

FINAL REPORT

NOISE ELEMENT
CITY OF SARATOGA, CALIFORNIA

BACKGROUND REPORT AND
GOALS, POLICIES, AND IMPLEMENTATION MEASURES

PREPARED FOR:
CITY OF SARATOGA

AUGUST 17, 1988

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**PREPARED BY:
COMMUNITY PLANNING CONSULTANTS**

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INTRODUCTION

The Noise Element of the General Plan for the City of Saratoga has been prepared to meet the requirements of California Planning law Section 65302 (f), which requires a Noise Element as one of the seven mandatory components or elements. The Noise Element has been prepared in recognition of the guidelines adopted by the State Office of Noise Control pursuant to the Health and Safety Code. The Noise Element quantifies the community noise environment in terms of noise exposure contours for both the near and long-term levels of growth and traffic activity.

Purpose and Goal of Noise Element

The purpose of the Noise Element is to define and prescribe ambient noise levels for the various land uses in Saratoga in order that the quiet residential atmosphere of the City will be maintained. The Element identifies areas where noise exceeds acceptable levels, and evaluates existing and potential sources of noise so that noise may be effectively considered in the land use planning process. As a matter of policy, the City considers all residentially-zoned property in Saratoga to be “noise sensitive.” In addition, specific land uses such as schools and convalescent homes, are identified as being noise sensitive. Accordingly, the Noise Element is intended to be used by the community in the goal of preserving the quiet residential environment of Saratoga by controlling noise to levels that are compatible with existing and future land uses, and by preventing

increases in noise levels where noise sensitive land uses are located.

DEFINITION AND DESCRIPTION OF NOISE ENVIRONMENT

Sound and Noise

Sound results from pressure alterations propagated in an elastic medium. In air, sound consists of changes in pressure that alternate above and below the atmospheric pressure. When vibrating objects accelerate the air next to them, alternate waves move through the air similar to waves in water. As the waves encounter an object, a force is exerted which causes the object to move. When the object is the human ear drum, forces are transmitted to the middle and inner ear sections where each vibration is ultimately carried to the brain and is interpreted as sound. Sounds have various characteristics including variations in intensity (loudness), frequency (pitch), incidence (constant vs. intermittent), and complexity (purity of pitch).

Noise is usually defined as unwanted sound. It is difficult to objectively describe noise since what is desirable sound to one person may be noise to another individual. The intensity, duration, time of occurrence and frequency components of the sound contribute to its identification as sound or noise. There are, however, many sounds which originate from transportation sources that are categorized as noise by most everyone. Generally, the determination of which sounds are noise vary by the individual’s experience, learning, or activity state.

Strange sounds are considered as noise compared to more familiar sounds. Random sounds are usually more disturbing than predictable sounds. Sounds which occur during activities requiring quiet are perceived as being noisier than sounds of the same intensity occurring during a more active period. Research indicates that loud, high-pitched, intermittent sounds are more annoying and considered the “noisiest”.

The Measurement of Sound

The measurement of sound involves two basic problems, a very wide range of pressures and the nonlinear manner in which the ear responds to sounds of varying intensity and frequency. It has been found that the human ear responds logarithmically to changes in loudness of an applied stimulus. Therefore, most sound measuring instruments are calibrated to read in terms of the common logarithm of the ration of sound pressure. The meter reading is called the sound pressure level and is express in decibels (dB).

Zero (0 dB) on the decibel scale is the lowest sound level that a healthy human ear can detect under very quiet conditions. As the sound level measuring scale is logarithmic (not in linear units like inches or pounds), a wide range of sound level changes can be expressed without using large, unwieldy numbers. For example, 10 decibels is 10 times more intense than 1 decibel, 20 decibels is 100 times greater than 1 decibel and 30 decibels is 1000 times greater than 1 decibel in sound

intensity. In relating decibels to human perception, it is necessary to use a particular type of decibel scale. This is known simply as the A-scale, which simulates the response by the human ear, a response more perceptive of mid-range frequencies. The A-scale is universally used for measuring sound levels because of its similarity to human perception. Typical “A” weighted sound levels for various sources measured at the distances shown are listed below:

NOISE SCALE

Source	Distance	Sound Level (dBA)
Soft whisper	5 ft	30
Quiet office	---	40
Light traffic	100 ft	50
Average speech	3-5 ft	60
Automobiles	50 ft	70
Inside bus	---	80
Leaf blower	25 ft	85
Inside subway train	---	90
Freight train	25 ft	100
Automatic punch press	3 ft	110
Pneumatic chipper	5 ft	120
Threshold of pain	---	130

The graph, shown below, further shows the relationship of how the level of noise varies with distance as well as the decibel level.

NOISE LEVEL

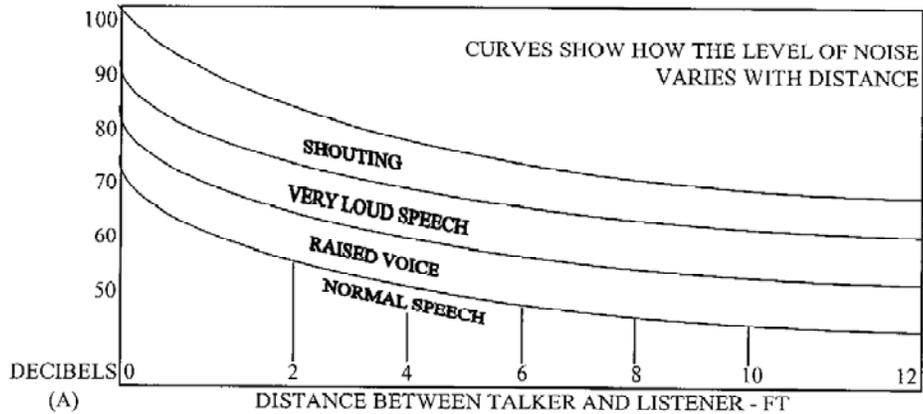


Figure 1 (See Page 5) expands on the above list by showing the relationship between various indoor and outdoor noises, their decibel level and their relative loudness.

In addition to its scientific definition, noise may also be defined as any sound that is annoying or which has a detrimental effect on a person's physiological and/or psychological processes. The degree of harm or annoyance produced by noise relates to the duration and intensity of sound. Increases of noises are often more annoying than a steady sound of greater intensity because one grows accustomed to a continuous sound. It is important to assess the impacts associated with noise for the following reasons:

1. Noises of sufficient intensity have caused irreversible hearing damage.
2. The effects of noise are cumulative, and, therefore, the levels and durations of noise

exposure must be taken into account in any overall evaluation. This realization has been translated into legislation and local regulatory ordinances.

3. Noise can produce physiological changes and often contributes to stress-related health disorders.
4. Noise can interfere with speech and other communication.
5. Noise can be a major source of annoyance by disturbing sleep, concentration, rest, and relaxation.
6. Noise interference with work is a significant direct and indirect cost to our industrial society.
7. People often do not complain about noise, despite its adverse impact on their health and general well-being.

*City of Saratoga Noise Element
Background Report/Goals, Policies and Implementation Measures*

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FIGURE 1

**Sound Levels and Loudness of Illustrative Noises in Indoor and Outdoor Environments
(A-Scale Weighted Sound Levels)**

dB(A)	OVER-ALL LEVEL (Sound Pressure Level Approx. 0.0002 Microbar)	COMMUNITY (Outdoor)	HOME OR INDUSTRY (Indoor)	LOUDNESS (Human Judgment of Different Sound Levels)
130		Military Jet Aircraft Take-Off With After-Burner From Aircraft Carrier @ 50 Ft. (130)	Oxygen Torch (121)	120dB(A) 32 Times as Loud
120	UNCOMFORTABLY	Turbo-Fan Aircraft @ Take-Off Power @ 200 Ft. (118)	Riveting Machine (110) Rock-N-Roll Band (108-114)	110dB(A) 16 Times As Loud
110		Jet Flyover @ 1000 Ft. (103) Boeing 707, DC-8 @ 6080 Ft. Before Landing (106) Bell J-2A Helicopter @ 100 Ft. (100)		100dB(A) 8 Times As Loud
100	VERY	Power Mower (96) Boeing 737, DC-9 @ 6080 Ft. Before Landing (97) Motorcycle @ 25 Ft. (90)	Newspaper Press (97)	90dB(A) 4 Times As Loud
90		Car Wash @ 20 Ft. (89) Prop Plane Flyover @ 1000 Ft. (88) Diesel Truck, 40 MPH @ 50 Ft. (84) Diesel Train, 45 MPH @ 100 Ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	80dB(A) 2 Times As Loud
80		High Urban Ambient Sound (80) Passenger Car, 65 MPH @ 25 Ft. (77) Freeway @ 50 Ft. from Pavement Edge, 10 AM (76 ± 6)	Living Room Music (76) TV-Audio, Vacuum Cleaner (70)	70 dB(A)
70	MODERATELY LOUD		Cash Register @ 10 Ft. (65-70) Elec. Typewriter @ 10 Ft. (64) Dishwasher (Rinse) @ 10 Ft. (60) Air Conditioning Unit @ 100 Ft. (60)	60dB(A) 1/2 As Loud
60		Large Transformers @ 100 Ft. (50)	Conversation (60)	50dB(A) 1/4 as Loud
50	QUIET	Bird Calls (44) Lower Limit, Urban Ambient Sound (40)		40dB(A) 1/3 As Loud
40	JUST AUDIBLE	[dB(A) Scale Interrupted]		
10	THRESHOLD OF HEARING			
0				

Source: *Melville C. Branch, et al., Outdoor Noise and the Metropolitan Environment, (Los Angeles Department of City Planning, 1970), P. 2.*

Figure 2

Acoustical Standards

The acoustical standards shown in Figure 2, which are a weighted 24-hour sound average (Ldn), are those recommended as being environmentally acceptable for the City of Saratoga and are achievable within the findings and recommendations of this Noise Element. These standards are consistent with those of other communities similar to Saratoga. However, because of Saratoga’s physical setting and the desires of the community for a quality environment based on its land use and development, it is the long range goal of the City to achieve an outdoor daytime residential standard of 55 dBA.

For the Purposes of evaluating noise conditions at a specific time and place, single event noise levels should not rise more than 6 dBA above the local ambient noise level in single and multi-family residential neighborhoods; the acceptable outdoor daytime ambient noise level in residential areas is considered to be 60 dBA. In commercial areas, single event noise levels should not rise more than 8 dBA above the local ambient noise level; the acceptable outdoor daytime noise level in commercial areas is considered to be 65 dBA. A single event noise level of 75 dBA is the maximum which should be tolerated for construction projects authorized by permits measured at the property line.

**ACOUSTICAL STANDARDS
(Recommended Average Daytime Ldn
Noise Levels)**

The recommended maximum levels are based upon preventing noise interference with human activities and are well below levels which could damage hearing. The indoor standards apply to noise produced by outdoor noise sources. Residential outdoor levels should be 10 dBA lower in the evening than in the daytime.

LAND USE	STANDARDS	
	Daytime	Evening
Commercial/Office	Outdoor	65 dBA
	Indoor	50 dBA
Public/Park	Outdoor	60 dBA
	Indoor	50 dBA
Residential	Outdoor	60 dBA
	Indoor	45 dBA

THE NOISE ENVIRONMENT IN SARATOGA

Identification of Existing Noise Sources and Noise Sensitive Areas

Shown on Map 1 are the existing noise contours for highways and major arterials in Saratoga which indicate the noise exposure levels associated with these corridors. The 60 dBA contour locations indicate the acceptable point of noise exposure. This means that the ambient noise levels within these contours are within acceptable limits for

the residential environment. Noise levels beyond 65 dBA are in excess of acceptable levels for residential land use. Actual conditions on each property and within residences will vary significantly due to such factors as elevation, setback, lot size, noise barriers and screening, and building construction. Daily variations in noise level occur as to time of day, weather conditions and other factors.

The noise environment along Saratoga's major streets and other locations is discussed further below:

1. **Highway 9** – Highway 9, consisting of Saratoga-Los Gatos Road and Big Basin Way, is both a rural two-lane highway within its mountainous entrance into the City and a four-lane highway from the village leading to Los Gatos. The two segments have differing noise profiles due to topography, traffic volumes, and land use. Excessive traffic noise has been recorded which adversely affects residential areas such as Mendelsohn Lane particularly where located below the elevation of the roadway. The Big Basin Way segment has the 60 dBA contour located at 76 feet from the centerline of the roadway. Los Gatos-Saratoga Road has produced the highest noise measurements with the 60 dBA contour located 407 feet from the center line in the roadway.

2. **Highway 85** – Highway 85 is the current designation of Saratoga-Sunnyvale Road; it is the busiest thoroughfare in Saratoga and contains the highest concentration of commercial development. The 60 dBA contour is 298 feet from the centerline of the roadway.

The West Valley Corridor will be constructed as an extension of Highway 85 through Saratoga within the next 3-5 years. The design of this corridor was the subject of a Freeway Agreement between the City, Caltrans and Traffic Authority which was adopted by the Saratoga City Council on March 2, 1988. The agreement requires that Route 85 be developed in the following manner:

a. The freeway will have six travel lanes, two of which will be designed as commuter lanes for use only by transit buses and high occupancy vehicles during commuter hours.

b. The freeway will have a forty-six foot landscaped median which will provide for future mass transit.

c. The freeway will be depressed throughout the City except for an at-grade section between Saratoga Avenue and Saratoga Creek. This section will have extensive landscaping treatment to minimize impact on nearby properties.

d. Cox Avenue and Prospect Avenue will remain essentially at grade with the freeway being fully depressed under these two streets.

e. Saratoga Avenue will go under the freeway by use of under-pass so that no structures will be above grade in the area.

f. Quito Road will be elevated about ten feet above current grade so

that the freeway can pass under it depressed about twelve feet.

g. A pedestrian overcrossing will be provided between Blue Hills School and Kevin Moran Park.

h. Extensive soundwalls will be provided throughout the length of the freeway to reduce noise. Walls will be built as early as possible during the construction process.

i. Medium and heavy trucks will not be permitted on the freeway.

j. No interchanges will be built in Saratoga.

k. The entire section of the freeway from Interstate Route 280 to State Highway 17 will be open to traffic at the same time to prevent partial openings which could divert freeway traffic onto Saratoga surface streets.

l. Funding to complete the entire project is provided by the Traffic Authority Strategic Plan.

m. Construction hours will be limited to comply with local ordinances (7:30 a.m. to 6:00 p.m. in Saratoga).

The negotiated freeway design would mitigate traffic noise to acceptable noise levels (60 dBA) for residential and open space land use in Saratoga along the freeway corridor.

3. Saratoga Avenue – Saratoga Avenue is a major two to four-lane arterial leading into the City from the north. The land use along the street is

predominantly residential, and it provides access to churches and schools. Should the two-lane portion from Fruitvale Avenue into the village be improved in the future, noise mitigation measures would be required in view of residential land uses and the traffic volumes. The 60 dBA contour is at 172 feet from centerline.

4. Fruitvale Avenue – Fruitvale Avenue is a two and four-lane arterial providing access to the Civic Center, Redwood School, West Valley College and the 100F Home. The 60 dBA contour is at 176 feet from centerline.

5. Allendale Avenue – Allendale Avenue provides a connection between Fruitvale Avenue and Quito Road. The land use is predominately residential with the exception of West Valley College and two churches. This street is two-lanes in its easterly section. The 60 dBA contour is at 26-feet from centerline.

6. Cox Avenue – Cox Avenue is a two-lane arterial between Saratoga-Sunnyvale Road and Quito Road. Cox Avenue intersects with the Southern Pacific Railroad Line, the West Valley Corridor, and Saratoga Avenue. This residential street has its 60 dBA contour located at 87 feet from centerline.

7. Quito Road – Quito Road is an arterial street of varying improvement standards leading from Saratoga Avenue to Saratoga-Los Gatos Road. The land use is single family residential, in both suburban and rural in character. The heavier traffic portion of Quito Road shows the 60 dBA contour at 235 feet.

8. **Prospect Road** – Prospect Road serves as the City’s northerly boundary; it is improved to four lanes and provides access to churches, shopping centers and schools, including Prospect High School. The 60 dBA contour is at 216 feet from centerline.

9. **Pierce Road** – Pierce Road is a designated arterial beginning at the Congress Springs Road portion of Highway 9 and terminating at Saratoga-Sunnyvale Road. Land use is low-density residential throughout its hilly location. Low traffic volumes and reduced speeds result in the 60 dBA contour at 36 feet from centerline.

10. **Railroads** – The southern Pacific Rail Lines consists of a spur line extending from San Jose, across Saratoga from Prospect Road in the north to Quito Road in the southeast, and terminating at the Kaiser Permanente Plant in Cupertino. One train each day is currently using the spur track. This train traverses the City on an irregular schedule ranging from 11 a.m to 4:00 – 5:00 p.m Southern Pacific does not anticipate a significant increase in the number of trains using the spur, particularly since only a small portion of the train’s present hauling capacity is being used. The 60 dBA contour is at 57.5 feet and the 65 dBA contour at 27 feet from the centerline.

11. **Airports** – Aircraft flight patterns over Saratoga are generated by Moffett Field and San Jose International Airport. Aircraft noise in Saratoga is a relatively small part of the City’s noise environment. In recent years, aircraft on

submarine patrol and training aircraft operating from Moffett Field Naval Air Station have routinely flown over the City on daytime training and patrol flights. Over flights of large aircraft from San Jose International Airport are at altitudes which make their noise effect noticeable but not intrusive at ground level in quieter noise environments.

12. **Commercial Activities** – Commercial concentrations and community and neighborhood shopping centers are located on Saratoga Avenue and Saratoga-Sunnyvale Road at intersections with other arterial streets. There is also a small neighborhood Center on Quito Road. Episodic noise associated with the shopping centers and commercial activities are truck unloading, trash collection, landscape maintenance (leaf blowers) and refrigeration equipment. The village is a concentration of smaller business activities and is the historic commercial core. The main village thoroughfare, Big Basin Way, is within acceptable limits of noise exposure (60-65 dBA) due to lower traffic volumes and vehicle speeds. However, the intersection of the three major arterials in the village finds points of exposure in excess of 7 dBA.

13. **Paul Masson Site** – The Paul Masson Winery complex of twenty-five acres on Saratoga Avenue is presently inactive. Future land uses is likely to be a mixed development of residential and commercial uses under the Planned Development Ordinance. The potential mixed development is both a source of potential noise and a noise sensitive environment, especially considering the likelihood of a senior housing

development and other residential uses. Specific attention to noise concerns should be part of the environmental review and eventual design of any future use or development.

Projected Noise Contours for the Year 2005

Map 2 shows noise contours based on projected future traffic volumes of major City streets and the development of the West Valley Corridor. Due to minimal future residential growth within Saratoga and the immediate surrounding area and the assumed traffic control measures that would maintain or reduce future peak hour traffic volumes, noise levels are not predicted to measurably increase by the target year 2005 on a City-wide basis. Construction of the West Valley Corridor is projected to stabilize traffic volumes on the City's major streets. The noise contours predicted for the Route 85 Freeway are based on the adopted Freeway Agreement.

Citywide Noise Exposure Inventory

As can readily be seen from the maps showing noise level contours, the principal existing and future noise problems in Saratoga are largely associated with the arterial street systems. Approximately 1,180 dwellings city-wide are located within the 60+ dBA contours with more than half of those units exposed to noise levels in excess of 65 dBA. Based on a household average of 3.0 persons per dwelling unit, this would mean that approximately 3,012 residents of the city of Saratoga currently are exposed to

excessive noise levels in their residential environment due to the ground transportation system. This number is forecasted to be relatively constant to the year 2000 due to the predicted lower traffic volumes on the major streets and the limited potential for further residential development. An additional number of dwellings will be affected by the new freeway upon its construction.

In addition to transportation – related noise, commercial activities (including shopping centers), recreation complexes and other sites of outdoor public assembly such as churches and school sites have been identified as periodic sources of noise complaints.

All residentially – zoned property in Saratoga is considered to be noise sensitive. In addition, specific types of land uses such as public and private schools, parks, and open spaces, community facilities, retirement and convalescent homes and churches are considered to be noise sensitive. Listed in Figure 3 (Page 12) and shown on Map 3 are the facilities or sites that are included under this identification.

Public schools located near major sources of transportation noises are Blue Hills School, Redwood School, Hansen School, Saratoga High School, Prospect High School and West Valley College. Noise mitigation measures are generally provided by landscaping, open space (parking or recreation) and building setbacks. Private schools are generally located in association with church facilities and have employed similar mitigation measures. Parks within the City of Saratoga are generally located

away from major thoroughfares and have not been found to be impacted by specific noise sources. Exceptions are Kevin Moran Park and Congress Springs

Park which are adjacent to the future Highway 85 freeway extension.

FIGURE 3

NOISE SENSITIVE LOCATIONS

PUBLIC SCHOOLS

1. MARSHALL LANE SCHOOL
2. PROSPECT HIGH SCHOOL
3. BLUE HILLS SCHOOL
4. LAURA HANSEN SCHOOL
5. SARATOGA HIGH SCHOOL
6. EL QUITO PARK SCHOOL
7. REDWOOD JUNIOR HIGH SCHOOL
8. ARGONAUT SCHOOL
9. OAK STREET SCHOOL
10. FOOTHILL SCHOOL
11. WEST VALLEY COMMUNITY COLLEGE

PRIVATE SCHOOLS

1. SACRED HEART CATHOLIC SCHOOL
2. SAINT ANDREWS EPISCOPAL SCHOOL
3. NOTRE DAME NOVITIATE
4. PACIFIC ACADEMY
5. COUNTRY LANE MONTESSORI PRE-SCH
6. NOTRE DAME MONTESSORI PRE-SCHOO
7. UNIVERSITY PRE-SCHOOL OF SARATO

PARKS

1. AZULE PARK
2. BROOKGLEN PARK
3. CENTRAL PARK
4. CONGRESS SPRINGS PARK
5. EL QUITO PARK
6. FOOTHILL PARK
7. GARDINER PARK
8. HAKONE JAPANESE GARDEN
9. HISTORICAL PARK
10. KEVIN MORAN PARK
11. WILDWOOD PARK

CHURCHES

1. ASCENSION CHURCH
2. SACRED HEART CHURCH OF SARATOGA
3. FIRST CHURCH SARATOGA
4. CHURCH OF JESUS CHRIST LATTER D. SAINTS
5. SARATOGA FEDERATED CHURCH
6. SAINT ANDREW'S EPISCOPAL CHURCH
7. IMMANUEL LUTHERAN CHURCH
8. PRINCE OF PEACE LUTHERAN CHURCH
9. SERBIAN EASTERN ORTHODOX CHURCH
10. ST. NICHOLAS ORTHODOX CHURCH
11. SARATOGA PRESBYTERIAN CHURCH
12. WESTHOPE PRESBYTERIAN CHURCH SARATOGA
13. GRACE UNITED METHODIST CHURCH
14. CONGREGATION BETH DAVID

COMMUNITY FACILITIES

1. SARATOGA CITY HALL AND COMMUNITY CENTER
2. VILLA MONTALVO
3. ARBORETUM
4. MADRONIA CEMETERY
5. SARATOGA COMMUNITY LIBRARY

SENIOR HOUSING
RETIREMENT HOMES
CONVALESCENT HOSPITALS

1. SARATOGA COURT
2. FELLOWSHIP PLAZA
3. ODD FELLOWS INFIRMARY
4. OUR LADY OF FATIMA VILLA
5. SARATOGA PLACE

Community Noise Complaints

Listed below are specific noise complaints that have been received by the City of Saratoga in the past three years through the Community Service Officer’s program. The number of complaints and percentage by category is included:

Barking dogs	45 (35%)
Juvenile parties	20 (16%)
Live band/loud music	19 (15%)
Construction noise	12 (9.5%)
Leaf blowers in residential zones	9 (7%)
Noise from commercial activities	7 (5.5%)
Other equipment noise in residential	6 (5%)
Noise from skateboard ramps	4 (3%)
Birds capable of raucous outcry	5 (4%)

Other general sources of noise that have been identified in environmental impact reports and the General Plan include:

- Traffic noise on major thoroughfares.
- Surplus school uses (business-institutions-recreation).
- Motorized off-road vehicles.
- Tunnel effect of sound barrier walls.

Noise problems and complaints currently are addressed and managed through City ordinances dealing with

nuisances or specifically by the noise control portion of the Municipal Code (Article 7-30, Health and Safety.) Like many other communities, Saratoga is experiencing a sensitivity by its residents toward power landscape maintenance equipment such as lawn mowers and leaf blowers. This equipment can reach excessive decibel levels which exceeds the permitted 70 dBA between the Hours of 8:00 a.m. and 8:00 p.m.

One of the problems associated with Saratoga’s existing noise ordinance as it applies to power equipment is that its enforcement relies primarily on noise measurement. Power landscape equipment is usually in motion and normally is used for short periods of time. Often by the time the Community Service officer arrives at the scene, the noise has ceased or has moved to a different location. Many noise meter readings are required to obtain an accurate measurement of the sound. One solution to this problem is the adoption of additional regulations that are easier to enforce. These may include the following:

1. greater restriction on the allowable hours of operation;
2. require the use of newer, quieter equipment; and

3. restrict operations to only one piece of power equipment at a time.

This problem has been addressed by other communities through more restrictive hours and encouragement of the use of quieter equipment that meets the 70 dBA limitation. The City of Palo Alto has amended its noise control ordinance to allow leaf blowers to be used only between the hours of 9 a.m. and 5 p.m. Monday to Saturday and 10 a.m. to 4 p.m. on Sundays. In addition, the maximum sound level of leaf blowers must be reduced to 75 decibels by the year 1989; the present limit is 82 decibels. This issue was the subject of a recent election where it was proposed to lower the level further to the 70 decibel level which is not attainable by most gas-powered blowers. This proposal was defeated by the voters. Improved technology, lower operating levels, and restricted hours are requirements of several other communities such as Santa Cruz, Santa Barbara and Carmel. The small residential community of Belvedere has banned the use of leaf blowers entirely.

Land Use Planning Implications

Land use planning can provide an effective means of mitigating adverse noise impacts by separating noise-sensitive areas from noise sources. Expensive site-specific noise mitigation structures such as sound walls or structural soundproofing can then be avoided or minimized. In developed areas, however, there is not always sufficient land to allow adequate separation of population concentrations

from transportation systems, which are the major sources of noise. Site specific noise abatement measures must be taken in these instances.

Control of noise can be accomplished by controlling noise at the source, buffering the pathway of sound waves with barriers or increased distance, controlling the transmission of noise through structures, and by enclosing or protecting the receiver of noise.

Noise Reduction Techniques

Noise reduction techniques available to the City of Saratoga to achieve noise-compatible land uses fall into five categories:

- Zoning standards
- Other legal restrictions such as subdivision laws, building, and health codes
- Municipal ownership or control of land
- Financial incentives for compatible use
- Educational and advisor municipal services.

Zoning Standards

Zoning standards can be a strong local control on the type of allowable new development, but is limited in controlling existing noise problems related to land uses. The principal use of zoning standards as a noise compatibility control is the separating of incompatible uses. In addition, zoning standards can regulate specific details of development design or construction, such as limiting

building heights, and requiring buffer strips, noise barriers, and sound insulating construction. These techniques are most frequently appropriate in the design and construction of multiple family buildings located on major traffic arteries.

Physical noise reduction techniques that can be utilized fall into the four major categories shown below. These physical techniques vary widely in their noise reduction characteristics their costs, and in their applicability to specific locations and conditions.

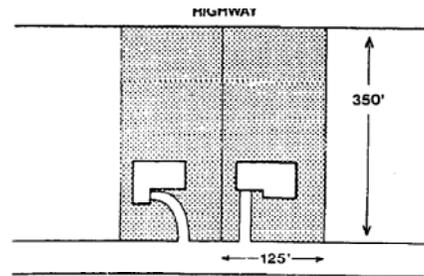
- Acoustical site planning
- Acoustical architectural design
- Acoustical construction
- Noise barriers

Acoustical Site Planning

Acoustical site planning uses the arrangement of buildings on a tract of land to minimize noise impacts by capitalizing on the site's natural shape and contours. Opportunities for successful acoustical site planning are determined by the size of the lot, the terrain, and the zoning restrictions. Acoustical site planning techniques include:

1. Placing as much distance as possible between the noise source and the noise sensitive activity.
2. Placing noise-compatible activities such as parking lots, open space, and commercial facilities, between the noise source and the sensitive activity.

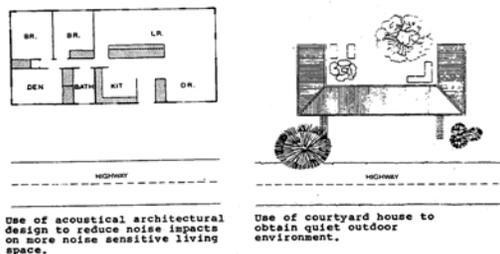
3. Using buildings as barriers.
4. Orienting noise-sensitive buildings to face away from the noise sources.



Houses placed near the front of long narrow lots have deep rear yards available to act as noise buffers.

Acoustical Architectural Design

Acoustical architectural design incorporates noise-reducing concepts in the details of individual buildings. The areas of architectural concern include building height, room arrangement, window placement, and balcony and courtyard design. For example, in some cases, noise impacts can be reduced if the building is limited to one story and if bedrooms and living rooms are placed in the part of the building farthest from the noise source, while kitchens and bathrooms are placed closer to the noise source.



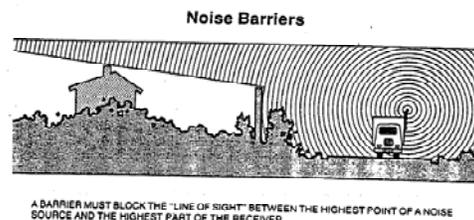
Acoustical Construction

Acoustical building construction is the treatment of the various parts of a building to reduce interior noise impacts. It includes the use of walls, windows, doors, ceilings and floors that have been treated to reduce sound transmission into a building. The use of dense materials and the use of air spaces within materials are the principle noise reduction techniques behind acoustical construction. Acoustical construction can be an expensive technique, especially when added to an existing building; however, it need not be prohibitively expensive in new construction. It is one of the most effective ways of reducing interior noise.

Noise Barriers

Noise barriers can be erected between noise sources and noise-sensitive areas. Barrier types include berms made of sloping mounds of earth, walls and fences constructed of a variety of materials, thick plantings of trees and shrubs, and combinations of these materials. The choice between these depends on a variety of factors, including the desired level of sound reduction, space, cost, safety and aesthetics. Solid wall barriers may reflect sound from one side of a highway

to the other, actually increasing sound levels by 3 dBA where walls are parallel. Earth berms deflect sound upward and tend to eliminate this condition; a combination of the two is usually recommended where possible for this reason.



Other Legal Controls

City ordinances other than zoning can act as noise compatible land use controls such as:

1. Subdivision or development standards can regulate details of larger developments to require acoustical site planning or to require berms and barriers. These standards often do not apply to new construction.
2. The Building Code can specify construction details such as acoustic insulation and sealed windows, or they can require that certain noise levels not be exceeded within a building.
3. State and federal standards specify noise levels which are not to be exceeded if a building is to be used for residential purposes. These standards have been the most consistently effective noise control where major noise sources have been identified.
4. An occupancy permit can be withheld unless all provision of zoning,

subdivision, building, and health codes have been met. This is an exceptionally effective enforcement mechanism.

5. Environmental impact reports can be required for new development projects. These contain a noise impact section which would require site-specific acoustical analysis. This information can act as a valuable aid for city officials who must make decisions on the appropriateness of permit applications.

Municipal Ownership

If the City or other government agency owns the noise-impacted land, it can keep the land vacant or ensure that it is developed only with noise compatible uses. Acquisition can be accomplished by several techniques, including purchase or taking by eminent domain. This can be both costly and locally unpopular. Land can be received as a gift, as a condition of subdivision approval, as a transfer from other government agencies, or in trade for other municipally owned land. Alternatively, the City can obtain, through purchase or otherwise, an easement which restricts the land without an actual transfer of ownership. This may often represent a low cost way to obtain strict land use control.

Educational and Advisory Municipal Services

Builders and developers often are unaware of noise compatibility measures which can be incorporated into a development at little cost. The City can, at very low cost, provide information to builders, developers, architectural firms,

and the public in general to generate the necessary awareness. These municipal services could include an acoustical information library or similar service as a reference source for local builders and developers. A public information effort can result in a public awareness of noise incompatibilities and their prevention.

Existing Noise Control and Enforcement Measures

The City of Saratoga, through its regulatory ordinances and code enforcement measures, contributes to the control of noise sources both directly through enforcement and indirectly through development standards and project review. Summarized below are the existing principal vehicles for noise control:

Zoning Ordinance

The Zoning Ordinance is the principal regulatory tool that controls land use by category, location, and intensity. Features related to noise are as follows:

1. Permitted land uses are prescribed by zoning district to ensure land use compatibility within and between districts.
2. Building setbacks provide for minimum distances from property lines and noise sources such as streets and highways.

The role of the zoning ordinance is described within the noise reduction techniques section of this report. Review of the zoning ordinance for

additional noise related controls is recommended as a part of the policies and implementation measures of this Element.

Fences, Walls, and Hedges Ordinance

This ordinance recognizes the need for noise protection along major streets. Fencing to mitigate noise from certain arterial streets (Prospect Road, Saratoga/Sunnyvale Road, Quito Road, Saratoga Avenue, Cox Avenue) can reach the maximum height of ten feet subject to the fence permit and meeting specified provision (15-29.030). Fencing adjacent to scenic highways is subject to controls of visual appearance including landscaping but with provisions for compensating for noise impacts (15-29.040).

Noise Control Ordinance (Article 7-30)

Specific provision of the current ordinance are:

1. Noise levels for residential zoning districts cannot exceed 6 dBA above the local ambient noise level. (7-30.030)

2. Noise levels for commercial and industrial zoning districts cannot exceed 8 dBA above the local ambient noise level (7-30.040) Exemptions to the above are that any noise source which does not produce a noise level exceeding 70 dBA at a distance of twenty-five feet under its most noisy condition of use shall be exempt from the provision of Sections 7-30.030 and 7-30.040 between the hours of 8:00 a.m. and 8:00 p.m.

3. Construction activities permitted only between the hours of 7:30 a.m. and 6:00 p.m. (7-30.060)

a. No individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of twenty-five feet from the source thereof.

b. The noise level at any point outside of the property plane of the project shall not exceed 86 dBA.

4. Amplified sound is subject to permit issued by Planning Director.

5. Excessive noise is unlawful when it disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitivities residing in the area.

The Saratoga Noise Control Ordinance, adopted in 1972, is based on a model ordinance recommended by the State for municipalities and is similar to ordinances of other communities in respect to standards and regulations. A recommendation of this Element is to consider amending the existing noise ordinance with revised standards and regulations that address the specific noise problems of the City of Saratoga.

Truck Route Ordinance (Article 9 – 40)

The Truck Route Ordinance contributes to both the safety and the quiet environment of the community by

limiting the operation of trucks on city streets. Truck routes are also important in respect to road maintenance and need for repair.

No street or portion thereof in the City which has not been designated a “truck route” may be used by any commercial vehicle having a gross weight in excess of five tons. All streets not designated truck routes are considered to be restricted streets. “Use of a street” includes the stopping, standing or parking of a vehicle as well as driving, operating or moving of such vehicle thereon.

Designated Truck Routes within the City of Saratoga are:

- Prospect Road from Lawrence Expressway to Saratoga Avenue and the City limits.
- Saratoga Avenue from the intersection of State Highway 9 and State Highway 85 to the City limits.
- State Highway 9 from the City limits at Pierce Road to the City limits at Austin Way (9-40.030)
- State Highway 85, from Prospect Road to Saratoga Avenue.

Off-Street Vehicle Operation Ordinance (Article 9-45)

This ordinance regulates the operation of motor vehicles upon public and private property, except public streets and highways, by any person, whether or not he possesses a valid motor vehicle operator’s license. This ordinance is difficult to enforce due to problems of terrain and access to private property. Specific provision are:

1. Permit required for all vehicles not specifically exempted. (9-45.020)

2. Certification of vehicles to ensure safety and that the use will not have an adverse impact upon the environment or upon the occupants of neighboring properties. Off-road vehicles must be equipped with an adequate muffler which is capable of maintaining a sound level not greater than 83 dBA under all conditions. (9-45.090)

Existing Goals and Policies in Other General Plan Elements

The following goals and policies relating to noise currently exist in other elements of the General Plan:

Land Use

LU.4.0 Encourage the economic viability of Saratoga’s existing commercial areas and their accessibility by residents, keeping in mind the impact on the surrounding residential area.

LU.4.1 Non-residential and industrial uses shall be buffered from other uses by methods such as setbacks, landscaping, berms and sound walls.

LU.4.2 Non-residential development shall be confined to sites presently designated on the General Plan for non-residential use. Existing non-residential zoning shall not be expanded nor new non-residential zoning added.

LU.6.0 Relate new development and its land uses to presently planned

street capacities so as to avoid excessive noise, traffic, and public safety hazards. If it is determined that existing streets need to be improved to accommodate a project, such improvements shall be in place or bonded for prior to issuance of building permits.

LU6.2 Proposed land uses and development proposals shall be evaluated against ordinance standards to assure that the related traffic, noise, light, appearance, and intensity of use have limited adverse impact on the area.

Circulation

CI 10.0 Traffic impacts that could create excessive noise, safety hazards, and air pollution shall be mitigated. The City shall use the standards established by the State of California and in effect on February 14, 1983, to determine what constitutes excessive noise, safety hazards, and air pollution until the City adopts its own standards or more restrictive standards are adopted by the state.

Housing

The Saratoga General Plan recognizes the predominately residential nature of the community and the need for protection of the noise sensitive environment. The Housing Element recognizes housing needs and the appropriate future locations of housing consistent with other elements of the General Plan.

Open Space

OS.3.2 The City shall review proposed interim uses of surplus school sites to determine if the impacts generated by the proposed uses will have significant adverse effects, particularly in terms of noise, traffic, and parking on adjacent residential areas.

Issue Identification and Proposed Goals, Policies and Implementation Programs

Issue #1: Many residents of the City of Saratoga are exposed to undesired levels of noise from a variety of sources.

1.0 (Goal) To maintain or reduce noise levels in the City to assure a residential environment free from annoying and/or harmful noise. It shall be the long range objective to reduce the average daytime outdoor residential noise standard to 55 dBA.

1.1 (Policy) The City shall maintain an up-to-date-Noise Element.

1.1 (Imp) The City shall periodically measure and monitor noise levels at noise sensitive locations.

1.1a (Imp) The Noise Element shall be reviewed in 1994 to assess the impacts of the West Valley Freeway (Route 85)

1.2 (Policy) The City shall control specific sources of noise either through abatement or through enforcement of noise standards, and shall discourage activities, practices, or land uses that create excessive noise.

1.2 (Imp) The City should revise the Noise Ordinance to reflect appropriate noise levels and regulations for various types of power equipment, land use activities and enforcement methods.

1.3 (Policy) The City shall ensure that all serviced contract or performed by the City do not cause noise problems.

1.3 (Imp) The City shall require that all City-owned and operated equipment and equipment operated under contract with the City contain adequate noise attenuation equipment. New purchases of equipment should be made with quiet operations given a high priority as a selection criteria.

Issue #2: The community noise environment may be detrimentally affected by land use conflicts.

2.0 (Goal) To promote and preserve land uses which are compatible with each other and with a minimal noise environment.

2.1 (Policy) Changes in land uses and development should be reviewed for noise impacts to neighboring land uses.

2.2 (Policy) Parks and recreational areas should be protected from excessive noise to permit the enjoyment of sports and other leisure time activities.

2.2 (Imp) Parks and other recreational areas which are impacted by outside noise sources should be provided with noise protection devices, including barriers and landscaping. Park design

should locate passive recreation areas away from noise sources.

2.3 (Policy) New development deemed noise sensitive shall be appropriately sited and protected from adverse noise impacts.

2.3 (Imp) The City shall require all noise sensitive development adjacent to or within an area where the noise level exceeds 60 dBA Ldn to include an acoustical analysis and recommendations for reducing noise impacts to acceptable levels.

2.4 (Policy) New development that generates noise shall utilize appropriate measures to reduce noise impacts.

2.4 (Imp) The City shall require all noise-generating development to mitigate noise impacts to the adopted noise standards; acoustical analysis may be required.

Issue #3: Public awareness and education is a key ingredient in controlling unwanted noise and its effects on the quality of life in Saratoga.

3.0 (Goal) To encourage public awareness of noise hazards, and ensure public protection from harmful miscellaneous noise sources.

3.1 (Imp) Commercial interests, institutions, and residential associations should involve their employees and members in efforts to reduce noise in their activities. Property improvements that would restrict noise and quieter maintenance equipment should be encouraged.

3.1a (Imp) The City should develop and distribute an educational brochure to inform the public of the general hazards of every day noise, including the various sources inside and outside of the home, consumer advice regarding products, hearing protection techniques, etc.

Issue #4: Local and regional traffic is the major source of environmental noise within the community.

4.0 (Goal) To maintain or reduce existing noise levels generated by the ground transportation system.

4.1 (Policy) The City should participate in inter-jurisdictional efforts to minimize noise impacts associated with transportation improvements.

4.1 (Imp) The City shall continue to work with Caltrans and the Santa Clara County Traffic Authority for the inclusion of noise mitigation measures identified in transportation improvement projects.

4.2 (Policy) The City shall work with the California Department of Transportation to mitigate the effect of existing and future highway noise.

4.2 (Imp) Cooperate with and provide input to Caltrans to ensure that design plans for Highway '85 and 9 improvements incorporate noise abatement measures to reduce or maintain existing noise levels to standards acceptable to the City of Saratoga.

4.3 (Policy) The City shall consider the use of alternative transportation methods in order to reduce cumulative traffic levels and noise generation.

4.3 (Imp) Consider programs to develop mass transit, pedestrian, and bicycle facilities along rights-of-way through the use of private and/or public funds or efforts.

4.4 (Policy) The City should ensure that roads constructed or improved in the City of Saratoga be designed with careful consideration given to both long and short term noise impacts.

4.4 (Imp) The City shall consider the inclusion of noise abatement design measures in street and roadway improvement projects.

4.5 (Policy) Noise should be minimized in predominately residential areas by discouraging or prohibiting through traffic.

4.5 (Imp) Continue to describe truck routes and regulate times of operation throughout the City as necessary in order to direct truck traffic away from noise sensitive land uses.

4.6 (Policy) Traffic noise should be reduced by proper vehicle maintenance and obedience of speed limits.

4.6 (Imp) Continue to enforce regulations relating to speed and vehicle repair.

APPENDICES – NOISE ELEMENT

DEFINITIONS

Absorption: Absorption is a property of materials that reduces the amount of sound energy reflected. The sound introduction of an “absorbent” into surfaces will reduce sound pressure level by virtue of the fact that sound energy will not be totally reflected. It should be mentioned that this is an entirely different process from that of the transmission loss through a material. The effect of absorption merely reduces the resultant sound level produced by energy which has already entered the room.

Acoustics: (1) the science of sound, including the generation, transmission and effects of sound waves, both audible and inaudible. (2) The acoustics of an auditorium or of a room, the totality of those physical qualities (such as size, shape, amount of sound absorption, and amount of noise) which determine the audibility and perception of speech and music.

Ambient Noise (Background Noise): The total of all noise in a system or situation, independent of the presence of the desired (or undesired) signal.

Ambient Noise Level: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Analysis: The analysis of a noise generally refers to the composition of the

noise into various frequency bands, such as octaves, third-octaves, etc.

Average Daily Traffic (ADT): The total volume during a given time period in whole days greater than one day and less than one year divided by the number of days in that time period, commonly abbreviated as ADT.

Background Noise: The total of all noise in a system or situation, independent of the presence of the desired signal. In acoustical measurements, strictly speaking, the term “background noise” means electrical noise in the measurement system. However, in popular usage the term background noise is also used with the same meaning as “residual noise.”

CNEL – Community Noise Equivalent Level: A noise rating scheme defined in California Administrative Code based on a process of sound energy averaging and with weighting factors applied to daytime, evening and nighttime noise exposures.

Continuous Noise: On-going noise, the intensity of which remains at a measurable level (which may vary) without interruption over an indefinite period or a specified period of time.

Daytime: Between the hours of 7:00 a.m. and 7:00 p.m. **Evening:** Between the hours of 7:00 p.m. and 10:00 p.m. **Nighttime:** Between the hours of 10:00 p.m. and 7:00 a.m.

dB (Decibel): A unit of level or logarithmic representation of magnitude when the base of the logarithm is the

tenth root of ten and the quantities concerned are proportional to power, such as sound pressure squared. The logarithm to the base the tenth root of 10 is the same as ten times the logarithm to the base 10.

dB(A) (Decibel A Scale): Measure of decibel using the “A” scale or “A” weighted network of the sound level meter. The “A” scale is the sound measuring scale that most closely correlates with the loudness of sounds as perceived by the human ear.

Equal Noisiness Zones: Defined areas or regions of a community wherein the ambient noise levels are generally similar (within a range of 5 dB). Typically, all sites within any given noise source will be of comparable proximity to major noise sources.

Fluctuating Noise: Continuous noise whose level varies appreciably (more than ± 5 dB) with time.

Frequency: The time rate of repetition of a periodic phenomenon (In cycles per second or hertz). The frequency is the reciprocal of the period.

Impulsive Noise: Noise of short duration (typically, less than one second) especially of high intensity, abrupt onset and rapid decay and often rapidly changing spectral composition.

Intrusive Noise: That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence, and tonal or

informational content as well as the prevailing ambient noise level.

Land Use Area: Reasonably homogenous and identifiable areas composed of similar general types of land uses such as residential, commercial or industrial districts.

L10, L50, and L90 Sound Level: The sound level which is exceeded 10%, 50%, or 90% of a specified period of time. For example, the L10 sound level for a daily period is that sound level which is exceeded for 10% of 24 hours, or for 2.4 hours. The L10 represents a reasonable estimate for the “intrusive” noise level, the L50 the “average” level and the L90 the “background” level.

Leq –Energy Equivalent Sound Level: Sound level based on the average of “A” weighted sound energy or sound pressure squared for a noise exposure over a specified period of time.

Ldn – Day-Night Average Sound Level: Sound level averaged on the basis of “A” weighted sound energy or sound pressure squared for a 24 hour noise exposure including a 10 dBA weighting penalty added to sound levels for the nighttime hours.

Level: In acoustics, the level of a quantity is the logarithm of the ratio of that quantity to a reference quantity of the same kind. The base of the logarithm, the reference quantity and the kind of level must be specified.

Loudness: The intensive attribute of an auditory sensation, in terms of which sounds may be ordered on a scale

extending from soft to loud. Note: Loudness depends primarily upon the sound pressure of the stimulus, but it also depends upon the frequency and wave form of the stimulus.

Noise: Any undesired sound. By extension, noise is any unwanted disturbance within a useful frequency band, such as undesired electric waves in a transmission channel or device.

Noise Exposure Contours: Lines drawn about a noise source indicating constant energy levels of noise exposure. CNEL and Ldn are the metrics utilized herein to describe community exposure to noise.

Noise Level: The level of noise. For airborne sound unless specified to the contrary, noise level is the weighted sound pressure level called sound level; the weighting must be indicated.

Pitch: That attribute of auditory sensation in terms of which sounds may be ordered on a scale extending from low to high. Pitch depends primarily upon the frequency of the sound stimulus, but it also depends upon the

sound pressure and wave form of the stimulus.

Sound Insulation: (1) the use of structures and materials designed to reduce the transmission of sound from one room or area to another, or from the exterior to the interior of a building. (2) The degree by which sound transmission is reduced by means of sound insulating structures and materials.

Sound Level Meter: An instrument comprised of a microphone, an amplifier, an output meter, and frequency-weighting networks, that is used for the measurement of noise and sound levels in a specified manner.

Transient Sounds: Sounds whose average properties do not remain constant in time. Examples are an aircraft flyover, a passing truck, a sonic boom.

METHODOLOGY

The Noise Element was prepared to accomplish two tasks. One was to comply with Section 65302 (f) of the Government Code which states that a Noise Element is a mandatory element of a General Plan. The other task is to establish a City-wide policy document that stipulates that the preservation of the City of Saratoga's "relatively quiet" acoustic environment is necessary and beneficial for the General health and welfare of all residents.

To accomplish both of these tasks the following methodology was utilized. During the writing of the Noise Element some parts of the methodology was emphasized more than others due to acoustical characteristics inherent to the City of Saratoga.

1. Preliminary identification of problem noise areas.
2. Collection of data on existing and proposed transportation sound sources.
3. Collection of data on general sound levels throughout the City.
4. Review of information from published sources regarding effects of sound on human activities, health, and well-being.
5. Survey of noise control regulations from other jurisdictions.
6. Preparation of standards that relate sound levels to types of land use and environmental factors.
7. Formulation of policy statements and implementation alternatives.
8. Citizen input and awareness.

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