Williams
2010 General Plan

Noise

Chapter 6

The requirements in the California Government Code for this element are to identify and appraise noise problems in the community as set out in the guidelines established by the Office of Noise Control in the State Department of Health Services. As required by law, this chapter will analyze and quantify current and projected noise levels for the following sources:

- Transportation Sources
  - Highways and freeways;
  - Primary arterial and major local streets;
  - Passenger and freight railroad operations; and
- Non-Transportation Sources
  - Airports;[1]
  - Local industrial plants; and
  - Other ground stationary sources identified by local agencies as contributing to the community noise environment.

The requirements for this element, while technical, serve as a guide for establishing a pattern of land use that minimizes the exposure of community residents to excessive noise. Policies, implementation measures, and mitigation options are presented in this chapter to address existing and foreseeable noise problems.

Purpose

The purpose of this general plan element is to provide a basis for comprehensive local policies to control and abate environmental noise and to protect the citizens of Williams from excessive noise exposure.

[1] Although airports are considered transportation as well as land uses, for the purposes of noise mitigation, they are better discussed in terms of land use.

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The fundamental goals are to:

- Provide sufficient information concerning the community noise environment so that noise may be effectively considered in the land use planning process.
- Develop strategies for abating excessive noise exposure through cost-effective mitigation measures, in combination with appropriate zoning, to avoid incompatible land uses.
- Protect those existing regions of the planning area whose noise environments are deemed acceptable, and also those locations throughout the community deemed "noise-sensitive."
- Protect existing noise-producing commercial and industrial uses in the City of Williams from encroachment by noise-sensitive land uses.
- Protect the existing and future citizens of Williams from the harmful effects of exposure to excessive noise. More specifically, the goal is to protect existing noise-sensitive land uses from new uses that would generate noise levels that are incompatible with those uses, and to discourage new noise-sensitive land uses from being developed near sources of high noise levels.
- Protect the economic base of Williams by preventing the encroachment of noise-sensitive land uses into areas affected by existing noise-producing uses. More specifically, the goal is to recognize that noise is an inherent by-product of many land uses, including agriculture, and to prevent new noise-sensitive land uses from being developed in areas affected by existing noise-producing uses.
- Provide the City flexibility in the development of infill properties, which may be located in elevated noise environments.
- Provide sufficient noise exposure information so that existing and potential future noise impacts may be effectively addressed in the City's land use planning and project review processes.

Decibel or dB Fundamental unit of sound, defined as ten times the logarithm of the ratio of the sound pressure squared over the reference pressure squared.

Frequency The measure of the rapidity of alterations of a periodic acoustic signal, expressed in cycles per second or Hertz.

L_{dn} Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.

L_{eq} Equivalent or energy-averaged sound level.

L_{50} Median noise level, or level exceeded 50% of the time.

L_{max} The highest root-mean-square (RMS) sound level measured over a given period of time.

Fundamentals of Noise

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variation occurs frequently enough (at least 20 times per second) it may be heard and is referred to as sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the accepted threshold of human hearing (20 micropascals) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the resulting numbers within a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) correspond closely to human perception of relative loudness. **Figure 6.1, Typical A-Weighted Sound Levels of Common Noise Sources or Environments**, shows examples of noise levels for several common noise sources and environments.

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighting the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this General Plan element are A-weighted.

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 (L_{eq}), which corresponds to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually 1-hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

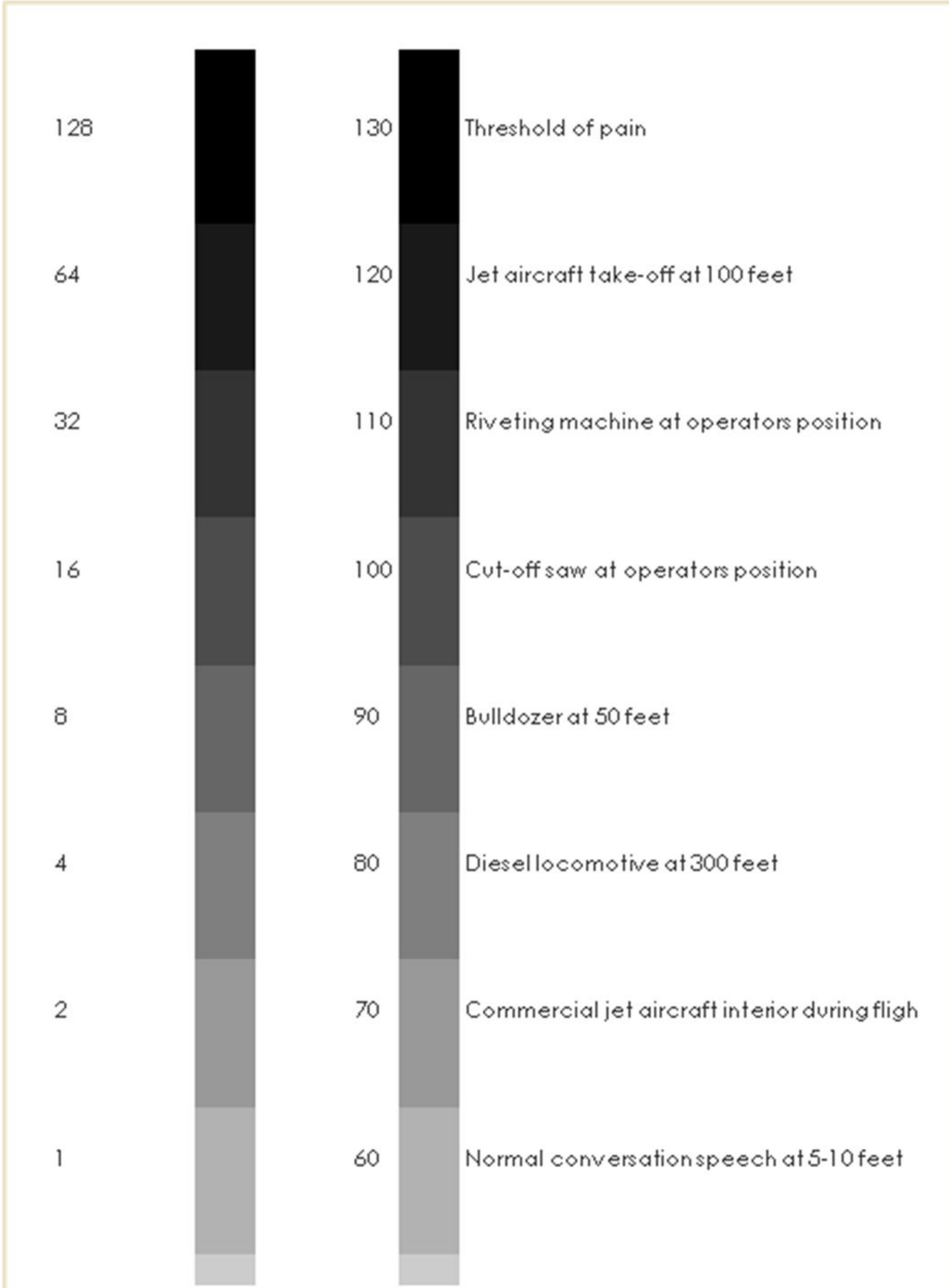

Figure 6.1, Typical A-Weighted Sound Levels of Common Noise Sources or Environments
Source: Bollard Acoustical Consultants, Inc.

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The Day-Night Average Level (L_{dn}) is based on the average noise level over a 24-hour day, with a +10 decibel weighting applied to noise occurring during nighttime hours (10:00 P.M. – 7:00 A.M.). The nighttime penalty is based on the assumption that people react to nighttime noise exposures as though they are twice as loud as daytime exposures. Because the L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Criteria for Acceptable Noise Exposure

The State Office of Planning and Research (OPR) Noise Element Guidelines include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The OPR guidelines contain a land use compatibility table, which describes the compatibility of different land uses with a range of environmental noise levels in terms of L_{dn}. A noise environment of 60 dB L_{dn} or less is considered to be "normally acceptable" for residential uses according to those guidelines.

The U.S. Environmental Protection Agency (EPA) also offers guidelines for community noise exposure in the publication Information on the Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. These guidelines consider occupational noise exposure as well as noise exposure in the home. The Levels Document recognizes an exterior noise level of 55 dB L_{dn} as a goal to protect the public from hearing loss, activity interference, sleep disturbance, and annoyance. The EPA notes, however, that this level is not a regulatory goal, but is a level defined by a negotiated scientific consensus without concern for economic and technological feasibility or the needs and desires of any particular community. The EPA and other Federal agencies have suggested land use compatibility guidelines, which indicate that residential noise exposures of 55 to 65 dB L_{dn} are acceptable.

The U.S. Environmental Protection Agency has also prepared a Model Community Noise Control Ordinance using L_{eq} as the means of defining allowable residential noise level limits. The EPA model contains no specific recommendations for local noise level standards, but reports a range of L_{eq} values as adopted by various local jurisdictions. The mean daytime residential noise standard reported by the EPA is 57 dBA (L_{eq}); the mean nighttime residential noise standard is 52 dBA (L_{eq}). Other state laws and regulations regarding noise control are directed towards aircraft, motor vehicles, and noise in general.

The California Vehicle Code sets noise emission standards for new vehicles, including autos, trucks, motorcycles, and off-road vehicles. Performance standards also apply to all vehicles operated on public streets and roadways. Section 216 of the Streets and Highways Code regulates traffic noise received at schools near freeways.

Community Noise Equivalent Level (CNEL)
A noise measurement system introduced in the early 1970's by the State of California as a simplified alternative to the NEF system (see NOISE EXPOSURE FORECAST) for community noise exposure, with particular emphasis on airport noise. The major difference is that CNEL can be measured using ordinary dBA readings (see *SOUND LEVEL METER*), as opposed to the computer calculation of *EFFECTIVE PERCEIVED NOISE LEVEL* used in the NEF. (Source: Handbook for Acoustic Ecology)

The mean daytime residential noise standard reported by the EPA is 57 dBA (L_{eq}); the mean nighttime residential noise standard is 52 dBA (L_{eq}).

Community Noise Survey

To quantify existing noise levels in the quieter parts of the City, a community noise survey was performed at eight locations, which are removed from major noise sources. These survey locations were chosen to provide adequate representation of the entire City. Three of the eight locations were monitored over a continuous 24-hour period, while the other five locations were each monitored for two short term periods during daytime and nighttime hours. The community noise survey noise measurement locations are illustrated in **Figure 6.2, Noise Monitoring Locations**. The results of the community noise survey are provided in **Table 6.1, Community Noise Measurement Survey Results.**

Table 6.1, Community Noise Measurement Survey Results

Location	Time Period	L_{eq}	L_{max}	L_{dn}	Noise Sources
East of ACC facility on Abel Rd.	Daytime Nighttime	42-48 47	53-54 57	53	distant traffic (I-5), natural sounds
Southwest of residential development at Husted Lateral Rd. and Theater Rd.	Daytime Nighttime	53-58 57	59-65 62	63	I-5 traffic
Corner of Redinger Way and I St.	Daytime Nighttime	48-53 50	62-66 56	57	Local and distant traffic
South terminus of Davis Rd.	Daytime Nighttime	41-43 43	53-57 52	49	distant traffic, natural sounds
West of Zumwalt Rd./Walnut Dr. Intersection	Daytime Nighttime	42-50 44	52-58 53	51	distant traffic (I-5)
425 San Antonio Dr.	Daytime Nighttime	56-62 52-61	63-75 63-68	64	I-5 traffic
165 8th St.	Daytime Nighttime	49-57 48-56	60-78 56-65	58	distant traffic, community sounds
Residence on Zumwalt Rd. South of Crawford Rd.	Daytime Nighttime	48-56 40-55	63-76 48-70	55	distant traffic, natural sounds

Notes:

- L_{dn} values for short-term measurement sites (Sites 1-5) were estimated based on average measured values. Two measurement sessions were completed during daytime hours for these sites to better assess daytime noise exposure – one in the morning and one in the afternoon.
- L_{dn} for long-term measurement sites (Sites A-C) were calculated based on measured Hourly L_{eq} data.
- Survey was conducted in Williams, California on January 27-28, 2010.

Realization

The major noise sources in Williams include traffic on I-5, SR 20, and local traffic on City streets; train operations associated with the CNRR; commercial and industrial uses; recreation areas (e.g., parks and school play areas); and aircraft flights associated with the Williams Soaring Center. The following sections outline policies and, where applicable, actions for general, transportation and non-transportation noises.

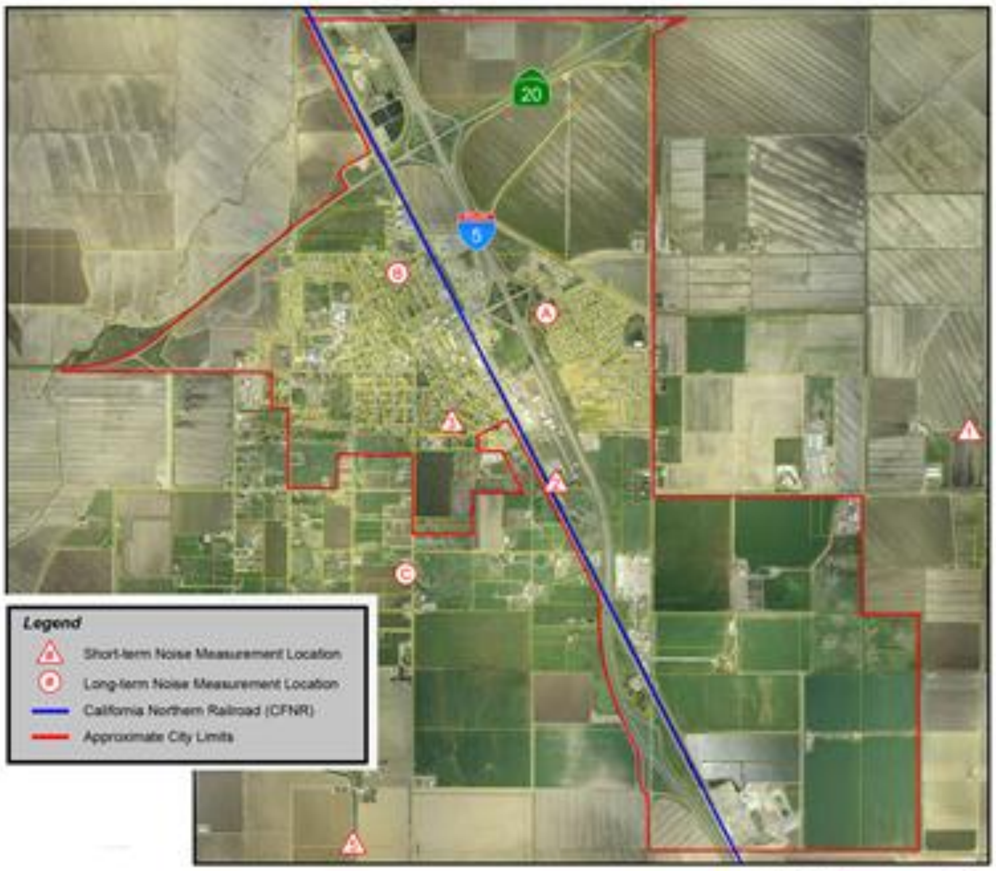

Figure 6.2, Noise Monitoring Locations
Source: Bollard Acoustical Consultants, Inc.

New Development and Transportation Projects (all Noise)

The need to mitigate noise impacts under state of California requirements is triggered by one of the following:

- New development proposed adjacent to a roadway that will be negatively impacted the existing or future traffic noise;
- A new roadway proposed to cross through or along an existing development, where future traffic noise will negatively impact the development;
- Expansion of an existing roadway where projected traffic noise will negatively impact adjoining land uses;
- Establishment of a new land use that will negatively impact on existing use; or
- Establishment of a new land use that will be negatively impacted by the proximity of an existing noise producing use.

The responsibility for noise mitigation should fall to the party creating the impact. In other words, a noise-sensitive development should be designed to accommodate noise emanating from an existing use, and noise producing uses should be designed to reduce noise that will project onto existing noise-sensitive areas.

Policies

6.1. All noise analyses prepared to determine compliance with the noise level standards contained within this Noise Element shall be prepared as described in Action 6.

6.2. The City should have the flexibility in its ordinance and policies to consider the application of 5 dB less restrictive exterior noise standards than those prescribed in **Table 6.2, Noise Guidelines for New Uses Affected by Transportation Noise Sources, and Table 6.4, Non-Transportation Noise Guidelines,** in cases where it is impractical or infeasible to reduce exterior noise levels within infill projects to a state of compliance with their standards. In such cases, the rationale for such consideration should be clearly presented and disclosure statements and noise easements should be included as conditions of project approval.

Table 6.2, Noise Guidelines for New Uses Affected by Transportation Noise Sources

New Land Use	Sensitive Outdoor Area - CNEL	Sensitive Interior Area[2] - CNEL	Notes
Residential	60	45	5
Residences in Ag. Zones	65	45	6
Transient Lodging	65	45	3,5
Hospitals & Nursing Homes	60	45	3, 4, 5
Theaters & Auditoriums	---	35	3
Churches, Meeting Halls Schools, Libraries, etc.	60	40	3 3
Office Buildings	65	45	3
Commercial Buildings	65	50	3
Playgrounds, Parks, etc.	70	---	
Industry	65	50	3

Notes:

1. Interior noise level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.
2. Where there are no sensitive exterior spaces proposed for these uses, only the interior noise level standard shall apply.
3. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
4. If this use is affected by railroad or aircraft noise, a maximum (L_{max}) noise level standard of 70 dB shall be applied to all sleeping rooms with windows closed to reduce the potential for sleep disturbance during nighttime noise events.
5. Due to the noise-generating nature of agricultural activities, it is understood that residences constructed on agriculturally-designated land may be exposed to elevated noise levels. As a result, a 65 dB CNEL exterior noise level standard is applied to noise-sensitive outdoor areas of these uses.

Actions

6.a. The City of Williams shall adopt an ordinance requirement for an acoustical analysis to be prepared with subdivision processes and site plan applications. This analysis shall include the following provisions:

1. Be prepared by qualified persons experienced in the fields of environmental noise assessment and architectural acoustics.

2. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.
3. Estimate projected future (20 year) noise levels, and compare those levels to the adopted policies of this general plan and adopted ordinance standards.
4. Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of this general plan and ordinance standards.
5. Estimate interior and exterior noise exposure after the prescribed mitigation measures have been implemented.

   The City of Williams shall adopt a local amendment to the Building Code to address interior noise standards.

6.b. Any extreme noise producer not specifically exempt shall be discouraged or prohibited by City Codes and policies.

Transportation Noise Sources

In addition to traffic on I-5 and trains on the CFNR, the ambient noise environment in Williams is defined primarily by traffic on SR 20, local traffic on City streets, commercial and industrial uses, active recreation areas of parks and outdoor play areas of schools, and to a small extent, aircraft operations associated with the Williams Soaring Center. With the exception of the Williams Soaring Center and a small crop dusting airport west of the City, there are no airports within the Williams City Limits, and the nearest known airport is the Colusa County Airport south of the City of Colusa. Because existing traffic volumes on City streets are relatively low, the ambient noise environments in the residential areas of the City – which are somewhat distant from I-5 and SR 20 – are similarly low. These noise sources are discussed individually below.

SR 20, one of the most heavily traveled roadways, abuts the northern neighborhoods and must be regulated for noise.

Roadways

The Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) with the Calveno vehicle noise emission curves was used to predict traffic noise levels within the City limits. The FHWA-RD-77-108 Model is considered acceptable for the development of General Plan traffic noise predictions. The FHWA Model was used with existing traffic data to develop Ldn contours for these roadways, as well as other smaller roadways in the City as summarized in **Table 6.3, Existing Traffic Noise Levels and Contour Distances**. Exterior decibel levels should not experience higher decibel levels than 55to 65 decibels.

Husted Road, I-5, SR 20, E Street, and are the most heavily traveled roadways in the City. The predicted Ldn at a reference distance of 100 feet and the distances from the centerlines of the major roadways to the 60, 65, and 70 dB Ldn contours are summarized in **Table 6.3, Existing Traffic Noise Levels and Contour Distances.** The FHWA Model input data for the studied roadways is provided in **Appendix A, FHWA Model Input Data.**

Table 6.3, Existing Traffic Noise Levels and Contour Distances

Seg.	Roadway	Segment Description	L_{dn} @ 100 feet from C/L (dB)	Distance (Feet)		
				70 dB L_{dn}	65 dB L_{dn}	60 dB L_{dn}
1	SR 20	West of E St.	62	31	66	143
2	SR 20	E St. to Old Hwy 99W	61	26	56	120
3	SR 20	Old Hwy 99W to I-5	62	28	59	128
4	SR 20	I-5 to Husted Rd./Freshwater Rd.	60	20	44	95
5	SR 20	East of Husted Rd./Freshwater Rd.	64	37	80	173
6	E St.	SR 20 to 9th St. (N)	57	14	30	64
7	E St.	9th St. (N) to 9th St. (S)	57	14	30	64
8	E St.	9th St. (S) to 7th St.	58	15	33	70
9	E St.	7th St. to 5th St.	58	16	34	74
10	E St.	5th St. to I-5	59	19	40	86
11	E St.	I-5 to Vann St.	57	15	31	68
12	E St.	Vann St. to Husted Rd.	55	10	21	45
13	Freshwater Rd.	North of SR 20	51	6	13	27
14	Husted Rd.	SR 20 to E St.	59	20	42	91
15	Husted Rd.	E St. to Husted Lateral Rd.	56	11	24	53
16	Husted Rd.	Husted Lateral Rd. to Abel Rd.	56	12	26	57
17	Husted Rd.	Abel Rd. to Crawford Rd.	56	12	25	53
18	Husted Rd.	Crawford Rd. to Old Hwy 99W	56	12	26	56
19	Husted Rd.	Old Hwy 99W to I-5	56	11	24	51
20	Husted Rd.	South of I-5	52	6	13	27
21	Old Hwy 99W	North of Husted Rd.	56	12	26	56
22	Old Hwy 99W	South of Husted Rd.	56	11	24	51
23	Abel Rd.	East of Husted Rd.	52	7	15	31
24	9th St.	North of E St.	43	2	3	7
25	9th St.	South of E St.	52	6	14	30
26	7th St.	North of E St.	54	8	17	38
27	7th St.	South of E St.	54	8	18	38
28	5th St.	North of E St.	51	5	12	25
29	5th St.	South of E St.	50	5	10	21
30	Vann St.	South of E St.	54	9	18	40
31	I-5	Husted Rd. to SR 20	76	234	505	1,088

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Policies

6.3. For City projects that involve capacity enhancing roadways, or the construction of new roadways, an acoustical analysis shall be prepared. If the project would result in a significant noise level increase as defined below, or if the project would cause noise levels to exceed the noise standards of Table 6.2, Noise Guidelines for New Uses Affected by Transportation Noise Sources, noise mitigation measures shall be considered to reduce traffic noise levels to a state of compliance with Table 6.2. A significant increase is defined as follows:

Pre-Project Noise Environment (Ldn)	Significant Increase
Less than 60 dB	5+ dB
60 - 65 dB	3+ dB
Greater than 65 dB	1.5+ dB

There are various factors which may affect the feasibility or reasonableness of the mitigation which shall be considered including the following:

1. The severity of the impact;
2. The cost and effectiveness of the mitigation;
3. The number of properties which would benefit from the mitigation; and
4. Aesthetic, safety, and engineering considerations.

6.4. If noise-reducing pavement is to be utilized in conjunction with a roadway improvement project, the acoustical benefits of such pavement shall be included in the noise analysis prepared for the project.

6.5. The City of Williams shall work with the State to mitigate noise levels to within acceptable levels as described in this chapter when the State expands or extends roadways that impacts existing residential development.


According to the Railroad Atlas of North America, the railroad tracks running north-south through the City of Williams are operated by the California Northern Railroad (CFNR).

Actions

6.c. The City of Williams shall adopt regulations to require implementation of noise mitigation to newly constructed roadways in new subdivision developments.

Railroads

Measurements of California Northern Railroad (CFNR) activity, collected in February 2010 at the Close Lumber, Inc. facility (333 6th Street), recorded a total of four train events over a continuous two-day period (two daytime events per day), producing an average sound exposure level (SEL) of 106 dB and 24-hour average noise exposure of approximately 56-61 dB (Ldn) at a distance of 42 feet from the center of the tracks. **Table 6.4, Railroad Noise Exposure as a Function of the Number of Daily Trains,** was developed to estimate the distances to the 60 and 65 dB Ldn railroad noise contours for various numbers of daily trains in Williams. The data assume that, since this is not a main line, additional railroad operations in Williams would likely occur primarily during daytime hours (7 am to 10 pm). The data also assume a mean train SEL of 100 dB at a distance of 100 feet, which is consistent with the measurement data reported above.

Table 6.4, Railroad Noise Exposure as a Function of the Number of Daily Trains

Average (L_{eq}) / Maximum (L_{max})				
Number of Daily Trains All Residential	**L_{dn} at 100 feet (dB)**		**Distance to 60 dB L_{dn} Noise Contour (Feet)**	
	Without Horn	With Horn	Without Horn	With Horn
1	51	56	24	51
2	54	59	38	81
3	55	60	49	106
5	58	63	69	150
7	59	64	87	187
10	61	66	110	237

Notes:
1. The predicted distances to the L_{dn} contours assume a mean railroad sound exposure level (SEL) of 100 dB without horn usage and 105 dB with horn usage at a reference distance of 100 feet from the tracks and that all train operations occur during daytime hours. The SEL of 100 dB at 100 feet matches the train noise level measurement results completed for this project.

The noise level standards for noise-sensitive areas of new uses affected by traffic or railroad noise sources in Williams are shown by **Table 6.2, Noise Guidelines for New Uses Affected by Transportation Noise Sources**. Where the noise level standards are predicted to be exceeded at new uses proposed within Williams, which are affected by traffic or railroad noise, appropriate noise mitigation measures should be included in the project design to reduce projected noise levels to a state of compliance with **Table 6.3, Existing Traffic Noise Levels and Contour Distances**.

Policies

6.6. For capacity enhancing rail, or the construction of new rail, a acoustical analysis shall be prepared. If the project would result in a significant noise level increase as defined below, or if the project would cause noise levels to exceed the noise standards of **Table 6.2, Noise Guidelines for New Uses Affected by Transportation Noise Sources**, noise mitigation measures shall be considered to reduce rail noise levels to a state of compliance with the Table 6.1. A significant increase is defined as follows:

Pre-Project Noise Environment (L_{dn})	Significant Increase
Less than 60 dB	5+ dB
60 - 65 dB	3+ dB
Greater than 65 dB	1.5+ dB

There are various factors which may affect the feasibility or reasonableness of the mitigation which shall be considered including the following:

1. The severity of the impact;
2. The cost and effectiveness of the mitigation;
3. The number of properties which would benefit from the mitigation; and
4. Aesthetic, safety, and engineering considerations.

Non-Transportation Noise Sources

The production of noise is a result of many processes and activities, even when the best available noise control technology is applied. Noise exposures within industrial facilities are controlled by Federal and State employee health and safety regulations (OSHA), but exterior noise levels may exceed locally acceptable standards. Commercial, recreational, and public service facility activities can also produce noise that affects adjacent sensitive land uses. Those land uses that are sensitive to noise should be prevented from locating noise producing uses and should be protected from introduction of new noise producing uses. **Table 6.5, Non-Transportation Noise Guidelines.**

Table 6.5, Non-Transportation Noise Guidelines

Average (L_{eq}) / Maximum (L_{max})

Receiving Land Use	Outdoor Area Daytime	Nighttime	Interior Day& Night	Notes
All Residential	55 / 75	50 / 70	35 / 55	
Transient Lodging	55 / 75	---	35 / 55	4
Hospitals & Nursing Homes	55 / 75	---	35 / 55	5, 6
Theaters & Auditoriums	---	---	30 / 50	6
Churches, Meeting Halls, Schools, Libraries, etc.	55 / 7	---	35 / 60	6
Office Buildings	60 / 75	---	45 / 65	6
Commercial Buildings	55 / 75	---	45 / 65	6
Playgrounds, Parks, etc.	65 / 75	---	---	6
Industry	60 / 80	---	50 / 70	6

Notes:

1. The standards in this table shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds these standards, then the noise level standards shall be increased in 5 dB increments to encompass the ambient.
3. Interior noise level standards are applied within noise-sensitive areas of the various land uses, with windows and exterior doors in the closed positions.
4. Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
5. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
6. The outdoor activity areas of these uses (if any), are not typically utilized during nighttime hours.

One of the airstrips near Williams

Airports/ Aircraft Noise Sources

The only airstrip located near the City of Williams is located at the Williams Soaring Center at the corner of E Street and Husted Road, near the eastern City limit. This facility is primarily used for the operation of gliders and their tow planes. Although Williams Soaring

Center aircraft overflights of the City occur, these flights are by small, single-engine planes, and are infrequent. As a result, the existing ambient noise environment of the City of Williams is not significantly influenced by aircraft noise.

Policies

6.8. In the event that and airport locates in or near Williams, new residential development proposed in airport noise environments between 55 and 60 dB

CNEL shall be subject to the following conditions:

1. Provide minimum noise insulation to 45 dB CNEL within new residential dwellings, including detached single family dwellings, with windows and exterior doors closed in any habitable room.
2. Provide disclosure statements to prospective buyers that the parcel is located in an area which may be exposed to frequent aircraft noise events (arrivals, departures, overflights, engine run-ups, etc.).
3. An Avigation Easement prepared by the Williams Counsel's Office granted to the City of Williams, recorded with the Williams Recorder, and filed with the City Planning Department shall be obtained from each residential parcel. The Avigation Easement shall acknowledge the property location near a source of aircraft noise and shall grant the right of flight and unobstructed passage of all aircraft into and out of the subject Airport.

Industrial Uses (Fixed Noise Sources)

Descriptions of existing fixed noise sources in the City are provided below. These uses are intended to be representative of the relative noise generation of such uses, and are intended to identify specific noise sources that should be considered in the review of development proposals. Site-specific noise analyses should be performed where noise-sensitive land uses are proposed in proximity to these (or similar) noise sources, or where similar sources are proposed to be located near noise-sensitive land uses. **Table 6.5, Non-Transportation Noise Guidelines.**

Bar Ale, Inc. Operations at the Bar Ale, Inc. facility consist primarily of the manufacturing of livestock and equine feeds. Typical noise-producing equipment associated with the facility includes the main manufacturing plant, and forklifts and heavy trucks. The plant may operate 24-hours a day, and produces a noise exposure level of approximately 62 dB Leq at a distance of 165 feet (from the main plant equipment). This facility is located at 1011 5th Street in an industrial area of the City.

Industrial area in Williams

The DePue Warehouse Company operates several rice drying and storage facilities throughout the City of Williams. Known locations include 1700 E Street, 401 C Street, 602 5th Street, and 5999 Freshwater Road. It is our understanding that these facilities operate during the rice harvesting season (approximately October thru February). These facilities were not in full operation during our noise level measurements (February 2010); however, loading of dried rice onto a transport truck at the 602 5th Street facility produced noise exposure of approximately 66 dB Leq and 77 dB Lmax at a distance of 75 feet. It is assumed that these facilities have the potential to produce much higher noise exposure during the rice harvest.

Morning Star Packing is a large tomato processing and packing facility located at 2211 Old Hwy 99 on the southeast corner of the City limits. The facility processes raw tomatoes into canned tomato pastes and canned diced tomato products. This facility includes large processing and packaging plants, substantial storage areas, and a rail spur to the CFNR for transport to and from the facility. This facility may operate 24-hours a day, and is expected to be busiest during the primary northern California tomato harvest of June thru October.

American Commodity Company (ACC) is a large rice drying and storage facility located at 6133 Abel Road on the east side of the City limits. Like the DePue Warehouse Company facilities, it is expected that this facility is busiest during the rice harvest (approximately October thru February). This facility may operate 24-hours a day. Noise exposure from drying and loading operations at the facility was measured to be approximately 64 dB Leq at a distance of 550 feet from truck loading and assumed drying equipment. This facility may produce substantially higher noise exposure during busier times, and would be expected to produce significant heavy-truck operations.

The Williams Redi-Mix facility located at 2385 Husted Road is a concrete batch plant and aggregate/landscape materials supplier. Typical hours of operations are 7 a.m. to 3 p.m. Noise produced by this facility is primarily associated with plant equipment operation, front loader use, and heavy truck movements. Typical noise exposure associated with this type of facility is 75 dB Leq and 80 dB Lmax at a distance of 100 feet from the plant, with heavy equipment operations (e.g., front loader and trucks) producing similar noise exposure.

Christman Drier is a large rice drying and storage facility located at the corner of 5th Street and B Street in the central part of the City. Like the DePue Warehouse Company and ACC facilities, it is expected that this facility is busiest during the rice harvest (approximately October thru February). This facility may operate 24-hours a day during peak times.

Policies

6.8. Prevent the introduction of new industrial uses in noise-sensitive areas.

Actions

6.d. Adopt noise performance standards for new industrial uses.

6.e. Where noise mitigation measures are required to satisfy the noise level standards of this Noise Element, development standards for new industrial sites shall require the use of setbacks and site design, and thereby keep the use of noise barriers at a minimum.

General Service Commercial & Light Industrial Uses

Noise sources associated with service commercial uses such as automotive and truck repair facilities, tire installation centers, car washes, loading docks, corporation yards, recycle center, and hardware and feed stores are found at various locations within the City of Williams. Many of these sources are located on E Street, 5th Street, and 7th Street. The noise emissions of these types of uses are dependent on many factors, and are therefore, difficult to quantify precisely. Nonetheless, noise generated by these uses contributes to the ambient noise environment in the immediate vicinity of these uses, and should be considered where either new noise-sensitive uses are proposed nearby or where similar uses are proposed in existing residential areas. **Table 6.5, Non Transportation Noise Guidelines.**

Policies

6.9. Prevent the introduction of new noise-producing uses in noise-sensitive areas.

6.10. Prevent encroachment of noise-sensitive uses upon existing noise-producing facilities.

Actions

6.f. Adopt noise performance standards for new noise-producing uses.

6.g. Adopt noise mitigation measures that will apply to new noise-sensitive uses if placed in proximity to noise producing facilities.

6.h. Where noise mitigation measures are required to satisfy the noise level standards of this Noise Element, development standards for new commercial sites shall require the use of setbacks and site design, and thereby keep the use of noise barriers at a minimum.

One of Williams' popular neighborhood parks

Parks and Schools

There are several park and school uses within the City limits. These uses are distributed throughout the City. Noise generated by these uses depends on the age and number of people utilizing the respective facility at a given time, and the types of activities they are engaged in. School playing field activities tend to generate more noise than those of neighborhood parks, as the intensity of school playground usage tends to be much higher. At a distance of 100 feet from an elementary school playground being used by 100 students, average and maximum noise levels of 60 dB (Leq) and 75 dB (Lmax), respectively, can be expected. At organized events such as high-school football games with large crowds and public address systems, the noise generation is often significantly higher. As with service commercial uses, the noise generation of parks and schools is variable.

Policies

6.11. When siting a new public park, the City shall consider separating the park from a noise-sensitive area if intense activities are to occur in the park.

Residential areas surround this park

Actions

6.i. Any noise regulations adopted by the City shall specifically exempt public parks and park activities.

Residential (Noise-sensitive Areas)

The primary outdoor activity area associated with any given land use at which noise-sensitivity exists and the location at which the City's exterior noise level standards are applied. Normally considered to be backyard spaces, or distinct rear patio/deck areas of single-family residential uses. Front yard spaces, elevated balconies, front courtyards, front decks, side yards, etc., are not commonly considered to be sensitive outdoor activity areas. Where the location of outdoor activity areas for large lot residential properties cannot be determined, the City's exterior noise level standards should be applied within 50 feet of the rear of the residence. Common outdoor recreation areas, such as pools, tot-lots, tennis courts, etc., of multi-family uses are considered to be the noise-sensitive outdoor areas. Individual patios and balconies of multi-family developments are not considered to be sensitive outdoor areas. Mixed-use developments will commonly consist of residential units on elevated floors above office or commercial uses. As a result, such uses may not include a clearly delineated noise-sensitive outdoor area, in which case satisfaction with the City's interior noise level standards should be considered adequate.

Policies

6.12. Prevent encroachment of noise-sensitive uses upon existing industrial facilities.

Actions

6.j. Adopt an ordinance amendment to require a sound wall regulations when new subdivisions are proposed adjacent to existing or proposed highways or major roads.

6.k. Where noise mitigation measures are required to satisfy the noise level standards of this Noise Element, development standards for new residential subdivisions, additional setbacks shall be considered in addition to the sound barrier wall to further protect future residents.

6.l. Adopt noise mitigation measures that will apply to new noise-sensitive uses if placed in proximity to existing industrial facilities, commercial facilities.

6.m. Noise analyses prepared for multi-family residential projects, town homes, mixed-use projects, condominiums, or other residential projects where floor/ceiling assemblies or party-walls are common to different owners/occupants, shall address satisfaction with the State of California Noise Insulation standards.

<u>Miscellaneous</u>

The City of Williams shall include regulations to limit construction activity to certain times and to exempt certain activities.

<u>Policies</u>

6.13. Noise associated with construction activities shall adhere strictly to the City Code restrictions regarding prohibited operating hours.

<u>Actions</u>

6.n The following sources of noise shall be exempt from the provisions of this Noise Element. Any noise regulations that are adopted shall specifically exempt the following:

a. Emergency warning devices and equipment operated in conjunction with emergency situations, such as sirens and generators which are activated during power outages. The routine testing of such warning devices and equipment shall also be exempt provided such testing occurs during daytime hours and does not occur for periods of more than one hour per week.

b. Activities at public schools, parks or playgrounds, provided such activities occur during daytime hours.

c. Activities associated with events for which a permit has been obtained from the City.

d. In the event of an emergency involving agricultural activities which requires prompt action to protect crops or equipment, the City can exempt noise generated by such action from the provisions of this Element.

Noise Mitigation Options

Any noise problem may be considered as being composed of three basic elements: the noise source, a transmission path, and a receiver. The appropriate acoustical treatment for a given project should consider the nature of the noise source and the sensitivity of the receiver. The problem should be defined in terms of appropriate criteria (Ldn, Leq, or Lmax), the location of the sensitive receiver (inside or outside), and when the problem occurs (daytime or nighttime). Noise control techniques should then be selected to provide an acceptable noise environment for the receiving property while remaining consistent with local aesthetic standards and practical structural and economic limits. Fundamental noise control techniques include the following:


The Valley Ranch neighborhood is protected by a noise mitigation barrier.

Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setback areas can take the form of open space, frontage roads, recreational areas, storage yards, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally about 4 to 6 dB per doubling of distance from the source.

Use of Barriers

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path-length-difference for a given increase in barrier height than does a location closer to either source or receiver.

For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. To ensure that sound transmission through the barrier is insignificant, barrier mass should be about 4 lbs./square foot, although a lesser mass may be acceptable if the barrier material provides sufficient transmission loss. Satisfaction of the above criteria requires substantial and well-fitted barrier materials, placed to intercept line of sight to all significant noise sources. Earth, in the form of berms or the face of a depressed area, is also an effective barrier material.

Transparent noise barriers may be employed, and have the advantage of being aesthetically pleasing in some environments. Transparent barrier materials such as laminated glass and polycarbonate provide adequate transmission loss for most highway noise control applications. Transparent barrier materials may be flammable, and may be easily abraded. Some materials may lose transparency upon extended exposure to sunlight. Maintaining aesthetic values requires that transparent barriers be washed on a regular basis. These properties of transparent barrier materials require that the feasibility of their use be considered on a case-by-case basis.

The attenuation provided by a barrier depends upon the frequency content of the source. Generally, higher frequencies are attenuated (reduced) more readily than lower frequencies. This results because a given barrier height is relatively large compared to the shorter wavelengths of high frequency sounds, while relatively small compared to the longer wavelengths of the frequency sounds. The effective center frequency for traffic noise is usually considered to be 550 Hz. Railroad engines, cars and horns emit noise with differing frequency content, so the effectiveness of a barrier will vary for each of these sources. Frequency analyses are necessary to properly calculate barrier effectiveness for noise from sources other than highway traffic.

There are practical limits to the noise reduction provided by barriers. For highway traffic noise, a 5 to 10 dB noise reduction may often be reasonably attained. A 15 dB noise reduction is sometimes possible, but a 20 dB noise reduction is extremely difficult to achieve. Barriers usually are provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall may provide up to 3 dB additional attenuation over that attained by a solid wall alone, due to the absorption provided by the earth. Berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons.

Site Design

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise level caused by reflections. The use of one building to shield another can significantly reduce overall project noise control costs, particularly if the shielding structure is insensitive to noise. As an example, carports or garages can be used to form or complement a barrier shielding adjacent dwellings or an outdoor activity area. Similarly, one residential unit can be placed to shield another so that noise reduction measures are needed for only the building closest to the noise source. Placement of outdoor activity areas within the shielded portion of a building complex, such as a central courtyard, can be an effective method of providing a quiet retreat in an otherwise noisy environment. Patios or balconies should be placed on the side of a building opposite the noise source, and "wing walls" can be added to buildings or patios to help shield sensitive uses.

Another option in site design is the placement of relatively insensitive land uses, such as commercial or storage areas, between the noise source and a more sensitive portion of the project. Examples include development of a commercial strip along a busy arterial to block noise affecting a residential area, or providing recreational vehicle storage or travel trailer parking along the noise-impacted edge of a mobile home park. If existing topography or development adjacent to the project site provides some shielding, as in the case of an existing berm, knoll or building, sensitive structures or activity areas may be placed behind those features to reduce noise control costs.

Site design should also guard against the creation of reflecting surfaces which may increase onsite noise levels. For example, two buildings placed at an angle facing a noise source may cause noise levels within that angle to increase by up to 3 dB. The open end of "U"-shaped buildings should point away from noise sources for the same reason. Landscaping walls or noise barriers located within a development may inadvertently reflect noise back to a noise-sensitive area unless carefully located. Avoidance of these problems while attaining an aesthetic site design requires close coordination between local agencies, the project engineer and architect, and the noise consultant.

Building Design

When structures have been located to provide maximum noise reduction by barriers or site design, noise reduction measures may still be required to achieve an acceptable interior noise environment. The cost of such measures may be reduced by placement of interior dwelling unit features. For example, bedrooms, living rooms, family rooms and other noise-sensitive portions of a dwelling can be located on the side of the unit farthest from the noise source.

Bathrooms, closets, stairwells and food preparation areas are relatively insensitive to exterior noise sources, and can be placed on the noisy side of a unit. When such techniques are employed, noise reduction requirements for the building facade can be significantly reduced, although the architect must take care to isolate the noise impacted areas by the use of partitions or doors.

In some cases, external building facades can influence reflected noise levels affecting adjacent buildings. This is primarily a problem where high-rise buildings are proposed, and the effect is most evident in urban areas, where an "urban canyon" may be created. Bell-shaped or irregular building facades and attention to the orientation of the building can reduce this effect.

Noise Reduction by Building Facades

When interior noise levels are of concern in a noisy environment, noise reduction may be obtained through acoustical design of building facades. Standard residential construction practices provide 10-15 dB noise reduction for building facades with open windows, and approximately 25 dB noise reduction when windows are closed. Thus a 25 dB exterior-to-interior noise reduction can be obtained by the requirement that building design include adequate ventilation systems, allowing windows on a noise-impacted facade to remain closed under any weather condition.

Where greater noise reduction is required, acoustical treatment of the building facade is necessary. Reduction of relative window area is the most effective control technique, followed by providing acoustical glazing (thicker glass or increased air space between panes) in low air infiltration rate frames, use of fixed (non-movable) acoustical glazing or the elimination of windows. Noise transmitted through walls can be reduced by increasing wall mass (using stucco or brick in lieu of wood siding), isolating wall members by the use of double- or staggered- stud walls, or mounting interior walls on resilient channels. Noise control for exterior doorways is provided by reducing door area, using solid-core doors, and by acoustically sealing door perimeters with suitable gaskets. Roof treatments may include the use of plywood sheathing under roofing materials.

Whichever noise control techniques are employed, it is essential that attention be given to installation of weather stripping and caulking of joints. Openings for attic or subfloor ventilation may also require acoustical treatment; tight-fitting fireplace dampers and glass doors may be needed in aircraft noise-impacted areas.

Design of acoustical treatment for building facades should be based upon analysis of the level and frequency content of the noise source. The transmission loss of each building component should be defined, and the composite noise reduction for the complete facade calculated, accounting for absorption in the receiving room. A one-third octave band analysis is a definitive method of calculating the A-weighted noise reduction of a facade.

A common measure of transmission loss is the Sound Transmission Class (STC). STC ratings are not directly comparable to A-weighted noise reduction, and must be corrected for the spectral content of the noise source. Requirements for transmission loss analyses are outlined by Title 24 of the California Code of Regulations.

Use of Vegetation

Trees and other vegetation are often thought to provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dB attenuation of traffic noise. Thus the use of vegetation as a noise barrier should not be considered a practical method of noise control unless large tracts of dense foliage are part of the existing landscape.

Vegetation can be used to acoustically "soften" intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected. It should be noted, however,

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that trees planted on the top of a noise control berm can actually slightly degrade the acoustical performance of the barrier. This effect can occur when high frequency sounds are diffracted (bent) by foliage and directed downward over a barrier.

In summary, the effects of vegetation upon noise transmission are minor, and are primarily limited to increased absorption of high frequency sounds and to reducing adverse public reaction to the noise by providing aesthetic benefits.