site, on January 21 and 27, 2000.

Equipment used for all noise level measurements included Larson-Davis-Laboratories (LDL) Model 820 precision integrating sound level meters. The sound level meters were calibrated in the field using an LDL Model CAL200 acoustical calibrator to ensure accuracy.

4.3.3 SIGNIFICANCE CRITERIA

The existing Citrus Heights General Plan Noise Element (i.e. Sacramento County General Plan) establishes acceptable noise level criteria for both transportation and non-transportation (fixed) noise sources. **Table 4.3-1** provides the noise level performance criteria for new projects, which are affected by, or including non-transportation noise sources, such as those attributed to commercial uses.

For transportation noise sources, such as roadway noise, the Sacramento County General Plan establishes an "Acceptable" exterior noise level standard for residential uses of 60 dB Ldn, which is applied in the outdoor activity areas. A "Conditionally Acceptable" exterior noise level standard of 65 dB Ldn is applied only after careful study and inclusion of protective measures as needed for intended use.

Table 4.3-1
Exterior Hourly Noise Level Performance Standards for Stationary Noise Sources
Source: Existing General Plan (Prior to November 2000)

	Maximum Acceptable Noise Level, dBA	
Minutes/Hour of Noise Generation (Ln)	**Daytime (7 am - 10 pm)**	**Nighttime (10 pm - 7 am)**
30 (L_{50})	50	45
15 (L_{25})	55	50
5 ($L_{8.3}$)	60	55
1 ($L_{1.7}$)	65	60
0 (Lmax)	70	65
Note: Ln means the percentage of time the noise level is exceeded during an hour. L_{50} means the level exceeded 50 percent of the hour; L_{25} is the level exceeded 25 percent of the hour, etc.		

Policy 51.2 of the City of Citrus Heights Draft General Plan Update Noise Element states the following:

> The maximum exterior noise level of 60 dBA Ldn shall be applied in residential areas where outdoor use is a major consideration (such as backyards in single family housing developments and recreation areas in multi-family housing projects). Where the City determines that providing an Ldn of 60 dBA or lower is not feasible, the noise level in outdoor areas shall be reduced to as close to the standard as feasible through project design.
>
> Indoor noise levels shall not exceed an Ldn of 45 dBA in new residential housing units.
>
> Noise levels in new residential development exposed to an exterior Ldn of 60 dBA or greater shall be limited to a maximum instantaneous noise level (e.g., trucks on busy streets, train warning whistles) in bedrooms of 50 dBA. Maximum instantaneous noise levels in all other habitable rooms shall not exceed 55 dBA.

The associated Action for this policy states: Revise the Noise Ordinance to reflect noise limits to protect noise sensitive land uses from intrusion by stationary noise sources.

Table 10 (Acceptable Noise Levels) within the Draft General Plan Noise Element provides some conflicting information relative to this policy. Instead of a maximum exterior noise level of 60 dBA, Table 10 indicates that the normally acceptable noise level for multi-family residential is 65 dB Ldn. Because the existing General Plan has a more stringent standard, it will be used as the significance criteria for determining noise impacts.

Determination of a Significant Increase in Noise Levels

Another means of determining a potential noise impact is to assess a person's reaction to changes in noise levels due to a project. **Table 4.3-2** is commonly used to show expected public reaction to changes in environmental noise levels. This table was developed on the basis of test subjects' reactions to changes in the levels of steady state pure tones or broad band noise and

to changes in levels of a given noise source. It is most applicable to noise levels in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels.

Table 4.3-2
Subjective Reaction to Changes in Noise Levels of Similar Sources

Change in Level, dBA	Subjective Reaction	Factor Change in Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0

Source: Architectural Acoustics, M. David Egan, 1988.

4.3.4 EXISTING SETTING

Acoustic Terminology

Noise is often defined simply as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers have generally agreed that A-weighted sound pressure levels (sound levels) are very well correlated with community reaction to noise. The unit of sound level measurement is the decibel (dB)[1], sometimes expressed as dBA. Variations in sound levels over time are represented by statistical descriptors, and by time-weighted composite noise metrics such as the Day-Night Average Level (Ldn), or the Community Noise Equivalent Level (CNEL). Throughout this analysis, A-weighted sound pressure levels will be used to describe community noise unless otherwise indicated. **Table 4.3-3** provides examples of maximum sound levels associated with common noise sources.

The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, so that sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in a change of 3 decibels (db), which is usually considered to be barely perceptible. A 10-fold increase in acoustical energy yields a 10-decibel change, which is subjectively like a doubling of loudness.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent sound level (Leq), which corresponds to a steady-state sound level containing the same total energy as a time-varying signal over a given period (usually one hour). The Leq is the foundation of the composite noise descriptors such as Ldn and CNEL, and shows very good correlation with community response to noise.

[1] *For an explanation of terms used in this report, see* ***Appendix C****.*

Table 4.3-3
Typical A-Weighted Maximum Sound Levels of Common Noise Sources

Decibels	Description
130	Threshold of pain
120	Jet aircraft take-off at 100 feet
110	Riveting machine at operators position
100	Shot-gun at 200 feet
90	Bulldozer at 50 feet
80	Diesel locomotive at 300 feet
70	Commercial jet aircraft interior during flight
60	Normal conversation speech at 5-10 feet
50	Open office background level
40	Background level within a residence
30	Soft whisper at 2 feet
20	Interior of recording studio

Source: Bollard & Brennan, Inc., 2000

Existing Background Noise Levels

Existing background noise levels on the project site, and in the vicinity of the project site are generally dominated by traffic on local roadways, aircraft overflights, and general neighborhood activities. **Table 4.3-4** provides a summary of the noise measurement results. **Figure 4.3-1** shows the six noise monitoring locations and **Figures 4.3-2** and **4.3-3** graphically show the results of the continuous noise measurements conducted in January 2000.

Existing Traffic Noise Levels

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD77-108) was employed for the prediction of traffic noise levels for the local roadways. The FHWA model is currently the preferred method of predicting traffic noise levels by Caltrans and most cities and counties. The FHWA model was developed to predict hourly Leq values, and is generally considered to be accurate within 1.5 dB. To predict Ldn values, it is necessary to determine the day/night traffic distribution, and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

To predict existing traffic noise levels for the adjacent street system, the FHWA model was used with traffic data provided by Fehr & Peers. **Appendix C** provides a full listing of the input data to the FHWA Model, and **Table 4.3-5** shows the results of the FHWA model.

Table 4.3-4
Summary of Noise Measurement Results

Site	Time AM/PM	Measured Noise Levels, dB						
			Daytime (7:00 a.m. - 10:00 p.m.)			Nighttime (10:00 p.m. - 7:00 a.m.)		
		Ldn	Leq	L50	Lmax	Leq	L50	Lmax
Site 1-Future Commercial	12:01	---	52.1	51	64.8	---	---	---
Site 2-Future Commercial	12:30	---	50.8	46	69.1	---	---	---
Site 3-Adjacent to Apts.	12:50	---	43.3	43	56.3	---	---	---
Site 4-Adjacent to SFD	13:30	---	46.9	46	54.6	---	---	---
Site 5-End of Fountain Square	13:45	---	45.0	43	56.0	---	---	---
Site 6-Future Park	14:00	---	51.3	43	66.5	---	---	---
*Site A-Future Commercial	24-hr	59.2	55.2	54	69.0	52.3	50	62.7
*Site B-Future Park	24-hr	54.1	48.0	43	63.6	47.6	46	57.1

* = Continuous 24-hour noise measurement sites. The daytime and nighttime hourly noise levels represent the average measured noise level during the noise measurement period.

Table 4.3-5
Predicted Existing Traffic Noise Levels

Roadway	Ldn at 75 feet from roadway centerline	Distance to Traffic Noise Contour (feet)*		
		60 dB Ldn	65 dB Ldn	70 dB Ldn
Auburn Boulevard				
Van Maren Ln. to Raintree Dr.	70.7	390	181	84
Raintree Dr. to Sylvan Rd.	71.1	415	193	89
Old Auburn Road				
East of Sylvan R.	69.4	315	146	68
Sylvan Road				
Old Auburn Rd. to Stock Ranch Rd.	69.1	303	141	65
Stock Ranch Rd. to Greenback Ln.	68.7	287	133	62
Stock Ranch Road				
West of Sylvan Rd.	54.6	33	15	7
Greenback Lane				
Van Maren Ln. to Fountain Sq. Dr.	71.0	404	187	87
Fountain Sq. Dr. to Sylvan Rd.	71.1	412	191	89
West of Sylvan Rd.	71.5	437	203	94
Fountain Square Drive				
North of Greenback Ln.	59.2	66	31	14

* Distance to traffic noise contours is from the roadway centerline.

4.3.5 PROJECT IMPACTS AND MITIGATION MEASURES

Traffic Noise Impacts

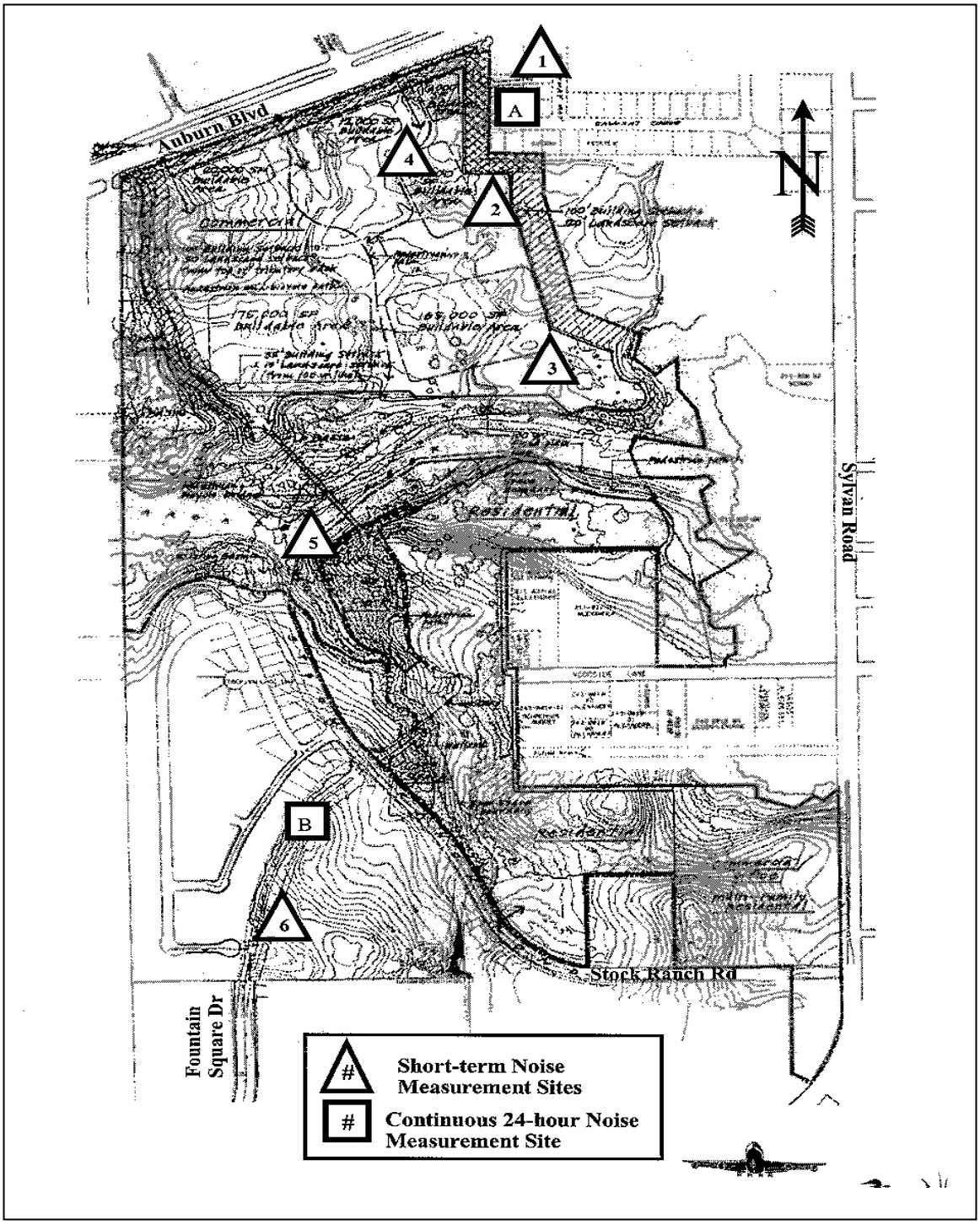
The FHWA Model was used to determine existing plus project traffic noise levels with the two proposed project Scenarios (i.e. Scenario 1 - 385,000 of shopping center and Scenario 2 - 450,000 sq. ft. of shopping center). **Table 4.3-6** shows the modeling results.

Table 4.3-6
Predicted Existing + Project Alternatives Traffic Noise Levels

Roadway	Ldn at 75 feet*		Distance to Traffic Noise Contour*					
			60 dB Ldn		65 dB Ldn		70 dB Ldn	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Auburn Boulevard								
Van Maren to Raintree	71.9	71.7	454	468	211	217	98	101
Raintree to Sylvan	72.4	72.3	496	507	230	235	107	109
Old Auburn Road								
East of Sylvan	70.0	69.9	344	347	160	161	74	75
Sylvan Road								
Old Auburn to Stock Ranch	69.1	69.4	317	302	147	140	68	65
Stock Ranch to Greenback	69.6	69.4	317	326	147	151	68	70
Stock Ranch Road								
West of Sylvan	61.8	61.8	99	100	46	46	21	21
Greenback Lane								
Van Maren to Fountain Sq.	71.2	71.2	417	417	193	193	90	90
Fountain Sq. to Sylvan	71.1	71.0	406	414	189	192	88	89
West of Sylvan	71.7	71.7	450	449	209	209	97	97
Fountain Square Drive								
North of Greenback	59.3	59.8	73	67	34	31	16	14

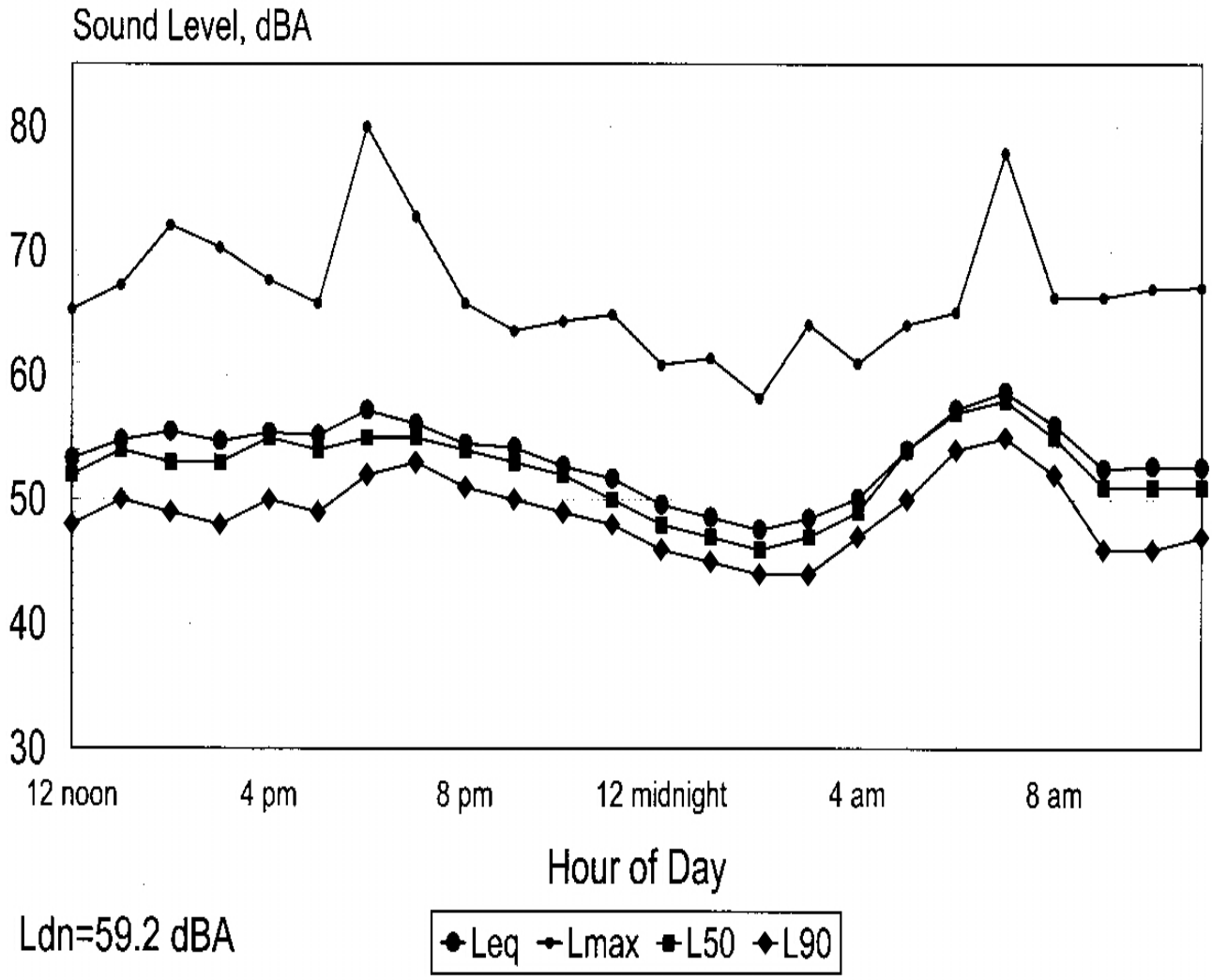
* Distance to traffic noise contours is from the roadway centerline.

Figure 4.3-1 Noise Monitoring Locations



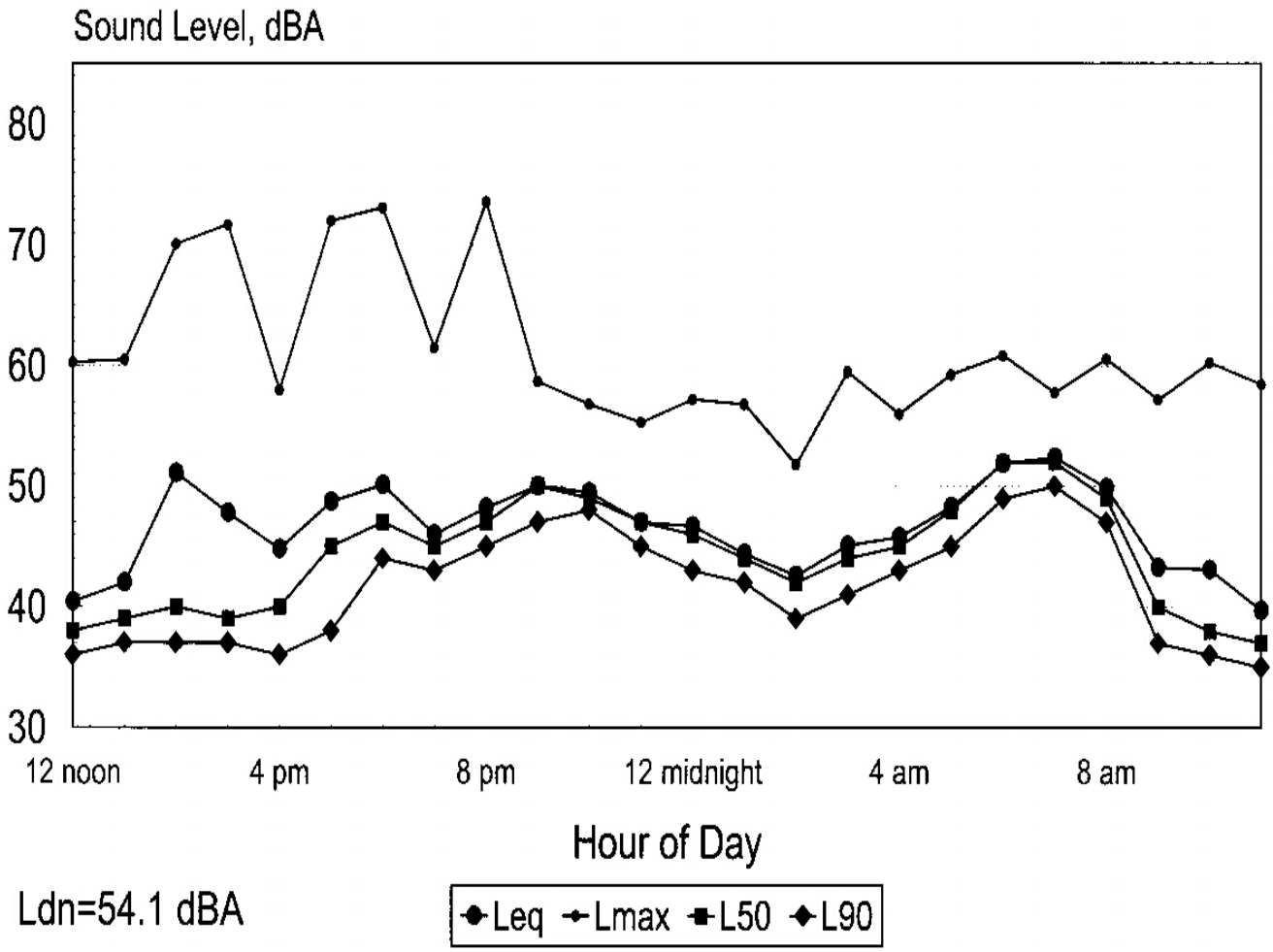
Source: Bollard & Brennan Inc., 2000.

Figure 4.3-2 Results of the Continuous Noise Measurements, January 2000



Source: Bollard & Brennan, Inc., 2000

Figure 4.3-3 Results of the Continuous Noise Measurements, January 2000



Source: Bollard & Brennan, Inc., 2000

Traffic Noise Impacts to Residential Outdoor Activity Areas

Impact 4.3.1 Any residential outdoor activity areas located within 100 feet of the Sylvan Road centerline could be exposed to traffic noise levels in excess of the 60 dB Ldn exterior noise level criterions. This is considered a significant impact. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

The proposed project includes single-family residential uses along the east side of Stock Ranch Road. Therefore, if outdoor activity areas of the proposed single-family residences are located within 100 feet of the Stock Ranch Road centerline, they could be exposed to future traffic noise in excess of the 60 dB Ldn noise level criterion.

Mitigation Measures

MM 4.3.1a Construct a property line sound wall which is six-feet in height relative to the building pad elevation. Alternative mitigation measures include locating outdoor activity areas, patios 100 feet or greater from the Stock Ranch Road centerline.

Responsible for Implementation: Applicant/Developer
Responsibility for Montoring: City of Citrus Heights Planning and Building Divisions
Timing: Determine applicable measure (wall or setback) at time of development plan submittal; install prior to issuance of certificate of occupancy for residential uses.

Traffic Noise Impacts to Proposed Multi-family Residential Uses

Impact 4.3.2 Proposed multi-family residential uses located adjacent to Sylvan Road and Stock Ranch Road could exceed the 60 dB Ldn exterior noise level criterion. This is considered a significant impact. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

The proposed project includes multi-family residential uses at the northwest corner of Sylvan Road and Stock Ranch Road. If outdoor activity areas are located within the future 60 dB Ldn traffic noise contours, could exceed the 60 dB Ldn exterior noise level criterion.

Mitigation Measures

MM 4.3.2a Locate a central common outdoor activity area inside of apartment complexes, at a minimum of 300 feet from the Sylvan Road centerline, and 100 feet from the Stock Ranch Road centerline. This will provide an adequate setback from the roadways, and take advantage of shielding from multi-family unit buildings.

Responsible for Implementation: Applicant/Developer
Responsibility for Monitoring: City of Citrus Heights Planning Division
Timing: Review setbacks at time of development plan submittal.

Traffic Noise Impacts on Existing Multi-family Residences – Stock Ranch Road

Impact 4.3.3 Existing multi-family residences adjacent to Stock Ranch Road would be exposed to a significant increase in traffic noise levels due to the proposed project. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

Future traffic noise levels from Stock Ranch Road, due primarily to development of the Stock Ranch project contribute to a significant increase in traffic noise levels at the existing multi-family residences adjacent to Stock Ranch Road. This includes the Merrill Gardens Apartments, Stock Ranch Senior Apartments and the Stock Villages.

Mitigation Measures

MM 4.3.3a Conduct a detailed analysis of barrier requirements to reduce traffic noise levels by up to 5 dB Ldn. A preliminary analysis indicates that a barrier six-feet tall along the property line of the residences would reduce traffic noise levels by up to 5 dB Ldn.

Responsible for Implementation:	Applicant/Developer
Responsibility for Monitoring:	City of Citrus Heights
Timing:	Determine need for soundwall or other mitigation at the time specific development projects are submitted

Commercial Land Use Noise Impacts

The potential exists for noise levels associated with commercial land use activities to adversely impact existing and future adjacent residential land uses. The noise impacts associated with these activities were evaluated using the hourly noise level performance standards for stationary noise sources, as shown in **Table 4.3-1,** above. Noise sources associates with these types of uses generally include loading docks, lumber storage and unloading areas, on-site truck traffic and air handling equipment.

Loading Docks

Impact 4.3.5 Operation of loading docks will create noise which could affect nearby residential uses. This impact is potentially significant but can be mitigated to a level of less than significant.

Maximum noise levels from loading dock operations are approximately 86 dB at a reference distance of 50 feet. Based upon the Stock Ranch Land Use Plan, the closest proposed commercial building foot-print is 300 feet from the west property line. Based upon that distance, the predicted maximum noise levels due to loading dock operations are 71 dB. In addition, there is a berm proposed to be located to the west of the proposed commercial buildings. Assuming that the berm/barrier is a minimum of eight-feet in height, the maximum noise levels due

to loading docks is predicted to be less than 65 dB, and would therefore comply with the daytime and nighttime maximum noise level criteria.

Maximum noise levels from loading dock operations are approximately 86 dB at a reference distance of 50 feet. Assuming that the minimum setback from the nearest existing residence to the east is 100 feet, based upon the Stock Ranch Draft Guide For Development recommendations, the predicted loading dock maximum noise level is 75 dB Lmax. As a means of complying with the daytime maximum noise level criterion of 70 dB Lmax, a property line barrier approximately eight-feet in height would need to be constructed along the residential property lines. As a means of complying with the nighttime maximum noise level criterion of 65 dB Lmax, a property line barrier approximately 12-feet in height would need to be constructed along the residential property line to the east. *Note: See mitigation measure below.*

Hourly average L50 noise levels from loading dock operations are approximately 53 dB at a reference distance of 50 feet. Based upon the Stock Ranch Land Use Plan, the nearest proposed commercial building foot-print is 300 feet from the west property line. Based upon that distance, the predicted hourly average L50 noise levels due to loading dock operations are 38 dB. In addition, there is a berm proposed to be located to the west of the proposed commercial buildings. Therefore, hourly average noise levels due to loading docks are predicted to comply with the daytime and nighttime hourly average L50 noise level criteria at the residences to the west.

Hourly average L50 noise levels from loading dock operations are approximately 53 dB at a reference distance of 50 feet. Assuming that the minimum setback from the nearest existing residence to the east is 100 feet, based upon the Stock Ranch Draft Guide For Development recommendations, the predicted hourly average L50 noise levels due to loading dock operations are 42 dB. Therefore, hourly average noise levels due to loading docks are predicted to comply with the daytime and nighttime hourly average L50 noise level criteria at the residences to the east.

Mitigation Measures

MM 4.3.5 Construct a sound wall or incorporate mitigation measures (such as berming) sufficient to reduce loading dock maximum noise levels by 5 dB. This will need to be done when a detailed site plan and design have been submitted.

Responsible for Implementation:	Applicant/Developer
Responsibility for Monitoring:	City of Citrus Heights
Timing:	Determine need for soundwall or other mitigation at the time specific development projects are submitted

Truck Circulation

Impact 4.3.6 Operation of loading docks will create noise which could affect nearby residential uses. This impact is potentially significant but can be mitigated to a level of less than significant.

Maximum noise levels from truck passbys are approximately 75 dB at a reference distance of 00 feet. Based upon the Stock Ranch Land Use Plan, the closest proposed commercial building foot-print is 300 feet from the west property line. Based upon that distance, the predicted maximum noise levels due to loading dock operations are 60 dB. In addition, there is a berm proposed to be located to the west of the proposed commercial buildings. Therefore, maximum noise levels due to truck circulation are predicted to comply with the daytime and nighttime maximum noise level criteria at the residences to the west. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

Maximum noise levels from truck passbys are approximately 75 dB at a reference distance of 20 feet. Assuming that the minimum setback from the nearest existing residence to the east is approximately 20 feet from the truck circulation route, the predicted loading dock maximum noise level is 75 dB Lmax. As a means of complying with the daytime maximum noise level criterion of 70 dB Lmax, a property line barrier approximately eight-feet in height would need to be constructed along the residential property lines. As a means of complying with the nighttime maximum noise level criterion of 65 dB Lmax, a property line barrier approximately 12-feet in height would need to be constructed along the residential property line to the east.

Hourly average L50 noise levels from truck passbys associated with a busy commercial operation are approximately 50 dB at a reference distance of 20 feet. Based upon the Stock Ranch Land Use Plan, the nearest proposed commercial building foot-print is 300 feet from the west property line. Based upon that distance, the predicted hourly average L50 noise levels due truck passbys is 35 dB. In addition, there is a berm proposed to be located to the west of the proposed commercial buildings. Therefore, hourly average noise levels due to truck passbys are predicted to comply with the daytime and nighttime hourly average L50 noise level criteria at the residences to the west.

Hourly average L50 noise levels from truck passbys associated with a busy commercial operation are approximately 50 dB at a reference distance of 20 feet. Assuming that the minimum setback from the nearest existing residence to the east is 20 feet from the truck circulation route, the predicted hourly average L50 noise levels due to truck circulation is 50 dB. Therefore, hourly average noise levels due to truck passbys are predicted to comply with the daytime hourly average L50 noise level criterion of 50 dB at the residences to the east. As a means of complying with the nighttime hourly average L50 noise level criterion of 45 dB at the residences to the east, an 8-foot tall property line barrier would need to be constructed.

Mitigation Measures

MM 4.3.6a Construct a sound wall or incorporate mitigation measures (such as berming) sufficient to reduce truck circulation maximum noise levels to comply with City noise criteria. This will need to be done when a detailed site plan and design have been submitted.

Responsible for Implementation:	Applicant/Developer
Responsibility for Monitoring:	City of Citrus Heights
Timing:	Determine need for soundwall or other mitigation at the time specific development projects are submitted

Mechanical Equipment

Impact 4.3.7 Rooftop mechanical equipment for commercial uses could exceed the daytime and nighttime exterior noise level criteria of 50 dB L_{50} and 45 dB L_{50}, respectively. This impact is considered potentially significant. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

Generally air-handling equipment such as cooling towers and HVAC systems within commercial areas are located on the rooftops of the buildings. Noise levels due to HVAC systems and air handling equipment can vary based upon the number of units used for cooling and the cooling capacity of the units. Other factors, which contribute to overall noise levels associated with the units, include the orientation of openings, type of fan, and the presence of sound suppression equipment such as acoustical hoods or silencers.

Data collected by Bollard & Brennan, Inc. for typical Home Depot and Lowes Home Improvement stores indicate that the cooling requirements require approximately 20 packaged rooftop air conditioning systems with 15 to 20 tons of refrigeration each. The units are generally evenly distributed across the roof of the building. These HVAC units, which stand about four to five feet tall, are shielded from view by the rooftop parapets. Since HVAC units could operate into the late night hours, the noise impacts need to be compared to the Sacramento County nighttime noise level criterion of 45 dB L_{50}.

The rooftop HVAC units are predicted to generate noise levels of approximately 55 dB at a reference distance of 100 feet (distance from the nearest HVAC units to the nearest residential property line). The shielding of HVAC noise provided by the store walls and parapets is generally at least 10 dB. Therefore, the predicted HVAC noise level at a distance of 100 feet would be approximately 45 dB or less.

Based upon data collected by Bollard & Brennan, Inc. for Safeway grocery stores, the mechanical equipment associated with HVAC and refrigeration includes one large Hussman Portapak Unit which houses the compressors for all of the refrigeration needs within the grocery store. A Baltimore Aircoil Company (BAC) cooling tower is also included in the design for the refrigeration system. Based upon the noise level measurements collected for the Safeway Store, the noise levels ranged from 58 dB L_{50} at the front of the unit at a distance of eight feet, and 76 dB L_{50} at the back of the cooling tower, at a distance of 15 feet. Therefore, at a distance of 100

feet, the predicted noise levels range between 37 dB and 60 dB L_{50}. The primary noise source associated with the refrigeration equipment is the cooling tower, with the majority of noise due to cascading water and airflow. The noise levels due to the refrigeration equipment are directional in nature.

Based upon the Stock Ranch Draft Guide For Development, major commercial tenants (over 65,000 square feet) require a building setback of at least 100 feet between any structure and the nearest residential property line. Specialty shops (under 30,000 square feet) and minor commercial tenants (between 30,000 square feet and 65,000 square feet) require a building setback of at least 75 feet from any structure and the nearest residential property line. Therefore, mechanical equipment noise levels are not anticipated to exceed the daytime and nighttime noise level criteria, provided that 1) the nearest mechanical equipment is located a minimum of 100 feet from the nearest property line; 2) the buildings include shielding of mechanical equipment through the use of parapets or mechanical equipment wells; and 3) any openings associated with cooling towers are oriented away from residential units. This impact is considered potentially significant and is subject to mitigation.

MM 4.3.7a Rooftop mechanical equipment should be located a minimum of 100 feet from the nearest property line. Mechanical equipment should be shielded through the use of parapets or mechanical equipment wells. Any ventilation openings associated with cooling towers shall be oriented away from residential units.

Responsible for Implementation:	Applicant/Developer
Responsibility for Monitoring:	City of Citrus Heights
Timing:	Install at time of development review at time of project submittal.

Play Fields

Impact 4.3.8 Crowd noise associated with park play fields could exceed the daytime and nighttime exterior noise level criteria at residential areas. This impact is considered potentially significant. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below. If parks are developed as "passive parks" with no sports fields, no mitigation is required.*

The one use associated with neighborhood parks, which has been identified as a potential noise source includes the active play fields. The identified noise impact from playing fields is primarily crowd noise and noise from lawn maintenance equipment.

If softball fields or soccer fields are included as a part of the project design there is a potential for noise levels from activities to exceed the non-transportation noise level criteria. For softball games, the focal point tends to be in the vicinity of the pitchers mound, with the participants and spectators all centrally located around and generally facing that position. For soccer games, the focal point is more variable, with considerable excitement generated when the ball is near either goal, but with the sound of the participants generally spread out over the entire field and the sounds of spectators spread out along the sidelines.

Noise sources associated with these games would primarily consist of occasional shouting and cheering of the participants and observers during the contests and practices. Bollard & Brennan, Inc. file data collected at various softball and soccer venues indicate that average noise levels generated during games are approximately 60 dB L_{eq} at a distance of 100 feet from the focal point or effective noise center of the playing fields. The reported noise levels do not include sound amplification equipment.

Table 4.3-7 shows the predicted hourly average and maximum noise levels from the soccer and softball fields at various distances.

Table 4.3-7
Predicted Softball and Soccer Field Noise Levels at Varying Distances

Distance	Predicted Sound Level, dB	
	Hourly L_{eq}	L_{max}
100 feet	60 dB	75 dB
200 feet	54 dB	69 dB
400 feet	48 dB	63 dB
600 feet	42 dB	57 dB
800 feet	36 dB	51 dB

Based upon **Table 4.3-7**, the noise levels due to park activities can achieve the daytime noise level criteria provided that there is no amplified sound, and that the play fields maintain a minimum distance of 200 feet from the nearest residence.

Mitigation Measures:

Note: These mitigation measures are necessary only for active sports parks. If passive parks with no sports fields are constructed, no mitigation is necessary.

MM 4.3.8a Restrict play field activities to the daytime hours. Provide buffers of 400 feet from the center of organized play fields to residential property lines; or

MM 4.3.8b Incorporate other mitigation measures such as barriers between play fields and residential uses.

Responsible for Implementation: Applicant/Developer
Responsibility for Monitoring: City of Citrus Heights Planning Division
Timing: Determine need for setbacks, soundwall or other mitigation at the time specific development projects are submitted.

Park Lawn Maintenance

Impact 4.3.9 Noise levels due to lawn maintenance at proposed parks could exceed the daytime and nighttime noise level criteria. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

Mowers, weed cutters and lawn tractors can produce relatively high noise levels, up to 90 dB, at a distance of 50 feet, although newer equipment is generally quieter than older model equipment, due to the improved mufflers, and engine design. Use of powered equipment is typically of short duration. For example, lawn-mowing noise would consist of operations in certain areas such as the softball fields with noise levels increasing or decreasing based upon the distance from the receiver. However, the noise levels associated with these operations are generally similar to the same types of activities, which occur at the residences adjacent to the project site. Therefore, these types of operations and resulting noise levels are not expected to be unique to the area, and would not adversely affect nearby residences, provided that these activities are confined to the daytime hours and the equipment is in good working condition, and fitted with proper muffler systems.

MM 4.3.9 Lawn maintenance activities should be confined to the daytime hours. All equipment should be kept in good working condition, and fitted with proper muffler systems.

Responsible for Implementation: Sunrise Recreation and Park District
Responsibility for Monitoring: City of Citrus Heights
Timing: Ongoing

4.3.6 CUMULATIVE IMPACTS

Bollard & Brennan, Inc. used the FHWA Model to determine traffic noise levels with the proposed project Scenarios. **Table 4.3-8** and **4.3-9** show the modeling assumptions and results for the Future Cumulative/No Project, Cumulative + Scenario 1, and Cumulative + Scenario 2 alternatives.

Based upon the predicted traffic noise levels shown in **Tables 4.3-8** and **4.3-9**, the following assessment of cumulative traffic noise impacts is set forth.

Traffic Noise Impacts to Residential Uses

Impact 4.3.10 Traffic along Sylvan Road, Auburn Boulevard, Greenback Lane and Fountain Square Drive is not anticipated to exceed the Existing General Plan noise level criteria at proposed single-family residential areas within the project site. This impact is considered less than significant. *Note: This impact can be mitigated to an acceptable level. See discussion below.*

The proposed project would create increases in traffic on roadways surrounding the project site including Sylvan Road on the east, Auburn Boulevard on the north, and Greenback Lane to the south. In addition traffic volumes would increase through the project site. However, volumes generated would not contribute to a significant increase in traffic noise levels along these roadways. The General Plan noise level criteria would not be exceeded. Therefore, no traffic noise impacts would occur to residential units along these roadways.

Table 4-3-8
Predicted Cumulative No Project Traffic Noise Levels

Roadway	Ldn at 75 feet from roadway centerline	Distance to Traffic Noise Contour*		
		60 dB Ldn	65 dB Ldn	70 dB Ldn
Auburn Boulevard				
Van Maren Ln. to Raintree Dr.	71.2	419	195	90
Raintree Dr. Sylvan Rd.	71.6	445	207	96
Old Auburn Road				
East of Sylvan R.	70.1	354	164	76
Sylvan Road				
Old Auburn Rd. to Stock Ranch Rd.	69.6	326	151	70
Stock Ranch Rd. to Greenback Ln.	69.6	330	153	71
Stock Ranch Road				
West of Sylvan Rd.	54.3	31	15	7
Greenback Lane				
Van Maren Ln. to Fountain Sq. Dr.	72.3	498	231	107
Fountain Sq. Dr. to Sylvan Rd.	72.4	506	235	109
West of Sylvan Rd.	72.4	505	234	109
Fountain Square Drive				
North of Greenback Ln.	59.4	68	32	15

* Distance to traffic noise contours is from the roadway centerline.

Residential Outdoor Activity Areas

Impact 4.3.11 Any residential outdoor activity areas located within 100 feet of the Sylvan Road centerline could be exposed to traffic noise levels in excess of the 60 dB Ldn exterior noise level criterion. This is considered a significant impact. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

Mitigation Measures

MM 4.3.11a Construct a property line sound wall which is six feet in height relative to the building pad elevation. Alternative mitigation measures include locating outdoor activity areas, patios 100 feet or greater from the Stock Ranch Road centerline.

Responsible for Implementation: Applicant/Developer
Responsibility for Monitoring: City of Citrus Heights
Timing: Determine need for soundwall or other mitigation at the time specific development projects are submitted.

Table 4.3-9
Predicted Cumulative + Project Alternatives Traffic Noise Levels

Roadway	Ldn at 75 feet*		Distance to Traffic Noise Contour*					
			60 dB Ldn		65 dB Ldn		70 dB Ldn	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Auburn Boulevard								
Van Maren to Raintree	72.0	72.1	475	479	221	223	102	103
Raintree to Sylvan	72.5	72.6	512	523	238	243	110	113
Old Auburn Road								
East of Sylvan	70.7	70.7	385	387	179	180	83	83
Sylvan Road								
Old Auburn to Stock Ranch	69.8	70.4	339	369	157	171	73	80
Stock Ranch to Greenback	70.4	70.2	368	360	171	167	79	78
Stock Ranch Road								
West of Sylvan	61.9	61.9	100	100	46	46	22	22
Greenback Lane								
Van Maren to Fountain Sq.	72.5	72.5	510	511	237	237	110	110
Fountain Sq. to Sylvan	72.5	72.6	513	520	238	241	111	112
West of Sylvan	72.6	72.6	521	521	242	242	112	112
Fountain Square Drive								
North of Greenback	60.1	60.1	76	76	35	35	16	16

* Distance to traffic noise contours is from the roadway centerline.

Proximity to Sylvan Road and Stock Ranch Road

Impact 4.3.12 Proposed multi-family residential uses located adjacent to Sylvan Road and Stock Ranch Road could be exposed to noise levels exceeding the 60 dB Ldn exterior noise level criterion. This is considered a significant impact. *Note: This impact can be mitigated to an acceptable level. See mitigation measure below.*

The proposed project includes potential multi-family residential uses at the northwest corner of Sylvan Road and Stock Ranch Road. If outdoor activity areas are located within the future 60 dB Ldn traffic noise contours, could exceed the 60 dB Ldn exterior noise level criterion.

Mitigation Measures

MM 4.3.12a Same as MM 4.3-2a, above.

Uses Adjacent to Stock Ranch Road

Impact 4.3.13 Existing multi-family residences adjacent to Stock Ranch Road will be exposed to a significant increase in traffic noise levels due to the proposed project. *Note:*

This impact can be mitigated to an acceptable level. See mitigation measure below.

Future traffic noise levels from Stock Ranch Road, due primarily to development of the Stock Ranch project contribute to a significant increase in traffic noise levels at the existing multi-family residences adjacent to Stock Ranch Road. This includes the Merrill Gardens Apartments, Stock Ranch Senior Apartments and the Stock Villages.

Mitigation Measures

MM 4.3.13a Conduct a detailed analysis of barrier requirements to reduce traffic noise levels by up to 5 dB Ldn. A preliminary analysis indicates that a barrier six feet tall along the property line of the residences would reduce traffic noise levels by up to 5 dB Ldn.

Responsible for Implementation:	Applicant/Developer
Responsibility for Monitoring:	City of Citrus Heights
Timing:	Determine need for soundwall or other mitigation at the time specific development projects are submitted.

Existing Single Family Residences Adjacent to Stock Ranch Road

Impact 4.3.14 Existing single-family residences (Stock Village 1) adjacent to Stock Ranch Road are screened from the roadway by an existing 10-foot combination berm/concrete block barrier. This feature would provide sufficient protection from traffic noise levels generated along Stock Ranch Road. *Note: Because this impact is less than significant, no mitigation is required.*

Residents along Stock Ranch Road would be expected to experience increased noise levels resulting from traffic increases along Stock Ranch Road associated with the project. However, there is an existing 10-foot combination berm/concrete block barrier along the roadway right-of-way/property line. Increasing the height of the existing barrier to provide additional noise buffering is not practical due to constraints on the existing footing. The barrier for these residential units was originally designed for buildout of the Stock Ranch project and is sufficient to reduce traffic noise levels along Stock Ranch Road at existing residences to less than 60 dB Ldn. As a result, the existing wall would be sufficient to buffer traffic noise to acceptable residential noise thresholds.

REFERENCES

Bollard and Brennan, Inc. Acoustical Consultants. (September, 2000).

Egan, M. David. Architectural Acoustics. 1998.

EIP. *Stock Ranch Draft Guide for Development.* August 30, 2000.