Environmental Resources

CONTENT OF THESE GOALS, POLICIES AND IMPLEMENTATION ACTIONS

The following Environmental Resources goals, policies and implementation actions address most of the City's natural resources including air quality, biology, surface and ground water resources, noise, and visual resources. Historic and archaeological resources are covered in the existing Conservation Element and the new policies developed through the 2011 General Plan Update (see Historic Resources Section) but will eventually be incorporated into the new Historic Resources Element.

Several new policy areas are included in the yet to be completed Environmental Resources Element: Climate Change, Energy Resources, and Food and Agriculture. These policy areas are part of the new sustainable focus of the General Plan addressing the City's ecological footprint and acknowledgement of the connection between the physical urban setting and people's health. Together they reflect all three aspects of sustainability: environment, equity and economy.

The following goals, policies and implementation actions were either developed during the *Plan Santa Barbara* General Plan update process, carried over from the Conservation Element in effect in 2011, or were EIR mitigation measures. These new goals, policies and implementation actions are operational with adoption of the General Plan, however, until the existing Conservation Element and Noise Element are comprehensively updated and become the Environmental Resources Element, they also remain in effect.

Goals, Policies and Implementation

GOALS

- ***Sustainable Resource Use.*** Protect and use natural resources wisely to sustain their quantity and quality, minimize hazards to people and property, and meet present and future service, health and environmental needs.
- ***Reduce Greenhouse Gases.*** Reduce where practicable greenhouse gas emissions contributions to climate change, and to air pollution and related health risks.
- ***Reduce Fossil Fuel Use.*** Reduce fossil fuel use through increased efficiency and conservation, and by developing renewable energy sources.
- ***Climate Change Adaptation.*** If applicable, incorporate adaptation to climate change in proposals for new development, redevelopment and public infrastructure.

Climate Change Policies

ER1. **Climate Change.** As applicable, private development and public facilities and services may be required to incorporate measures to minimize contributions to climate change and to adapt to climate changes anticipated to occur within the life of each project.

Possible Implementation Actions to be Considered

ER1.1 Comprehensive Climate Change Action Plan. Prepare a comprehensive climate action plan, toward compliance with AB32, to address climate change concerns including reducing green-house gas emissions, green-house gas absorption, and adaptation to climate change. The climate action plan will include evaluation of community energy use (i.e., energy used by buildings and infrastructure); waste and recycling; water and wastewater systems; transportation; and community design. Include objectives and indicators to monitor greenhouse gas emissions, and natural phenomena related to climate change, such as oil seeps, sea-level rise, weather patterns, and wildlife behavior.

All elements of the General Plan will identify which specific policies contribute towards the reduction of green house gases. (Green house gases include carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons, among many others.)

ER1.2 Greenhouse Gas Emission (GHG). Require new development, redevelopment and substantial remodels to demonstrate how the project will support the City in attaining regional GHG vehicular emissions reduction targets. The Santa Barbara region has targets of zero net increase (from 2005 levels) in per capita GHG vehicular emissions in 2020 and 2035. These regional targets were adopted in 2010 by the Santa Barbara County Association of Governments (SBCAG) and the California Air Resources Board (CARB) pursuant to SB 375.

ER1.3 Urban Heat Island Effect. Improve carbon sequestration and reduce the urban heat island effect by:

a. Amending the Zoning Ordinance to establish standards that decrease impermeable surfaces and building areas relative to lot size;

b. Providing incentives such as expedited permitting for building projects that incorporate green roofs; and

c. Exploring possibilities for reducing standards for impermeable surfacing required by the Transportation Division and Fire Department.

ER2. **Emergency Response Strategies and Climate Change.** The City shall incorporate into its response strategies for emergency preparations, the potential effects of climate change, including from extreme weather, sea level rise, or epidemics, on humans, and the built and natural environments.

ER3. **Decrease City's Global Footprint.** In addition to promoting reduced unit size, building footprints and GHG emissions, and energy conservation, promote the use of more sustainable building and landscaping materials and methods.

Possible Implementation Action to be Considered

ER3.1 Locally-Harvested Renewable Materials. Establish additional green building incentives for the use of locally harvested, renewable building or manufacturing materials.

ER4. **Incorporation of Adaptation in Development.** New public and private development or substantial redevelopment or reuse projects shall estimate the useful life of proposed structures, and, in conjunction with available information about established hazard potential attributable to climate change, incorporate adaptation measures in the design, siting and location of the structures.

Possible Implementation Action to be Considered

ER4.1 Adaptation Guidelines. The City shall prepare adaptation guidelines for development projects, and to the extent of information available to the City, provide information about potential climate change hazards to developers. (See also Safety and Public Services Element policies, Hazard Avoidance.)

ER4.2 Sea Level Rise. Identify policy options, costs, and consequences for addressing sea level rise issues, including:

- Techniques to minimize wave energy and damage from storm surges, while minimizing disruption of coastal activities and habitats.
- Review of City public improvements and utilities for potential consequences of sea level rise, and consideration of means of adaptation such as measures to protect in place, raising facilities above projected flood heights, and managed retreat or relocation of facilities.
- Coordination with private property owners along the waterfront on techniques for structural adaptation and new design.

Energy Conservation Policies

ER5. **Energy Efficiency and Conservation.** As part of the City's strategy for addressing climate change, minimizing pollution of air and water, depleting nonrenewable resources and insulating from volatility of fossil fuel prices, dependence on energy derived from fossil fuels shall be reduced through increased efficiency, conservation, and conversion to renewable energy sources when practicable and financially warranted.

Possible Implementation Actions to be Considered

ER5.1 Energy Efficient Buildings. Encourage all new construction to be designed and built consistent with City green programs, the California Green Building Code, policies, and the goal of achieving "carbon neutrality" by 2030 in all buildings.

Further reduce energy consumption over time to "carbon neutrality" by 2030 in new building and through suggested retrofits. Establish a voluntary program and time line for increasing the energy efficiency and carbon neutrality of new buildings or additions, and of existing building stock. Provide:

a. Information on current energy use and conservation options;

b. Incentives for voluntary upgrades;

c. Voluntary incremental upgrades may be encouraged at time of sale, and/or other methods for greening the existing building stock; and

d. Tools for self-assessment financing for energy efficiency upgrades and on-site solar and wind power generation through property taxes (in conjunction with AB 811).

ER5.2 Retrofitting of Systems. Continue to implement programs through Sustainable Santa Barbara for retrofitting of municipal systems with energy efficient equipment, systems, and programs.

ER6. **Local and Regional Renewable Energy Resources.** Provide both within the city, and regionally through working with the County and other local jurisdictions or parties, opportunities to preserve, promote and participate in the development of local renewable energy resources such as solar, wind, geothermal, wave, hydro, methane and waste conversion.

Possible Implementation Actions to be Considered

ER6.1 Community Choice Aggregation. Conduct a feasibility study to include a cost benefit analysis and carbon footprint assessment for a Community Choice Aggregation arrangement as either a bulk purchaser or producer of energy from alternative resources. Change codes to support and promote examining the feasibility of Community Choice Aggregation.

ER6.2 Alternative/Advanced Fuels. Support and implement the California Energy Commission and State Air Resources Board goal for alternative/advanced fuels set forth in AB1007 for non-petroleum fuel use of 20% by 2020 and 30% by 2030.

ER6.3 Incentives for Alternative/Advanced Fuel Infrastructure. Give priority through expedited processing to projects providing infrastructure for alternative/advanced fuels.

ER6.4 Obstacles for Small Wind Generators. Identify and study regulatory obstacles to installing small individual or community wind generators, and prepare standards for siting, design, maintenance and operation to ensure compatibility with adjoining land uses and protect environmental resources.

ER6.5 Facilitate Renewable Energy Technologies. Promote flexible design review standards and facilitate use of renewable energy technologies through streamlined planning and development rules, codes, processing, and other incentives.

ER6.6 Solar Energy. Encourage the use of solar photo-voltaic arrays on new construction, redevelopment, and significant remodel projects, as appropriate, taking into consideration project scale and budget, building size, orientation, roof type, and current energy use.

a. For multi-residential projects of 3 or more units, require provision of a minimum 2 kw system per unit consistent with the City's Solar Energy System Design Guidelines, if physically feasible.

b. For 1 or 2-unit residential projects require provision of 300 sq. ft. rectangular unobstructed roof area free of mechanical equipment and vents facing south, east or west in a manner that future photovoltaic installation would be consistent with the City's Solar Energy System Design Guidelines, if physically feasible.

c. For commercial and industrial projects provide a minimum of 5 watts of photovoltaic panel systems for every new square foot of building net floor area; or a photovoltaic system sized to meet a minimum of 30% of the average projected energy demand for the structure, whichever is lower.

Air Quality Policies

ER7. **Highway 101 Set-Back.** New development of residential or other sensitive receptors (excluding minor additions or remodels of existing homes or one unit on vacant property) on lots of record within 250 feet of U.S. Hwy 101 will be prohibited in the interim period until California Air Resources Board (CARB) phased diesel emissions regulations are implemented and/or until the City determines that diesel emission risks can be satisfactorily reduced or that a project's particulate exposure level is sufficiently reduced. The City will monitor the progress of CARB efforts and progress on other potential efforts or measures to address diesel emissions risks.

Possible Implementation Actions to be Considered

ER7.1 Review Criteria. Prepare project review criteria for the set-back area.

ER7.2 Barriers and Sound Walls. Pursue funding and installation of sound walls, trees and shrubs along unprotected areas of U.S. Hwy 101 to create a barrier to reduce particulate transmissions. Barriers and sound walls to be consistent with the Highway Santa Barbara Coastal Parkway Design Guidelines.

ER8. **Low-Emission Vehicles and Equipment.** Expand infrastructure and establish incentives for use of lower emission vehicles and equipment (e.g., parking priority, electric vehicle plug-ins). Support the amendment of speed limit restrictions to permit the wider use of electric vehicles.

Possible Implementation Actions to be Considered

ER8.1 Electric Vehicles. Monitor electric car development, including the projected availability of new vehicles and the types of charging stations that will serve those vehicles. Require the installation of the most commonly used types of electric charging stations in all major new non-residential development and remodels as appropriate, based on increases in the electric vehicle fleet and the availability of suitable charging technology. Provide expedited permitting for installation of electric vehicle charging infrastructure in residential, commercial, and industrial development. Consider changing the Building Code to require pre-wiring for electric vehicle charging infrastructure in new and substantial remodels of residential units.

ER9. **Marine Shipping Emissions.** Support regional and State efforts to reduce marine shipping emissions.

ER10. **Development Mitigation.** Establish ordinance requirements to apply standard air-quality mitigation measures for new development and construction projects. These include measures to minimize construction dust and vehicle emissions; provide landscaping; conserve energy and reduce vehicle trips.

Biological Resources Policies

ER11. **Native and Other Trees and Landscaping.** Protect and maintain native and other urban trees, and landscaped spaces, and promote the use of native or Mediterranean drought-tolerant species in landscaping to save energy and water, incorporate habitat, and provide shade.

Possible Implementation Actions to be Considered

ER11.1 Tree Protection Ordinance. Update ordinance provisions to protect native oaks and other native or exotic trees. New development shall be sited and designed to preserve existing mature healthy native and non-native trees to the maximum extent feasible.

ER11.2 Oak Woodlands. Site new development outside of oak woodlands to the maximum extent feasible. Within and adjacent to oak woodlands:

a. Avoid removal of specimen oak trees;

b. Preserve and protect oak saplings and native understory vegetation within areas planned to remain in open space;

c. Provide landscaping compatible with the continuation and enhancement of the habitat area, consisting primarily of native species and excluding use of invasive non-native species;

d. Include conditions of approval for habitat restoration of degraded oak woodlands where such development creates direct or indirect impacts to the affected habitat;

e. Minimize or avoid installation of high water use landscaping (e.g., lawn) under the dripline of oak trees.

ER11.3 Urban Tree Protection and Enhancement. Create a City-wide enforcement and mitigation program for removal, severe pruning without a permit, or neglect, of protected trees (street trees, trees in front yards, and historic or otherwise designated trees).

ER12. **Wildlife, Coastal and Native Plant Habitat Protection and Enhancement.** Protect, maintain, and to the extent reasonably possible, expand the City's remaining diverse native plant and wildlife habitats, including ocean, wetland, coastal, creek, foothill, and urban-adapted habitats.

Possible Implementation Actions to be Considered

ER12.1 Designate Habitats. Map and designate important City upland habitats and wildlife corridors that merit long term protection, enhancement, and preservation for habitat and wildlife values. Include criteria and monitoring objectives such as largest areas of contiguous coastal sage scrub (generally five acres or greater), oak woodlands (generally one-half acre or greater), perennial grasslands (generally 0.25 acres or greater), annual grasslands (generally five acres or greater), and important wildlife movement corridors.

ER12.2 Multi-Use Plan for Coast and Native Habitat Restoration. Develop updated multi-use plans and monitoring guidelines for publicly owned beaches and other coastal areas to provide for both recreational uses and protection of coastal habitats and wildlife/native plant species. Incorporate as part of the Multi-Use Plan, a Waterfront habitat and wildlife management program that provides measures to improve the extent and quality of native coastal habitats within the City Waterfront, with the following goals:

a. Restoration and protection of remnant coastal sand dune habitat along the City Waterfront, including the removal of non-native and/or invasive plants.

b. Restoration and enhancement of the estuaries of Mission and Sycamore creeks and the Laguna Channel, including appropriate revegetation and removal and control of invasive species. Measures should be considered to improve these estuaries where feasible to maximize biological productivity and ecological function taking into consideration the dynamics of ocean waves and currents and ongoing movement of sand along the City coast.

c. A public access management plan that maintains public access to and along the shoreline, but channels the public to appropriate access locations as needed through sensitive habitat areas of the beach.

ER12.3 Coastal Bluff Habitat Restoration Program and Protection

a. Coastal Bluff Scrub Protection. Site and design new development or major remodels/expansions along the City coastal bluffs (including access, drainage, and landscape improvements) to:

- minimize impacts to coastal bluff scrub habitat;
- include provisions for habitat restoration of coastal bluff scrub habitats where development creates direct or indirect impacts to the affected habitat;
- provide compatible landscaping within 10 feet of the edge of the bluff or on the bluff face, consisting of appropriate native coastal bluff scrub species.

b. Coastal Bluff Restoration. Establish a goal to restore 5.0 acres of coastal bluff habitat over the 20-year life of Plan Santa Barbara.

c. Restoration on Publicly Owned Lands. Work to increase the acreage of coastal bluff scrub through restoration projects on publicly-owned lands along Shoreline Park and the Douglas Family Preserve, and through providing education and assistance to private land owners to encourage the restoration of such habitats.

ER12.4 Native Species Habitat Planning. Protect and restore habitat areas for native flora and fauna, and wildlife corridors within the City, including for chaparral, oak woodland, and riparian areas. In particular, provide land use/design guidelines to:

a. Require buildings and other elements of the built environment, and landscaping to be designed to enhance the wildlife corridor network as habitat.

b. Ensure that the City and new development preserve existing trees within identified wildlife corridors, and promote planting new trees, and installing and maintaining appropriate native landscaping in new developments within or adjacent to important upland wildlife corridors and all streams. Ensure that efforts are made to minimize disturbance to understory vegetation, soils, and any aquatic habitats that are present below the trees in order to provide movement of species that utilize the habitat.

c. Ensure that new development and redevelopment projects will not result in a net reduction or loss in size and value of native riparian habitats.

d. Increase riparian habitat within the City and / or its sphere of influence by 20 acres or more, and 1 linear mile or more, over the 20 year life of Plan Santa Barbara. Priorities for restoration include perennial reaches of the major streams, reaches of creek on publicly-owned land, and degraded areas of the City's three major creeks.

ER12.5 Riparian Woodland Protection. Site new development outside of riparian woodlands to the extent feasible. Within and adjacent to riparian woodlands:

a. Avoid removal of mature native trees;

b. Preserve and protect native tree saplings and understory vegetation;

c. Provide landscaping within creek setback compatible with the continuation and enhancement of the habitat area, consisting primarily of appropriate native species and excluding use of invasive non-native species;

d. Include conditions of approval for habitat restoration of degraded oak woodlands where such development creates direct or indirect impacts to the affected habitat;

e. Include water quality protection and enhancement measures consistent with the adopted City Storm Water Management Plan.

ER13. **Trail Management.** Existing and future trails along creeks or in other natural settings shall be managed for both passive recreational use and as native species habitat and corridors.

ER14. **Integrated Pest Management Program.** To the extent allowable under state health and safety laws, establish ordinance provisions to apply integrated pest management requirements to development permits.

Hydrology, Water Quality and Flooding Policies

ER15. **Creek Resources and Water Quality.** Encourage development and infrastructure that is consistent with City policies and programs for comprehensive watershed planning, creeks restoration, water quality protection, open space enhancement, storm water management, and public creek and water awareness programs.

Possible Implementation Actions to be Considered

ER15.1 Comprehensive Creek Action Plan. Prepare a comprehensive long term action plan for protecting and enhancing creek water quality, riparian area, and steelhead use, and maintaining or enhancing flood management.

ER15.2 Master Drainage Plan. In coordination with watershed planning, develop a comprehensive drainage plan that identifies the existing system, policies and development standards to better address drainage and water quality issues, areas appropriate for drainage retention/detention, future capital improvements, and funding plan to finance the projects.

ER15.3 Pharmaceutical Waste Education and Collection. Continue coordination with the County of Santa Barbara and other agencies to establish and maintain an ongoing public education campaign and periodic drop-off collection days, focusing on proper disposal of pharmaceutical materials and other emergent contaminants of concern, to reduce the contaminants entering wastewater, storm drain, and solid waste systems.

ER15.4 Beach Water Quality Improvement. Consider actions for further improving water quality at East Beach, which could include: (1) a restoration plan for Lower Mission Creek/Laguna Channel, including the potential for a constructed wetland at the creek/ocean interface and/or (2) an ultraviolet treatment system to disinfect the flow within Laguna Creek during low flow periods (e.g., May-September) prior to entering the channel and discharging to the beach.

ER15.5 Watershed Action Plans. Continue work toward completion of Watershed Action Plans for Mission Creek, Sycamore Creek, Arroyo Burro Creek, and Laguna Watersheds.

ER16. **Storm Water Management Policies.** The City's Storm Water Management Program's policies, standards and other requirements for low impact development to reduce storm water run-off, volumes, rates, and water pollutants are hereby incorporated into the General Plan Environmental Resources Element.

Possible Implementation Actions to be Considered

ER16.1 Storm Water Guidelines. The City's Storm Water Management Guidelines provide information on implementation measures such as ground water recharge, pervious surfacing, bioswales, detention basins, and green roofs. Update measures for street sweeping, storm-drain stenciling, and public outreach for inclusion in conditions of approval or as mitigation measures. Encourage the conversion of excess street paving between sidewalks and streets to bioswales.

ER16.2 Wash-Down Policies. Prepare or update regulations to limit the practice of hosing down driveways, to conserve water and reduce pollutants carried through urban run-off and conserve water per State Water Resources Control Board regulatory guidelines for storm water management.

ER16.3 Floodplain Mapping Update. Update the Flood Insurance Maps (FIRM) floodplain boundaries for Special Flood Hazard Areas such as the Mission and Sycamore creek drainages and Area A near the Estero.

ER17. **Creek Setbacks, Protection, and Restoration.** Protection and restoration of creeks and their riparian corridors is a priority for improving biological values, water quality, open space and flood control in conjunction with adaptation planning for climate change.

Possible Implementation Actions to be Considered

ER17.1 Creek Setback Standards. Establish updated creek setback and restoration standards for new development and redevelopment along all creeks, and prepare or update guidelines for restoration, increase of pervious surfaces and appropriate land uses within designated creek side buffers.

a. Develop setback standards of greater than 25 feet from the top of bank for new structures and hard surfaces adjacent to creeks and wetlands.

b. At a given site, creek buffers should be adequate for protection from flood, erosion, and geologic hazards, and to provide habitat support.

c. In developing creek setback and restoration standards, consider applicable creek standards in surrounding jurisdictions and the Santa Barbara County Flood Control District general recommendation for new development setbacks of 50 feet from the top of bank of major creeks with natural creek banks, with a reduction up to 25 feet where "hard bank" protection is present.

d. For new development that is closer than 50 feet to the top of the bank of any major stream, creek bank stabilization shall be provided through planting of native trees and shrubs on creek banks and along the top of banks to minimize erosion and the potential for bank failure.

e. When the City determines that a structure must be constructed within proposed creek setbacks or where a project would be exposed to unusually high risk of bank erosion or collapse, non-intrusive bank stabilization methods such as bio-engineering techniques (e.g. revegetation, tree revetment, native material revetment, etc.) shall be used where feasible rather than hard bank solutions such as rip-rap or concrete.

ER17.2 Creekside Development Guidelines. Establish design guidelines for development and redevelopment near creeks, such as measures to orient development toward creeks, and better incorporate creeks as part of landscape and open space design. Utilize native riparian palettes for landscaping along creeks, and prohibit the use of non-native invasive plants. Encourage public creekside pedestrian paths where appropriate to increase connectivity and provide pocket parks and signage to improve public awareness and enjoyment of the City's creeks.

ER17.3 Creek Naturalization. Prohibit the placement of concrete or other impervious material into, or piping of, major creeks and primary tributaries except for water supply projects or flood control projects that are necessary for public safety, or to maintain or repair a structure that protects existing development. These protection measures shall only be used for water supply or flood control purposes where no other less environmentally damaging method is available and the project has been designed to minimize damage to creeks, wetlands, water quality, and riparian habitats. Whenever feasible, existing concrete lining shall be removed from creek channels, and reaches of drainages that have been previously under-grounded shall be "daylighted."

ER17.4 Surface Water Drainage Restoration. Set a goal to restore or daylight a total of at least .5 miles of surface water drainages over the life of Plan Santa Barbara. Priority areas for restoration include segments of Mission Creek consistent with sound flood control practices, the reach of Arroyo Hondo Creek through City College, the tributary to Arroyo Burro Creek west of Las Positas Road, and the segment of Arroyo Burro Creek adjacent to La Cumbre Plaza.

Food and Agriculture Policies

ER18. **Farmers Markets.** Continue to support local farmers markets, and expand locations to include neighborhood locations consistent with Sustainable Neighborhood Plans, expand infrastructure to support them, and expand hours of operations.

ER19. **Gardener Education.** Continue to support the City/County/SBCC Green Gardener training program, and expand community and school educational programs for producing gardens year-round using sustainable gardening practices. Encourage the use of fruit trees in landscaping where appropriate.

ER20. **Food Scrap Recovery and Composting Program.** Continue and expand the City program for diversion of food scraps from landfill disposal, to be composted for use as soil amendments so long as economically viable.

ER21. **Public and Private Food Gardens.** Provide for infrastructure to support local community gardens. With neighborhood support, develop publicly-available edible landscaping in existing and new parks. Reserve space for public gardening within the urban core area to be maintained by the community. Design for green roofs and urban rooftop gardens in residential development Downtown.

ER22. **Food Gardens for Schools**. Work with the Santa Barbara School Districts to develop organic gardens at schools and a healthy and waste-free lunch program:

a. To educate students about where food comes from, and the nutrient and energy cycles from garden to table and back again;

b. To encourage the development of healthy eating habits, and;

c. To provide healthy local food.

ER23. **Regional Agriculture.** Support regional coordination toward expanding local sustainable food sources. Support incentives for maintaining and establishing additional agricultural farms and farm stands within the City, the South Coast, and tri-county areas. Support directing local food to our schools, cafeterias, groceries, convenience stores, and restaurants.

Aesthetics and Visual Resources Policies

ER24. **Visual Resources Protection.** New development or redevelopment shall preserve or enhance important public views and viewpoints for public enjoyment, where such protection would not preclude reasonable development of a property.

Possible Implementation Actions to be Considered

ER24.1 Document Public Views. Conduct a study to identify and document important public views of the ocean, the mountains or other highly-valued views, establish a list of important public view points, and provide a photo record. Prepare related development standards to protect the views seen from the public view points.

ER24.2 Evaluation Criteria. In evaluating public scenic views and development impacts at a particular location, the City shall consider:

a. The importance of the existing view (i.e., whether a view contains one or more important visual resources, has scenic qualities, and is viewed from a heavily used public viewpoint, such as public gathering area, major public transportation corridor or area of intensive pedestrian and bicycle use);

b. Whether a proposed change in the existing view would be individually or cumulatively significant (i.e., substantially degrade or obstruct existing important public scenic views, or impair the visual context of the Waterfront area or designated historic resource);

c. Whether changes in the proposed action could be avoided or adequately reduced through project design changes (such as site lay-out, building design, and landscape design).

ER24.3 Site-Specific Coastal Bluff Analysis. Any mapped illustration, description of, or reference to, a "coastal bluff" in the Plan Santa Barbara planning, background, or environmental documents should trigger the requirement for professional site-specific coastal bluff location analysis as part of the application for development on a parcel, rather than to be a conclusive determination that a "coastal bluff" now exists, or at any time during the historic record has existed, on that parcel.

ER24.4 Vegetation Protection. Prepare guidelines and standards for removal of significant trees and for planting replacement or additional trees, and protect significant natural vegetated areas from inappropriate development.

ER24.5 Scenic View Protection. Further protect public scenic views of the coast, hillsides, open spaces, creeks and historic resources by incorporating visual guidelines as part of project design guidelines and environmental review guidelines.

ER25. **Enhance Visual Quality.** Not only retain, but improve visual quality of the city wherever practicable.

Possible Implementation Action to be Considered

ER25.1 Underground Utilities. Cooperate with developers and utility companies to underground as many as possible overhead utilities in the city by 2030. Establish a listing of priority street segments with realistic target dates in the capital improvements program and continue to support neighborhood efforts for undergrounding.

Noise Policies

ER26. **Noise Policies for New Residential Uses.** Take into consideration the surrounding existing and future legal land uses in establishing exterior noise policies for new residential uses.

Possible Implementation Actions to be Considered

ER26.1 Residential Exterior Ambient Noise Levels in Non-Residential and Multi-Family Zones. An average ambient outdoor noise level of 65 dBA Ldn or CNEL or less is established as the level considered normally acceptable for required outdoor living areas of residential units located within non-residential and multi-family zones. This policy amends the General Plan Noise Element Land Use Compatibility Guidelines for residential units in non-residential and multi-family zones.

ER26.2. Residential Exterior Ambient Noise Levels in Single Family Zones. An average ambient outdoor noise level of 60 dBA Ldn or CNEL or less is established as the level considered normally acceptable for required outdoor living areas of residential units located within single-family zones except for areas subject to higher ambient noise levels, for which a 65 dBA Ldn or CNEL standard is established. This policy amends the General Plan Noise Element Land Use Compatibility Guidelines for residential units in single-family zones that already experience average ambient noise levels above 60 dBA.

ER26.3 Subdivisions in Single-Family Zones. Subdivisions may be permitted in areas where the existing average ambient noise level exceeds 60 dBA Ldn or CNEL only if it is demonstrated that required outdoor living areas can be provided with an exterior noise level of 60 dBA Ldn or CNEL or less.

ER26.4 Construction Noise. Establish different construction noise standards for mixed-use urban and suburban residential areas, including standards for days, hours, and types of construction.

ER26.5 Non-Residential Noise Affecting Residential Neighborhoods. To further General Plan policies for maintaining quiet, high quality neighborhoods, require more detailed noise assessments for proposed special, conditional, and institutional uses with episodic activities and events that may cause noise effects to residential neighborhoods.

ER27. **Sound Barriers**. The City supports and will assist in the provision of sound barriers along the Hwy 101 transportation corridor.

Possible Implementation Actions to be Considered

ER27.1 Local Share Funding. The City should pursue funding toward the extension and connection of the sound attenuation wall along the entire U.S. Hwy 101 and Union Pacific Railroad corridor within City boundaries. Barriers and sound walls to be consistent with the Highway Santa Barbara Coastal Parkway Design Guidelines.

ER27.2 Noise Monitoring and Reduction. The City shall periodically monitor freeway noise level increases through the year 2030 and if necessary work with neighborhoods, the California Department of Transportation, and Union Pacific Railroad to identify and implement specific measures to reduce future freeway noise increases affecting expanded areas of existing residential neighborhoods with noise levels of 65 dBA or more. Noise attenuation measures may include added sound walls along portions of the freeway and/or local measures.

ER27.3 Environmental Justice Populations. The City should establish a financial incentive program designed to provide low-interest loans to allow environmental justice populations located in high noise areas to construct noise control improvements to reduce indoor noise levels below 45 dBA CNEL.

CONSERVATION ELEMENT

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(Note: These illustrations and plates are not included in the 1994 reprint of the General Plan.)

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INTRODUCTION

LEGISLATIVE AUTHORITY

In making city and county governments responsible for the preparation and implementation of a Conservation Element in their General Plans, the California Legislature has recognized the need for a comprehensive planning program which protects the land and water resources under the jurisdiction of local and regional governmental entities.

Specific authority for this Element of the General Plan is contained in Government Code Section 65302(d) which requires the following:

A conservation element for the conservation, development, and utilization of natural resources including water and its hydraulic force, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals and other natural resources. That portion of the conservation element including waters shall be developed in coordination with any countywide water agency and with all district and city agencies which have developed, served, controlled or conserved water for any purpose for the county or city for which the plan is prepared. The conservation element may also cover:

1. The reclamation of land and waters.
2. Flood control.
3. Prevention and control of the pollution of streams and other waters.
4. Regulation of the use of land in stream channels and other areas required for the accomplishment of the conservation plan.
5. Prevention, control and correction of the erosion of soils, beaches and shores.

PURPOSE AND APPROACH

As a mandated part of the General Plan, the Conservation Element is intended to serve as the City's official policy guide in public and private development matters related to the preservation and enhancement of natural resources. The basic goal of this Element is to outline a comprehensive program to achieve and maintain a healthful natural environment which reflects a balance between human activities and natural processes. The intent of this Conservation Element is to identify, evaluate, and analyze the natural and cultural resources present in the City and establish policies which reflect not only the uniqueness of Santa Barbara, but also those which are responsive to the need to preserve the City's resources for future generations. This Element has been prepared in a manner which reflects the relationship between Conservation and the Land Use, Open Space, Safety, and Circulation Elements of the General Plan.

CONTENTS AND USE OF THIS DOCUMENT

Given the urbanized nature of the City of Santa Barbara, this Element covers only those resources which are present within the City. Subject areas such as forests and minerals are not assessed due to their absence within the City. This Element therefore focuses on Cultural and Historic Resources, Visual Resources, Air Quality, Biological Resources, Drainage and Flood Control, and Water Resources. Agricultural Resources are addressed briefly, as the supply of prime agricultural soils and agricultural activity is limited. Estuarine

and Marine Resources are also discussed, but not at great length due to the pending completion of the City's Local Coastal Program.

Goals, policies, and implementation strategies for each resource are combined in a separate section at the end of the Element.

This document should be viewed as a flexible policy guide rather than an exhaustive inventory of all natural and environmental resources. It has been prepared to highlight key conservation issues and recommend implementation strategies. As conditions change and issues are resolved, this Element should be revised to reflect future conditions and community concerns related to the conservation of Santa Barbara's natural and non-renewable resources.

GENERAL DESCRIPTION

The City of Santa Barbara is widely known as a beautiful and prosperous community. The physical setting of the City has shaped its past and will have important implications for its future. Sheltered from severe weather by the Channel Islands which lie parallel to the coast, the City has matured in a basin located at the approximate center of a narrow east-west trending coastal shelf. The Santa Ynez Mountains to the north and the Mesa hills to the southwest provide a topographic envelope which opens to the ocean at the southeast. The City, situated in and limited by this visually dramatic juncture of land and sea, possesses both sandy beaches and coastal bluffs.

The climate of Santa Barbara is Mediterranean, as is most of coastal southern California, with cool, wet winters and relatively hot, dry summers. The local extremes of temperature range from over 100 degrees to below freezing, with 72 degrees to 48 degrees being the average annual temperature range. Although its southerly location enables it to avoid the direct impact of harsh northwest storms, Santa Barbara is far enough north to receive precipitation from such storms as their fury diminishes. The average annual rainfall is approximately 18 inches and the growing season averages 342 days per year. Occasional fogs and blustering Santana winds are elements which add diversity to the City's climate.

Encompassing 10,741 acres, the predominant land use within the City is residential. The distribution of uses is indicated below.

LAND USE IN THE CITY OF SANTA BARBARA (1975)

Land Use	Acres	% of City Land
Residential		
Single-Family	3,718	35
Multiple-Family	636	6
Other Residential	43	*
TOTAL RESIDENTIAL	4,397	42
Commercial	510	5
Industrial	161	1
Public & private Facilities	1,274	12
Vacant & Private Facilities	2,640	25
Circulation Routes	1,759	16
TOTAL	10,741	100

* Less than 1 percent

SOURCE: Henningson Durham & Richardson, Downzoning EIR

The population, approximately 72,238 according to the 1975 Special Census, depends primarily upon property, pensions, and tourism for basic income. The percent of per capita income coming to Santa Barbarans from the City's basic economic sources in 1970 was as follows:

Property and Pensions Income	31%
Tourism - Visitor Expenditures	29%
Manufacturing - Research and Development	20%
University of California	8%
All other Elements	12%

Source: Keisker, 1969

The relationship between these income sources remained stable over the 1960-1970 period, and there is no reason to doubt that these relationships will continue into the future (Planning Task Force, 1974).

Attracted by the beauty of the physical setting, pleasant climate, attractive architecture, and "Old World" charm, tourists and visitors generate substantial income for the community. The Chamber of Commerce makes annual estimates of the volume of local business sales brought in by tourists and attendees at conferences held in the area. For 1975, the estimate was about $81 million. In 1976, the total came to about $87 million.

The influence of Spanish, Mexican, and Indian heritage produces a unique cultural environment to complement the City's physical setting. The annual Fiesta celebration recalls Hispanic traditions, and local architecture of compatible styles is encouraged and, in the central business district, required. Lectures, concerts, exhibits, and other events are routinely available, many at no charge to the public. The extensive

Continuing Education Program, several museums, a symphony orchestra, and a number of institutions of higher education contribute to the City's reputation as a cultural center.

Although its population has grown gradually through most of its history, Santa Barbara experienced a surge of growth after both World War I and World War II and again during the decade between 1960 and 1970. Since 1970 the population increase has declined, and the trend for the future indicates a relatively slow rate of growth. The City's policy of limiting the zoned residential capacity to approximately 85,000 persons, as well as a general decline in birthrate, are contributing factors to this future trend.

The community is now almost wholly urbanized, and the utilization, preservation, and maintenance of natural and cultural resources is of paramount concern. Much of what Santa Barbara is, a community with a distinct sense of place, depends upon how these resources are treated in the future. The constraints implicit to these resources are more clearly felt as their limited nature is recognized. Because the resources are limited, the potential for conflict relative to future development and preservation of these resources is magnified.

CONSERVATION OF RESOURCES

CULTURAL AND HISTORIC RESOURCES

Introduction

Santa Barbara's heritage combines centuries of Indian culture with years of Spanish, Mexican, and American influence. This blending of cultures manifests itself in the style, character, pace, and appearance which have made our City one of the most widely acclaimed centers of archaeological, historical, and cultural significance in the State. Those structures and remnants of settlement which remain are cherished not only as links to our colorful and varied past but also as irreplaceable components of the City's ambiance. These "pieces of the past" add texture to the fabric of our community, giving it that special charm in appearance which draws tourists from around the world and contributes to the unique sense of place experienced by residents.

The City's commitment to the conservation of its archaeological, historic, and architectural resources is reflected in existing protective legislation and public policy, past and present activities of concerned individuals and groups, and, of course, the continued and respected presence of these resources within the community. However, the potential for loss or degradation of these resources exists and increases as pressure for new development increases.

In years past, valuable archaeological sites and significant architectural landmarks have been destroyed to make way for new developments that, at the time, signified "progress." Examples of resources which have been lost to such pressure include:

- Archaeologically significant Burton Mound, site of a Chumash Indian settlement, was developed into residential uses;
- Most of the Spanish-Mexican era adobes, including the unique Packard Winery Adobe and the Goux Adobe, have been razed (today only 19 of approximately 200 adobes remain);
- "La Barranca," the sprawling Hopi style pueblo home of celebrated artist Ed Borein, was torn down to make room for a housing development;
- The Gaspar Orena Mansion on upper Laguna Street was leveled in 1923 to provide the playground for Roosevelt School.

Santa Barbara has learned from what it has lost and has sought to protect the remaining significant resources in a manner which respects their irreplaceable nature.

Significance of Resources

Historic and cultural resources encompass a wide variety of properties which were and are significant in American history, regional architecture, archaeology, and culture. The Federal Advisory Council on Historic Preservation has set forth the following criteria to assist in determining what constitutes historic significance:

"Districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feelings, and association and:

- That are associated with events that have made a significant contribution to the broad patterns of our history; or
- That are associated with the lives of persons significant in our past; or,
- That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant distinguishable entity whose components may lack individual distinction; or,
- That have yielded, or may be likely to yield information in history or prehistory.

Once historical or archaeological areas have been identified, steps should be taken to preserve them and if necessary restore them. It is not necessary that they be converted to public uses such as museums, but the public should be able to see, use, and enjoy these resources." (National Study by the Federal Advisory Council on Historic Preservation).

In light of these criteria, many structures and areas in Santa Barbara can be considered to have significance. Not all of these resources have yet received official recognition of their significance.

Archaeological Resources

The Cultural and Historic Resources map indicates the locations of known and suspected sites of archaeological significance. The mapped locations are purposely vague so as not to be helpful for those who would seek to despoil and/or pilfer artifacts from the sites. More precise maps are on file at the Santa Barbara County Planning Department. Several of the areas delineated on the map (i.e., adjacent to creeks, on the perimeter of Goleta Slough, and in the Burton Mound area of the waterfront) are noted because of their relation to the Chumash habitation.

Indian culture, appearing along the channel coast over 10,000 years ago, provides a distinctive foundation for the Santa Barbara area. Numerous villages of the Chumash were found to have flourished in the coastal plains and creekside areas that are now encompassed by the City. It was the Chumash's well-developed material culture and their advanced social organization that significantly influenced the Spanish and Mexican cultures that were to follow.

Archaeological research indicates that the historic Indian population in Santa Barbara was the most advanced Indian group in California. Artifacts from coastal and interior sites are an integral part of current research into theories of cultural evolution. The preservation and conservation of these sites of prehistoric Chumash habitation is very important to future research. The archaeological resources in the Santa Barbara area include cave archaeology and rock art in the interior, and middens containing artifacts such as ornaments, tools, and shells along the more extensively inhabited coastal areas.

Archaeological resources are particularly vulnerable to urban development (e.g., residential and industrial construction, road improvements, etc.). Also, public access to, and vandalism of valuable sites are major sources of damage and destruction. In order to avoid conflicts arising between land-modifying development and the preservation of non-renewable archaeological resources, the incorporation of a study of archaeological resources into the planning process from the earliest planning stages is necessary. Before construction is begun on a project, it must be ascertained what archaeological resources are present which

might affect or be affected by the project. Such planning involves the systematic identification of archaeological resources via preliminary site surveys, evaluation of these resources, and formulation of means for their protection, relocation, or their scientific study prior to possible disturbance. Some sites, such as the one identified in the area of the old motorcycle track near the Airport, could be preserved entirely to remove the threat of future damage.

Historic Resources

Several of the sensitive historic resource areas noted on the Cultural and Historic Resources map relate to habitation during the 18th and 19th centuries and are delineated due to their proximity to the Mission, the Royal Presidio, and other adobes. Specific structures of significance are also referred to individually on the map.

The City began in 1782 as a Spanish presidio, or fortress, which was constructed of adobe buildings with tile roofs. A cluster of adobe residences around the presidio formed the heart of what is now the downtown area. The site of the Spanish Royal Presidio is of archaeological and historical importance. Portions of it are contained within El Presidio de Santa Barbara State Historic Park. The Santa Barbara Trust for Historic Preservation and the State of California are cooperating in efforts to acquire the remainder of the site, protect certain features, study the archaeological remains, and reconstruct the fortress as an historic, cultural, educational, and civic resource.

The Mission Church, known as the "Queen of the Missions" was begun in 1786 on a gentle knoll away from the town's center. The Mission has been altered through the years by four major earthquakes but remains much the same as the 1820 version.

Historic landmarks in Santa Barbara have been recognized in a variety of ways. The federal government provides for registration as "National Historic Landmarks" and in the "National Register of Historic Places." The State of California registers "State Historic Landmarks." These various designations can afford some degree of protection by requiring review of developments
or modifications that could damage these resources. Additionally, registration can make property owners eligible for some forms of tax relief and can also make possible grant monies for preservation. A list of historic landmarks, their particular designations, and their addresses are included in Appendix A.

Local protection of historic landmarks is provided by the "Historic Structures Ordinance."
The ordinance officially declares that it is the City's policy to recognize, preserve, enhance, perpetuate, and use structures, natural features, sites, and areas which have historic, architectural, archaeological, cultural or aesthetic significance (Chapter 22.22, Municipal Code, City of Santa Barbara). Landmarks designated under the provisions of this ordinance cannot be altered (on the exterior), relocated, or demolished. The Landmarks Committee, established under this measure, recommends to the City Council landmarks of historical significance to be designated. The current listing of Designated Landmarks is included in Appendix A. "Structures of Merit" are also listed. Although these structures do not receive the protection of the ordinance, they have received official recognition.

Architectural Resources[1]

The variety of architectural styles which are comprised by the City's built environment are a significant cultural resource. These buildings reflect a rich heritage and are evidence of the different influences that have shaped the City since the mid-nineteenth century. By that time, American and English settlers had introduced wood-frame and brick construction, and Santa Barbara had taken on the typical appearance of a California town. Victorian styles: Italianate, Queen Anne, Stick and Eastlake, and Gothic revival prevailed through the mid-1870s. During the 1880s and 1890s, styles reflected the influence of San Francisco. In the mid-1890s, through the early part of the twentieth century, Mission Revival buildings were erected (the railroad station remains as an example).

In the early years of the twentieth century, the community began to strive to establish the Hispanic image of the City. The incorporation of the De la Guerra Adobe into the "El Paseo" shopping/office complex was a major step in this direction. The need to control the planning and design of buildings produced a planning commission in 1923 and an Architectural Board of Review two years later. The destructive 1925 earthquake afforded the opportunity to rebuild large parts of the central City in Spanish Colonial style. The influence of the Architectural Board of Review was dramatic during the months following the earthquake. This group was disbanded after operating for nine months and processing over 2,000 designs. Although architectural controls were not included in the City's ordinances, in the 1930s it became understood that Spanish style was a "must" for the central City. The Plans and Planting Committee unofficially worked to make sure that the City would be rebuilt in the Hispanic tradition.

After World War II, the Architectural Board of Review was re-established and was given design control over all commercial and apartment developments. The goal of conserving and protecting the community's architectural heritage by requiring good design and neighborhood compatibility in new development continues to be implemented by the Architectural Board of Review.

In order to give special protection and attention to the central core area which developed around the Royal Presidio, the "El Pueblo Viejo" landmark district was established in 1960. Preserving and enhancing the unique historic and architectural character of this area is the express purpose of this district. Refined in its geographical extent in recent years, El Pueblo Viejo requirements demand that any structure built or modified in the district be compatible with the Hispanic tradition. Emphasis is placed upon California Adobe, Monterey Revival, and Spanish Colonial Revival styles. The Landmarks Committee administers the requirements of the El Pueblo Viejo district.

Supported by widespread community sentiment, and bolstered by the economic reality that the architectural, historical, and archaeological resources are a primary focus of the City's tourism, efforts to perpetuate these resources must continue. Santa Barbara's wealth of styles has produced architecturally heterogeneous neighborhoods which contribute immeasurably to the comfortable character of the City. Both the Architectural Board of Review and the Landmarks Committee carry on the protective traditions begun over half a century ago.

Recognition of significant historical and cultural amenities, however, does not ensure preservation. The fate of the central core and those structures protected as Designated Landmarks is much brighter in this regard than are those structures and areas which, although important, are relatively common. Several of the areas currently zoned for the most intensive land uses are also of remarkable architectural/historic/cultural value. As pressure for new development grows, it will become more difficult to conserve these older values. The residential neighborhoods of Oak Park, Laguna, and West Downtown, are examples of this situation.

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[1] This section is intended to be a brief overview of the architectural history of the City. Readers desiring a complete inventory and explanation of architectural styles of Santa Barbara are referred to Santa Barbara Architecture, which was invaluable in the development of this section.

Zoned for higher densities, the visual and historic/cultural amenities provided by such neighborhoods will probably be lost unless protective policies are adopted. Brinkerhoff Avenue, which is lined with relatively modest late 19th-century cottages now in residential/commercial use as an "antique shop row," is also afforded no special protection.

The Landmarks Committee is currently conducting an architectural and historic survey of structures throughout the City. The survey is partially funded by a State grant from the Office of Historic Preservation in the Department of Parks and Recreation. It is intended that this inventory provide an architectural catalogue of the City's buildings. Nominations for the Designated Landmark and Structures of Merit distinction will eventually be forthcoming from this effort. This survey, by identifying the range of building types, architectural styles and periods, and documenting facts about the buildings, could be a major step in the future of historic preservation in Santa Barbara. The list of "Noteworthy Buildings of Importance" included in Appendix A is an informal roster of structures which, while they have not been recognized under the City's protective ordinance, may be likely candidates for designation in the future.

Future land use decisions which affect the community's heritage, as reflected in the historic, architectural, and archaeological resources, must recognize the irreplaceable nature of these resources. The value of these resources are to be given equal weight to other factors being considered in the decision-making process. Goals, policies, and implementation strategies for the conservation of these resources can be found in the last chapter of this Element.

VISUAL RESOURCES

Introduction

The aesthetic qualities of the City of Santa Barbara vary as widely as the nature of the topography and the land uses. The manner in which the City's visual resources are perceived is two-fold: first, those areas possessing aesthetic qualities attributable to natural or structural amenities; and second, those places from which scenic areas can be viewed. The close proximity of beach and mountain land forms offer a unique visual setting for Santa Barbara. The City, nestled amid mountain backdrops and surrounding foothills, contrasts with the ocean's expanse to create a unique visual quality unparalleled in California.

Natural land areas possessing aesthetic attributes include the creeks and their riparian environment, hillsides and their native vegetation, the shoreline and its related amenities, and the remaining open space within the City. When considered in conjunction with the natural surroundings, the architectural character also becomes an important visual resource which contributes to the quality of life in Santa Barbara. These and other cultural resources are discussed in the previous section.

On one hand, it is important that land areas which are high in scenic value be conserved. On the other hand, it is just these scenic values which attract both tourism and residential development in areas of high visual sensitivity. Hillside developments provide vistas for residents who inhabit those structures. Yet, residential developments render hillsides less natural as topography and vegetation are modified. The ocean becomes increasingly harder to see from more and more locations as low-lying buildings are replaced by taller ones. The General Plan serves not only to identify these visual resources, but also to recommend policies that will conserve and enhance those resources for all segments of the population.

Inventory of Resources

CREEKS

Mission, Arroyo Burro, San Roque, and Sycamore creeks constitute the major creek systems within the City. The creeks which provide drainage from the mountains and hills to the sea are largely natural in appearance and thus contribute significantly to the aesthetic quality of the City. In addition, they function as an important ecological resources while providing connecting linear open space links from the hillsides to the shoreline. The creeks also provide the potential for aesthetic enhancement of recreational, residential, and commercial areas.

Due to its central location with the City's creek network, Mission Creek is a predominant natural feature which bisects the City. As open space, the creekside environment of Mission and other creeks contributes to meeting the spatial and spiritual needs of the community residents by offering visual relief from the built environment. The Scenic Resources map indicates the extent and location of these riparian/creekside open space resources.

The absence of creek management in the past has resulted in alteration of creek environments through practices such as concrete channelization, defoliation of riparian vegetation, and dumping of debris into creeks. These actions and some creekside construction activities severely detract from the creek's visual value and indirectly contribute to degradation of the coastal environment as well.

HILLSIDES

Major hillside topography does much to accentuate the visual contrast of Santa Barbara. Foothill open space provides a transition zone between residential development and the natural mountain areas. The Scenic Resources map includes delineation of hillsides which have a slope of 30% or greater. Due to the steepness of these slopes, they are especially prominent in the overall community landscape and provide a significant visual resource, as reflected in the City's Slope Density Ordinance. The natural character of the hillsides is aesthetically attractive in and of itself, with the real beauty of these hillsides lying in the scenic vistas they provide for residents and tourists alike. The areas of higher elevation provide views of both the ocean and the mountains.

The higher elevations also provide a visual resource to hillside residents of surrounding valleys and the ocean. For example, the Riviera provides views of the ocean and the Channel Islands. The Foothill neighborhood in the northeastern portion of the City also provides dramatic views of the Santa Ynez Mountains and the ocean. The Mesa area possesses magnificent scenic vistas of the City and its environs. The steep, wooded hillside of the Mesa's north slopes provides a visual backdrop for much of the City's downtown area while also providing for a 350-degree panoramic view. However, hillside development also creates scars on the landform which require many years to revegetate. This condition most affects those residents who view the hills from lower elevations.

SHORELINE

The shoreline, harbor, and waterfront areas are key aesthetic assets which provide diverse recreational opportunities and passive enjoyment of the sea, sand, and scenic views. From the beaches, views of the ocean and the islands, with sailboats in the harbor, are the dominant visual elements. Cabrillo Boulevard, a designated scenic highway, has views of not only the ocean and Palm Park, but also of the Bird Refuge, Child's Estate, Montecito foothills, and the Santa Ynez Mountains. (See the Scenic Highways Element for a further description of Cabrillo Boulevard. Other scenic routes include parts of Sycamore Canyon Road, Stanwood Drive, Mission Ridge Road, and Mountain Drive.) The importance of the harbor and the shoreline as scenic resources cannot be overestimated, as the City's location at the juncture of land and sea is fundamental to
the charm and character of the community. The significance of this resource is reflected by the designation of "unique visual sensitivity" on the Scenic Resources map.

Scenic corridors providing views of the hills and mountains, as seen from the beach and Cabrillo Boulevard, are valuable resources. Despite the presence of a substantial number of tourist-oriented developments on the inland side of Cabrillo Boulevard, view corridors continue to exist. If development is allowed in these remaining open areas without proper height, set back, and design limitations, the visual corridors could be blocked and inland views impaired, thereby causing a decline in the aesthetic amenities of the shoreline. Palm Park and the beachfront are particularly sensitive to such "filling in" of view corridors.

SPECIMEN AND STREET TREES

The presence of trees throughout the City is invaluable in the preservation of the rustic, visually pleasing appearance of Santa Barbara. Widely distributed along many streets, the trees provide needed greenery and shade while concealing some buildings and unsightly utility lines and poles.

While it is not feasible to map all the trees in the community which contribute to this general visual resource, the Scenic Resources map does indicate the outstanding Stone Pine street trees *(Pinus pinea)* along Anapamu Street, as well as those historic and specimen trees protected by City ordinance. The Stone Pines which line the 300-800 blocks of East Anapamu Street are a prime example of the outstanding contribution that trees can make to the appearance of a neighborhood, and from higher elevations form a striking green belt in the heart of the City.

When integrated into landscaping plans for commercial and residential uses, trees make for more attractive development. Although there appears to be adequate tree coverage throughout the City, additional new trees and preservation of existing tree cover is needed to maintain and enhance this visual resource. According to the City Arborist, those areas most in need of additional street trees are the business/commercial districts and the major thoroughfares. Santa Barbara Beautiful is the primary, privately sponsored organization that aids in planting new street trees throughout the City. This street tree planting program provides trees through donation of funds by members of the public. Currently, the goal is to add 5,500 trees to the City. This type of promotion for new tree plantings is a significant step toward preserving and enhancing Santa Barbara's scenic quality.

In response to the need for the protection of trees from removal during construction, Chapter 15.24 of the Municipal Code, "Preservation of Trees," of the Tree Ordinance, was instated. Under this ordinance, it is "unlawful to cut down or otherwise destroy or authorize the destruction or cutting down of any tree that has been designated as an historic or specimen tree by the City Council..." (See Appendix B for a list of trees which currently receive protection under this ordinance.) The presence of trees is perhaps taken for granted, but if the tree population were allowed to diminish in an uncontrolled manner, their absence would undoubtedly be noticed, and Santa Barbara would be deprived of a valuable aesthetic amenity. Continued

protection and enhancement of trees is an important consideration in maintaining the visual resources of the City.

OPEN SPACE

The Open Space Element (adopted in 1972) provides for the protection of "significant open and natural landforms through and around the community." This Element includes the ocean, the mountains, and the major hillsides as categories of open space. The Wilcox Property, major creeks, the shoreline, Montecito Golf Course, Andree Clark Bird Refuge, Clark Estate, and Child's Estate are included as significant areas of open space and/or visual features. These areas are indicated on the Scenic Resources map as is the "Kim Nursery" property on the westside. The Kim property, visible from the foothills and many downtown locations, is presently being developed for residential use, but some parts are to remain relatively undisturbed.

City Parks also provide significant open space within the community. Although they are not all indicated on the Scenic Resources map, the parks are valuable visual amenities and are considered as such, as well as recreational resources.

The Goleta Slough is a significant ecological resource and also provides open space. Infringement on the open character of this wetland is not compatible with maintenance of this habitat. Protective policies and regulations which ensure the continued preservation of the Slough as open space will be forthcoming in the City's Local Coastal Program. Further discussion of the Goleta Slough is found in the Biological Resources section.

Threats to Visual Resources

Vigorous planning and management of our visual resources is essential in order to prevent the eventual degradation of these resources which contribute substantially to the aesthetic, environmental, and economic well-being of the City.

Threats to the creekside environment are not as evident as those to other visual resources. There is presently a lack of local policy which recognizes the value of the creekside environment from a visual resources perspective. While creek setbacks are currently being proposed by the City and the County, there are no standards with regard to the appearance, design, or site layout of new development adjacent to or within the riparian environment. Presently, concrete retaining walls and artificial filling are the primary structural improvements for creekside development. As remaining vacant land along Mission Creek, for example, is developed, creekside vegetation, topography, and access are reduced or eliminated from the visual environment. This trend will continue until objectives, policies, and implementing regulations are adopted which recognize the major creeks within the City as visual amenities which provide opportunities for restoration and enhancement of urban resources.

The same type of unchecked development that has resulted in the degradation and artificial channeling of once natural, free-flowing streams and creeks, has also had a direct effect on the hillside regions of the City. Areas such as the Eucalyptus Hill neighborhood have been the site of conversion of natural hillsides into building sites. The extensive cutting and grading of hillsides that accompany residential development can cause irreversible environmental damage, thus diminishing the aesthetic character of the City. Development has also impaired scenic vistas from open, publicly accessible sites on the hills themselves. Natural constraints to development such as excessive steepness of slopes have been overcome by environmentally damaging engineering practices throughout the hillside areas. In response to this trend, a Slope Density Ordinance was incorporated into the City's land use controls in 1975. The intent of this ordinance was to

prevent the unnecessary scarring of hillsides through regulation of density on various slopes. However, this ordinance has not been effective, as is evidenced by major scarring on the north facing slopes of the Mesa Hills and other areas of the City. It is therefore suggested that the location of development in the hillside areas should be controlled in a manner which guarantees the preservation of the natural characteristics of the terrain and vegetation, even if revised ordinances prohibit development in certain areas altogether.

The conservation of the harbor, shoreline open space, and natural features that contribute to the beachfront character should be a major focus of the City's future planning policy. The Local Coastal Program, for example, is presently refining the City's policies in this regard. Sand build-up at the harbor entrance has forced closure of the harbor in the past, and constant dredging is required to keep it open. The harbor itself is threatened by potentially serious damage from southeasterly storms. Because future development in the shoreline area could enhance or damage existing aesthetic qualities, great care and thoughtfulness must precede major alterations within the coastal zone.

Unfortunately, the City's visual and aesthetic resources are most vulnerable to the pressures of increased land development and population growth. Through the years, the need for protection of these remaining amenities has become a vital concern of those wishing to maintain the essence of Santa Barbara's character and beauty. In response to this need, goals, policies, and implementation strategies have been formulated to conserve and protect the creeks, trees, hillsides, and shoreline, and are contained in the final chapter of this document.

AIR QUALITY

Introduction

Perception of air quality varies from person to person. Some people perceive air pollution as a haze of particulate matter which impairs the range of vision, while others experience burning eyes or difficulty in breathing. Still others do not consider Santa Barbara to have an air pollution problem at all, or blame the air quality on the larger metropolitan areas to the southeast.

Santa Barbara has been designated by the California Air Resources Board as a non-attainment area. This designation reflects the area's failure to meet certain national air quality standards. The air within the South Coast Air Basin, of which the City of Santa Barbara is a part, presently exceeds State and Federal standards for concentrations of oxidants, carbon monoxide, and suspended particulate matter. Air quality standards have been established as benchmarks for concentrations of potentially harmful pollutants. Standards are set at the lowest concentration found to cause harmful effect(s) (Brodine, 1977). These air pollution problems manifest themselves in the form of reduced visibility, eye irritation, impairment of plant growth, added cleaning and maintenance costs, accelerated deterioration of buildings, and, particularly for those with respiratory difficulties, a serious health threat.

Major Considerations

Santa Barbara's air quality, like other natural resources, is limited. That is, at a given point in time, the local air-environment has a limited ability to dilute contaminants and remain clean enough for the population to breathe without experiencing adverse effects. Although local air quality appears to be very good when compared to some communities in Southern California, Santa Barbara is experiencing substantial locally generated air pollution.

FACTORS AFFECTING AIR QUALITY

Air quality varies with the amount of pollutants emitted and the subsequent dispersion of the pollutants into the atmosphere. When the rate of dispersion does not equal the rate at which pollutants are added to the atmosphere, air quality problems arise. Inversions, light winds, and inland mountain ranges are factors which limit the local air environment's capacity to disperse pollutants.

An inversion acts as a "lid" obstructing the vertical diffusion of pollutants. The inversion layer in the coastal areas of Santa Barbara County is quite persistent in trapping pollutants and "is lower than that measured to the north or to the south" (Norsieck and Eschenroeder). The winter months are apt to be accompanied by frequent surface-based inversions (radiation inversion), and during the summer months higher-altitude inversions persist (subsidence inversion).

Local wind conditions are another factor which affect the dispersion of pollutants. Light winds accompanied by inversion thwart the scattering of primary pollutants. December, January, and February exhibit extreme surface stability with almost no mixing. Such stability is more prevalent during late evening and early morning hours. This stagnation functions to trap the primary pollutants while complex photochemical reactions take place, resulting in the production of secondary pollutants (e.g., smog). Local air quality problems are closely linked with these meteorological conditions.

Topographic features also affect local air circulation and, in the case of mountain ranges, encourage the build-up of pollutants by restricting air movement.

Over and above the atmospheric and topographic conditions which affect air quality, auto use is the single most determining factor of air quality in the South Coast. In addition to the increased reliance upon the automobile for transportation, Santa Barbara has recently experienced widespread proliferation of drive-though facilities which cater to convenience-oriented auto use. Autos idling in such facilities cause a substantial build-up of carbon monoxide, which can create health hazards. Convenience-oriented auto use results in low auto occupancy rates, single purpose auto trips, and foregone opportunities for public transit use, all of which add auto-related pollutants to the air. With approximately 70-95% of pollutant emissions having the automobile as their source, the prevention of further air quality degeneration must be based on strategies to reduce overall automobile use and vehicle miles traveled.

JURISDICTION AND STANDARDS

Air quality control involves several levels of government. The Clean Air Act (1970) is the major Federal legislation addressing air quality. The Act deals with both vehicular and stationary emission sources. Pursuant to this Act, the Environmental Protection Agency has the vested authority to set air quality standards and to oversee State implementation of those standards. California's Air Resources Board is responsible for establishing implementation plans for the attainment and maintenance of Federal State ambient air quality standards. The final authority for the actual implementation plans is vested with the Santa Barbara County Air Pollution Control District which enforces Federal and State rules and regulations.

A recent amendment to the Clean Air Act includes provisions for identifying and dealing with areas which do not meet and/or are not expected to meet the national air quality standards. Santa Barbara is one of those areas of non-compliance and therefore must develop an Air Quality Attainment Plan (AQAP) to demonstrate how the area intends to attain national standards in the future. The plan delineates the degree and manner in which the emission rates must be "rolled back" or reduced in order to meet the National Ambient Air Quality Standards by 1982.

National standards have been established to indicate concentration levels at which pollutants will have a harmful effect upon humans. These standards are displayed in Table 1. An area is not in compliance with the standards if it experiences pollutant concentrations in excess of the amount or frequency designated in Table 1. Although exceedance of such standards has long-term significance for the entire population, it can have particularly adverse health effects on those segments of the population designated as "sensitive receptors." Sensitive receptors are those who are most vulnerable to air pollution, including persons with respiratory and heart ailments, the very young (under five years), and the elderly (over 65 years) (Office of Environmental Quality, 1977). Factors such as age, location of residence, income, mobility, and sex are also closely linked to pollutant sensitivity. (See Air Quality map for generalized locations of sensitive receptors.)

TABLE 1

STANDARDS, SOURCES, LOCAL EXCEEDANCE, EFFECTS

	Carbon Monoxide	Oxidants	Particulate Matter
FEDERAL STANDARDS:			
Primary	8 hr.-9 ppm	1 hr.-.12 ppm	Annual average 75 ug/m^3 24 hr. 260 ug/m^3
Secondary	Same	Same	60 ug/m 150 ug/m
Pollutant Source South Coast:	Mobile source emissions Incineration Oil/gas production operations Power generation plant operations	Secondary photochemical product from reactions of hydrocarbons and nitrogen oxides	Mineral extraction and production, demolition, burning of fossil fuels, oil with high sulfur content
Locally Recorded Pollutant High:	Santa Barbara: 2/74 – 32 ppm peak 29 ppm max. hr. average	South Coast: 9/75 - .25 ppm max. hr. avg. 6/76 - .32 ppm instantaneous peak	172.3 ug/m^3
Pollutant Effects	Harmful effects from headaches, fatigue, and slowed reactions, to death. Can cause interference with oxygen transport in blood.	From mild eye irritation to possible impairment of lung function. Aggravation of respiratory and cardiac diseases, pulmonary dysfunction. Damage to vegetation (ornamental plants to commercial food crops).	Reduces visibility and if particles are small enough can be carried to lungs. Many of the suspended particulates are toxic and are deposited on the food stuffs of animals and humans.
Source:	Adapted from *Methodology Development for Coordinated Air Quality/Land Use Planning*, Office of Environmental Quality, County of Santa Barbara, Revised November 1977, p. 22.		

POLLUTANTS AND LOCAL AIR QUALITY

While there are natural sources of pollutant emissions in the environment, the human population contributes quite significantly to localized concentrations of certain pollutants. Transportation, the generation of energy, manufacturing of goods, household heating, and waste disposal all contribute to the emission of contaminants into the air. Pollutants are generally classified into two distinct categories: primary and secondary pollutants. Primary pollutants are defined as those pollutants that are emitted directly from a source. This class of pollutants includes carbon monoxide, oxides of nitrogen, sulfur dioxide, hydrocarbons, and particulates. Secondary pollutants are those pollutants formed by chemical and photochemical reactions in the atmosphere such as photochemical oxidants. Ozone is the predominant component of the photochemical oxidant complex.

Oxidants are produced by complex reactions involving nitrogen oxides (NO_x), reactive hydrocarbons, and oxygen in the presence of sunlight. Locally, the primary source for both nitrogen oxides and reactive hydrocarbons is the motor vehicle. In 1975, it was estimated that all such mobile sources accounted for over 92% of NO_x and over 76% of hydrocarbons (Office of Environmental Quality, 1977). By 1985, it is anticipated that off-shore oil production and transport in the South Coast area will have increased to the extent that the major proportion of reactive hydrocarbons will be emitted from various phases of these oil operations (local AQMP).

Oxidants can reduce pulmonary functions in healthy individuals, irritate the eyes, decrease lung elasticity, and aggravate respiratory ailments (e.g., emphysema, asthma). The “smog” which is visible in the Santa Barbara area is photochemical oxidants (NO_x produces the familiar brownish color).

The monitoring data of the Air Pollution Control District confirms that the standard for oxidants is exceeded on a regular basis in the South Coast between the months of May through September. In 1975 and 1976, serious concentrations of oxidants resulted in first stage health alerts. Future projections indicate that the standard for oxidants (measured as ozone) will not be met in 1982 unless drastic reductions are achieved in emissions of reactive hydrocarbons and nitrogen oxides.

Carbon monoxide, 90% of which is emitted from motor vehicles, is the greatest single pollutant by volume in the atmosphere (Office of Environmental Quality, 1977). This pollutant can be lethal in high concentrations. In lesser concentrations it can be “especially dangerous for people with heart disease, anemia, emphysema, asthma, and other respiratory ailments,” (Terry, 1975). Exposure to concentrated doses of carbon monoxide can produce headaches and distortion of both time and vision in healthy persons.

Concentrations of this pollutant are found in close proximity to busy streets, congested intersections, drive-through facilities, and other areas where vehicles idle for prolonged periods. The Air Quality map indicates such “hot spots” of carbon monoxide concentrations. The proximity of sensitive receptors to these “hot spots” is indicative of potentially harmful health effects for that population. The eight-hour standard for carbon monoxide is exceeded at the downtown monitoring station for many days each year. The standard is probably exceeded at a variety of other locations, but in the absence of monitoring data, this has not been confirmed.

Particulates range in size from microscopic to large enough to be seen with the naked eye. Fires, agricultural processes, power plants, and transportation are the major sources for particulates. Motor vehicles accounted for over 71% of the local particulate inventory in 1975 (Office of Environmental Quality, 1977). Particulates floating in the air are carried directly into the lungs where they can cause irritation of the pulmonary system and/or aggravation of respiratory ailments. Some types of particulate matter (i.e., photochemical aerosols) reduce visibility and consequently have an adverse impact on Santa Barbara’s visual quality. The disposition of particulates on buildings, clothing, etc., results in added burdens to cleaning and maintenance requirements and the associated costs.

RELATIONSHIP BETWEEN AIR QUALITY AND VEHICLE USE

Motor vehicles are the source of approximately 70% to 95% of the total amount of each of the major pollutants emitted locally. Despite the fact that substantial reductions in auto emission have been brought about by federally mandated improvements in emission controls, significant violations of air quality standards still occur and are predicted to occur in the future. "…By 1985 all pollutant reductions achieved as a result of technological advances would be offset by increases in vehicle miles traveled" (Office of Environmental Quality, 1977). In the complex relationship of vehicle use and air pollution, the City of Santa Barbara only has effective jurisdiction over land use practices. Land use controls can affect the nature and distribution of commercial and residential uses which generate auto trips and can affect the supply and utilization of parking facilities.

Land use controls must internalize air quality considerations which are aimed at minimizing the need for auto use, minimizing auto trip length, and maximizing the use of alternative forms of transportation. Because the auto is the focus of the existing transportation system, the present land use pattern is oriented toward scattered residential and commercial development. This type of spatial distribution serves to make public transit ineffective and bicycle and pedestrian travel inadequate, leaving the auto as the only means of providing convenient transport for necessary work, shopping, and personal trips.

The City can utilize its control over the nature, location, and intensity of land uses in a manner which applies strong disincentives to developments which would encourage single occupant and/or single purpose auto trips. Similarly, incentives can be employed to promote developments which concentrate and/or mix uses in a manner which would result in decreased miles traveled and a reduction in auto dependency. Public parking, on-street parking, and off-street parking requirements can also be manipulated to discourage auto use (particularly by commuters) and foster the use of public transit. Car pooling and intracity "people movers" have been discussed in recent years as methods for decreasing traffic congestion in the downtown area. These additions are not likely to be successful unless accompanied by measures which make the status quo (i.e., the single-occupant auto trip) significantly less convenient. While applying disincentives to automobile use, it is essential that alternative forms of transportation (e.g., bus, bicycle) be made more convenient. As it becomes more expensive and inconvenient to use automobiles, alternate means of transportation must be encouraged.

Improving Air Quality

The costs of air pollution include loss of tourist income, increased and additional cleaning costs, increased costs for medical treatment, loss of income due to sickness and decreased function, and damage to ornamental and food crops. Another cost directly associated with air pollution could be federal sanctions which are scheduled to be applied if the Santa Barbara area does not demonstrate, through its Air Quality Attainment Plan (AQAP), how local air quality is to achieve standards. Sanctions could include the withholding of federal highway construction funds and federal grants for sewage treatment and other public facilities.

Plans for improved air quality must recognize that pollutants do not respect political boundaries, and, as such, air quality within the City will be determined by the success of pollution controls imposed throughout the entire region. The Air Quality Attainment Plan currently being developed by Santa Barbara County will demonstrate how this area proposes to attain air quality standards in the future.

Because the South Coast air environment has a limited capacity to dilute pollutants, strategies aimed at limiting emissions must be geared to ultimate thresholds established for problem pollutants. The Air Quality Attainment Plan should address the air resource "holding capacity" or "budget." This

complicated technical problem involves defining an area's threshold for pollutants in order to determine allocation of the remaining capacity. In this regard, local agency cooperation with these efforts is needed to ensure optimum land-use/air quality planning. In the interim, until the region's "holding capacity" has been defined, major development proposals should be thoroughly evaluated for adverse air quality effects.

The land use policies and implementation framework included in the air quality portion of the Goals, Policies, and Implementation Strategies section is intended to ensure community cooperation in regional efforts to improve air quality. The strategies included will not be easily accomplished as they will require change, cause some inconvenience, and have associated costs.

BIOLOGICAL RESOURCES

Introduction

The primary and overriding issue affecting biological resources is the conflict which has developed between urban land use and the preservation of a productive Citywide ecosystem. Urban uses exist in the City of Santa Barbara at least in part because the area is pleasant and in many ways a unique place to live. However, a part of the attractiveness of the region is the degree to which the ecosystem has been maintained in the past.

Provision for both urban use and the preservation of biological resources is dependent on the determination of land use suitability. Conflicts arise between land use capability, which only considers the physical structure of the environment, and land use suitability, which considers the biotic characteristics as well as the physical structure of the environment. Land use suitability must also reflect the value and sensitivities of the general public as expressed through City goals and policies.

Two major concerns have developed in the City because of the conflict between urban use and ecosystem preservation: urban encroachment into ecologically sensitive resources and current degradation of resources. Urban encroachment particularly affects City hillsides, streams, and marine resources.

Current degradation of resources is exemplified by the gradual deterioration of City streams, the Andree Clark Bird Refuge, and the Goleta Slough. As these and other important habitats in the City are lost, the general environmental quality of the City is reduced, thus making Santa Barbara a less attractive place to live and visit.

Native Terrestrial Resources

BIOTIC COMMUNITIES

An ecosystem is composed of biotic communities and the physical and chemical environment with which the communities are interrelated. A biotic community consists of all the populations of living organisms in a particular area. These populations can be divided into three classes: producers (plants), which capture and store energy and materials from the environment; users (animals), which redistribute energy and materials; and decomposers (bacteria), which break down complex organic molecules and return nutrients to the environment.

All living organisms have four basic needs for survival: food, water, shelter and space. The term "habitat" is generally used to define those areas of the environment that supply these basic needs. Because the physical environment provides these needs in different amounts and in different ways, a large variety of habitats is available. Each habitat or group of habitats has a distinctive biotic community associated with it. For convenience, a habitat or its associated community is generally described in terms of a dominant feature, such as a vegetation or soil type.

Terrestrial biotic communities in the City of Santa Barbara can be distinguished by the vegetation type found within them (see Biotic Communities map). The following is a synopsis of the major characteristics of these communities. (More specific information will be found in the Master Environmental Assessment for the City of Santa Barbara.)

Coastal Strand / Beach - Vegetation in this community consists of low-growing (two feet) perennial shrubs and herbs found on the loose sand above the high-tide line at the beach. The loose sand, sea salt, fog, and strong winds make this a particularly harsh habitat, and few species are adapted to survive and flourish here. The strand community has very few resident reptiles or mammals and no year-round resident bird species. Invertebrates are also relatively sparse, with only a few forms abundant at any time. Of these, most are inclined to drastic population changes due to the rapidly changing environment. Recreational use of the beach areas has created further disturbances and limited vegetation growth to small areas along Palm Park and at the toe of the coastal bluffs.

Coastal Bluff - This community is limited to the steep bluffs below Shoreline Drive. Sparsely distributed perennial shrubs and hardy annuals vegetate the slopes. Many of the plants are reduced to a mat form by prevailing winds and are often succulent species. Wildlife is limited to a few birds and arthropods.

California Annual Grassland - Annual grasses and weedy herbs introduced by Europeans have become naturalized in habitats formerly occupied by native perennial grasses. The grassland community is found on the gently rolling hillsides of the City, particularly in areas disturbed by people. Wildlife found here includes primarily grazers and seed-eaters, many of which are ground-burrowers. Decomposers are an important aspect of this community, as their activity maintains the fertility of the soil.

Coastal Perennial Grassland - Native bunchgrass can be found in two areas of the City, on a hillside in Parma Park and at the northeast end of Anapamu Street. These two sites are not considered pristine stands of *Stipa* species because the bunchgrass exists as scattered clumps in a largely annual grassland. While many wildlife species are able to exist in either type of grassland, the native grasses are the only food plants for several insect species.

Coastal Sage Scrub - Vegetation of this community is comprised primarily of low (one to four feet), drought-deciduous, aromatic, semi-woody shrubs and subshrubs, with some larger evergreens and annual or perennial grasses. This community is often referred to as "soft chaparral" and is limited to the lower, dry slopes of undeveloped hillsides in the City. A surprising number and variety of

animals are found in this community, most of which are permanent residents. This is due to the diversity of forage plants and availability of cover.

Chaparral - The organisms which compose this community are illustrative of the way in which the physical environment and the biotic community are interrelated. The community is found on hot, dry slopes, ridges and mesas within the City, and generally on thin, rocky soils. The vegetation consists of many varieties of shrubs, most showing similar adaptations to summer drought, such as stiff, thick, heavily cutinized and generally evergreen leaves. Several of the shrubs are also capable of condensing fog, thereby creating more moist conditions for growth. Organisms within the community are generally adapted to periodic wildfire. Good examples of this community are found in the northeastern sector of the City.

The diversity of shrubs is reflected by the many invertebrate species found in the community. Many vertebrate species nest in the almost impenetrable stands of shrubs. Decomposer species are somewhat lacking in chaparral communities because the drought adaptations also inhibit organic breakdown and soil conditions are generally unfavorable. Periodic fires aid in the decomposition of dead organic matter in this community.

Southern Oak Woodland - Coast Live Oak is the predominant tree type of this community in the City. The oak trees control the micro-environment around them as their extensive shade produces significantly lower summer temperatures and their leaf litter creates acidic soil conditions. The oaks provide shelter, food, and space for many animals. Pristine stands can be found along Las Canoas Road and west of Calle de Los Amigos.

Riparian Woodland and Creeks - Water is the major limiting factor to the abundance and diversity of terrestrial organisms, and, within the City, the creeks are the major natural supply of readily available water. Because of this, riparian areas are very important as they provide water to wildlife from several communities. Riparian woodlands provide a balanced combination of the four basic needs in a terrestrial habitat, but these areas have been altered greatly by urban development within the City. Extensive riparian woodlands and natural creek areas are now limited to the upper portions of Mission and Sycamore Creeks and along most of Arroyo Burro.

Freshwater Marsh - Vegetation in this community is composed of floating, emergent, and submerged herbaceous perennials with little or no woody tissue. Most of the wildlife associated with this community are intimately dependent on water, with many species having aquatic larval forms. The only extensive freshwater marsh in the City is contained in the upper end of Goleta Slough, though elements of this community are found in reservoirs, creeks, and ditches throughout the City.

Coastal Saltmarsh - This community is distinguished by salt-loving herbaceous plant species lying in the intertidal zone of Goleta Slough and, to a small extent, at the mouth of Mission Creek. The saltmarsh community is further considered in Marine and Estuarian Resources.

Relationship to Ecosystem Preservation

Because the biotic community is closely interrelated with the physical environment, it reflects changes within the ecosystem that may not be measured in other ways. Many organisms are sensitive to minor changes in their environment, and these species can be used to index the environmental quality of an ecosystem. Often these “index” species are rare because they depend on precise environmental characteristics. When people alter environmental characteristics on a massive scale, these species become increasingly scarce and may become extinct.

RARE, ENDANGERED OR THREATENED WILDLIFE

The continual expansion of human development has created conflicts between activities and the survival of wildlife. Though extinction is a natural result of a changing environment and continued evolution, the rate at which species are disappearing has increased dramatically in the last few centuries. It has been estimated that the current extinction rate among most groups of mammals is about a thousand times greater than the "high" rate that occurred at the end of the last glaciation, when the geologic record suggests that there were massive extinctions of large birds and mammals (Ehrenfeld, 1972). The rate may be even higher for other animals, particularly invertebrates. Federal and State governments have recognized this problem and enacted legislation protecting wildlife determined to be endangered, rare, or threatened. Under the Federal Endangered Species Act of 1973, an animal may be determined to be endangered or threatened (rare) because of any of the following factors:

- The present or threatened destruction, modification, or curtailment of its habitat or range;
- Over-utilization for commercial, sporting, scientific, or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms; or
- Other natural or man-made factors affecting its continued existence.

Species are considered endangered if they are liable to become extinct in most of or throughout their range. Species are considered threatened if they are likely to become endangered within the foreseeable future. The California Endangered Species Act of 1970 has made similar findings, but uses the word "rare" or "threatened." The following rare, threatened, or endangered wildlife species may be found in the City of Santa Barbara (U.S. Fish and Wildlife Service, 1976, 1977, 1978; CA Department of Fish and Game, January, 1976. All of these species are found on both lists except the last two.)

American Peregrine Falcon *(Falco peregrinus anatum)* - this falcon is endangered due primarily to food chain contamination by persistent pesticides and other pollutants, and to illegal taking by falconers. Human disturbance and occasional shooting are also factors contributing to its decline. The bird has been sighted at Goleta Slough (City of Santa Barbara, February, 1978).

Southern Bald Eagle *(Haliaeetus leucocephalus leucocephalus)* - this endangered eagle occurs statewide, particularly along the coast near wetlands, reservoirs, and large lakes. It is endangered due to irresponsible shooting, removal of nest trees, human encroachment into breeding and feeding habitat, power line electrocution, environmental pollution, and persistent pesticides. Migrants occasionally occur around Goleta Slough and the Andree Clark Bird Refuge (Santa Barbara County Planning Department, 1978).

California Brown Pelican *(Pelicanus occidentalis californicus)* - this large shorebird became endangered due to reproductive failure cause by environmental pollution and persistent pesticides. Their population has been increasing in recent years, and nesting sites have been established on Santa Cruz Island. Several birds frequently roost in the harbor area and other coastal wetlands, but feed primarily offshore (Western Marine Laboratory, 1974).

California Least Tern *(Sterna albifrons browni)* - this small bird formerly nested in large numbers along sandy beaches throughout Southern California. Destruction of its nesting sites and feeding areas, along with human disturbance, has endangered it. While it has not nested recently in the Santa Barbara Region (Atwood, 1977), it is capable of re-establishing former nesting sites if disturbances are limited and an adequate supply of small fish (generally in estuaries) is nearby.

Light-footed Clapper Rail *(Rallus longirostris levipes)* - development of coastal wetlands throughout Southern California has limited this endangered species to a few remnant saltmarshes. Goleta Slough is one of only ten areas identified in the state as appropriate habitat (California Fish and Game, 1976); the population at the Slough has been small and the 1977 census failed to find any clapper rails there (Wilbur, 1978). The Slough currently lacks extensive stands of cordgrass *(Spartina foliosa)*, which are the primary habitat of the Light-footed Clapper Rail.

Belding's Savannah Sparrow *(Passerculus sandwichensis beldingi)* - this endangered sparrow (State list only) is a year-round resident of coastal saltmarshes in Southern California and is restricted almost entirely to pickleweed *(Salicornia sp.)* marshes. Continued development of these wetlands has eliminated essential habitat of Belding's Savannah Sparrow. While Goleta Slough was estimated to contain 28 nesting pairs in 1977, this is considered very small in proportion to the Slough's size and is a substantial reduction from 50 pairs in 1973 (Massey, B.W., 1977).

Black Rail *(Laterallus jamaicensis coturniculus)* - this small bird is listed as rare by California Fish and Game because its habitat, coastal and inland wetlands, has been largely destroyed. Because it is highly secretive and occurs only in limited numbers, it is rarely seen. The actual distribution and abundance of this species is as yet undetermined (City of Santa Barbara, February, 1978).

RARE AND ENDANGERED PLANT SPECIES

The Federal Endangered Species Act of 1973 includes authority for establishing rare and endangered plant species, and the Smithsonian Institute (1974) was asked to provide a list of candidate species. To date, of the plant species which have been listed as endangered on the Federal list, only one occurs in the City. At the State level, the Fish and Game Commission designated 29 native plants as endangered or rare on October 6, 1978, in accordance with the provisions of the Native Plant Protection Act. None of these plants occur in the City. A private group, the California Native Plant Society (CNPS), has published a rare and endangered species list which may be used to identify sensitive plants in the City. Table 2 lists those plants which do or may occur in the City, along with the Society's endangerment code and local habitat.

TABLE 2

SENSITIVE PLANTS WHICH MAY OCCUR IN THE CITY OF SANTA BARBARA

Scientific Name	Common Name	CNPS REVD Codes*	Smithsonian Code**	Habitat in City
Cordylanthus maritimus spp. Maritimus	Saltmarsh bird's beak	3-2-2-2	E+	Found in Coastal Saltmarsh at Goleta Slough
Dicentra ochroleuca	Yellow dicentra	1-2-1-3	E	Dry, disturbed places in Chaparral below 3000'; no known location in City
Pholisma arenarium	Pholisma	2-2-2-2-	N	Coastal Strand; no known location in City
Sanicula hoffmannii	Hoffman's sanicle	2-2-1-3	N	Coastal Sage Scrub,; no known location in City
Lasthenia conjugens	Contra Costa Bueria	3-2-2-3	T	Possibly found in ephemeral ponds in Goleta Slough – probably introduced from northern California; has not been recorded in Santa Barbara region since 1950

Nomenclature and habitat according to Munz, P.A. 1974; "A Flora of Southern California", and Smith, C., 1976; "A Flora of the Santa Barbara Region."

* Status, as defined by the California Native Plant Society (Powell, 1974):

First Number: Rarity
1 - Rare, of limited distribution, but distributed widely enough that potential for extinction or extirpation is apparently low at present.
2 - Occurrence confined to several populations or one extended population.
3 - Occurs in such small numbers that it is seldom reported; or occurs in one or very few highly restricted populations.
P.E - Possibly extinct or extirpated.

Second Number: Endangerment
1 - Not endangered
2 - Endangered in part
3 - Totally endangered

Third Number: Vigor
1 - Stable or increasing
2 - Declining
3 - Approaching extinction or extirpation

Fourth Number: General Distribution
1 - Not rare outside California
2 - Rare outside California
3 - Endemic to California

** Status, as defined by the Smithsonian Institute (1974):
E - Endangered; those species of plants in danger of extinction throughout all or a significant portion of their national ranges.
+ - Recognized as endangered by the Federal government, 28 September 1978.
T - Threatened; those species of plants likely to become endangered within the foreseeable future throughout all or a significant portion of their national ranges.
N - Not included in Smithsonian list.

Biotic Community Sensitivity

The loss of rare species from a community indicates possibly detrimental, environmental changes are affecting the entire ecosystem. The extent to which a biotic community can withstand these changes is dependent on the type of environmental stresses which naturally occur in the habitat and the ability of the organisms to change their environment. Communities which cannot adapt to new environmental stresses can be considered relatively sensitive to development activity. These communities often require an extensive amount of time to recover through the process of ecological succession. This aspect of the City of Santa Barbara's terrestrial communities is illustrated in Table 3.

TABLE 3

SENSITIVITY AND RECOVERY TIME OF TERRESTRIAL COMMUNITIES IN THE CITY OF SANTA BARBARA

Biotic Community	Sensitivity	Recovery Time*
Coastal Bluff	Very High	Indeterminate
Coastal Strand/Beach	Very High	Indeterminate
California Annual Grassland	Low	1-2 years
Coastal Perennial Grassland	Very High	Indeterminate
Coastal Sage Scrub	Medium	5-10 years
Chaparral	Medium	8-12 years
Southern Oak Woodland	High	100 years
Riparian Woodland/Creeks	Medium	20-30 years
Freshwater Marsh	High	5-10 years
Saltwater Marsh	High	5-10 years

* The time necessary for the community to recover if all vegetation is removed, but no other environmental changes are made.

Urban growth has depleted several biotic communities within the City's boundaries. The following major resource areas are considered particularly sensitive to continued growth:

> Goleta Slough - Landfilling for the construction of Santa Barbara Airport has limited the wetland habitats available for saltmarsh and freshwater marsh communities. Sedimentation from upland sources is a critical problem as small changes in elevation affect tidal flushing within the saltmarsh. Littoral drift of sediments continually closes the mouth of the Slough, limiting tidal flushing and causing oxygen depletion of Slough waters.

Coastal Perennial Grassland - native grasslands were largely replaced by exotic annual grasslands during the last 400 years, primarily as a result of grazing pressure. In the recent past, grassland habitat was converted to urban areas because of the ease of developing the coastal plains. Only a few stands of bunchgrass *(Stipa spp.)* remain in the City, interspersed with annual grassland; however, none are in pristine condition.

Riparian Woodland/Creeks - urban development has encroached on City creeks, substantially altering the creek environment. This has caused increased bank erosion coupled with downstream siltation, abundant growth of noxious algae, and loss of many organisms formerly associated with the creeks, such as steelhead trout. Continued streamside development will further damage this resource.

While the preceding resource areas contain the most sensitive communities in the City, other areas also contain valuable terrestrial habitats which should be considered in the development of land use policies. These include undisturbed stands of Southern Oak Woodland and Coastal Sage Scrub which contain elements unique to the City of Santa Barbara. An example would be the stand of oaks located on the north slope of the Wilcox property.

Estuarine and Marine Resources

The immediate coastal waters and tidelands have long been recognized as critical habitats of especially high biological productivity. This productivity is due, in part, to the relatively stable environment of the ocean, the influx of nutrients from land, and tidal activity which transports wastes and nutrients within this system. The California Coastal Act of 1976 acknowledges the value of these lands, and requires local jurisdictions to adopt a Local Coastal Program establishing goals and policies regarding use of the Coastal Zone. The City has developed draft portions of its program, including reports on Water and Marine Resources: Environmentally Sensitive Habitat; and Diking, Dredging, Filling and Shoreline Structures (City of Santa Barbara, February, July, August, 1978). Because the Local Coastal Program takes precedence over the Conservation Element in the Coastal Zone, this portion of the Element should be reviewed to incorporate the City's program when it is adopted.

INTERTIDAL AND NEARSHORE HABITATS

Intertidal communities within the City of Santa Barbara include the rocky shores of the western mesas and the open coast beaches. Rocky shore organisms as shown on Figure 1 are fairly abundant in three locations. These organisms are extremely hardy because they must withstand wave action, and current recreational use of the area has not significantly affected them (City of Santa Barbara, July, 1978). Most invertebrates associated with the open shore of the sandspit and public beaches are adapted to burrowing, which decreases wave shock. This habitat is much harsher than the corresponding rocky shore habitat, and few organisms can adapt to it.

Both the rocky shore and beach communities support significant numbers of shorebirds that forage in these habitats.

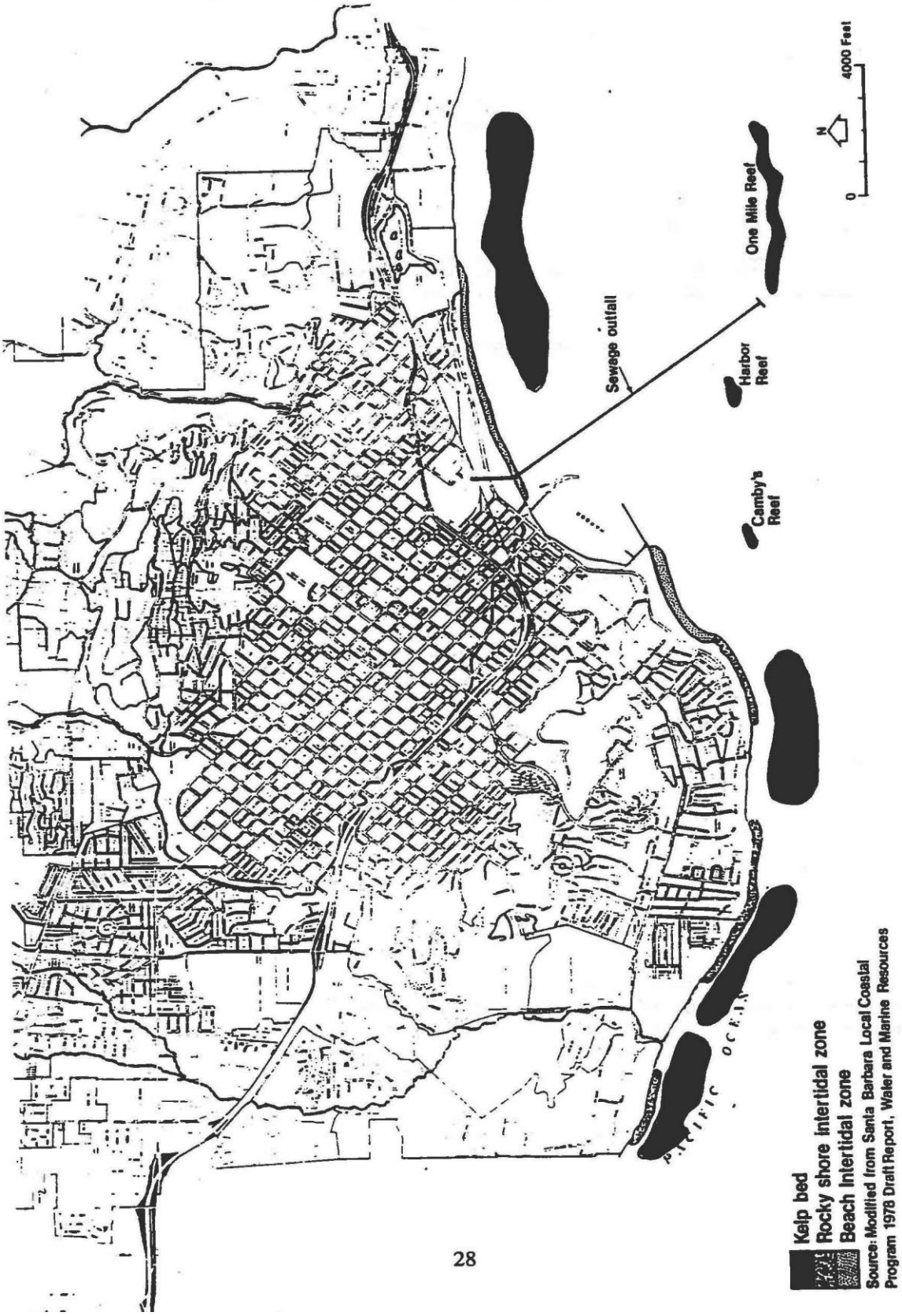
Kelp bed and reef habitats are particularly important because of their high productivity (Figure 1). Kelp beds provide forage and shelter for many fish and invertebrate species. Some regulated kelp harvesting has been allowed in the area, but it has not adversely affected this important resource. Reefs provide shelter and breeding areas for local fish populations. Currently, the Santa Barbara sewage outfall discharges wastes at the west end of the One-Mile Reef (Figure 1), but no harmful effects from the waste discharge have been found in recent tests (City of Santa Barbara, July, 1978).

Future growth within the City may have substantial effects on these habitats. Development above the cliffs can increase rates of cliff retreat which is adverse for local biotic populations. Coastal plain development affects intertidal and near-shore habitats by increasing run-off with higher contaminant loads, altering sedimentation patterns, and increasing sewage waste disposal into coastal waters.

FISHERIES

The reefs and kelp beds off the coast provide important fishery areas, with rockfish, English sole, petrale sole, and other flatfish being the most common commercial landings (Smith, E.J., 1976). The rocky intertidal and subtidal areas below the mesas provide habitat for spiny lobster and abalone. Both of these species are currently declining for many reasons, particularly overfishing and environmental disruptions (City of Santa Barbara, July, 1978).

Figure 1. Intertidal and nearshore habitat.



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GOLETA SLOUGH

Estuaries are partially enclosed coastal waters with a free connection to the sea. Fresh water flows into these areas, carrying nutrients, while the tidal action transports nutrients and wastes in the system. Because food, shelter, and water are relatively abundant, estuaries are highly productive habitats and many fish species and free-swimming invertebrates use the estuary as nursery grounds. Goleta Slough is the only significant estuarine habitat in the City, as urban encroachment and landfills have reduced the El Estero to a few remnant saltmarsh patches along the Central Drainage Channel.

Two important vegetative communities are present at Goleta Slough: coastal saltmarsh and freshwater marsh. Coastal saltmarsh vegetation is generally composed of extensive stands of a limited number of species because of the environmental stresses associated with abrupt changes in salinity, temperature, ion concentration, and water level. However, these species grow rapidly because of the ample water supply, nutrient mixing by tidal action and reduction of competition with other species. Much of the marsh vegetation dies back during the winter and is decomposed by various bacteria and fungi and eaten by small invertebrates. This decomposing organic matter is washed into the tidal channels and the ocean by tidal action, and provides the primary food source for coastal animals in the nearshore area.

The freshwater marsh also benefits from an ample water supply, and is a highly productive habitat. Many animal species are found in this habitat, which is becoming increasingly rare in the southern coastal region.

An inventory of the Slough's biotic resources (City of Santa Barbara, February, 1978) shows that the area supports a large and highly diverse flora and fauna. The City's Local Coastal Program emphasizes the importance of the Slough, and recommends a management plan for this resource.

Agricultural Resources

Agriculture has historically been important to the economy of the cities and south coast of Santa Barbara County. As the City has urbanized, however, commercial agricultural uses have gradually been replaced by other uses of the land. Today, the primary pursuits are related to avocado orchards, specialty crops, nursery stock and ornamental plants.

The location of prime soils (Class I and II soils as defined by the Soil Conservation Service) is scattered throughout the City, with substantial prime acreage in the La Cumbre Road vicinity. However, a majority of the City's prime soils have already been converted for urban uses. There is little, if any, prime land still in large, undivided tracts.

Continued commercial agriculture on the remaining pieces of prime land is deterred by some basic conflicts with adjacent land uses. For the farmer/rancher, urban neighbors create problems of trespass, vandalism, and pilferage. For residents adjacent to farmland within the City, noise, dust, odors, operation of heavy machinery at sleeping hours, and chemical spraying constitute nuisances which may interfere with daily living and could present health hazards. For these reasons, and the problems of substantial parcelization, high land costs, high property taxes, and no option for Land Conservation Act contracts (Williamson Act of 1965), commercial agriculture within the City of Santa Barbara will, for the most part, continue in a transition to small home orchards and community gardens or to urban uses.

INVENTORY OF CROP PRODUCTION

In 1990, there were 133 parcels in the single-family zones of the City which are more than three acres in size (74 parcels, three to five acres in size; 34 parcels, five to ten acres; 25 parcels, over ten acres), excluding parcels containing present or future parks or institutional uses (i.e., schools, reservoirs, seminaries). This

accounts for a total of a little over 1,000 acres or about five percent of the City. Many of these parcels are developed with single-family residences and related accessory uses, including agricultural uses. Some parcels, particularly along the northern edge of the City, are developed exclusively with agriculture. Other parcels remain vacant and have potential for residential or agricultural uses or both.

Ornamental and Nursery Stock - There are two remaining growing grounds in the City for ornamental plants and nursery stock. They are located on Yankee Farm Road off Cliff Drive and on Calle Canon on the northern edge of the Mesa.

Many of the large growing areas for ornamental plants and nursery stock are found just outside the City limits, in Goleta and in Carpinteria. Substantial production from orchards, potted plants and other greenhouse-grown plant materials contribute to the economic base of the South Coast in general.

Avocado Orchards - The foothill areas above the coastal plain are prime areas for avocado production. Hass, Fuerte, Bacon, Zutano and other avocado varieties are all suited to the mild climate of Santa Barbara. In addition, this high-cash crop can be grown on steeper slopes and less fertile soils than Class I or Class II prime soils. Although handicapped by heavy clay soils and fungal root rot in some areas, avocado orchards are currently a crop which generates considerable interest locally.

In 1978, there were about 190 acres of avocados grown within the City limits (Rich, personal communication, 1978). From 1978 to 1994, the total number of acres appears to have changed very little, although the distribution has changed. Several parcels are 30-40 acres in size, but the typical orchard is only 1-5 acres. These orchards are scattered throughout the City. Some orchards are located on Braemar Drive, others on the western City boundary, with many also along the northern edge of the City in the foothills. The high cash value of avocados makes small family orchards economic to harvest and merchandise. The larger undeveloped parcels (½ acre to 5+ acres) in the foothill and Mesa portions of the City may see increased conversion to small, private avocado orchards. This would be encouraged by maintenance of the slope density ordinance or additional slope constraints on foothill development for residential uses. Where additional building sites for homes are improbable on these larger parcels, owners may attempt to offset property taxes and supplement income by removing natural vegetation and planting avocado orchards.

Clearing hillside brush for avocado orchards can be far more unsightly and environmentally damaging (siltation, drainage alteration and flooding aggravation) in the short-term than creating individual hillside homesites, one at a time. However, avocado orchards do result in buffer areas that slow wildfire progress by eliminating highly flammable ground cover and replacing dry natural vegetation with irrigated trees.

Lemon and Orange Orchards - There are no commercial citrus orchards still maintained in the City of Santa Barbara (Santa Barbara Lemon, Goleta Lemon Association, personal communication, 1978). The agricultural lands of the South Coast are highly suited to citrus production, but encroaching urban development and variable cash returns on citrus produce have eliminated the local commercial crop. Goleta and Carpinteria still have citrus crops harvested and shipped, but there is no longer any commercial contribution from the City. There are many family orchards, however, which are picked for home use.

Contemporary Community Gardens - There has been a major trend back to "urban gardens," similar to the victory gardens of World War II. Intense interest in development of backyard and community gardens is evident throughout the United States.[2]

[2] Results of a 1977 Gallup Poll on Home Gardening showed that six million households (currently without land to garden upon) would participate in community gardens, if available. Nationally, one-third of all community gardens in 1977 were city-sponsored.

Santa Barbara has had several community gardens in the recent past which have served as models for other communities (Chapala Street garden, El Mirasol garden, the Mesa garden and the Yanonali Street garden, all operated by the Community Environmental Council of Santa Barbara, and the Pilgrim Terrace garden operated by the residents of Pilgrim Terrace). In addition, there are numerous private fruit, vegetable and flower gardens which are found scattered throughout the City. Many of these provide a recreational outlet for people, as well as edible and saleable produce. The Rancheria garden, near City College, and El Mirasol garden, in the Lower Eastside, each offer about one-half acre of land for community gardening primarily for the residents in those areas. The Pilgrim Terrace garden provides land for gardening primarily by the residents of Pilgrim Terrace Homes.

FARMER'S MARKET

In 1980, the first certified Farmer's Market was established in Santa Barbara. It was held in several locations throughout Santa Barbara until it settled into its present location in 1985. This event occurs on Saturday mornings in the City Commuter Parking Lot at Cota and Santa Barbara Streets. It is operated by Santa Barbara Certified Farmer's Market, Inc. It has proven to be very successful in its sale of fruits, vegetables, flowers and similar products.

In 1988, the Old Town Merchants Association and the operators of the earlier Farmer's Market received permission to close the 400 block of State Street on Tuesday evenings in order to establish a second Farmer's Market. The purpose of the Old Town Market was to return lost business to the lower Downtown Area during the closure of State Street due to Crosstown Freeway construction. The location was later moved to the 500 block of State Street. The Old Town Market sells similar produce to the Saturday market. When the Crosstown Freeway construction was completed and the State Street Underpass opened in mid-1991, the continued existence of the Old Town Market was reassessed. The Planning Commission reviewed the Old Town Market in late 1993, determined that it was still an appropriate use on State Street and issued a Conditional Use Permit. It was also expanded to include both the 500 and 600 blocks of State Street. At the same time, a Conditional Use Permit was granted for the continuance of the Saturday Farmer's Market at the City Commuter Parking Lot. In 1994, the Planning Commission approved a third Farmer's Market location on Coast Village Road that operates on Friday mornings.

The majority of the sellers at the Farmer's Market are residents of Santa Barbara County with most of the rest from Ventura and San Luis Obispo Counties. A few sellers also come from the Central Valley. The Farmer's Market provides an alternative shopping source to area residents and tourists, generally at prices that are lower than available at the local supermarket. At the same time, the Farmer's Market provides an outlet for growers who are able to sell at prices which are higher than wholesale and with reduced packing costs, which improves their profit. It also draws people to the Downtown at times when they might not otherwise come and creates a community gathering place (Mark Sheridan, Santa Barbara Certified Farmer's Market, Inc., personal communication, September 1990).

The Future of Agriculture in the City

As the City becomes more urban, the larger parcels are likely to be subdivided into smaller lots and developed with residential uses. However, on the northern edge of the City, in particular, the land is steep (slopes in excess of thirty percent) and, even after subdivision, parcels are likely to remain larger in size. These parcels will continue to be likely locations for agricultural uses, particularly avocado orchards.

In other areas of the City, smaller parcels will continue to be used to grow specialty food crops. Many of these crops will be grown organically or with minimal pesticides and sold locally, especially through the Farmer's Market.

Generally speaking, agriculture in the City is not important on a state or national level, although avocados are one of California's leading agricultural cash crops. However, agricultural production does contribute in several ways to the area. Agriculture provides a living to a small portion of the City's residents. The crops grown contribute to the variety of produce available to local consumers and provide competition to major growers. Mature orchards often contribute to the aesthetics of the community through variation in texture, color and the break up of suburban areas of the City. Agricultural areas serve as animal habitat and provide green corridors for animals to travel from one natural habitat area to another. More importantly, agriculture provides fire protection by removal of dense, flammable ground cover and replacement with irrigated vegetation with high moisture content which slows all but the most powerful wildfires. Dispersal of agriculture in the City fringe will help reduce the fire hazard for the entire City.

Because, first and foremost, the City is an urban area with emphasis on a high quality of life for its residents and visitors, the types of agriculture allowed should be limited. Commercial dairying and commercial animal and poultry husbandry should not be allowed due to the production of noxious odors and flies. Agricultural accessory uses such as canning would also be incompatible with adjacent residential uses. Pesticide and heavy equipment use should be restricted in order to minimize their effects on neighbors, as well. Neighborhood compatibility is very important in determining what types of agricultural operations are acceptable.

Another important aspect of the City is its interest in protection of the environment, both natural and man-made. Grading and irrigation for agricultural purposes should be closely reviewed to assure that water use is limited, environmentally sensitive habitats are protected, viewsheds are preserved and downstream flooding, siltation and erosion are prevented. Particular emphasis should be placed on preservation of oak groves, riparian and bunchgrass habitat and skyline trees. Issues such as noise, dust, odors, operation of heavy equipment and chemical spraying must also be addressed.

Other Urban Biotic Resources

SANTA BARBARA HARBOR

Four biotic communities are associated with the harbor: a quiet bay community, formerly found on the pilings and floats of the marinas and now located only on Stearns Wharf; a bottom community; an open water community; and a rocky intertidal community on the breakwater. The bay community is probably the most biologically productive of the harbor communities; however, most of these organisms are considered nuisances because they eventually destroy the pilings and floats and damage boat bottoms. The harbor communities are not as productive or stable as natural communities because of continual environmental stresses caused by poor water circulation, periodic dredging, and intense human activity (Western Marine Laboratories, 1974).

A critical problem within the harbor is the dumping of waste materials and the use of toxic compounds to prevent boat fouling which have contributed to the harbor's low water quality. Proposed harbor expansion should consider this potential impact.

While most of the organisms found within the harbor are common forms, the Brown Pelican and California Least Tern, both endangered species, occasionally forage for fish in the harbor (Western Marine Laboratories, 1974. See section on Rare, Endangered, and Threatened Wildlife.). The possible effects of harbor pollution on local individuals of these species is unknown.

URBAN RESOURCES

The urban biotic community generally lacks a major necessity for the survival of organisms, which is space. The primary constituent of the community is the human population, and other organisms within the community are dependent on the manipulation of energy by humans. Because of this, individuals of common wildlife species are often widely separated, and maintenance of breeding populations is difficult. Those species which are highly mobile, such as birds, insects, and annual plants with wind-borne seeds, are the most successful in an urban community. There are four important biotic resource areas of the urban community in the City.

Wilcox Property - This property contains a large, landscaped garden of native plant species.

Andree Clark Bird Refuge - This brackish pond was created especially for migratory waterfowl; however, the lack of management, misuse of the park, and gradual eutrophication has diminished its habitat value (City of Santa Barbara, August 1978).

Horticulture Plantings - Landscaping within the City has been influenced by several noted horticulturists and includes many unique and rare species. An inventory of Santa Barbara's trees has been published (Beittel, 1976; Muller, Broder & Beittel, 1974), with particularly important plantings listed, such as those in Franceschi Park, Alameda Plaza, Orpet Park, and around the County Courthouse. An area of special interest is the grounds of the old Verhelle Kentis nursery in the areas of Manitou and Chuma roads, where Kentia palms have established a breeding population.

Golf Courses - These areas function similarly to annual grassland communities, and many species found normally in grasslands also occur here.

Goals, policies, and implementation strategies for biological resources are discussed in the last chapter of this document.

DRAINAGE AND FLOOD CONTROL

Introduction

San Roque, Arroyo Burro, Mission, and Sycamore Canyon creeks are the four major drainages in the City of Santa Barbara. Of these, Mission and Sycamore creeks pose significant flood hazards where they pass through urbanized portions of the City. The Central Drainage Area in the lower east side of the City is a separate 1,600 acre watershed which lies between Mission and Sycamore creeks. There has been frequent flooding of the Central Drainage Area due to inadequate local drainage. This condition, however, has been substantially reduced with completion of the Eastside Storm Drain. Near the Santa Barbara Municipal Airport are the drainages of San Pedro, Las Vegas, Carneros, and Tecolotito creeks. The Airport is shown within the boundary of the 100-year standard project flood.

Santa Barbara's major flooding threat results from high-intensity rainfall which produces heavy runoff in a short period of time. Often, flood waters are laden with channel debris, especially after fire has denuded chaparral vegetation in the foothills, or where stream channels have not been recently swept clean of accumulated debris by creek runoff. Narrow, crooked stream channels with steep gradients such as are found on the South Coast are especially prone to rapid runoff.

Brush, trees, and other debris are often washed downstream and caught, obstructing the flood flow. As the flow increases, these barriers too are swept loose, creating a wall of water and debris which can be highly destructive downstream. Debris which collects around bridges and culverts can create a damming effect

which is capable of washing out structures if their structural capability is exceeded. When this debris is finally deposited downstream, flood waters may reach elevations higher than they would otherwise.

Damaging floods occurred in 1862, 1875, 1877, 1883, 1888, 1907, 1909, 1911, 1914, 1918, 1938, 1941, 1943, 1952, 1967, 1969 and 1978. Although flood control improvements have substantially alleviated the conditions leading to flooding in the downtown area (channelization and realignment of portions of Mission Creek, Eastside Storm Drain project, etc.,) there is still a major hazard to structures and to lives from flooding in the City (Corps of Engineers, 1975).

An evaluation of the 100-year standard project flood limits for San Roque, Arroyo Burro, Mission, and Sycamore creeks shows that there are approximately 2,725 permanent structures within, or partially within, these limits which could be subject to flooding (HUD, 1978). It is not possible to forecast dollar costs and loss of life from future flood episodes, but the number of structures currently exposed to hazard by their location within the 100-year flood limits is an indication of the large magnitude of this problem. Implementation of land use regulations which promote wise floodplain management can substantially alleviate future flooding in areas which will be urbanized in the future. Such management strategies include creek setbacks, regulation of creekside land uses by the Zoning Ordinance, participation in the Federal Flood Insurance program, construction of additional fixed-work flood prevention structures where necessary, and continued refinement of flooding and floodway fringe area maps.

Development of creekside areas is more difficult to manage. Areas bordering lower Mission Creek and Sycamore Creek have already been substantially urbanized, and it is also in these areas that the greatest areal extent of flooding is projected to occur. Obviously, structures cannot be removed solely because they lie in flood hazard zones. However, measures can be taken to require that replacement of such structures be prohibited if they are severely damaged or lost to floods. This approach can be modified to allow rebuilding if it can be demonstrated that the structure has been satisfactorily “flood proofed” and that no increase in flood height is induced by replacement of the structure, or that subsequent flood control fixed works have altered the limits of the 100-year standard project flood. Flood-proofing is defined as a combination of structural provisions, changes, or adjustments to properties and structures subject to flooding primarily for the reduction or elimination of flood damages to properties, water sanitary facilities structures, and contents of buildings in a flood hazard area (ASPO, 1972).

(Insert)

Source: Adopted HUD, 1978.

Major Creeks

MISSION CREEK

A 4.4-mile section of Mission Creek traverses the City from the northern City limits to the Pacific Ocean. It flows from Mission Canyon to Oak Park, then parallel to U.S. Highway 101 from Junipero to Gutierrez Streets, and finally to the ocean directly east of Stearns Wharf at the foot of State Street. Its drainage area is approximately 11.5 square miles.

Mission Creek poses the most substantial flooding problem to the City in terms of hazard to existing structures. About 2,380 of the 2,725 structures within the limits of the 100-year flood are subject to flooding from Mission Creek and its overflow.

SYCAMORE CREEK

Sycamore Creek runs a 2.7-mile course through the City between the Stanwood Drive/Sycamore Canyon Road intersection and the ocean at East Beach. Its drainage area is about 4.0 square miles. It constitutes a substantial watershed from which flooding frequently occurs. Sycamore Creek is heavily urbanized through the Eastside and East Beach neighborhoods. Areas along Milpas, Salsipuedes, and Cacique Streets experience minor flooding after even moderate rainfall.

Through the Eastside neighborhood, Sycamore Creek is reported to be polluted by animal wastes flushed down from upstream. High coliform bacteria counts during low water periods are evident, posing a potential health hazard (Planning Task Force, 1974).

ARROYO BURRO CREEK

This creek flows 4.5 miles through the City from the northern City limits to the ocean. It passes through the Hope Avenue neighborhood, under U.S. Highway 101 east of La Cumbre Road, along Las Positas Road, and to the ocean at Arroyo Burro Beach Park. Its drainage area is about 9.5 square miles.

Overbank flows result in sheet flow outside the main stream channels along both Arroyo Burro and Mission Creeks. These flows break out during the 100- and 500-year floods and can inundate large areas with depths up to three feet. Due to the wide areal extent of these breakouts, and because they occur in residential areas, they would be responsible for substantial flood damage (HUD, 1978).

SAN ROQUE CREEK

San Roque Creek joins Arroyo Burro Creek just southwest of the YMCA on Hitchcock Way, south of Upper State Street. It runs a 1.2-mile course within the City limits from Foothill Road to its confluence with Arroyo Burro Creek and has a drainage area of about 4.7 square miles.

Historic records show negligible evidence of serious flooding along San Roque Creek. This creek passes through older residential areas, and it appears that structural protection is adequate since there is little evidence of serious flood damage from previous floods in Santa Barbara.

AIRPORT AREA CREEKS

The reaches of Tecolotito, Las Vegas, San Pedro, and Carneros creeks within the City limits were studied for their relationship to airport flood hazard (HUD, 1978). These creeks drain from the steep, mountainous reaches of the Goleta watershed into the relatively flat coastal plain and then to the Goleta Slough. San Pedro and Las Vegas Creeks lie immediately east of the airport and are shown as a single drainage course. Tecolotito and Carneros creeks converge at Goleta Slough west of the airport.

Flood Hazards

Flood boundaries have been mapped for all major creeks in the City. The 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of floodplain management measures (HUD, 1978). Limits of the 100-year flood are shown in the Flood/Fire Hazard and Tsunami Run-up map for Mission, Sycamore, Arroyo Burro, and San Roque creeks. This map also shows the limits of the 100-year flood which affect the City airport area (Tecolotito and Carneros creeks, and San Pedro and Las Vegas creeks).

The 100-year flood boundary includes the *floodway* and the *floodway fringe*. The floodway is the channel of the stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increase in flood heights. The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe.

In cases where the boundary of the floodway and the 100-year flood coincide, only the floodway boundary is shown, and is the basis for floodplain management (HUD, 1978).

MISSION CREEK FLOOD HAZARD

The Flood Insurance Study shows a narrow area of floodway above Alamar Avenue and State Street. This widens rapidly to a nine-block corridor between San Pascual Street and Mountain Avenue just south of U.S. Highway 101 between Mission and Islay Streets. This is primarily from overflow of Mission Creek where it would break out of its banks at about Pueblo Street.

The floodway corridor narrows again as it crosses U.S. Highway 101 at Carrillo Street until it reaches the downtown area of the City. A second outbreak of the creek is shown from Ortega Street through the State Street signals on U.S. Highway 101, across the Southern Pacific Railroad tracks and to the ocean. A six-block area between Chapala and Santa Barbara streets is shown as inundated by the 100-year storm.

In addition, limited drainage of the lower central City area could create inundation of a six-block area bounded by Ortega, Santa Barbara, and Quarantina Streets to U.S. Highway 101, and below U.S. 101 to the Southern Pacific Railroad. Castillo Street above the harbor is also a significant inundation area. Leadbetter Beach west of the harbor is also within the fringe.

SYCAMORE CREEK FLOOD HAZARD

Sycamore Creek is confined to a narrow floodway with no flood fringe for a major portion of its run through the City. At about Cacique Street on the lower Eastside, a 100-year storm would flood a section several blocks wide near the Old Coast Highway, Salinas Street, portions of East Beach, and the Child's Estate.

ARROYO BURRO CREEK FLOOD HAZARD

The floodway and floodway fringe for Arroyo Burro Creek are mapped as a narrow corridor through the Hope neighborhood. An overflow of the creek is shown below U.S. Highway 101 and also below the confluence of San Roque Creek with Arroyo Burro Creek. This covers the area along Palermo Drive from north of Amalfi Way to Barcelona Drive. Las Positas Road north of Portesuello Avenue is also shown as flood fringe for about 1,000 feet.

SAN ROQUE CREEK FLOOD HAZARD

San Roque Creek does not pose flood hazards to so widespread an area as do Mission and Sycamore creeks. Above its point of confluence with Arroyo Burro Creek, its flood plain is confined to a narrow creek bed. About 750 feet above Foothill Road, at the large meander, San Roque Creek has its widest flood fringe. It is roughly 500 feet in width.

No major areas of outbreak from San Roque Creek are indicated for a 100-year flood (Impacts of Growth).

AIRPORT CREEKS FLOOD HAZARD

The four creeks which empty into the immediate vicinity of Santa Barbara Municipal Airport pose substantial flooding hazard to the Airport during a 100-year flood.

Floodway limits (within the creek bed and floodplain of the 100-year flood) include everything from just north of Hollister Avenue down to Moffett Lane at Ward Memorial Freeway for Las Vegas and San Pedro creeks. Hollister Avenue, Firestone Road, and Arnold Street are all within the floodway from Carneros and Tecolotito creeks, as is the Goleta Slough.

The flood fringe of the four creeks includes all portions of the Airport facility, including each runway, terminal buildings, parking lots, and access roads.

The last section of this Element contains goals, policies and implementation strategies which ensure that adequate drainage and flood control is provided for the City.

WATER RESOURCES

Introduction

A major issue in the determination of how best to approach the future use of City water resources is the significant difference between the City's need for new sources and that of the County. The City has in the past established a water system capable of supplying its needs for the present and the near future. Many County areas, on the other hand, have grown beyond the capability of various districts to supply adequate water, and future growth cannot be accommodated. Various alternatives have been proposed to solve this Countywide problem with the principal concern being the supply of the needed water at the least possible cost to the consumer. Unfortunately, the most efficient solution for the County may not be the most efficient solution for long-term City needs.

A somewhat related issue is the tendency of an assured future supply to induce growth. All water supplies must include some "excess" capacity to accommodate increased demand during prolonged dry periods. The smaller this margin of safety, the more likely it will also function as a constraint on growth. Therefore, some individuals or groups may well oppose development of an increased water supply, not because they are against adequate water, but because they oppose growth. This approach has been tried by some jurisdictions in California in the past, and with near-disastrous results during the recent drought.

Supply/Demand Relationships

EXISTING SUPPLIES

Existing sources of supply are shown diagrammatically on Figure 2. Gibraltar Reservoir via the Mission Tunnel has been the primary source (60%) for the City with deliveries averaging approximately 10,000 acre-feet in recent years (Don Owen, 1976). However, the usable storage in the reservoir has been declining at an average rate of 275 acre-feet per year due to siltation, and is now at a capacity of approximately 8,000 acre-feet (Figure 3).

(insert Figure 2)

Figure 2. Sources of the Santa Barbara City water supply (from City of Santa Barbara, 1977).

Cachuma Reservoir has also been a major source of water for the City, accounting for 23% from 1952 to 1975 (Don Owen, 1976). This source will increase in importance as the City's entitlement increases. The present contract value is 6,800 acre-feet per year, which is expected to increase to approximately 8,950 acre-feet per year (based on revised project yield) in 1990.

Jameson Lake has been an additional source of Santa Ynez River water with supply being via the Montecito County Water District (Figure 2). However, this source has averaged less than 3% of the total supply, and is expected to remain relatively small.

The only significant local source of water is the Santa Barbara groundwater basin. This source was heavily pumped during the 1960s and supplied an average of about 2,500 acre-feet per year for this period. However, this level of use resulted in an overdraft (i.e., extraction exceeding replenishment) of the basin, and pumping has since been reduced. The safe yield of this basin has been estimated at approximately 2,000 acre-feet per year; however, a program of monitoring wells and stream gauges has been underway for the past two years to refine this estimate. Preliminary results will be forthcoming in early 1979 and the study is expected to require an additional five years to complete. The current extraction rate is 1,700 acre-feet per year.

(insert Figure 3)

Figure 3. Historic and projected usable storage at Gibraltar Reservoir. (Source: Don Owen & Associates, 1976).

The interrelationship of the sources discussed above is shown diagrammatically in Figure 4. Groundwater has been a more significant source only during the 1960s; Cachuma has been a relatively constant source over the period shown; and Gibraltar has been primarily the source that has met increasing demand. However, unless the desilting program can be implemented in the near future, Gibraltar will decline as the primary source of City water. Increasing entitlements from Cachuma can maintain the level of supply for a time, but in the absence of alternative sources, the supply will decline significantly after 1990.

(insert Figure 4)

Figure 4. Historical and projected water supplies and projected water demand. (Source: Don Owen & Associates, 1976).

EXISTING AND FUTURE DEMAND

The future demands for water in the City have been estimated by Don Owen & Associates (1976) based on past use and projected future populations. Past rates of use are estimated from known and interpolated population data combined with actual water use for the years 1960 through 1974. Based on this analysis, consumption has varied from a low of 163 gallons per day per person to a high of 203 gallons per day per person, depending primarily on rainfall during the year. The consumption for a normal year is estimated at 180 gallons per day per person.

Estimates of future water demand have been based primarily on land use zoning or future population levels. Assuming 2.3 persons per dwelling unit, 80 gallons per day per person for household use, and 1.6 acre-feet per year per acre for outside use, the zoning approach to estimating ultimate water demand yields a value of 17,200 acre-feet per year. However, because actual land use densities do not follow directly from planned densities, the City Water Commission has requested that future water requirements be based on the population goals of 85,000 which is the "planning objective common to both water and land use planning programs" (Don Owen & Associates, 1976). Based on this approach, the Owen report estimates future water requirements for the Santa Barbara Water Service Area as follows:

Demand (Acre-feet per year) for:

Year	Population	Normal Year	Dry Year	Wet Year
1980	73,900	14,900	15,500	13,400
1990	78,800	15,900	16,500	14,300
2000	83,100	16,800	17,400	15,100

These estimates of future demand are for the City Water Service Area which presently includes the Mission Canyon area of the County and a part of the Goleta County Water District served by the City, but does not include that part of the City served by the Goleta County Water District.

In 1976, the District terminated the agreement with the City in these "overlap" areas effective June 30, 1979. While all the problems related to the termination of this agreement have not been settled, the City and the District have agreed to certain principles summarized as follows:

1. The overlap areas will be detached from the Goleta County Water District, and the City will assume the responsibility for water service.
2. The City will sell 240 acre-feet per year to the District for the next ten years, and up to 63% of surplus water as determined by the City.
3. The airport area will be supplied by the Goleta County Water District but with water from the City's Cachuma entitlement.
4. The City may utilize the Goleta groundwater basin to store up to 2,500 acre-feet per year for five years. Return of the stored water is to be at a rate of up to 1,250 acre-feet per year. (This aspect of the agreement will provide storage for excess water pumped from the Santa Barbara groundwater basin during the testing of the basin for the conjunctive use program).

To allow time to implement the principles summarized above, the existing agreement has been extended for one year. Implementation of these principles will increase the population to be served by the City by about 8,500 (based on data from the Don Owen report), and will increase the demand on City supplies by about 2,000 acre-feet per year (Michael Hopkins). The projected water requirements of the City, not including this demand, are shown on Figure 5 along with projected supplies based on existing facilities and programs. These relationships indicate a balance between supply and demand will occur about 1985 to 1990. However, with the 2,000 acre-feet increase, demand could exceed supply before 1985.

Additional factors that may influence the supply/demand relationship are increased supplies for nearby County areas and additional annexations to the City. The latter could increase demand, while the former would likely reduce development pressure in the City. Also, water conservation techniques are estimated to reduce demand by approximately 400 acre-feet per year by the year 2000. (Don Owen & Associates, 1976.) This aspect of the conservation of City resources has been implemented by resolution of the City Council which required installation of low-flow shower heads, toilet installations, etc., in all new developments.

FUTURE SUPPLIES

Steps are now underway to expand City water supplies by three methods: desilting of Gibraltar Reservoir, conjunctive use of the Santa Barbara groundwater basin, and wastewater reclamation.

Desilting of Gibraltar Reservoir - The Gibraltar desilting program consists of two phases. Phase I is a pilot program to test the feasibility of an air-driven dredge pump not yet used for this purpose in this country, and Phase II is an implementation program that would proceed if the pilot program is successful (City of Santa Barbara, 1977). Phase I, Stages A and B, would extend over a period of approximately ten years and cost about $2,200,000. A federal EPA grant of $1,000,000 on a 50/50 cost-sharing basis has been obtained to implement this test phase of the program. If the new type of pump and the procedure generally prove to be feasible, then the Phase II implementation program would be undertaken. This program is expected to extract about 1,000,000 cubic yards of silt, adding 620 acre-feet of storage capacity per year at an annual cost of $875,000 (1977 dollars). This rate of extraction would be in excess of twice the average siltation rate of 225 acre-feet per year, so that the 20-year operation of this program would return Gibraltar to near its capacity of approximately 15,000 acre-feet (with the raised height of the dam).

Conjunctive Use of the Groundwater Basin - The conjunctive use of the groundwater basin as proposed in the Don Owen report is based on the use of this natural resource as a “water bank.” Excess flows on the Santa Ynez River would be diverted and stored in the basin during wet years. During dry years, the stored water could be pumped to meet demands in excess of those normally available.

The basin has produced an average of approximately 14% of City supplies. This production, however, has been quite variable, and may have, at times, exceeded the safe yield of the basin. Figure 5 shows the relationships between groundwater production in excess of about 2,000 acre-feet per year results in a lowering of water levels during years of normal rainfall, whereas reduced extraction (e.g., during the years 1971-1975) results in a rise in the water level. Water-bearing rocks within the basin include alluvium of various ages (alluvium of Muir, 1968, and younger alluvium, older alluvium and terrace deposits of Upson, 1951) and the Santa Barbara Formation. The older rocks of Tertiary age are considered non-water-bearing, but may yield small quantities of water locally. These water-bearing rocks are offset by faults that form barriers or partial barriers to the movement of groundwater. The most important of these is the Mission Ridge fault (Figure 6).

(insert Figure 5)

Figure 5. Groundwater elevation and production for the Santa Barbara basin, 1950 through 1975. (Source: Don Owen & Associates, 1976).

The Mesa fault is probably of lesser importance as a groundwater barrier because differences in water levels across the fault appear to be minor. However, this fault is generally considered the boundary between storage units 1 and 2 of the Santa Barbara basin. A third fault, unnamed by Muir (1968) and located just offshore of the City, is important as a barrier to the intrusion of seawater into the basin.

Conjunctive use of the basin would involve intentionally lowering the water table so that potential problems such as seawater intrusion can be carefully monitored and evaluated. A storage location is needed for the pumped water so that it is not wasted during this step of the process. A solution for this problem is found in the principles for resolution of "overlap" areas discussed above which provide for the use of the Goleta groundwater basin to store pumped water during the testing and evaluation of this potential source.

Figure 6. Santa Barbara groundwater basin.

Legend

Fault; hatchured where forms boundary of groundwater basin; dashed where approximately located.

Fault; may affect levels within groundwater basin.

Boundary of water-bearing rocks; hatchured on water-bearing side; dashed where approximately located.

Major stream supplying surface flow to recharge basin.

Minor source of surface runoff to recharge basin.

(Adapted from Michael F. Hoover, Geologic Hazards Evaluation of the City of Santa Barbara, October 27, 1978.)

Wastewater Reclamation - A third project for the conservation of City water resources is the use of reclaimed wastewater, now discharged to the ocean, for irrigation of landscaping at various parks, schools, and along freeways in the City.

These potential uses of wastewater amount to approximately 660 acre-feet per year (Don Owen & Associates, 1976). Problems related to the implementation of such a project are disrepair of the existing collecting system and a high salt content of influent attributed to seawater infiltration and water softeners (Don Owen & Associates, 1976). Projects are underway to correct the majority of these problems, and a grant which provides up to 87½% Federal funding is available as a result of a joint powers agreement between the City and other South Coast agencies.

Alternative Supplies - In addition to these ongoing programs, alternative supplies include the utilization of local runoff by constructing dams on coastal streams. The construction of dams on coastal streams has been investigated, and is not cost effective in comparison to other alternatives. The issue of importing State Project water was rejected by County voters in March, 1979.

Summary of Future Supplies - Desilting of Gibraltar Reservoir offers the greatest potential for maintaining and increasing City water supplies. If the project proves to be feasible, storage would be increased by approximately 345 acre-feet per year. If reversal of the present trend of reduced storage is included, the overall increase would be about 620 acre-feet per year. In a ten-year period, half the life of the project, the increased storage would amount to more than 6,000 acre-feet.

Other projects could provide smaller but significant increases in supply. The conjunctive use program is expected to provide an average of 2,050 acre-feet per year, and 650 to 700 acre-feet of reclaimed wastewater could be used in place of domestic water for irrigation of landscaping at parks, schools and along the freeway. Continued enforcement of existing water conservation measures could provide an additional 400 acre-feet per year by the year 2000.

Of these potential sources, the most significant are Gibraltar desilting which would increase storage by 12,000 acre-feet by the year 2000, and the conjunctive use program with a potential yield of approximately 2,000 acre-feet per year. The desilting and the conjunctive-use programs will both require testing to establish their feasibility. The ability to meet future demand is, therefore, primarily dependent on the results of these testing programs.

Water Quality

QUALITY OF EXISTING SUPPLIES

The quality of existing City water supplies is dependent primarily on the quality of the flow in the Santa Ynez River and facilities available for transmission and treatment for domestic purposes. Biologic contamination is not a problem in the City, and the principal measure of water quality is the total of dissolved solids or salts in the water. The salts in City water are approximately 650 mg/l (milligrams per liter), and the hardness component is 340 mg/l. The value for total dissolved solids exceeds the Federal standard of 500 mg/l, but is well within the State standard of 1000 mg/l.

Some hydrogen sulfide enters the water supply during transport, primarily from highly mineralized water seeping into Tecolote Tunnel. This very undesirable component is removed during treatment at the Cater Filtration Plant by conversion to sulfate, a common “salt” component. The capacity of this plant is presently ten million gallons per day (nominal capacity), and plans are being prepared for increasing capacity to approximately 24 million gallons per day.

GROUNDWATER QUALITY

The quality of water in the Santa Barbara groundwater basin is affected primarily by the quality of water that percolates into the basin directly from rainfall and indirectly from runoff from the mountains to the north of the City. Since the rock and soil terrain of this source area are similar to those of the Santa Ynez River, the quality of runoff into local basins is similar. The quality of the stored groundwater is slightly higher because of the better quality of the component of direct infiltration from rainfall.

Areas with high concentration of septic tank systems tend to degrade groundwater quality because of the increased content of dissolved solids, particularly nitrate, in the effluent. Further expansion of the use of septic tanks in the city should be discouraged.

Potential effects of a conjunctive-use program are difficult to quantify, but are expected to be minimal (SBCWA, 1978, VII-7). A lowered water table may result in an increased mineral content, but the quality of the groundwater will reflect primarily the quality of the replenished water. Therefore, a slight increase in mineral content from 625 mg/l to approximately 650 mg/l may accompany a conjunctive use program.

The use of reclaimed water for irrigation purposes is expected to “eventually have a deleterious effect on local groundwater mineral quality” (SBCWA, 1978) because the salts normally carried to the ocean would be returned to the basin. The precise amount of salt increase, however, will depend on the degree of treatment and level of desalination. The Water Agency (1978) has estimated that the salt concentration of groundwater will increase at a rate of 20 mg/l/year with use of reclaimed water with partial desalination at a rate of 750 acre-feet per year.

HARBOR WATER QUALITY

The water quality of the Santa Barbara Harbor is also a subject of concern. Currently, Marina 1 has no sanitary facilities (i.e., marine heads) for use by boat owners or visitors although other marina sections do have facilities. Bilge and head pumping is prohibited within the harbor and the three-mile limit. However, some boats may be discharging directly into the harbor. These factors, along with the animal wastes of the pets of visitors and persons who live aboard their boats within the harbor, contribute to the potential for degraded water quality within the harbor.

The following chapter contains goals, policies, and implementation strategies which ensure the proper maintenance and protection of water resources for the City.

GOALS, POLICIES, IMPLEMENTATION STRATEGIES

ORGANIZATION OF RECOMMENDATIONS

In this chapter, general planning goals, policies, and implementation strategies are recommended for the City of Santa Barbara. These recommendations constitute the plan for the conservation, development, and utilization of resources within the City and are the heart of the Conservation Element.

The recommendations comprise general planning goals, general policies, and suggested implementation strategies. The general goals provide statements of the basic purpose of the Conservation Element so that consistent planning is possible. They are necessary guidelines which can be held up against future proposals to determine their effect on the community. The general policies complement the planning goals and define specific directions for the City to take in conserving, developing, and utilizing resources. The implementation strategies are suggested refinements of the general policies. Methods for implementation of the goals and policies need not be limited to those listed in this section, as other effective strategies may become apparent in the future.

While it would be desirable to fully implement each of the implementation strategies, it is recognized that there are competing demands for preservation, enhancement, development, and conservation of resources and the City's economic resources are limited. Therefore, priorities for the implementation of these strategies shall be determined by the City Council after consideration of economic, social, and environmental concerns weighted according to balance and priority.

A finding of project consistency with this Element shall be made to the goals and policies only.

CULTURAL AND HISTORIC RESOURCES

Goals

- Sites of significant archaeological, historic, or architectural resources will be preserved and protected wherever feasible in order that historic and prehistoric resources will be preserved.
- The Hispanic tradition of architecture reflected in the El Pueblo Viejo district of the central City shall be perpetuated.
- Selected structures which are representative of architectural styles of fifty or more years ago (pre-1925) will be preserved wherever feasible.

Policies

1.0 Activities and development which could damage or destroy archaeological, historic, or architectural resources are to be avoided.

2.0 The Designated Landmark distinction shall continue to be extended to those structures and sites which have recognized significance.

3.0 The establishment of historic districts should be encouraged as a method to provide for historic and cultural resources which warrant protection.

4.0 The requirements and restrictions administered by the Landmarks Committee and the Architectural Board of Review will apply to City and other public agencies as well as private projects.

Implementation Strategies

1.0 Activities and development which could damage or destroy archaeological, historic, or architectural resources are to be avoided.

1.1 In the environmental review process, any proposed project which is in an area indicated on the map as "sensitive" will receive further study to determine if archaeological resources are in jeopardy. A preliminary site survey (or a similar study as part of an environmental impact report) shall be conducted in any case where archaeological resources could be threatened.

1.2 Potential damage to archaeological resources is to be given consideration along with other planning, environmental, social, and economic considerations when making land-use decisions.

1.3 Publicly owned areas known to contain significant archaeological resources should be preserved by limiting access and/or development which would involve permanent covering or disruption of the sub-surface artifacts.

2.0 The Designated Landmark distinction shall continue to be extended to those structures and sites which have recognized significance.

2.1 The current list of Noteworthy Structures of Importance should be scrutinized for nominees for becoming Designated Landmarks.

2.2 Results of the architectural survey of the City should be examined specifically for potential nominees for becoming Designated Landmarks.

3.0 The establishment of historic districts should be encouraged as a method to provide for historic and cultural resources which warrant protection.

3.1 Brinkerhoff Avenue and the Laguna, Oak Park, Upper Eastside, and West Downtown neighborhoods should each be examined for suitability as special preservation/design review districts.

3.2 In any neighborhood districts designated as special preservation/design review districts, replacement structures, new construction, and exterior remodeling should be carefully evaluated by the Landmarks Committee for neighborhood compatibility.

3.3 Within the boundaries of preservation/design review districts, special attention should be given to height limitations in order to prevent blockage and/or other aesthetic degradation of significant structures or areas.

4.0 The requirements and restrictions administered by the Landmarks Committee and the Architectural Board of Review will apply to City and other public agencies as well as private projects.

4.1 Municipal Code Chapters 22.22 and 23.68 should be reviewed and revised to assure that both public and private projects are reviewed by the Landmarks Committee and the Architectural Board of Review.

VISUAL RESOURCES

Goals

- Restore where feasible, maintain, enhance, and manage the creekside environments within the City as visual amenities, where consistent with sound flood control management and soil conservation techniques.
- Prevent the scarring of hillside areas by inappropriate development.
- Protect and enhance the scenic character of the City.
- Maintain the scenic character of the City by preventing unnecessary removal of significant trees and encouraging cultivation of new trees.
- Protect significant open space areas from the type of development which would degrade the City's visual resources.

Policies

1.0 Development adjacent to creeks shall not degrade the creeks or their riparian environments.

2.0 Development on hillsides shall not significantly modify the natural topography and vegetation.

3.0 New development shall not obstruct scenic view corridors, including those of the ocean and lower elevations of the City viewed respectively from the shoreline and upper foothills, and of the upper foothills and mountains viewed respectively from the beach and lower elevations of the City.

4.0 Trees enhance the general appearance of the City's landscape and should be preserved and protected.

5.0 Significant open space areas should be protected to preserve the City's visual resources from degradation.

6.0 Ridgeline development which can be viewed from large areas of the community or by significant numbers of residents of the community shall be discouraged.

Implementation Strategies

1.0 Development adjacent to creeks shall not degrade the creeks or their riparian environments.

- 1.1 Setbacks, as required by the Federal Flood Insurance Program, should be enforced (see Drainage and Flooding section).
- 1.2 Examine undeveloped parcels having creek frontage for possible purchase and retention as open space.
- 1.3 Developments which require retaining walls or other topographic modifications of the creekside environment should not be permitted unless consistent with sound flood control management and soil conservation techniques.
- 1.4 Develop a creek beautification ordinance.

2.0 Development on hillsides shall not significantly modify the natural topography and vegetation.

- 2.1 Development which necessitates grading on hillsides with slopes greater than 30% should not be permitted. The Slope Density Ordinance and Grading Ordinance should be so amended.
- 2.2 Performance Bonds should be required to ensure achievement of revegetation of graded areas.
- 2.3 Use of native or naturalized and fire retardant vegetation should be encouraged for landscaping on major cut and fill slopes where development occurs on hillsides.
- 2.4 All development on hillsides should be required to landscape the downslope side so as to hide or break up large surface area views of structures facing down slope.
- 2.5 Height restriction ordinances should be changed to allow for “step-down” development design on hillsides to hide or break up large surface area views of structures facing down slope.

3.0 New development shall not obstruct scenic view corridors, including those of the ocean and lower elevations of the City viewed respectively from the shoreline and upper foothills, and of the upper foothills and mountains viewed respectively from the beach and lower elevations of the City.

- 3.1 In the absence of Local Coastal Program policies, develop a design overlay zone to limit building heights.
- 3.2 The northerly side of Cabrillo Boulevard from Castillo Street to Los Patos Way should be designated a special design review district. Restrictions should be developed for this district which establish setbacks and height limitations formulated to ensure the preservation of views and view corridors from the beach toward the mountains.

3.3 When the Local Coastal Program is finalized, this element should be revised, as needed, to preserve and enhance the harbor, shoreline, and other coastal resources.

4.0 Trees enhance the general appearance of the City's landscape and should be preserved and protected.

4.1 Mature trees should be integrated into project design rather than removed. The Tree Ordinance should be reviewed to ensure adequate provision for review of protection measures proposed for the preservation of trees in the project design.

4.2 All feasible options should be exhausted prior to the removal of trees.

4.3 Major trees removed as a result of development or other property improvement shall be replaced by specimen trees on a minimum one-for-one basis.

4.4 Private efforts to increase the number of street trees throughout the City should be encouraged.

5.0 Significant open space areas should be protected to preserve the City's visual resources from degradation.

5.1 The City should consider purchase or the obtainment of development rights of significant open space where no other means can be found to protect visual resources from degradation.

5.2 Parks and other public lands which provide panoramic views or scenic vistas, especially those at higher elevations, shall be protected and maintained for the enjoyment by the public.

6.0 Ridgeline development which can be viewed from large areas of the community or by significant numbers of residents of the community shall be discouraged.

6.1 Develop a comprehensive analysis of the ridgeline areas of the City to review zoning and development regulations related to protecting the visual qualities of the community.

AIR QUALITY

Goals

- Maintain air quality above Federal and State ambient air quality standards.
- Reduce dependence upon the automobile.

Policies

1.0 Reduce single occupant automobile trips and increase the utilization of public transit.

2.0 Improve the attractiveness and safety of bicycle use as an alternate mode of travel for short- and medium-distance trips.

3.0 Promote the use of car pooling through special provisions for the priority use of parking facilities and other employee disincentives to auto traffic in commercial areas (per TMIS) as an alternative to construction of additional parking facilities.

4.0 Discourage and, where possible, prohibit land uses which unnecessarily contribute to air quality degradation.

Implementation Strategies

1.0 Reduce single occupant automobile trips and increase the utilization of public transit.

- 1.1 Institute appropriate traffic and parking implementation measures (from TMIS and WATS studies) as soon as possible.
- 1.2 Cooperate with M.T.D. to improve bus zones and routes throughout the City.
- 1.3 Investigate providing for bus pre-emption of traffic signals.

2.0 Improve the attractiveness and safety of bicycle use as an alternate mode of travel for short- and medium-distance trips.

- 2.1 Revise the zoning ordinance to require the installation of secure bicycle storage facilities for all new commercial development and redevelopment.
- 2.2 Encourage the construction of off-street bikeways or the payment of in lieu fees in all new developments, and improve bikeways on public streets wherever feasible.
- 2.3 Seek State, Federal, or other funds for use in providing a bicycle fleet for short-distance City business trips of short duration.
- 2.4 Update the Bicycle Master Plan to better reflect the desires and needs of the community.
- 2.5 Resurface streets and roadways with relatively high levels of bicycle use.

3.0 Promote the use of car pooling through special provisions for the priority use of parking facilities and other employee disincentives to auto traffic in commercial areas (per TMIS) as an alternative to construction of additional parking facilities.

- 3.1 Encourage City employees to car pool through the construction of park-and-ride, carpool parking lots on the downtown fringe.
- 3.2 Provide incentives for employers and employees of private business to encourage car pooling by using park-and-ride lots offering reduced or free rates.
- 3.3 Exhaust all reasonable parking management strategies prior to the construction of new public off-street parking lots.

4.0 Discourage and, where possible, prohibit land uses which unnecessarily contribute to air quality degradation.

- 4.1 Prohibit the construction of, and/or conversion to, drive-through facilities.
- 4.2 Develop a program to equitably phase out all existing drive-through facilities.
- 4.3 Institute controls that will address the construction of any new facilities which add significantly or will cumulatively result in a significant increase in air quality degradation.
- 4.4 Encourage cooperation between City and County jurisdictions to develop additional air quality monitoring stations to obtain better information regarding air quality.

BIOLOGICAL RESOURCES

Goal

- Enhance and preserve the City's critical ecological resources in order to provide a high-quality environment necessary to sustain the City's ecosystem.

Subgoals

- Develop a permanent park, recreation, and open space system which maintains important ecological systems while providing open space and recreational needs.
- Maintain, protect, and enhance marine resources within the City boundaries.
- Increase public understanding of the relationship between the maintenance of the City ecosystem and the welfare of the general public.
- Encourage the conservation of existing tracts of agricultural land and provide for expansion of agricultural land uses in a manner which maximizes compatibility with adjacent land uses.

Policies

1.0 A set of land use suitability guidelines shall be developed for use in land planning and the environmental review process.

2.0 Redevelopment and renovation of the central city shall be encouraged in order to preserve existing resources.

3.0 Goleta Slough shall be preserved and restored as a coastal wetland ecosystem.

4.0 Remaining Coastal Perennial Grasslands and Southern Oak Woodlands shall be preserved, where feasible.

5.0 The habitats of rare and endangered species shall be preserved.

6.0 Intertidal and marine resources shall be maintained or enhanced.

7.0 Prime agricultural lands shall be conserved wherever possible and expansion of agricultural uses shall be allowed subject to maximizing compatibility with adjacent land uses and restricting effects on the environment.

8.0 The use of City-owned vacant properties for community gardens shall be encouraged.

9.0 The biotic resources of the Harbor shall be maintained, so far as possible within the framework of the LCP and other Harbor Restoration plans.

10.0 Programs shall be developed to maintain a productive urban biotic community.

11.0 Where Biological Resources policies conflict, the policy most protective of the natural environment shall prevail.

Implementation Strategies

1.0 A set of land use suitability guidelines shall be developed for use in land planning and the environmental review process.

1.1 Develop criteria to evaluate and assess the ecological significance of biotic communities found to exist within the City. This information would be used to identify healthy, abundant communities, as well as rare or endangered communities.

1.2 Conduct a study to recommend suitable land uses and/or acquisition priorities for pristine or near-pristine communities previously inventoried by the City (Santa Barbara Planning Task Force, 1974).

1.3 Where not preempted by the Federal Flood Insurance Program, land use regulations will be developed for the creek influence zones of Mission, Sycamore, San Roque, and Arroyo Burro creeks.

a. Assign the task of conducting a biological study of the creek influence zones to the Community Development Department. This study is to determine the general land uses within the zone which would be compatible with the maintenance of the existing biological communities of the creeks, and is not intended to consider the development of public recreation facilities within the creeks.

b. Enact a flood control and creek ordinance which would include provisions to restrict channelization in natural creek bottoms and structural developments within the 100-year floodplain in natural creek areas.

c. Conduct a feasibility study on the replacement of concrete bottoms of channelized creek sections with natural bottoms and/or the use of mitigation measures to increase the habitat diversity of channelized creeks.

d. Increase fines under Municipal Code Chapter 14.56, which restricts dumping into creeks, and charge the Santa Barbara Flood Control District with reporting violations and the City Police Department with investigating such reports.

2.0 Redevelopment and renovation of the central city shall be encouraged in order to preserve existing resources.

2.1 Develop a program of tax incentives and transferable redevelopment rights to encourage the rehabilitation, restoration, or redevelopment of deteriorating neighborhoods.

2.2 Modify existing subdivision requirements and performance standards to provide adequate landscaped area where housing is being replaced with higher-density housing.

2.3 Identify trees of horticultural value within the City and institute a program to replace such trees on a one-to-one basis if they are lost (due to causes other than non-compatibility with Santa Barbara's climate).

3.0 Goleta Slough shall be preserved and restored as a coastal wetland ecosystem.

3.1 Develop a master plan for the ecological management of the Slough. The plan should provide for maintenance of the wetlands by natural physical and biological actions as much as possible. The Master Plan should make provision for educational facilities in the Slough region, but not within the Slough, to be developed and administered by the City in

cooperation with the University of California at Santa Barbara. All areas of the Slough and airport land extending north to Hollister Avenue, exclusive of the airport facilities, should be included in the Master Plan.

3.2 Continue to restrict pedestrian and vehicular access in order to reduce adverse environmental impact to the Slough.

3.3 Rezone the Goleta Slough, as defined by the City, as open space.

3.4 Initiate a study to consider the environmental and economic impacts of replacing and/or relocating sewage facilities currently degrading the Slough.

4.0 Remaining Coastal Perennial Grasslands and Southern Oak Woodlands shall be preserved, where feasible.

4.1 Conduct a study to determine whether access should be restricted into the remaining grasslands and what types of limited recreational uses, in conjunction with educational and scientific use, would be compatible with their preservation. In the interim, access should be restricted, if possible, to only carefully monitored scientific studies.

4.2 Develop guidelines and regulations which protect, preserve and enhance Southern Oak Woodlands habitat and individual oak trees.

5.0 The habitats of rare and endangered species shall be preserved.

5.1 Require that a complete vegetation survey be conducted at an appropriate time of the year for any proposed action which would cause large-scale changes in vegetation patterns in Coastal Strand, Coastal Sage Scrub, and Chaparral communities, and the Goleta Slough. The survey should be funded by those proposing the potential environmental change. If any rare and endangered plants are located, mitigation measures will be required to maintain and preserve the plant's habitat in the area in which it has been found.

5.2 Include provisions in the Goleta Slough master plan to aid in the recovery of the Light-footed Clapper Rail.

5.3 Include an analysis in the Goleta Slough master plan of the current reduction of Belding's Savannah Sparrow and implement such measures as necessary and feasible to reverse this trend, provided that such measures do not affect populations of other rare and endangered organisms.

5.4 Prohibit the use of long-term, persistent pesticides by the City and conduct a study of the use of other pesticides by City parks, schools, and other agencies with the intention of developing limits on such use.

6.0 Intertidal and marine resources shall be maintained or enhanced.

6.1 Post Fish and Game laws on the taking of intertidal organisms at beach access points and encourage vigorous enforcement of those laws by the appropriate agency.

6.2 Restrict clifftop developments on the Mesa by appropriate setbacks (determined by site specific geologic surveys required as a part of subdivision) to prevent acceleration of cliff erosion. Mitigation measures to prevent cliff-face "weeping" should also be instituted.

6.3 Prohibit off-shore dumping of sediments near kelp beds or reefs.

6.4 Conduct a study to determine disposal sites for dredged material such that the material can aid in beach replenishment without significantly impacting major marine resources.

6.5 Continue monitoring of organisms at the sewage outfall in conjunction with the Coastal Water Research Project. Such monitoring will be used to determine the environmental impact of Santa Barbara's sewage outfall over a long term.

6.6 Conduct a feasibility study on the construction of wastewater reclamation facilities, provided this can be accomplished without significant degradation of the groundwater basin.

7.0 Prime agricultural lands shall be conserved wherever possible and expansion of agricultural uses shall be allowed subject to maximizing compatibility with adjacent land uses and restricting effects on the environment.

7.1 Develop a zoning mechanism for agricultural land uses which includes performance standards in the Municipal Code which maximize compatibility with adjacent land uses, including but not limited to pesticide use and storage, drainage, habitat protection, noise, operation of heavy equipment and employee parking.

One performance standard shall require that specified grasses shall be seeded in all cleared orchard areas between October 1 and November 15 after clearance. Such seeds shall be hand broadcast according to specified formulas and mowing shall occur after the seeded grass has matured each spring in order to allow continued perpetuation. Compliance shall be monitored by City staff.

7.2 Develop a program of incentives and regulations which would encourage the retention of prime agricultural land.

8.0 The use of City-owned vacant properties for community gardens shall be encouraged.

8.1 Encourage the provision of small areas of community gardening where new multiple housing units are planned.

8.2 Inventory those City-owned lands which are vacant and have water service to the site.

8.3 Notify interested persons of the number, size, and availability of vacant, City-owned lands which are suitable for use as new community gardens.

9.0 The biotic resources of the Harbor shall be maintained, so far as possible within the framework of the LCP and other Harbor Restoration plans.

9.1 Construction which would substantially decrease the current rate of tidal flushing in the Harbor should be avoided if feasible alternatives are available.

9.2 Continue the study of littoral sand drift with the objective of developing feasible alternatives to additional breakwater construction to reduce sand deposition in harbor channels.

9.3 Evaluate the feasibility of onshore boat storage and pull-out facilities as an alternative to harbor expansion.

9.4 Provide for onshore disposal of toxic wastes from shipyard facilities.

10.0 Programs shall be developed to maintain a productive urban biotic community.

10.1 Prepare a Master Plan for the Andree Clark Bird Refuge. The Master Plan shall include:

a. Determination of existing biotic conditions in the Refuge.

b. A detailed management plan for restoration and maintenance of the Refuge.

c. Provisions for development of educational programs run by volunteers.

10.2 Require the City Parks Department and Animal Control to investigate the advisability of trapping dogs which are currently running loose in the Andree Clark Bird Refuge. These animals would be returned to the owners only after payment of fines imposed under Section 6.08.030 of the Municipal Code.

10.3 Develop an ecological reserves program in conjunction with land-use suitability guidelines to acquire and/or preserve parcels within the City large enough to represent natural biotic communities.

10.4 Encourage the use of native or fire retardant shrubs or trees, particularly those that provide food for wildlife, in landscaping of golf courses, and as a mitigation measure for land development.

10.5 Develop a program to regulate off-road recreation vehicle use within the City. The program should include:

a. Restrictions on ORV use to land already damaged by current use or areas of low ecological value as determined through land use suitability criteria.

b. License private property owners to develop ORV parks which are managed such that the deleterious impacts of ORV use (including wind and water erosion and sedimentation) are limited to those licensed areas.

c. Approve an ordinance designating ORV use on private and public lands (other than those area licensed as ORV parks) a nuisance subject to fines if that use causes significant environmental impacts. A study should be made prior to ordinance approval to determine the amount of ORV use which causes significant environmental impact.

11.0 Where Biological Resources policies conflict, the policy most protective of the natural environment shall prevail.

DRAINAGE AND FLOOD CONTROL

Goals

- Ensure that human habitation of the City's floodplains does not adversely affect public health, safety, and welfare.
- Encourage recreation, conservation and open space uses in floodplains.
- Provide Federal Flood Insurance for structures already built within flood hazard zones.[3]

Policies

1.0 The City shall participate in the Federal Flood Insurance Program so that property owners may receive disaster assistance.[3]

2.0 Floodplain management programs shall be implemented through the Building Officer of the Division of Land Use Controls, and the Flood Control Division.

3.0 Hazard reduction programs shall be implemented in urban sections of the City already built in hazardous flood-prone areas.

4.0 Goals and policies of this element are interrelated with those of the Safety and Open Space Elements and shall be considered together in land use planning decisions.

Implementation Strategies

1.0 The City shall participate in the Federal Flood Insurance Program so that property owners may receive disaster assistance.[4]

1.1 Adopt the provisions of the Program and make application to the Federal Flood Insurance Administration.[4]

1.2 Maintain records of future peak-flow conditions.

1.3 Provide for update and revision of floodway/flood fringe maps as specified in the Federal Flood Insurance Program.

2.0 Floodplain management programs shall be implemented through the Building Officer of the Division of Land Use Controls, and the Flood Control Division.

2.1 Prohibit the construction of new structures in stream channels (except stream measurement or flood control-related facilities).

2.2 Encourage light-intensity use in the floodway or floodway fringe with the requirement that such uses shall not impair the flood-carrying capacity of the stream.

---

[3] The City is participating in the Federal Flood Insurance Program as of December 1978.

[4] The City is participating in the Federal Flood Insurance Program as of December 1978.

2.3 Require adequate setbacks from flood channels of any new development as defined under the Federal Flood Insurance Program, for those properties within the identified flood hazard area.

2.4 Encourage the use of permeable or pervious surfaces in all new development to minimize additional surface runoff.

3.0 Hazard reduction programs shall be implemented in urban sections of the City already built in hazardous flood-prone areas.

3.1 Restrict the replacement of old structures within the floodway fringe unless the applicant has satisfactorily demonstrated that the structure will not impair flood flow, and has proved that the floodway fringe boundaries as designated by the HUD maps should be adjusted.

3.2 Regulate buffer zones along creeks to protect against bank erosion from public or private practices including grading, brush cleaning, trail maintenance, dumping or construction of private structures such as bridges or walkways across creeks. Routine debris removal by the City for flood reduction is exempted.

3.3 Undertake flood control work projects as rapidly as possible where necessary to protect existing structures.

4.0 Goals and policies of this Element are interrelated with those of the Safety and Open Space Elements and shall be considered together in land use planning decisions.

4.1 Encourage the use of natural building materials for flood control channels such as stone, heavy timber, erosion control shrubs, and wire revetment with plantings of native or naturalized flora wherever they provide a comparable degree of flood protection.

4.2 Creeks and their banks constitute a scenic open space resource within the City in their natural state; thus, the Open Space Element also recognizes the importance of keeping structures out of the stream channels for preservation of City resources.

4.3 The Safety Element recognizes the hazard to lives and property of encroachment of structures into stream channels and on stream banks; thus, it also supports the findings of this Element on the basis of hazard reduction.

WATER RESOURCES

Goal

- To maintain existing and protect future potential water resources of the City of Santa Barbara.

Policies

1.0 Provide for a continued supply of water to the City which meets all Regional, State, and Federal health standards.

2.0 Develop plans for implementation of water conservation regulations.

3.0 Implement monitoring program of groundwater resources in the Santa Barbara basin.

Implementation Strategies

1.0 Provide for a continued supply of water to the City which meets all Regional, State, and Federal health standards.

- 1.1 Work with the County, the State, and Regional Water Quality Control Boards, and other agencies directly involved in land use policies within the Santa Ynez River drainage to ensure that this major water supply is not significantly degraded.
- 1.2 When deemed necessary, channelization of major creeks within the City should be conducted in such a manner as to retain as much of a natural state along the creeks as possible. The use of concrete channelization shall be discouraged in order to maximize groundwater recharge.
- 1.3 Encourage innovative use of permeable or pervious surfaces such as turfblocks or other materials in all new development in order to maximize groundwater recharge.
- 1.4 Prohibit the expansion of the use of septic tank systems.
- 1.5 Provide sanitary facilities for use by boat owners or visitors at Marina 1.
- 1.6 Enforce restrictions on bilge and head pumping within the harbor and within the three-mile limit.

2.0 Develop plans for implementation of water conservation regulations.

- 2.1 Require all new development to incorporate water conservation features and devices into project design in order to minimize future increases in water demand.
- 2.2 Encourage new development and redevelopment to consider innovative water conservation techniques such as gray water recycling.
- 2.3 Conduct further study on the cost-effectiveness of Wastewater Reclamation for use in landscape irrigation.
- 2.4 Institute a public information program with the objective of achieving installation of water-saving devices in 50% of the existing dwelling units by the year 2000.

3.0 Implement monitoring program of groundwater resources in the Santa Barbara basin.

- 3.1 Monitor groundwater basin pumping and continue testing program to determine the safe yield of Santa Barbara basin.
- 3.2 Develop long-term strategies for the extraction, use, and replenishment of water from the basin.

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Sandy Wilbur, 12/11/78; Research Biologist for U.S. Fish and Wildlife; Team Leader, Light-footed Clapper Rail Recovery Team.

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APPENDIX A

CULTURAL AND HISTORIC RESOURCES

APPENDIX A: CULTURAL AND HISTORIC RESOURCES

DESIGNATED LANDMARKS[1]

1. Arlington Theatre, 1317 State Street (1929-30)
2. Arrellanes/Kirk Adobe, 421 E. Figueroa Street (ca. 1860)
3. Botiller/Grand Adobe, 1023 Bath Street (ca. 1850)
4. Buenaventuro Pico Adobe, 920 Anacapa Street (ca. 1850)
5. Caneda Adobe, or Whittaker Adobe, 123 E. Canon Perdido Street (1788)
6. Carrillo Adobe, or Hill-Carrillo Adobe, 11 E. Carrillo Street (1826)
7. Santa Barbara County Courthouse, Anacapa at Anapamu Street (1929)
8. Covarrubias Adobe, 715 Santa Barbara Street (1817)
9. De la Guerra Adobe, or Casa De la Guerra, 11 E. De la Guerra Street (1819-26)
10. El Paseo, E. De la Guerra, State, and Anacapa Streets (1922-23+)
11. El Cuartel, 122 E. Canon Perdido Street (1788)
12. Fernald House, 414 W. Montecito Street (and Carriage House) (1862 & 1877)
13. Guard House, E. De la Guerra Street at Presidio Avenue (ca. 1830)
14. Gonzalez/Ramirez Adobe, 835 Laguna Street (1825)
15. Historic Adobe, 715 Santa Barbara Street (ca. 1830)
16. Hunt/Stambach House, 821 Coronel Street (1879)
17. Lugo Adobe, 114½ E. De la Guerra Street (ca. 1850)
18. Miranda Adobe, Presidio Avenue (ca. 1840)
19. Mission Santa Barbara, Upper Laguna Street (1786)
20. Orena Adobes, E. De la Guerra and Anacapa Streets (1849, 1858)
21. Refugio Cordero Adobe, 820 Santa Barbara Street (1850?)
22. Rochin/Birabent Adobe, 820 Santa Barbara Street (1856)
23. Santiago De la Guerra Adobe, 110 E. De la Guerra Street (ca. 1812?)
24. Tree of Light, NW Corner Chapala and Carrillo Streets (ca. 1878)
25. Trussell/Winchester Adobe, 412 W. Montecito Street (1854)
26. Savoy Hotel, 409 State Street (1888-89)

STRUCTURES OF MERIT DESIGNATED BY LANDMARK COMMITTEE

27. Old Physicians Building, 1421 State Street (1920, 27, 29, 30)
28. Upper Hawley Block, 1227-1233 State Street (ca. 1888)

29. Sherman House, 625 Chapala Street (1876)

STATE HISTORIC LANDMARKS IN SANTA BARBARA CITY[2]

Burton Mound, E. Mason Street & Burton Circle

(9) Casa de la Guerra, 11 E. De la Guerra St.

(8) Covarrubias Adobe 715 Santa Barbara St.

(19) Mission Santa Barbara, Upper Laguna St.

Lobero Theatre, 33 E. Canon Perdido St.

(25) Trussell-Winchester Adobe (Hastings), 412 W. Montecito St.

(6) Carrillo Adobe, 11 E. Carrillo St.

Santa Barbara Presidio, E. Canon Perdido, Anacapa, Santa Barbara Streets

LISTED ON NATIONAL REGISTER OF HISTORIC PLACES[2]

(19) Mission Santa Barbara, Upper Laguna Street

(14) Gonzales-Ramirez Adobe, 835 Laguna Street

(10) El Paseo and Casa de la Guerra, 11 E. De la Guerra St. to State St. and Anacapa St.

Santa Barbara Presidio — Includes ruins in vicinity of E. Canon Perdido, Anacapa, Santa Barbara Streets and historic buildings, i.e., Caneda Adobe (5), El Cuartel (11), Rochin-Birabent Adobe (22), Pico Adobe (4), Cota- Knox House, chapel site.

NATIONAL HISTORIC LANDMARKS[3]

(19) Mission Santa Barbara

(14) Gonzales-Ramirez Adobe

NOTEWORTHY STRUCTURES OF IMPORTANCE

Royal Presidio remains	
Cota-Knox Building	914 Anacapa Street
Former Church	2020 Chapala Street
Old Mission Waterworks and grist mill	
Railroad Station	209 State St., and Roundhouse E. Cabrillo Blvd.
Upham Hotel	1404 De la Vina Street
Lobero Theatre	E. Canon Perdido St., and Anacapa St.

Meridian Studios	114 E. De la Guerra Street
Mortimer Cook House	1407 Chapala Street
House	501 Chapala Street
Edwards House	1721 Santa Barbara St.
Orella Adobe (incorporated portion of Copper Coffee Pot Restaurant)	
Redwood Inn	124 W. Cota Street
House of Paintings (Darling House)	Rancheria Street
Old Courtroom	25 E. De la Guerra Street
Streetcar Stop	Alameda Padre Serra at Lasuen Road
Fithian (Park) Building	600 Block State Street
Hitching Posts, stepping blocks, cut sandstone curbs, and old streetlights	
Moreton Bay Fig Tree and Portola Site	E. Montecito Street
House	1822 Santa Barbara Street
House	31 E. Pedregosa Street
Rice House	131 E. Arrellaga Street
House	422 W. De la Guerra Street
Tinker House	Modoc Road and Mission Street
House	1632 Chapala Street
House	15 E. Valerio Street
Hernster House	136 W. Cota Street
House	535 N. Quarantina Street
The Tea House Restaurant	301 E. Canon Perdido Street
Cottage	710 Anacapa Street
Yellow House at the Bird Refuge	50 Los Patos Way
Former Grocery Store	800 De la Vina Street
House	302 W. Micheltorena Street
Brinkerhoff Avenue Cottages	
Knights of Columbus Hall	925 De la Vina Street
Peshine House	925 San Andres Street
El Caserio Studio Cottage	900 block Garden Street
S. side 300 blk. E. Canon Perdido Street (portion)	
Historical Society Museum	136 E. De la Guerra Street

El Presidio office building	800 Anacapa Street
San Marcos Building	State at Anapamu Streets
Museum of Art (former Post Office)	1130 State Street
St. Anthony's Seminary	2300 Garden Street
Little Town Club	27 E. Carrillo Street
Mihran Studios	17-21 E. Carrillo Street
Masonic Temple	16 E. Carrillo Street
News-Press Building	De la Guerra Plaza
House	20, 30 to 36 W. Valerio Street
Plaza Rubio homes	

APPENDIX B

VISUAL RESOURCES

APPENDIX B: VISUAL RESOURCES

TREES DESIGNATED BY THE CITY OF SANTA BARBARA AS "HISTORIC TREES" AND "SPECIMEN TREES" UNDER MUNICIPAL CODE

Historic Trees

Moreton Bay Fig Tree *(Ficus macrophylla)*	Chapala & E. Montecito Streets	Sept. 1, 1970
Arlington Silk Oak *(Grevillea robusta)*	309 State Street	Sept. 1, 1970
Four Large Olive Trees *(Olea europea)*	NE Garden & Los Olivos Streets	Sept. 1, 1970
S. B. Orchid Tree *(Bauhinia forficata)*	NE Garden & Carrillo Streets	April 20, 1976
Sailor's Sycamore *(Platanus racemosa)*	SW Milpas & Quinientos Streets	April 20, 1976
Arroyo Burro Sycamore *(Platanus racemosa)*	315 N. Ontare Road	April 20, 1976

Specimen Trees

Indian Laurel Fig Tree	100 E. Constance Avenue
Moreton Bay Fig Tree	1816 Santa Barbara Street

NOISE ELEMENT

ACKNOWLEDGEMENTS

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*Available through Santa Barbara City Planning Department

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Current Noise Contours, 1978
Future Noise Contours, 1990
Airport Noise Contours, S.B. Municipal Airport

ABBREVIATIONS

ADT Average Daily Traffic for a 24-hour day
ANSI American National Standards Institute (formerly USASI)
dB A-weighted deciber (decibels). Also written dB (A)
EPA Environmental Protection Agency
Hz Hertz or wave cycles per second
L_{eq} Equivalent A-weighted sound level over a given time interval
$L_{eq(8)}$ Equivalent A-weighted sound level over eight hours
$L_{eq(24)}$ Equivalent A-weighted sound level over twenty-four hours
L_{dn} Day-night average sound level - the 24 hour A-weighted equivalent sound level with a 10 decibel penalty applied to nighttime levels
L_d Daytime equivalent A-weighted sound level between the hours of 0700 and 2200
L_n Nighttime equivalent A-weighted sound level between the hours of 2200 and 0700
L_{max} Maximum A-weighted sound level for a given time interval or event
NIPTS Noise-Induced Permanent Threshold Shift
NITTS Noise-Induced Temporary Threshold Shift
OSHA Occupational Safety and Health Act
SENEL Single Event Noise Equivalent Level

POLICY REPORT

INTRODUCTION

Noise affects man and his environment in a number of important ways. Some sounds cannot be heard or are not noticed, yet the human body reacts involuntarily to them. Other sounds are intense and quick to rupture the eardrum. However, all sound is not destructive. The point should be emphasized that sound is vital to communication and necessary for the maintenance of life.

Legislative Authority

In making city and county governments in California responsible for a Noise Element in their General Plans, the Legislature has recognized the steady escalation of outdoor noise as a significant environmental hazard. Unlike other hazards faced by California residents, such as earthquakes or floods, noise is generated primarily by man's own activities. Considering noise in the planning process, then, is essential to controlling its impact on the community. Specific authority for this Element of the General Plan is contained in Government Code Section 65302(g), which was revised by Senate Bill 860 (Bielenson, 1975). The amendment became effective January 1, 1976, and requires the following:

A noise element which shall recognize guidelines adopted by the Office of Noise Control pursuant to Section 39850.1 of the Health and Safety Code, and which quantifies the community noise environment in terms of noise exposure contours for both near- and long-term levels of growth and traffic activity. Such noise exposure information shall become a guideline for use in development of the land use element to achieve noise compatible land use and also to provide baseline levels and noise source identification for local noise ordinance enforcement.

The sources of environmental noise considered in this analysis shall include, but are not limited to, the following:

1. *Highways and freeways.*
2. *Primary arterials and major local streets.*
3. *Passenger and freight on-line railroad operations and ground rapid transit systems.*
4. *Commercial and general aviation; heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.*
5. *Local industrial plants, including, but not limited to, railroad classification yards.*
6. *Other ground stationary noise sources identified by local agencies as contributory to the community noise environment.*

The noise exposure information shall be presented in terms of noise contours expressed in community noise equivalent level (CNEL) or day-night average level (L_{dn}). CNEL means the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of ten decibels to sound levels in the night before 7 a.m. and after 10 p.m. L_{dn} means the average equivalent A-weighted sound level during a 24-hour day,

obtained after addition of 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.

The contours shall be shown in minimum increments of 5 dB and shall continue down to 60 dB. For areas deemed noise sensitive, including, but not limited to, areas containing schools, hospitals, rest homes, long-term medical or mental care facilities, or any other land use areas deemed noise sensitive by the local jurisdiction, the noise exposure shall be determined by monitoring.

A part of the noise element shall also include the preparation of a community noise exposure inventory, current and projected, which identifies the number of persons exposed to various levels of noise throughout the community.

The noise element shall also recommend mitigating measures and possible solutions to existing and foreseeable noise problems.

The state, local, or private agency responsible for the construction, maintenance, or operation of those transportation, industrial or other commercial facilities specified in paragraph 2 of this subdivision shall provide to the local agency producing the general plan, specific data relating to current and projected levels of activity and a detailed methodology for the development of noise contours given this supplied data, or they shall provide noise contours as specified in the foregoing statements.

It shall be the responsibility of the local agency preparing the general plan to specify the manner in which the noise element will be integrated into the city or county's zoning plan and tied to the land use and circulation elements and to the local noise ordinance. The noise element, once adopted, shall also become the guideline for determining compliance with the State's Noise Insulation Standards, as contained in Section 1092 of Title 25 of the California Administrative Code.

Purpose and Approach

As a mandated part of the General Plan, the Noise Element is intended to serve as the local government's guide to public and private development matters related to outdoor noise.

The basic goal of the Element is to outline a comprehensive plan to achieve and maintain a noise environment that is compatible with a variety of human activities in different land uses. To achieve this goal, the Element provides a quantitative estimate of noise exposures, land use noise standards, and policies and implementation measures for controlling noise. This information is intended for use in conjunction with other adopted policies of the General Plan, particularly those of the Circulation, Land Use, and Housing Elements.

This Noise Element has been prepared in two sections for the City of Santa Barbara. The first section, the Policy Report, is concerned with the implications of the technical findings for noise control. The second section, the Technical Report, and the Appendices, contain the quantitative estimates of existing and forecasted noise levels in the City, and document the methods used in computing noise exposure. Together, these two sections constitute the Noise Element.

The Noise Element is one of the more technical Elements of the General Plan. However, the approach of this report is to present discussions of noise primarily in qualitative form and to rely on the use of figures in presenting certain mathematical concepts. Those wishing a more detailed technical explanation are referred to the works listed in the General References.

Relationship to Other General Plan Elements

The Noise Element is most closely related to the Circulation, Land Use, Housing and Conservation Elements. The principal noise sources evaluated in the Element are transportation noise sources, which are road, rail, and air traffic. Noise generated by these sources depends primarily on the number and type of vehicles in operation as planned for in the Circulation Element.

Inseparable from the circulation considerations in the General Plan are the locations and types of land uses throughout the City. The locations of circulation routes in relation to different land uses can be a major determining factor of noise exposure. It is important that consideration be given in the Land Use Element to separating the most sensitive land uses from the sources of high noise levels. Land use noise standards are recommended as a part of this Element to assist in these considerations.

The Housing Element is related to the Noise Element in that both the location and insulation requirements of housing are, in part, determined by noise exposures.

The Conservation Element identifies passive areas such as open space along creek beds, where low noise levels should be maintained.

NOISE EXPOSURE

General

The existing and forecasted noise levels in the City of Santa Barbara are presented in graphic form on the Noise Contours Maps and in tabular form in Appendix C of the Technical Report. These noise levels are expressed in A-weighted decibels in terms of Day-Night Noise Levels (abbreviated L_{dn}). Detailed explanations of L_{dn} noise levels and the methods used to compute them are presented in the Technical Report. The following brief discussion is intended to provide a basic understanding of the terms to facilitate use of the Noise Contours Maps and Appendix C. Appendix A of the Technical Report provides a glossary with additional discussion of some of the more technical language.

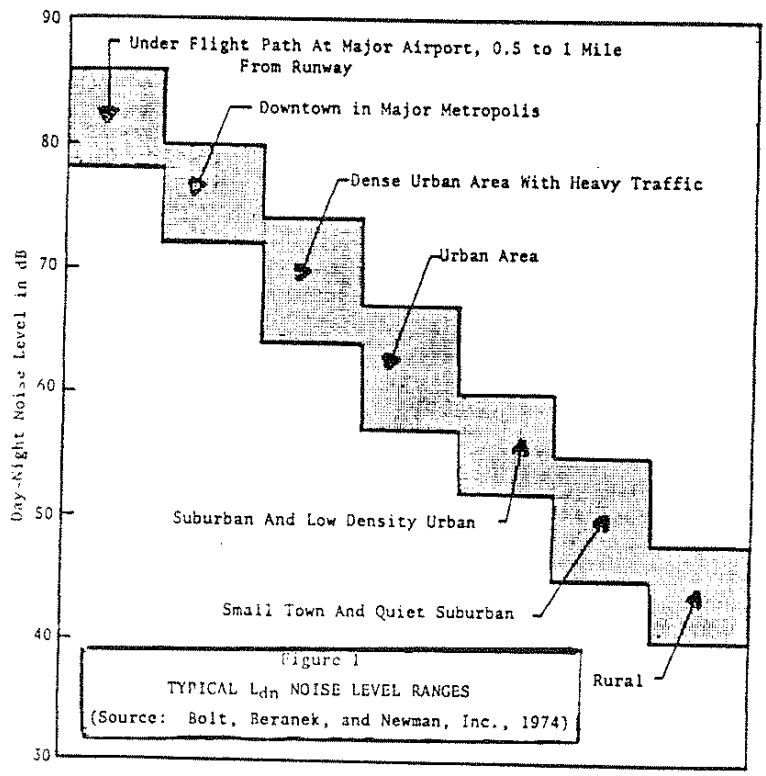
Common noise experienced by each of us daily may range from a whisper to a locomotive train passing by. The range of sound <u>energy</u> represented by these two events is so large that it cannot be represented mathematically without using numbers in the millions and billions. To avoid this inconvenience, sound levels have been compressed in a standard logarithmic scale called the decibel (dB) scale. The reference level for the scale, O dB, is not the absence of sound, but the weakest sound a person with very good hearing can detect in a quiet place. The most important feature of the decibel scale is its logarithmic nature. An increase from 0 to 10 dB represents a tenfold increase in sound energy, but an increase from 10 to 20 dB represents a hundredfold increase, and from 20 to 30 dB represents a thousandfold increase over 0 dB.

The average range of sounds that we are commonly exposed to generally falls in the 30 to 100 dB range. However, not all sound waves affect us equally. The human ear is more sensitive to high pitch sounds, such as a whistle, than it is to low pitch sounds, such as a drumbeat.

To account for this effect in noise measurements, it is necessary to use an electronic filter in sound level meters which acts as the equivalent of the human ear in filtering out some of the lower frequencies of sound. This filter is called the A-scale weighting network, and is abbreviated by the A in the notation dBA.

A-scale decibel measurements can be taken at any time in the community to record the sound levels of various noise sources. However, to develop an indicator of varying sound levels occurring over the 24-hour day, it is necessary to average the sound occurring at each moment throughout the day. The Day-Night Noise Level is the result of this procedure, and gives a general, single-number index of noise exposure over an average 24-hour day. In computing the L_{dn} levels, it is also necessary to apply weighting to noise that occurs at night to account for the greater sensitivity that people have to noise at night. L_{dn} noise levels can be developed for road traffic, as well as for rail and air traffic for which the measure has been used traditionally. As examples of typical L_{dn} noise level ranges, Figure 1 gives ranges of L_{dn} decibel exposures ranging from quiet rural areas to an area under the flight path of a major airport.

FIGURE 1



Existing Conditions

The existing noise environment in the City of Santa Barbara is composed of sounds from many sources. Under the scope of this Element, the noise sources evaluated were road, rail, and air traffic. Parks, schools and hospitals were also monitored as noise sensitive land uses to determine if potentially incompatible noise levels impinged on them. The following are summary conclusions regarding the existing noise environment in the City:

1. In general, the City of Santa Barbara may be considered a relatively quiet environment. Ten potential major noise conflict areas were identified from a list of 98 possible problem areas within the City. An additional 12 potential minor conflict areas were also identified, based on the estimated locations of noise contours. Monitoring conducted at locations of noise sensitive uses revealed three more potential minor conflict areas. Of the more than one hundred road segments evaluated for traffic noise, segments on four principal roadways were associated with L_{dn} noise levels of 70 dBA or higher. This is not to say that the City is without noise problems. Rather the major noise sources are few in number and of limited impact.

2. The most significant source of noise in the City is road traffic, followed by rail and air traffic. Of the roads evaluated for noise exposure, the following were found to be associated with L_{dn} noise levels of 70 dBA or higher: U.S. 101, State Street, Cabrillo Boulevard, and Las Positas Road. Table 5 of the Technical Report lists roads with L_{dn} noise levels of 65 dBA or higher.

3. Rail traffic on the Southern Pacific line is infrequent, but creates intense noise events such that the total sound energy associated with the railroad is nearly equivalent to that of U.S. 101. Noise sensitive areas potentially impacted by railroad noise include Wilson School, Bohnett Park, Palm Park, A Child's Estate, Andree Clark Bird Refuge, Dwight Murphy Field and the Moreton Fig Tree.

4. The Municipal Airport is a source of local noise. Most of the land within the 60 dB CNEL contour is under the jurisdiction of the County of Santa Barbara. Noise complaints are received from various areas within the County, including the University of California, Hope Ranch, and University Village. Land uses in areas immediately adjacent to the Airport, within the City limits, are primarily non-residential.

5. Table 1 contains a partial list of those noise sensitive uses which were found to be exposed to potentially incompatible noise levels according to the land use standards recommended in this Policy Report. The incompatibility is termed potential because the land use was evaluated only at a general level. Site acoustic analysis is necessary to determine the nature and extent of a noise problem, should one be confirmed to exist. Sources of the noise impinging on the land use or facility are also listed. Appendix F contains a list of rest homes and approximate noise levels at each location.

TABLE 1
POTENTIAL NOISE CONFLICT AREAS

Heavily Impacted Areas[1]	Local Noise Source(s)
Oak Park Convalescent Hospital	Highway 101
Santa Barbara Convalescent Hospital	Highway 101
Wilson School	Highway 101
Bohnett Park	Highway 101 & Railroad
A Child's Estate	Highway 101 & Railroad
Andree Clark Bird Refuge	Highway 101 & Railroad
Dwight Murphy Field	Highway 101 & Railroad
Moreton Fig Tree	Highway 101 & Railroad
Municipal Tennis Courts	Highway 101
Palm Park	Cabrillo Blvd. & Railroad
Residential areas adjacent to major noise sources	Highway 101, State St., Las Positas, Cabrillo Blvd. & Railroad

Slightly Impacted Areas[1]	Local Noise Source(s)
Oak Park	Highway 101 & Railroad
Las Positas Park	Las Positas Road
Adams School	Las Positas Road
McKinley School	Cliff Drive
Monroe School	Cliff Drive
Santa Barbara City College	Cliff Drive
Santa Barbara Jr. High	Milpas Street
West Beach	Cabrillo & Railroad
East Beach	Cabrillo
Ambassador Park	Cabrillo
Vera Cruz Park	Haley Street
Municipal Golf Course	Highway 101
Residential areas adjacent to minor noise sources	See Table 5 of Technical Report for noise sources

Additional Potential Conflict Areas[2]	Local Noise Source(s)
Lincoln School	Anacapa
Santa Barbara High School	Anapamu
Plaza del Mar	Castillo & Cabrillo

[1] Based on estimated contours for 1978.

[2] Based on noise monitoring.

Future Conditions

In planning for noise control, it is necessary to estimate what the future noise environment may be like. Accordingly, noise level forecasts for the year 1990 were included as part of the technical analysis. In general, the future noise environment will be controlled by three factors:

1. The expected increase in the number of noise sources (i.e., traffic volumes).

2. The application of noise control technology to various sources.

3. Noise mitigation measures applied to exterior walls and exterior areas to decrease interior noise levels and noise levels in recreation areas.

It is reasonable to assume that noise control technology will be applied to some noise sources, and that this will counterbalance the increase in traffic, resulting in the same noise levels as currently exist or in decreased noise levels. No major technological breakthrough is foreseen for other noise sources, however, such as light aircraft, and the expected increase in volumes of these sources will mean an increase in noise levels. Even with the application of technology, high noise levels are expected to persist in some areas of the City, particularly along Highway 101. There are limits to what can be accomplished by technology alone, and this makes land use control a necessary component of successful noise control strategies. Summary conclusions regarding the expected future noise environment are as follows (see Section D, Future Noise Projection of Methodology Chapter of the Technical Report, for further discussion):

1. Forecasts of road traffic noise assume that noise control technology will be applied (as required in the California Vehicle Code, Section 21760), and that this will counteract the expected increase in road traffic in most, but not all, cases. Thus, road traffic noise is projected to remain the same or decrease somewhat by 1990 on most roads.

2. Current noise levels generated by the Southern Pacific Railroad are assumed to persist for at least the intermediate future, based on the assumption that existing levels of railroad traffic remain constant. If railroad traffic increases, noise levels will correspondingly increase.

3. The improvement in aircraft noise exposure resulting from compliance with Federal Aviation Regulation 36 may be partially offset by increased airport activity. Therefore, no dramatic reductions in aircraft engine noise are anticipated in the near future unless there is a major technological breakthrough. In the absence of accepted projections of air traffic growth for the Santa Barbara Municipal Airport, the noise contours projected by Bolt, Beranek and Newman are considered as adequately describing the 1990 noise exposure.

Effects of Noise in the City of Santa Barbara

Health and welfare criteria have been published by the federal Environmental Protection Agency, and these criteria can be compared to the noise levels quantified in this Element to draw some general conclusions. The basic criteria are given in Table 2, and utilize the Sound Equivalent Level (L_{eq}) and Day-Night Noise Level (L_{dn}). The L_{eq} is the basis for the L_{dn} noise level, but does not include a weighting for nighttime noise. It should be noted also that an "adequate margin of safety" has been built into these criteria.

Near Highway 101, the Southern Pacific Railroad, and the Municipal Airport, these criteria indicate that a certain level of activity (i.e., sleep, speech) interference and stress can be expected. However, it is unlikely that any resident's hearing is threatened unless he is spending unusually long periods of time in close proximity to these major sources.

TABLE 2
SUMMARY OF NOISE LEVELS IDENTIFIED AS REQUISITE TO PROTECT PUBLIC HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY

(Source: U.S. Environmental Protection Agency, 1974)

EFFECT	LEVEL	AREA
Hearing Loss	$L_{eq}(24) \geq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \geq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \geq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \geq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \geq 45$ dB	Other indoor areas with human activities such as schools, etc.

Explanation

$L_{eq}(24)$ - Equivalent A-weighted Sound Level over a 24-hour period.

L_{dn} - Day-Night average sound level - the 24-hour A-weighted Equivalent Sound Level, with a 10-decibel penalty applied to nighttime levels.

dB - decibels.

NOISE CONTROL

Noise Regulations

Heightened concern in recent years for "environmental quality" has led to greater attention by the legislative and administrative branches of government to the problem of excessive noise. This attention has resulted in the enactment of a number of laws and regulations regarding noise. To provide the legal and planning contexts within which the recommended goals and policies of the Element would be implemented, this section summarizes the current noise laws and outlines possible noise control strategies.

Unfortunately, there has been little coordination among the agencies responsible for noise control, and this has resulted in the use of different noise evaluation techniques and standards in noise regulations. This non-uniform approach makes comparison and use of standards and regulations a confusing matter for both the general public and those government officials responsible for compliance at the local level. Table 3 provides a summary list of existing noise regulations which pertain to the City of Santa Barbara. In addition to those laws shown in the table, both the National Environmental Protection Act (NEPA) and the California Environmental Quality Act (CEQA) require environmental analysis of certain developments including an analysis of potential noise problems at the project site.

The most significant of the laws listed in Table 3 is the Noise Control Act of 1972. This law essentially authorizes the EPA to coordinate noise regulation at the national level. It also authorizes the EPA to set noise emission limits for major noise sources including aircraft, motor vehicles, and trains. These emission standards can be expected to have an important effect on future noise levels in the City. In addition, health and welfare criteria for noise exposure limits have been published in compliance with the Act, and these criteria have been incorporated into the recommended land use compatibility standards. In publishing these criteria, the EPA has selected and recommended the L_{dn} measurement scale for use as a uniform noise evaluation scheme. If nationwide use of this measurement becomes a reality, much of the existing confusion regarding noise should diminish. This should enable the city to enact noise control regulations and measurements consistent with other cities and counties as well as with the State and Federal government.

Alternative Noise Control

Any action to control noise will work on either the source of the noise, its transmission path, the receiver of the noise, or any combination of these facets of sound. As noted in the preceding section, source controls are primarily the responsibility of the Federal government, and to a lesser degree, the State government. Control of the reception of noise, however, has its roots in local government's traditional authority over land use control.

The basic goal of this Element is to achieve and maintain a noise environment that is compatible with a variety of human activities. This clearly calls for cooperation among all levels of government. Source controls are the most effective means of reducing noise, but there are limits to what can be accomplished through technology alone. A need for land use controls, coupled with source controls, will probably be necessary for overall noise reduction in many cities for the foreseeable future.

The purpose of this section of the Noise Element is to outline some of the land use and other types of noise reduction alternatives that are available for implementation by the City. These various strategies form the basic planning framework for the recommended goals and policies of the next sections.

Generally, noise control strategies may be thought of as belonging to one of five approaches. These strategies are: 1) to encourage voluntary noise reduction measures by property owners and developers; 2) to mandate compatible land use through zoning and planning powers; 3) to require noise reduction based upon environmental performance standards; 4) to encourage and require noise attenuation through a housing rehabilitation program; and 5) to enact noise control through government ownership of the affected property.

The first approach would include providing information to builders and the general public regarding the importance of noise reduction and different construction and site development techniques for noise compatibility. Various means of achieving this objective would include review of proposals by an architectural review board, design services by government staff during the permit application process, and maintenance of an acoustical information library for developers and the public. Education of the public is an important aspect of this approach since public awareness of noise problems can affect the marketability of developments. Such an approach can be successful in solving noise problems provided there is a degree of cooperation between the local government and developers or if the development market is a buyer's market and there is a demand for noise compatibility.

If these conditions do not exist, it may be necessary to use the local government police powers of zoning and planning to ensure that the public is protected from excessive noise. These measures can be an important influence on future development, but may be of little help in resolving existing noise problems. The basic approach is the exclusion of noise sensitive land uses from areas of high noise levels, such as along the Southern Pacific Railroad and Highway 101. If development is permitted in noise-impacted areas, zoning performance and development standards can regulate the details of the development such as building height, buffer areas, and noise barrier construction. Special types of development, such as cluster housing and planned unit developments, can be regulated to prevent unnecessary noise problems from occurring. Building codes may be enforced under this approach as well to limit the transmission of sound into and out of buildings.

One concept being implemented in a number of cities in California and across the country is the adoption and enforcement of environmental performance standards or a noise ordinance which sets quantitative limits on the level of noise permitted in different zones in the City.

A zone can be established in areas heavily impacted by noise (i.e., along Highway 101 and the Southern Pacific Railroad) which designates these areas as "blighted" due to high noise levels. A housing rehabilitation program can be instituted in these zones to provide low interest loans for modifying housing units to comply with acceptable noise levels. These noise "blighted" areas may also qualify for redevelopment funds.

TABLE 3
EXISTING FEDERAL AND STATE NOISE REGULATIONS

	Responsible Agency	Regulation/Standard	Noise Source Regulated	Summary
FEDERAL	Environmental Protection Agency	Public Law 92-574 (Noise Control Act of 1972)	All	Gives EPA responsibility to identify noise sources, set standards for limiting emissions, publish health and welfare criteria, set product labeling standards, and recommend aircraft standards.
	Federal Aviation Administration	FAR Part 36	Aircraft	Sets emission limits for aircraft under specified flight conditions for type certification.
	Federal Highway Administration	PPM 90-2	Highways, outdoor noise environment	Sets land use compatibility requirements for developments adjacent to Federal-aid highways.
	Department of Housing and Urban Development	Policy Circular 1390.2	Airports, outdoor noise environments	Sets noise acceptability requirements for developments requesting Federal Loan assistance.
	Department of Labor	Occupational Safety and Health Act of 1970	Outdoor/Indoor noise environments	Specifies maximum noise exposure levels for workers.
STATE OF CALIFORNIA	Department of Aeronautics (Caltrans)	California Administrative Code, Title 4, Sub-Chapter 6	Airports, aircraft	Specifies maximum noise exposures for sensitive uses near airports; sets standards for aircraft operations.
	Department of Motor Vehicles	California Vehicle Code Section 23130	Motor vehicles	Sets noise emission limits for motor vehicles under specified operating conditions.
	Department of Transportation (Caltrans)	Streets and Highways Code	Highways	Requires corrective action when noise levels from new freeways exceed set limits in nearby schools.
	Commission of Housing and Community Development	California Administrative Code, Title 25, Article 4	Outdoor/Indoor noise environments	Limits interior noise levels resulting from outdoor levels in new multi-family units.
	Council on Intergovernmental Relations	California Government Section 63502(g) Amended by Senate Bill 860 (Beilenson, 1975)	Outdoor noise environment	Requires quantitative Noise Elements in all City and County General Plans.
	Department of Health, Office of Noise Control	Noise Insulation Standards	Indoor noise environment	Sets Statewide noise insulation standards for housing.

City ownership of noise-impacted land, the most restrictive approach, makes the regulation of its use a simpler matter. Purchase or the use of the power of eminent domain which fully compensates the property owner should be used rather than the purchase of an easement regulating the land without transfer of ownership.

Which of these approaches is used depends in large measure on the severity of the noise problem. The Technical Report of this Element concludes that, on the basis of the Noise Contour Map, most of the City of Santa Barbara is not heavily impacted by high noise levels except in close proximity to certain major sources such as U.S. 101, the Municipal Airport, and the Southern Pacific Railroad tracks (other noise sources are listed in Table 5 of the Technical Report). It is unlikely, then, that the City needs to consider the most restrictive approach, and can rely on zoning and planning to prevent major noise problems from occurring near these sources.

Most of the above strategies deal primarily with reducing future noise problems rather than existing ones. Where a noise problem already exists, one or more of five general solutions are available: 1) the noise can be reduced at the source; 2) the noise can be blocked by an insulating barrier; 3) the source can be removed from people and other receivers; 4) the receiver can be removed from the source; or 5) the time exposure to the noise can be minimized. As is true with most environmental hazards, preventing or reducing the cost of the future hazard is easier and less expensive than resolving existing problems.

GOAL AND POLICY RECOMMENDATIONS

Organization of Recommendations

The previous sections of this report provide a summary of the technical analysis of noise in the City of Santa Barbara, and a synthesis of the legal and planning frameworks for noise control. In this section, general planning goals and policies are recommended for the City of Santa Barbara. These recommendations constitute the noise control plan for the City and are the heart of the Noise Element.

The recommendations comprise a general planning goal, general policies, and more specific policies termed implementation strategies. The general goal provides a statement of the basic purpose of the Noise Element so that consistent planning is possible. It is a necessary guideline which can be held up against future proposals to determine their effect on the noise environment. The general policies complement the planning goal and define specific directions for the City to take in controlling noise. The implementation strategies are suggested refinements of the general policies and will be carried out through the development of City ordinances and regulations. Methods for implementation of the goals and policies need not be limited to those listed in this section, as other effective strategies may become apparent in the future.

While it would be desirable to fully implement each of the implementation strategies it is recognized that there are competing demands for preservation, enhancement, development, and conservation of resources, and the City's economic resources are limited. Therefore, priorities for the implementation of these strategies shall be determined by the City Council after consideration of economic, social, and environmental concerns weighted according to balance and priority.

Goal

To ensure that the City of Santa Barbara is free from excessive noise and abusive sounds such that: a) sufficient information concerning the City noise environment is provided for land use planning; b) strategies are developed for abatement of excessive noise levels; and c) existing low noise levels are maintained and protected.

In defining this goal, primary emphasis should be placed on protecting the general public from noise levels which may be hazardous to hearing. Second in importance is the minimization of noise induced stress, annoyance, and activity interference.

Policies

1.0 Land use noise compatibility standards should be established for general planning and zoning purposes.

2.0 Provision should be made for the identification and evaluation of potential noise problem areas.

3.0 Existing and potential incompatible noise levels in problem areas should be reduced through land use planning, building and subdivision code enforcement, and other administrative means.

4.0 Existing and potential incompatible noise levels in problem areas should be reduced through operational or source controls where the City has responsibility for such controls.

5.0 A program should be developed for the education of the community in the nature and extent of noise problems in the City.

6.0 Noise control activities should be coordinated with those of other responsible jurisdictions.

7.0 Provision should be made for periodic review and revision of the Noise Element.

Implementation Strategies

1.0 Land use noise compatibility standards should be established for general planning and zoning purposes.

1.1 Adopt the noise compatibility standards provided in Figure 2 for use in identifying potential noise problem areas, and in reviewing environmental impact documents.

1.2 Incorporate noise performance standards to mitigate peak noise levels into zoning and other appropriate ordinances.

1.3 Enforce noise compatibility standards for the mixed uses in the Lower East Industrial Area.

1.4 Require the City Redevelopment Agency to incorporate noise performance standards into the Land Use Standards, Regulations, and Restrictions outlined in Section 507 of the First Amended Redevelopment Plan.

2.0 Provision should be made for the identification and evaluation of potential noise problem areas.

2.1 Using the noise compatibility standards provided in Figure 2, review existing land uses to identify potential noise problems.

2.2 Establish an ongoing noise monitoring program to identify and evaluate noise levels in locations identified as conflict areas on the Noise Contour Map.

2.3 Conduct noise conflict mapping for land use categories not included in this analysis, particularly residential land uses.

3.0 Existing and potential incompatible noise levels in problem areas should be reduced through land use planning, building and subdivision code enforcement and other administrative means.

3.1 Locate proposed developments in the City on the Noise Contour Map to determine if there is a potential impact on the development or, conversely, if the development will increase noise levels in a relatively quiet area. The development review and environmental review processes should include a further analysis in areas of potential impact.

3.2 Discourage development of noise sensitive uses in incompatible noise-impacted areas, particularly adjacent to Highway 101, the Municipal Airport, and the Southern Pacific Railroad.

3.3 Strictly enforce all existing noise control regulations, including building and subdivision laws.

3.4 In existing or future development in noise-impacted areas, especially surrounding the Municipal Airport, encourage or require through ordinance that proper site planning and insulation measures be taken to reduce noise to establish levels.

3.5 Require public housing constructed in noise conflict areas to incorporate noise attenuation measures in site design and construction techniques and materials such that HUD guidelines are met.

4.0 Existing and potential incompatible noise levels in problem areas should be reduced through operational or source controls where the City has responsibility for such controls.

4.1 Establish routes for use by heavy trucks away from noise sensitive land uses.

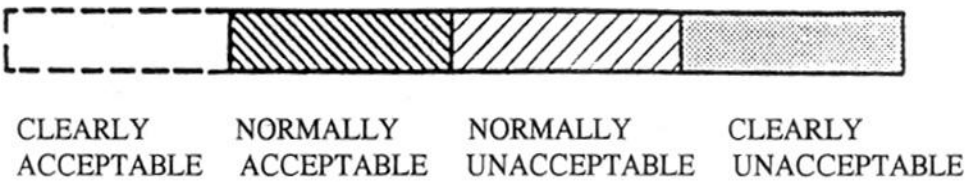
FIGURE 2

Land Use Compatibility Guidelines

LAND USE CATEGORY	Maximum Interior Exposure, Ldn*	LAND USE INTERPRETATION FOR Ldn VALUE (55 65 75 85)
Residential - Single Family, Duplex, Mobile Homes	45	
Residential - Multiple Family, Dormitories, etc.	45	
Transient Lodging	45	
School Classrooms, Libraries, Churches	45	
Hospitals, Nursing Homes	45	
Auditoriums, Concert Halls, Music Shells	35	
Sports Arenas, Outdoor Spectator Sports		
Playgrounds, Neighborhood Parks		
Golf Courses, Riding Stables, Water Rec., Cemeteries		
Office Buildings, Personal, Business and Professional	50	
Commercial - Retail, Movie Theaters, Restaurants	50	
Commercial - Wholesale, Some Retail, Ind., Mfg., Util.		
Manufacturing, Communications (Noise Sensitive)		
Livestock Farming, Animal Breeding		
Agriculture (except Livestock), Mining, Fishing		
Public Right-of-Way		
Extensive Natural Recreation Areas		

*Due to exterior sources
(Source: Bolt, Beranek, and Newman, Inc., 1974)

EXPLANATION
FOR
FIGURE 2



CLEARLY ACCEPTABLE The noise exposure is such that the activities associated with the land use may be carried out with essentially no interference. (Residential areas: both indoor and outdoor noise environments are pleasant.)

NORMALLY ACCEPTABLE The noise exposure is great enough to be of some concern, but common constructions will make the indoor environment acceptable, even for sleeping quarters. (Residential areas: the outdoor environment will be reasonably pleasant for recreation and play at the quiet end and will be tolerable at the noisy end.)

NORMALLY UNACCEPTABLE The noise exposure is significantly more severe so that unusual and costly building constructions are necessary to ensure adequate performance of activities. (Residential areas: barriers must be erected between the site and prominent noise sources to make the outdoor environment tolerable.)

CLEARLY UNACCEPTABLE The noise exposure at the site is so severe that construction costs to make the indoor environment acceptable for performance of activities would be prohibitive. (Residential areas: the outdoor environment would be intolerable for normal residential use.)

4.2 Undertake a specific study to establish a land use compatibility plan based on current and future noise projections. This plan should include an assessment of the potential for modifying aircraft operations, including hours and flight patterns and land uses around the airport operations, and to reduce excessive noise levels. In addition, the study should evaluate the effect of increased air traffic on surrounding County impacted areas as discussed in Implementation Strategy 6.3.

4.3 Seek to restrict the type of aircraft allowed to operate at the Municipal airport if certain aircraft are found to emit excessive noise.

4.4 Implement operational controls (e.g., flight path modification) for specific aircraft if those aircraft emit excessive noise.

4.5 Encourage the Southern Pacific Transportation Company to control its operations to reduce noise impacts on the City.

4.6 Consider noise abatement of stationary sources in cases of excessive noise emissions.

5.0 A program should be developed for the education of the community in the nature and extent of noise problems in the City.

5.1 Develop an information release program to familiarize residents of Santa Barbara with the Noise Element and noise problems in general. Special attention should be paid to identifying and informing those people now residing or working in noise problem areas.

5.2 Provide developers and builders with specific design information to reduce noise levels in new and existing developments. (See publication entitled "Evaluation of Outdoor to Indoor Noise Reduction of Building Facades and Outdoor Noise Barriers," by Russell B. DuPree, 1975.)

5.3 As part of the permit application process, inform developers and building contractors about potential construction noise problems and measures to reduce construction noise.

5.4 Maintain a noise information library for both the general public and those with technical backgrounds involved in noise control.

6.0 Noise control activities should be coordinated with those of other responsible jurisdictions.

6.1 Encourage the State Department of Transportation (CALTRANS) and the County Engineer to incorporate noise reduction methods, such as barrier walls, in new road construction and improvements to existing roadways.

6.2 Coordinate noise monitoring activities with those of Caltrans with regard to Highway 101 and other major State roadways, and with the County of Santa Barbara with regard to acceptable noise levels surrounding the Municipal Airport and the County Bowl, and with the County Health Department in all other identified conflict areas.

6.3 Evaluate the effects of increased air traffic on surrounding County impacted areas such as Hope Ranch and University Village.

6.4 Coordinate with the Santa Barbara Municipal Airport Noise Abatement Committee in its efforts to encourage working relationships between all interested parties in order to establish consistent and constructive methods of control over arriving and departing aircraft at the airport.

6.5 Encourage the development and use of a uniform noise evaluation scheme at all levels of government.

6.6 Coordinate the land use compatibility study referred to in implementation Strategy 4.2 with that of the County of Santa Barbara with regard to acceptable noise levels and land use planning.

7.0 Provision should be made for periodic review and revision of the Noise Element.

7.1 Review the Noise Element at least every two years and comprehensively revise it every five years or whenever major changes in the noise environment occur.

7.2 The Noise Element should be reviewed when revisions or preparation of the following plans or elements occur: Airport Land Use Plan, Land Use Element, Circulation Element, Housing Element and Conservation Element.

7.3 Integrate the task of implementing the policies of the Noise Element into the responsibilities of the Current Planning Division and the City Building Official.

TECHNICAL REPORT

FOREWORD

This Technical Report is the second of two sections which together constitute the Noise Element for the City of Santa Barbara. The first section, the Policy Report, will be submitted with this report to the City Council for adoption as one of the state-mandated Elements of the General Plan. It is intended that, once adopted, the Noise Element will be updated on a regular basis.

The purpose of this portion of the Noise Element is to provide the necessary technical back-up for the recommendations contained in the Policy Report. The technical nature of some of the information contained in this section necessitates a scientific discussion. However, because of the diverse audience of the Noise Element, the approach has been to minimize the use of detailed mathematical presentations and scientific terminology. Rather, this Report relies for the most part on qualitative descriptions of methodology and noise exposure.

Those wishing a more detailed discussion of noise evaluation techniques are referred to the works listed in the References Section.

INTRODUCTION TO NOISE

Sound Mechanics

Fundamental to any discussion of environmental noise is an understanding of sound phenomena. Such an understanding is interdisciplinary in that the generation of sound waves is within the traditional domain of physics while the perception of sound is primarily a concern of physiology and psychology. In this section, the emphasis is on the source of sound waves. The next section deals with the reception of sound, and is followed by a discussion of sounds that are defined as noise in the Element.

Sound can be defined as a mechanical form of radiant energy which is transmitted by longitudinal pressure waves in air or another medium. To illustrate this definition, consider a tuning fork in vibration after being struck. As a tong of the fork moves in one direction, it compresses the air particles in its path producing an area of condensation. As the tong reverses direction, the air particles left in its wake spread out resulting in an area of refraction. This movement of air particles is a form of wave motion in which the displacements are along the direction of the wave motion and is termed longitudinal wave motion. This is in contrast to transverse waves, such as those in a vibrating string, in which the displacements are perpendicular to the direction of wave motion.

Sound waves emitted by a source have two major dimensions: frequency (or pitch) and amplitude (or intensity). Frequency is measured by the number of sound waves passing a point in one second. This measure is termed "cycles per second" or "Hertz" (abbreviated Hz). In general, humans can hear sounds with frequencies from about 16 to 20,000 Hz, although those limits may be decreased or increased somewhat depending on the individual and the intensity of the sound. Sound waves below 16 Hz are in the realm of infrasonics, and cannot be heard. Ultrasonics refers to sound waves above 20,000 Hz which generally cannot be detected by the human ear either.

Amplitude is a measure of the height or depth of sound waves above and below a median line on a diagram or a sound wave (Figure 1). It is the intensity or magnitude of the sound, and is measured in decibels (abbreviated dB). The decibel system is a relative logarithmic scale of sound pressure which is based on human hearing. The scale has a number of important features. Its basic reference point is the weakest sound which a person with very good hearing can detect in a quiet place. This quantity of sound is assigned the value 0 dB. Since the range of sound pressure which the ear can detect is so great, it is necessary to mathematically compress that range on a logarithmic scale of 0 to about 180. The most important aspect of this scale is that it does not progress arithmetically or linearly. That is, while a 10 dB sound is ten times as intense as a 0 dB sound, 20 dB sound is 100 times as intense as 0 dB (rather than 20 times), and 30 dB is 1000 times as intense as 0 dB (rather than 30 times).

Another important feature of the decibel scale is that sound levels are not directly combined when they are added. For example, if one truck emits 65 dB while idling, parking another truck producing 65 dB next to it does not generate a total noise level of 130 dB. Rather, the total noise level would be 68 dB. The basis of this is the logarithmic nature of the decibel scale, and it is an important feature to remember when considering an area exposed to more than one source of noise. A convenient graphic method for combining decibels is provided in Figure 2.

FIGURE 1

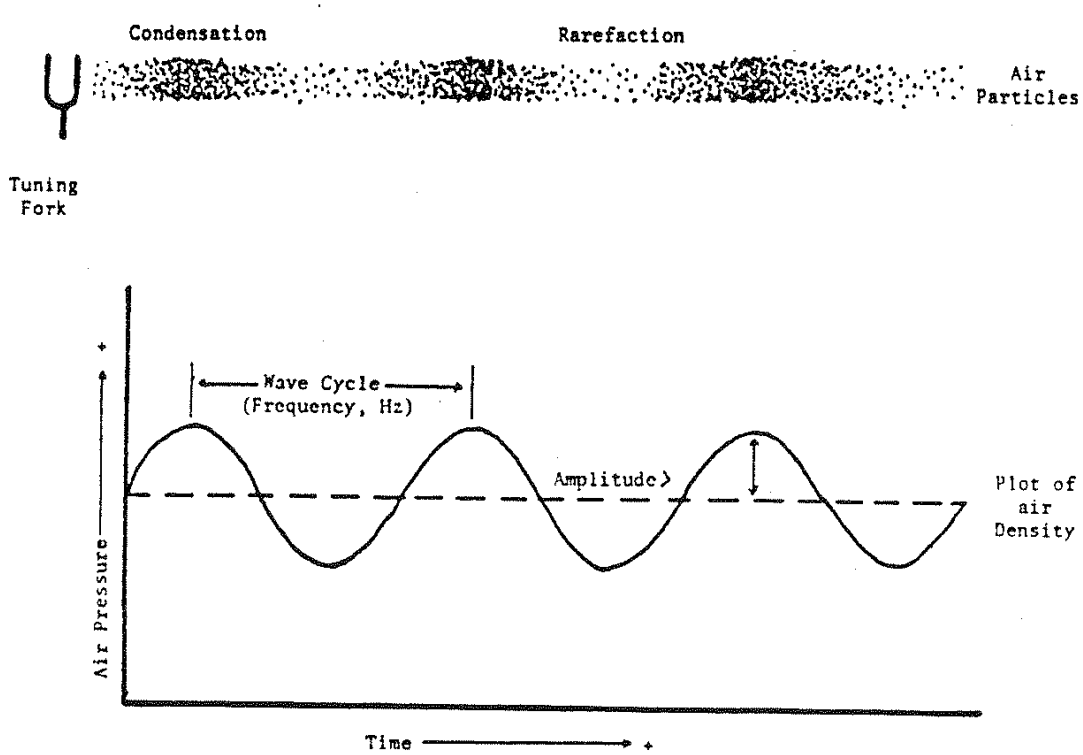


Figure 1. Diagram of Simple Sound Waves

FIGURE 2

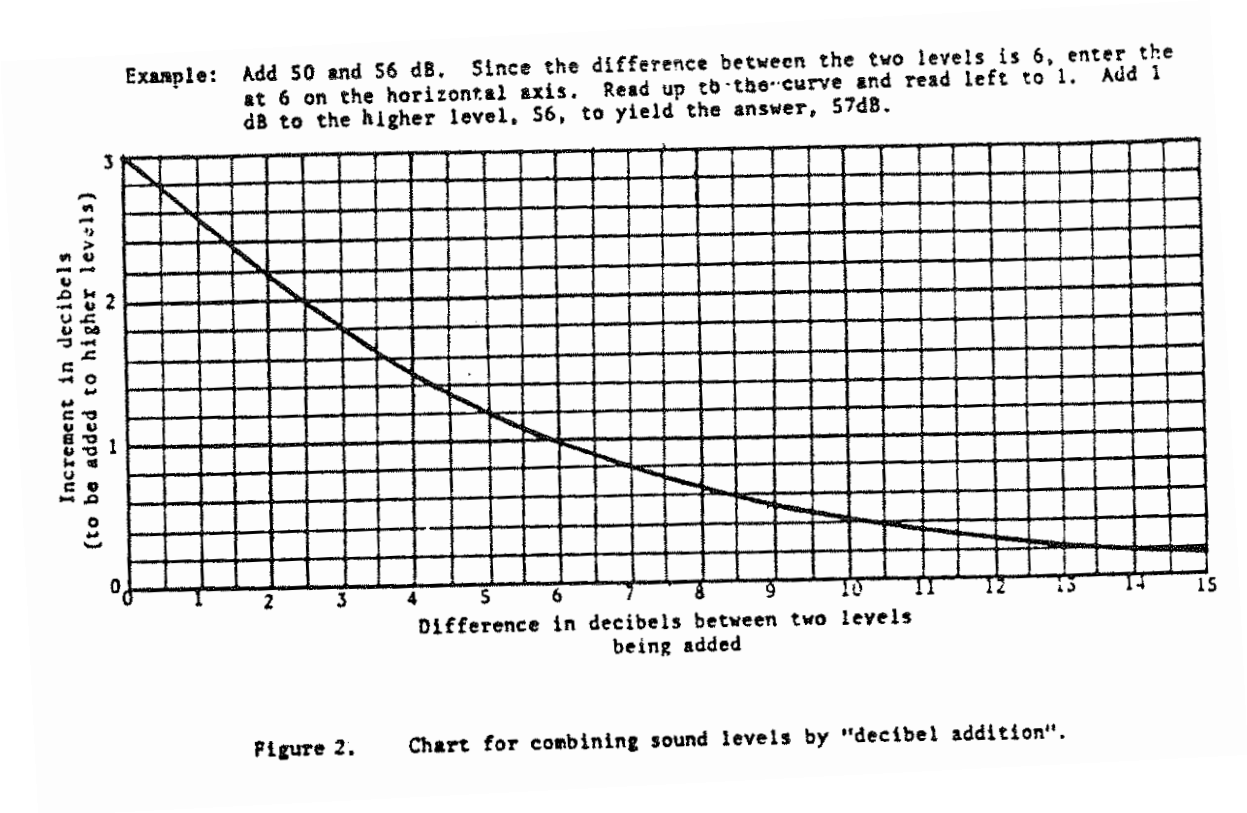


Figure 2. Chart for combining sound levels by "decibel addition".

Hearing

"If a tree falls in the woods and no one hears it, is there a sound?" This is an old question, and it serves to emphasize the three major facets of sound: generation, transmission and perception. The following gives a brief description of the perception of sound, or what happens when someone hears the tree fall.

The ability to hear involves a highly complex process and mechanism. The diagram in Figure 3 is a simplified picture of the ear which illustrates its three major parts: the outer, middle, and inner ear. The outer ear may be thought of as an air-filled funnel ending in a membrane, the eardrum. Sound waves travel down the funnel and impinge on the eardrum causing it to vibrate. This vibration mechanically transmits the sound wave to the middle ear which consists of a set of three connected bones. These small bones act as levers to amplify the vibrations on the ear drum, and to distinguish sound waves from the eardrum from those coming through other head tissues and bones. This part of the ear ends in a sound membrane called the oval window which separates the air-filled middle ear from the liquid-filled inner ear or cochlea. The window transmits the mechanical vibrations into liquid waves which travel through the spiral, parallel tubes of the cochlea. A basilar membrane separates two of these tubes; and, as it is distorted by the liquid waves, hair-like cells (cilia) are bent and trigger nerve cell endings by mechanical, chemical and electrical processes. These signals are transmitted to the brain through the auditory nerve.

It is interesting to note that the ear is sensitive to a wide range of acoustic stimuli, but has not evolved involuntary response mechanisms to protect it from very loud noises without temporary or permanent loss of hearing acuity. This contrasts with the eye, which has evolved the dilation mechanism to protect it from overstimulation by light. It is thought that an analogous mechanism to dilation has not developed in the ear because the environmental stimulus, i.e., frequent exposure to loud noise, has not been present. Whether existing levels of noise in large cities are sufficient to initiate natural selection processes is difficult to say, but in any event such adaption in man would take a long time. The human ear, then, is not well adapted to high levels of noise. This highlights the need to control loud noise before it reaches the ear.

There are a number of important aspects of the hearing process that enter into the evaluation of noise exposure in this Element. One is that the ear does not perceive all frequencies of sound equally. Generally, people are more sensitive to sounds in the higher frequencies than lower frequencies. This means that it takes a greater magnitude low frequency sound to be perceived as equal in loudness to a high frequency sound. This fact is accommodated in noise measurement by the use of an electronic filter in sound level meters that enables a meter to approximate the response of the human ear. Such measures are made by using the A scale of a meter, and are noted by the letter A in the abbreviation dBA. Other measurement scales are the B and C scales which discriminate less against the lower frequencies, and therefore show somewhat higher decibel readings than the A scale (Figure 4).

Another characteristic of human perception of sound is that it takes much more than twice a reference sound energy level to perceive a doubling in loudness. The average person can detect a difference in sound level at 2 dB, but laboratory hearing tests indicate that it takes about a 10-decibel increase for most people to perceive a doubling of loudness. Field experimentation with aircraft noise indicate that the doubling of loudness can be perceived over a wide range, but the 10 dB increase per doubling of loudness is an acceptable rule of thumb.

To give a better idea of the everyday meaning of some of the above concepts, Table 1 provides a number of examples of sound sources, their approximate decibel output, their relative energy content, and the human response to those sounds.

FIGURE 3 & 4

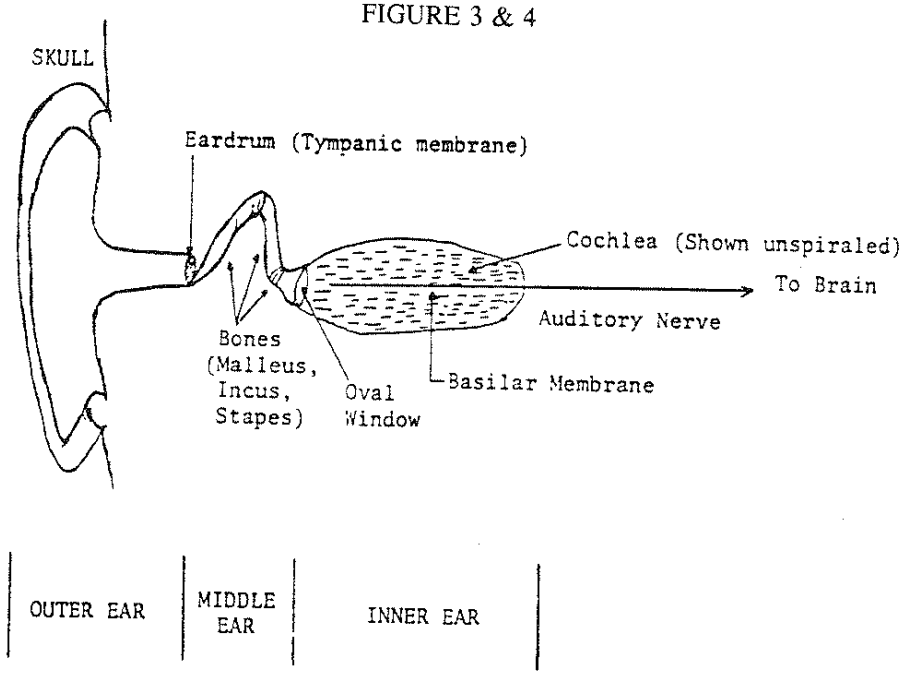


Figure 3. Simple functional diagram of the human ear. (After Kryter, 1970).

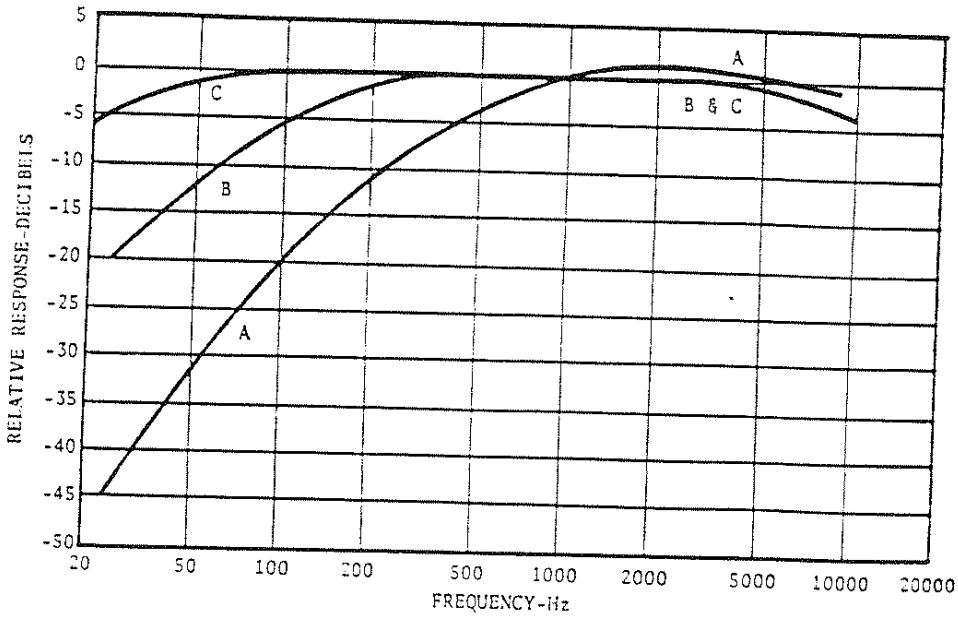


Figure 4. Frequency-response characteristics in the American National Standard Specification for A, B, and C scales in sound level meters. (Source: Peterson, 1972)

TABLE 1
SOUND LEVELS AND HUMAN RESPONSE

Relative Sound Energy	Noise Level, dBA	Example	Response	Relative Loudness (Approximate)
1 quadrillion	150	Carrier Deck Jet Operation		32,768
100 trillion	140		Initial Pain Threshold	16,384
10 trillion	130		Initial Discomfort Threshold	8,192
1 trillion	120	Jet Takeoff (2,000 feet) Auto Horn (3 feet)	Maximum Vocal Effort	4,096
100 billion	110	Riveting Machine Jet Takeoff (2,000 feet)		2,048
10 billion	100	Garbage Truck		1,024
1 billion	90	Heavy Truck (50 feet)	Very Annoying Hearing Damage (8 hours)	512
100 million	80	Alarm Clock	Annoying	256
10 million	70	Freeway Traffic (50 feet)	Telephone Use Difficult Intrusive	128
1 million	60	Air Conditioning Unit (20 feet)		64
100,000	50	Light Auto Traffic (100 feet)		32
10,000	40	Bedroom, Library	Quiet	16
1,000	30	Soft Whisper (15 feet)	Very Quiet	8
100	20	Broadcasting Studio		4
10	10		Just Audible	2
1	0		Threshold of Hearing	1

Noise

General

At what point does sound become noise? The answer to this question is difficult primarily because of the subjective nature of noise. The American National Standards Institute (ANSI) defines noise as 1) any erratic, intermittent, or statistically random oscillation; or 2) any unwanted sound. It is the definition of noise as unwanted sound that causes difficulty in specifying what is noise and what is not. A common example of the difficulty is music. What may be rock and roll to some is noise to others. Resolution of this problem at the community level requires a large measure of public participation in defining "acceptable sound."

Noise Element

The sources of noise may be thought of as either indoor or outdoor sources. Indoor noise includes all of those devices and machines in homes, offices, and factories that can create sounds loud enough to damage hearing, interfere with speech communication, and arouse a person from sleep. The concern of this Element, however, is outdoor noise. While both indoor and outdoor noise sources are regulated at the Federal level by the EPA and the Occupational Health and Safety Administration, control of outdoor noise is also a function of local government.

Outdoor noise can be considered in five categories: transportation, construction work, industrial operations, the individual human being (shouting, playing radio too loudly), and miscellaneous noises such as air conditioning units attached to windows or the banging of garbage cans and lids. Of these different categories, noise generated by transportation is the most serious. Transportation accounts for the most continuous and, in many areas, the loudest noise in urban centers. The emphasis of this Element is on evaluating and planning for transportation noise.

Transportation noise sources are considered in this report in three categories: air, road, and rail traffic noise. It should be noted that noise produced by aircraft in flight is regulated by the Federal government, and that much of the land within the 60 dB CNEL for the Municipal Airport is under the jurisdiction of the County of Santa Barbara. However, the CNEL contours for the Airport are included as a mandated part of this Element to assist in land use planning for the area immediately adjacent to the Airport which is within the City limits.

Road Traffic Noise

Within the City of Santa Barbara, road traffic is the most significant source of noise in terms of continuity and the size of the impacted area. This results simply from the fact that there are greater volumes of road traffic than air or rail traffic, and from the fact that roads exist in areas where there is no airport or rail line.

Road traffic noise is generally dominated by emissions from automobiles and heavy diesel trucks. There are five other categories of vehicular noise sources: motorcycles, sport cars, light trucks, large gasoline-engine trucks, and buses. Generally, motorcycles and sport cars are noisier than automobiles because of higher engine speeds and less adequate muffling. Light trucks emit noise levels that are similar to automobiles, while the larger gasoline-fueled trucks are noisier than cars but quieter than diesel-fueled trucks of equal size. Buses are much noisier than automobiles on city streets, but are quieter than diesel trucks on the highway because they are usually better muffled and maintained. As a group, these five types of vehicles normally comprise only a small percentage of the total daily traffic flow. Since their noise emissions are within the range defined by auto and truck emissions, their noise is generally assumed to be contained within the mix generated by cars and trucks.

The principal components of both automobile and truck noise are three: the engine, exhaust and tires. Fans operating as part of the cooling system are a major contribution to engine noise; hot gases escaping out of the exhaust pipe create noise in that area of the vehicle; and the escape of air from between tire treads and the road surface is the source of tire noise. Four major factors control the noise level of vehicles: speed, acceleration, road grade and road surface. Generally, vehicular noise levels increase directly with increases in speed, acceleration, and road grade, and with rougher road surfaces. Figures 5 and 6 show the generalized noise spectra of an auto and a truck operating on level, average road surfaces at highway speeds.

FIGURE 5

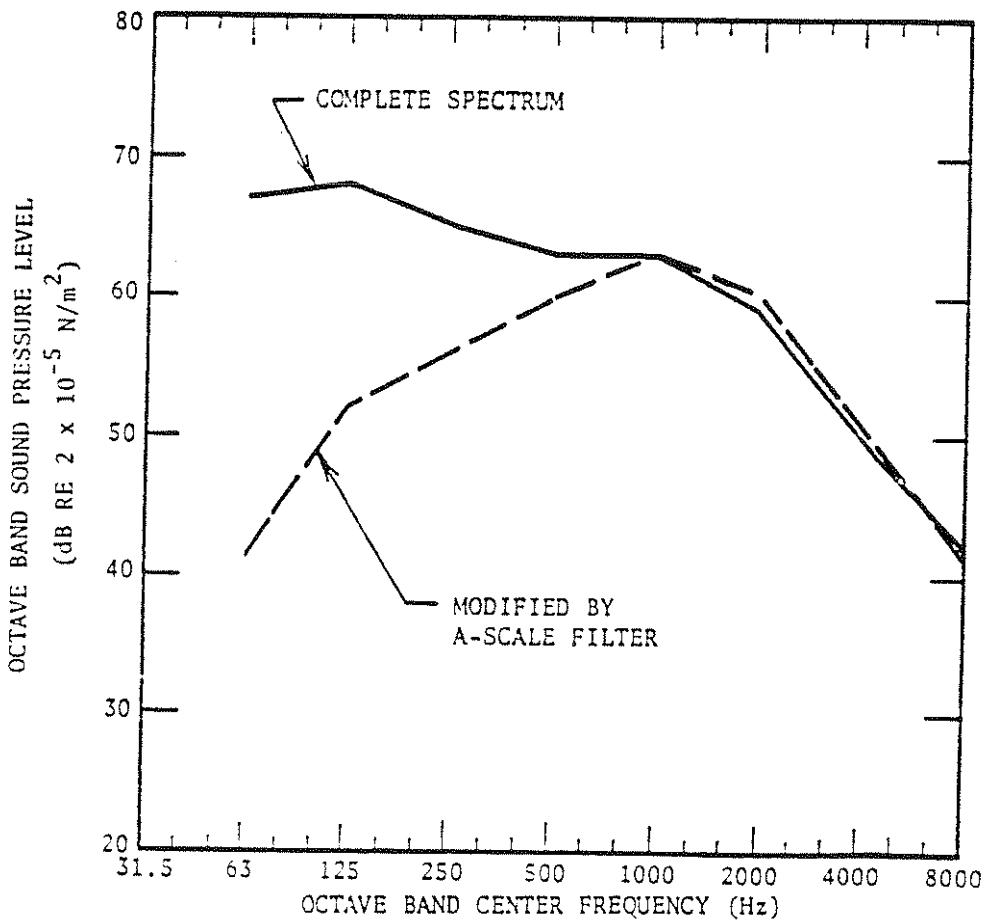


Figure 5. Generalized spectrum of typical passenger automobile at 50 mph speed and at 50 ft. distance. (Source: Bolt, Beranek, and Newman, Inc., 1973)

FIGURE 6

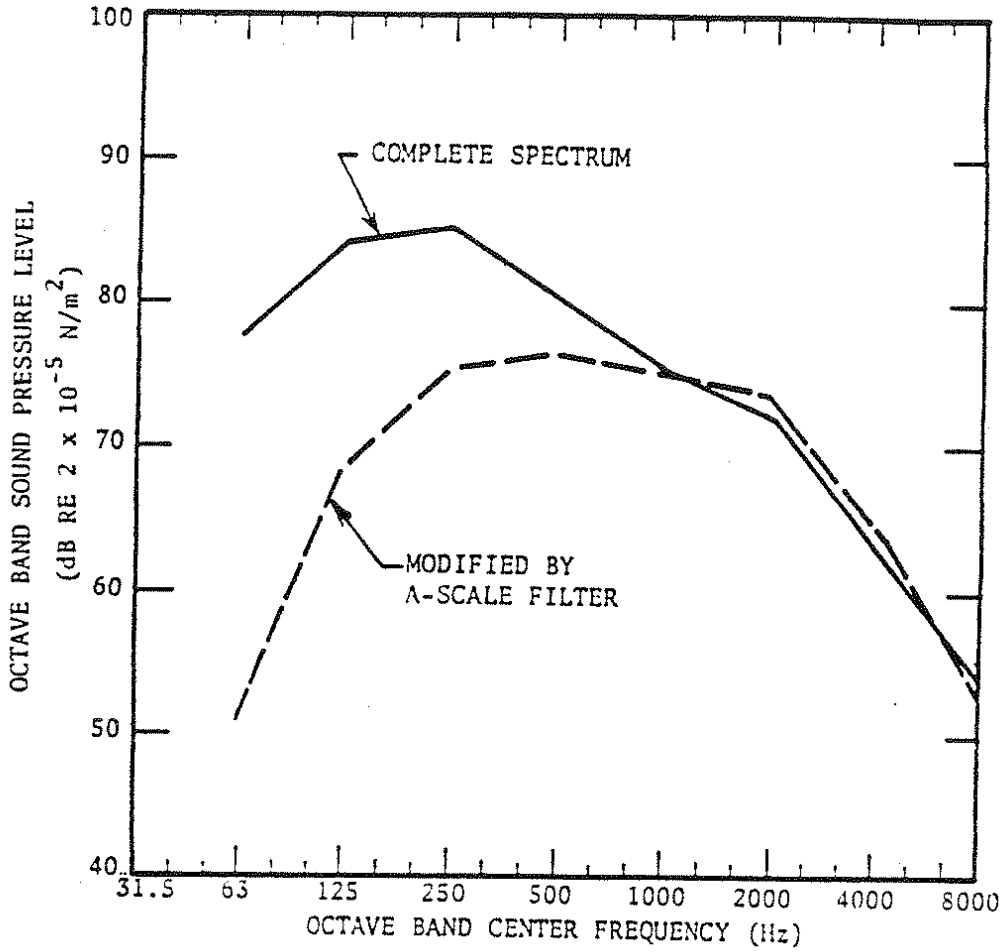


Figure 6. Generalized spectrum of typical diesel truck at 50 ft. distance on level roadway at highway cruising speeds. (Source: Bolt, Beranek, and Newman, Inc., 1973)

Rail Traffic Noise

There is only one active rail line in the City of Santa Barbara -- the Southern Pacific Transportation Company's line which runs near U.S. 101. At one time, the railroad was the principal transportation mode in the County (and throughout the State), but with the age of the internal combustion engine, railroad passenger service has declined almost to extinction. Freight traffic is now the railroad's principal income producer, but even freight operations must compete with trucking and air cargo operations. Southern Pacific's line in the City is little used, except for two Amtrak passenger trains and an average of 12 freight trains per day.

Noise produced by rail traffic in the City consists of events which are widely separated in time, but which are intense. Unlike road traffic, train noise is not considered as continuous. When a train passes through, however, it produces a very intense noise, often exceeding 100 dB (at 100 feet from the track centerline). The two major components of rail traffic noise are locomotive noise and passenger or freight car noise.

The locomotive produces the most intense noise which is generally thought to be a function of speed and track bed gradient. The relationship between speed and noise output is less well established, however, than the relationship between grade and noise output. Locomotives pulling upgrade generate significantly more noise than those operating under level or downgrade conditions.

In contrast, car noise is dependent upon velocity and increases directly with increases in speed. The wheel-track interaction is also a primary factor in noise output. Jointed track, frogs and grade crossings, and tight radius curves all act to increase the noise output of rail cars. Figure 7 shows an idealized noise history for a train-passby illustrating the locomotive and car components of train noise.

FIGURE 7

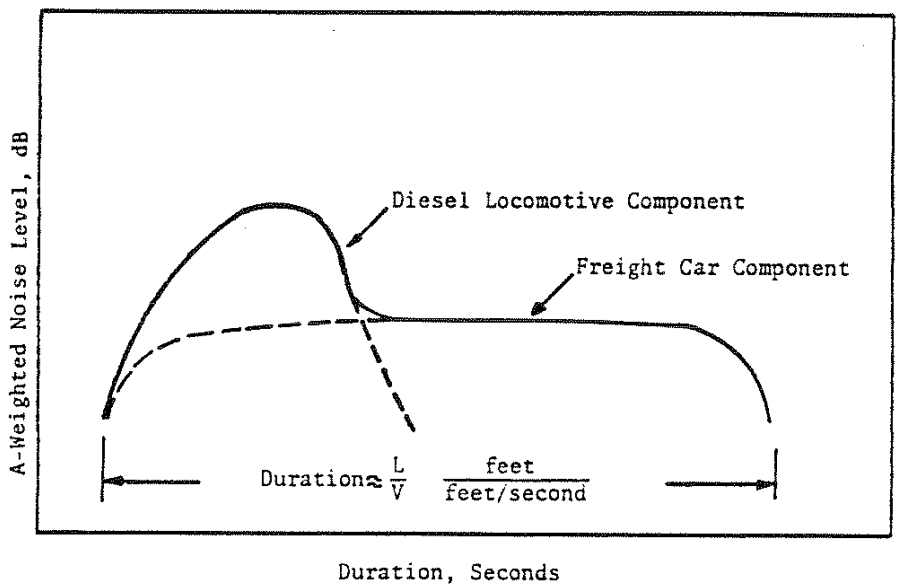


Figure 7. Idealized time history of train passby illustrating locomotive and freight car components. (Source: Wyle Laboratories, 1973)

Air Traffic Noise

The type of noise generated by air traffic is directly related to the type of propulsion system used in the aircraft. The Santa Barbara Municipal Airport is used by a variety of aircraft ranging from private single-engine piston-powered propeller aircraft to commercial turbofan jet aircraft.

The majority of aircraft using the Airport are general aviation propeller types. Noise emissions from these aircraft are produced primarily by engine exhaust and the intersection between the rotating propeller and the air. The amount of noise generated by light aircraft is primarily a function of the throttle setting. Thus, aircraft under full power on takeoff make a great deal more noise than aircraft under low power on the landing approach. The tip of the rotating propeller is constantly breaking the sound barrier, and the greater this "bite" of the propeller, the higher the noise level. The amount of bite is related to the rate of climb which is greatest on takeoff when the

plane is pulling its greatest load. There are a number of combinations of propeller pitch, flap settings, air speeds and other parameters which can be adjusted to achieve a rate of climb. Therefore, the same aircraft can be much noisier in the same flight pattern depending on the pilot's selection of takeoff parameters. Thus, "low noise" modes can be achieved with light aircraft under certain operating conditions. These operational characteristics are generally controlled by gross weight of the aircraft and ambient weather conditions. As a result, propeller aircraft exhibit a wide range of noise levels.

In contrast to the buzzing noise of propeller aircraft, jets produce noise by high velocity exhaust and compressor machinery. The exhaust nozzle discharges a fast moving, hot air mass which meets the cool, relatively motionless ambient air and creates turbulence. This results in the loud blowtorch type noise heard at takeoff. The compressor blades are responsible for the high-pitched whine dominant in landings.

The turbofan jet aircraft which service the Santa Barbara Municipal Airport have fan stages which significantly reduce the exhaust velocity. These fan stages, however, are a major noise producing component in the turbofan engines. The human ear is very sensitive to the particular sounds produced by these engines. Consequently, the jet aircraft which service the Airport have less jet roar but higher intensity jet whines.

The engines of a small percentage of the Boeing 727 aircraft which use the airport have been treated with sound absorbing material to comply with Federal Aviation Regulation (FAR) 36. The remainder of Boeing 727s and 737s and DC-9s which serve the Airport do not comply with FAR 36 at this time.

Total operations at the Santa Barbara Municipal Airport amounted to 228,384 in 1977. Of these, 5,923 were air carrier movements using jet aircraft. Community Noise Equivalent Level (CNEL) contours were estimated for the Airport in 1972 by Bolt, Beranek & Newman, based on 201,115 annual operations, including 6,570 jet air-carrier movements. The Santa Barbara County Planning Department recently collected noise measurements at five locations near the Airport to determine the accuracy of these projected CNEL contours. Their results lead them to conclude that the CNEL contours projected in 1972 provide a reasonably accurate description of existing noise exposure from current levels of aircraft activity at the Airport. Therefore, these CNEL contours which were incorporated into Santa Barbara County's Noise Element are also included in the Noise Contour Maps for the City's Noise Element.

METHODOLOGY

Philosophy of Analysis

When evaluating noise exposure, it is necessary to account for a number of diverse parameters. These include not only sound wave amplitude and frequencies, but also the time characteristics of the noise, reverberation and attenuation by structures and other barriers, the hearing ability of individuals exposed, and their activity during exposure. Such a description entails the use of several numerical indicators and would be specific to a particular site and situation. However, when evaluating noise exposure on a regional and community basis, such a complete description would be impractical. It is necessary then to choose a less detailed but reliable indicator of noise exposure and potential noise problems. This is the approach taken in this Noise Element.

The rating scheme used in this Element to describe transportation noise is the Day-Night Noise Level which results in a generalized single-number indicator of noise exposure. While the establishment of a completely valid single-number noise exposure index has been the goal of psychoacoustic experts for many years, no indicator has proven to be a fully adequate substitute for more complex descriptions. With that qualification in mind, it can be said that the single-number indices are useful tools in defining noise exposure for general planning purposes.

One other qualification regarding the noise exposures described in this report should also be noted. The noise levels were defined by use of mathematical models which rely heavily on the validity of the input data. In a number of instances, these data were incomplete or not available, and it was necessary to make reasonable estimates. In developing these estimates, a conservative approach was taken at each stage of data analysis. The end result of this process is that the noise exposures computed in this analysis may be somewhat high and could be considered to contain a "margin of safety." The intent of this approach is to ensure that any error introduced into the process is on the side of public benefit.

Measurement Scheme: Day-Night Noise Level

L_{dn}

In recent years, there has been a proliferation of noise rating schemes or techniques, and different agencies of the Federal and State governments have adopted different techniques. The result has been a general confusion by both government administrators and the public. A resolution to this problem has yet to be found in a uniformly accepted, single-number index of noise exposure that can be applied to all types of noise sources and that accurately reflects human response to sound.

To date, the most promising noise exposure index to be developed is the Day-Night Noise Level (abbreviated L_{dn}).

This index is based on two premises regarding human response to sound. The first is that humans will respond to a steady noise over a given period of time in the same way that they will respond to a time-varying noise with an equivalent amount of sound energy as the steady noise. The second premise is that humans are generally more sensitive to noise during the night than during the day.

The dominant characteristic of transportation noise is that it is not steady. There are constant fluctuations which may or may not be widely separated in time. At any given moment near a freeway or rail line, it may be quiet, but when traffic volumes or speeds increase that quiet is quickly displaced by high noise levels. Therefore, it is not appropriate to measure noise at any given moment and call that the noise level of the source. A statistical approach is required to account for the time-varying nature of the sound. Such an approach, however, would yield a large number of statistics to show the day, night, weekday, weekend, fair and foul weather differences in noise levels. Such a large number of parameters make baseline noise level mapping and noise control enforcement extremely difficult, if not impossible, to accomplish on a community-wide basis.

L_{dn}

The problem of time-fluctuating noise levels is further complicated by the fact that people are exposed to different sources of noise as they move from place to place in the community. For example, a typical factory worker spends time in a relatively quiet residential setting during the night, drives to work in high noise traffic, works around loud machinery all day, except for a quieter period at lunch, and then returns home. This pattern of exposure to different noise levels increases the number of descriptive parameters needed to evaluate the total noise "dosage" of people as they move through the day, and complicates the task of setting standards to protect human health and welfare.

To avoid a large number of noise indices, it became necessary for acousticians to develop single-number indicators. As the basis of such indicators, it has been shown that humans respond to steady noises in generally the same way as to fluctuating noises with equal energy content. The level of a constant sound which has the same sound energy as does a time-varying sound is termed the Equivalent Sound Level (abbreviated L_{eq}).

The L_{eq} concept was first introduced in Germany in 1965 to evaluate aircraft noise and has since received wide use in many countries. It has been adequately demonstrated that the L_{eq} can be used to describe the noise levels which cause annoyance and lead to permanent hearing loss.

The Day-Night Noise Level is based on the L_{eq} and the premise that noise at night is more annoying than daytime noise. This is primarily a reflection that most people sleep during the night. The L_{dn} uses the A-scale weighted L_{eq} as the basic expression of noise levels, over a 24-hour period, but applies a 10-dB penalty to the noise which occurs during the night hours (defined as 10:00 p.m. to 7:00 a.m.). This means that the method makes noise levels measured at night 10 dB higher than they actually are. The summary definition of L_{dn} is: the A-weighted average sound level in decibels during a 24-hour period with a 10-dB weight applied to nighttime sound levels.

The considerations discussed above form the basis of the rationale for selecting the L_{dn} as the primary noise evaluation scheme for the Noise Element. In summary, the L_{dn} has the following desirable characteristics:

1. The L_{dn} utilizes A-scale measurements of noise corrected for time-variance and nighttime exposure and, therefore, is a reliable single-number index of human response to noise.

2. The measure can be applied to any source of environmental noise, thereby providing a common scale to compare (and add) noise exposure from different sources.

3. The measure can be easily calculated from sound level meter recordings.

4. The measure can be used in predictive methodologies to estimate future noise levels.

CNEL

The L_{dn} represents an evolution of a noise measurement scheme called the Community Noise Equivalent Level (CNEL). The CNEL is virtually identical to the L_{dn}, but for one parameter. Rather than dividing the 24-hour day into two parts, the CNEL scheme adds a third period, the evening, which is defined as 7:00 p.m. to 10:00 p.m. Noise events during this evening period are assigned an additional 5 dB weighting.

CNEL and L_{dn} noise levels usually agree within plus or minus 1 dB for the same noise. The evening noise weighting has not been shown to yield a better indicator of human response to sound, and is considered an unnecessary complexity in the scheme. Therefore, it was dropped when the L_{dn} was developed. However, the CNEL scheme was used to compute noise exposures of aircraft in flight in the analysis conducted in 1972 by Bolt, Beranek & Newman for the County of Santa Barbara. This analysis was conducted to meet the requirements of California Administration Code, Title 4, Subchapter 6, which mandates the use of the CNEL scheme in evaluating noise around airports. Therefore, the air traffic noise levels indicated on the Noise Contours Map for this Element are expressed in CNEL. The contours were obtained from Santa Barbara County's Planning Department.

It is important to remember for the purpose of this Noise Element that there is no significant difference between the L_{dn} and CNEL noise levels. They may be compared directly and combined using "decibel addition" to estimate the total noise exposure of a site.

Direct Measurement

Noise levels at parks, schools, hospitals, and industrial sites were determined by direct measurement in accordance with amended requirements for Noise Elements. Measurements were made with a Pulsar Instruments Model 40 Sound Level Meter. Sound levels at these sites are described in terms of statistical noise levels, termed L_{10} and L_{50} sound levels. The L_{10} level is that level exceeded 10 percent of the measurement time period, and the L_{50} level is the level 50 percent of the time. For example, the notation L_{10} = 68 dBA means that for six minutes of each hour, the noise level exceeds 68 decibels as measured on the A-scale of a sound level meter. An L_{50} = 55 dBA means that for 30 minutes of each hour, the noise level exceeds 55 decibels as measured on the A-scale of a sound level meter. When the L_{10} and L_{50} levels are identical, or nearly so, it is an indication that the sound level being measured is constant, that is, a sound of an intensity which does not fluctuate widely with time.

Mathematical Modeling

General

Noise environments around roads and railroads were computed according to mathematical models of road and rail traffic noise developed by Wyle Laboratories. Specifically, the models used are published in Development of Ground Transportation Systems Noise Contours for the San Diego Region (Wyle Research Report WCR 73-8; for road traffic), and Assessment of Noise Environments Around Railroad Operations (Wyle Research Report WCR 73-5; for rail traffic). These models are based on a large sample of field noise measurements of road and rail traffic, and predict L_{dn} noise levels as a function of specified traffic data.

A modeling approach was taken in developing the noise contours for two reasons: (1) collection of input data for the models was more practical than collection of field measurements under the time and budget constraints of the study, and (2) modeling techniques for L_{dn} noise levels have been shown to be just as reliable as calculations based on field measurements. As a basis for this second reason, it should be remembered that the L_{dn} is not measured directly, but is calculated from measurements. These calculations require making estimates and developing averages that are subject to the same limits of error as mathematical modeling.

The exact expression of L_{dn} levels is found in integral calculus. For applications to road and rail traffic, however, it is possible to approximate the L_{dn} by expressions which avoid computation of the integral, and are accurate to within less than plus or minus 1 dB. The basic expression is:

$$L_{dn} = \overline{SENEL} + 10 \log N - 49.4$$

where,

$\overline{SENEL}$ = Average Single Event Noise Exposure Level

N = Number of road or rail operations

49.4 = A normalization factor equal to 10 log (3600 x 24)

and where,

$$SENEL = L_{max} + 10 \log_{10} t_{ea}, \text{ dB}$$

with,

L_{max} = maximum noise level as observed on the A scale of a standard sound level meter

t_{ea} = effective time duration of the noise level in seconds. It is about equal to ½ of the "10 dB down duration" or the duration for which the noise level is within 10 dB of L_{max}

and,

$$N = N_D + 10N_N$$

with,

N_D = Number of operations between 7 a.m. and 10 p.m.

N_N = Number of operations between 10:00 p.m. and 7:00 a.m.

The value of the modeling procedure is that the SENEL has been defined through sample measurements and correlated to such factors as vehicle speed and acceleration. This kind of information then, along with the number of operations, can be used to predict the L_{dn} noise levels. Other factors, such as existing noise barriers, can also be accounted for through modeling in estimating the propagation of noise into the community.

Input Data

The importance of the input data in mathematical modeling cannot be understated. The accuracy of the final noise level estimate relies heavily on this information as a description of the "real world." The following lists of information describe the kind of input data used in calculating the noise levels of transportation sources. Specific compilations of these data for the City of Santa Barbara are contained in Appendix B.

Road Traffic Data

1. List of roads selected for evaluation.
2. Road segment identification as defined by the following parameters (no. 3 through 9). When one of these parameters changes, a new road segment is defined.
3. Average Daily Traffic (ADT) broken down into hourly flows for the daytime (7:00 a.m. to 10:00 p.m.) and the nighttime (10:00 p.m. to 7:00 a.m.).
4. Lane configurations: number of lanes and average width of median strip divides, if any.
5. Percentage of diesel truck traffic on the road segment.
6. Representative speeds for road segments as determined by the posted speed limit and observations of variations to that limit.
7. Road grade conditions: mild (0 to 2 percent), moderate (3 to 5 percent), and severe (greater than 6 percent).
8. Lane distribution of road traffic by vehicle class; i.e., if the road has more than two lanes, what percent of total cars (and trucks) are in each lane.
9. Road sideline terrain characteristics; i.e., is the sideline elevated, depressed, or level with the roadbed.

Rail Traffic Data

1. Line segment identification.
2. Representative train speeds.
3. Average train lengths.
4. Grade conditions. Grades are considered in three categories: Level (within ± 0.75 percent), upgrade (greater than + 0.75 percent) and downgrade (greater than - 0.75 percent).
5. Sideline characteristics.
6. Identification of track characteristics:
    a. Mainline welded or jointed track.
    b. Low speed classified jointed track.
    c. Presence of switching frogs or grade crossings.

d. Tight radius curves
   i. radius less than 600 feet
   ii. radius 600 to 900 feet
   iii. radius greater than 900 feet

e. Presence of bridgework
   i. light steel trestle
   ii. heavy steel trestle
   iii. concrete structure

7. Number of operations broken down into the number of day and night operations.

The information describing road traffic in the City was provided by the City's Department of Transportation, Santa Barbara County Transportation Study, and CALTRANS. Rail traffic data were provided by the Southern Pacific Transportation Company and obtained from Santa Barbara County's Draft Noise Element. The References section lists the sources of published and unpublished data used in computing noise exposures.

Future Noise Projections

General

In planning for noise control at the local government level, it is necessary to consider what the future noise environment may be like. For the most part, two factors will control environmental noise levels over the next 20 years. These are (1) the level of use transportation facilities will receive, based on estimates of demand; and (2) advances in noise reduction technology and better application of existing technology. It is safe to assume that noise emissions will be reduced at the source to a certain extent. That reduction may be counter-balanced, however, by an increase in the number of sources, specifically, the volume of traffic. In addition, there are limits to what can be achieved in technological solutions to the noise problem. For example, a major contributor to road traffic noise is tire noise. Reductions in tire noise are limited, at least in existing technology, by safety considerations in tread design.

Because of the limitations of technology and the expected increase in traffic, land use regulation will be a necessary part of noise control over the next 20 years. Through a combination of noise source control by the Environmental Protection Agency and land use control by local governments, a noise environment compatible with a variety of activities can be achieved.

Road Traffic

In forecasting 1990 noise levels from road traffic, it has been assumed that automobiles and trucks will still utilize rubber tires on asphalt and concrete surfaces. This assumption limits the amount of noise reduction which can be expected from technological means alone. Even if engine and exhaust noise could be eliminated, the interaction between tire tread and road surface would continue to emit high noise levels.

The characteristics of automobile noise are expected to remain the same as existing vehicles, but the level of noise is forecast to decrease by about 3 dB over the typical range of operating speeds (Figure 8). This level of noise reduction assumes enforcement of legal constraints and application of currently available technology.

Noise emissions from heavy trucks are also assumed to decrease for the forecast year. This will require application of current "state-of-the-art" technology at the production level. Such technology indicates that maximum noise levels of 70 dBA at 50 feet are attainable. This represents a noise level reduction of 10 to 15 dB from some models currently in use (Figure 9). Levels much below 70 dB do not seem to be feasible at this time because of economic and safety considerations in tire design.

Overall noise levels from road traffic, then, are assumed to decrease at the source for purposes of this Element. If legal constraints go unenforced, or if adequate noise control technology is not applied, noise levels will, of course, increase. Conclusions from the Santa Barbara County Transportation Study indicate road traffic volumes may double in some areas of the City by 1990. This translates into a 3 dB increase in noise levels. Since it is always possible that the necessary noise control technology will not be applied in the coming years, it is necessary to review this Element periodically to assess the validity of the noise projections.

FIGURE 8

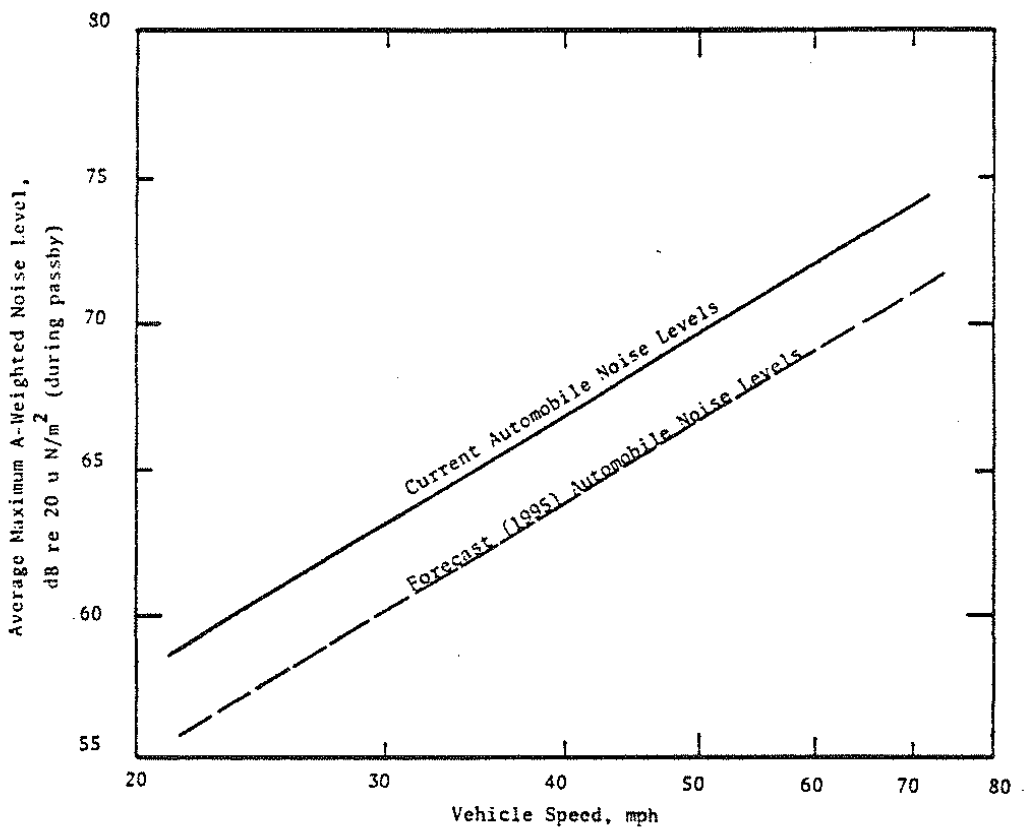


Figure 8. Average maximum passby noise levels of automobiles (at 50 feet) for current and forecast years (Source: Wyle Laboratories, 1973)

FIGURE 9

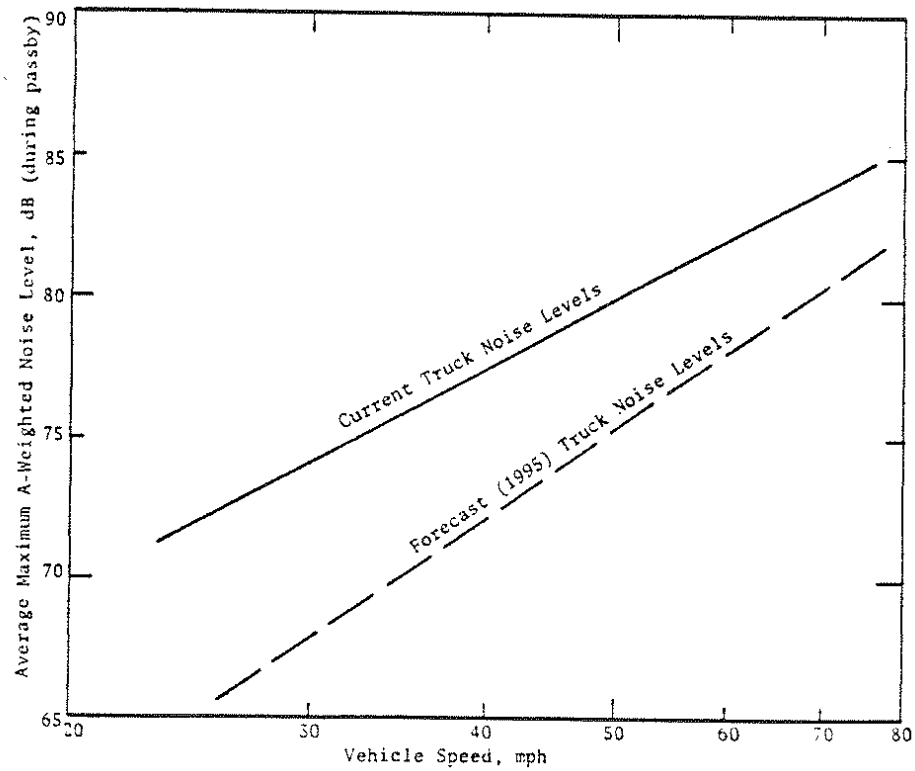


Figure 9. Average maximum passby noise levels of heavy trucks (at 50 feet) for current and forecast years (Source: Wyle Laboratories, 1973).

Rail Traffic

For the general planning purposes of the Noise Element, the noise levels associated with current rail traffic are assumed to describe noise levels for the forecast year. The rationale for this assumption is twofold. Either the railroad will continue to carry freight and few passengers at current volumes, or the railroad will be restored as a major transportation mode. If the second alternative is realized, it is most likely that major track rights-of-way alignments will be affected, and new, high-speed trains will be produced. Some data describing the expected noise effects of this alternative are available from studies of the BART (Bay Area Rapid Transit) system in the San Francisco area and from Department of Transportation studies on experimental trains. Generally, these studies forecast quieter trains which are capable of higher speeds than existing trains. It is not possible to adequately predict the effects of any of this new technology on the City of Santa Barbara. Enough information is not available at this time.

Continuation of existing levels of rail traffic noise is, therefore, the most realistic projection for at least the intermediate future. As the price of gasoline continues to increase, the relatively energy-efficient train may assume a greater share of the freight traffic in California. Measuring this possible effect and its effect on noise is difficult, and beyond the scope of this Element.

Air Traffic

Existing federal legislation will reduce future noise emissions from individual aircraft. Federal Aviation Regulation (FAR), Part 36, regulates the amount of noise that legally can be produced by newly developed aircraft. As a result of this regulation, recent aircraft types such as the Lockheed L-1011, Douglas DC-10 and Boeing 747 are

quieter and less annoying than their predecessors. The exhaust nozzles and fan stages are still the primary noise producing components of the newer high bypass ratio turbofan engines, but the intensity of the noise generated by these components has been significantly reduced. However, none of these large, new aircraft types currently service Santa Barbara Municipal Airport.

FAR Part 36 also sets standards for sound modification of older, noisier turbojet or low-bypass turbofan aircraft. Fifty percent of an airline's fleet of two or three engine aircraft must be retrofit with Sound Absorbing Material (SAM) nacelle treatment by January 1, 1981. The remaining fifty percent of the fleet must be retrofit by January 1, 1983 (Mr. Altman, Hughes Airwest). Assuming that these standards are met, the noise generated by individual turbofan jets servicing Santa Barbara's Airport will be reduced by 1983. However, this improvement will be partially offset by potential increases in the number of flights.

The County's Draft Noise Element states that previous projections of future commercial air travel and general aviation activity were based on population projections for the County which are no longer considered appropriate. Therefore, in the absence of accepted forecasts of air traffic for the Santa Barbara Municipal Airport, the County prepared Table 2 to illustrate a range of future airport noise exposure possibilities. Changes in Community Noise Equivalent Level exposure near the Airport can be determined by comparing the percent increase in aircraft operations with the decibel reductions in "average" aircraft noise levels. The example presented in the County's Draft Noise Element (p. 36) which accompanied the table was the following:

"...if at some point in the future aircraft are on average 4 dB quieter than those operating today, and if at the same time total aircraft operations have increased 30%, noise exposure in CNEL will have been reduced by about 2.9 dB."

TABLE 2
Change in Airport Noise Exposure
Expressed in CNEL*

Increase in Aircraft Operations %	Reduction in Average Aircraft Noise Level (dB)					
	0	2	4	6	8	10
1	0	- 2.0	-4.0	-6.0	-8.0	-10.0
10	+0.4	- 1.6	-3.6	-5.6	-7.6	-9.6
20	+8.0	- 1.2	-3.2	-5.2	-7.2	-9.2
30	+1.1	- 0.9	-2.9	-4.9	-6.9	-8.9
50	+1.8	- 0.2	-2.2	-4.2	-6.2	-8.2
100	+3.0	+1.0	-1.0	-3.0	-5.0	-7.0
150	+4.0	+2.0	0	-2.0	-4.0	-6.0

* Table Assumes:
1. Operations of all aircraft types increase proportionately.
2. No change in distribution of operations between daytime and nighttime.
3. No change in aircraft operational procedure.

Source: Santa Barbara County Draft Noise Element.

Noise Contouring

Quantitative estimates of existing and future noise exposure in the City are provided in two forms in this report. Appendix C contains this data in tabular form, and the Noise Contours Maps show the data in graphic form. The noise contours are lines connecting points of equal sound intensity. They form bands 5 dBA in width along the roads, railroad, and around the Airport. Some attempt was made in this analysis to account for the attenuative effects of the more significant sideline features along the freeway and rail line. These are primarily the areas in which the route is depressed relative to the surrounding topography or is immediately adjacent to a large elevation. The effect of these sideline features is to attenuate the propagation of higher sound levels into the community. This is represented by the contour lines being closer together. Analysis of attenuation and reverberation due to small sideline features, such as buildings, is beyond the scope of this analysis and would not be appropriate to noise evaluation at a city-wide level for general planning purposes. It should be remembered, then, that the noise contours are general indicators of noise exposure and not precise levels. It should also be noted that the noise contours only represent noise generated by road, air and rail traffic. These contours will not account for interior noise or outdoor noise generated by construction work, individual persons, miscellaneous noises such as window air conditioning units, or other stationary sources.

The preparation of the noise contour maps involved a certain amount of estimating and smoothing. For example, the contour lines at intersections of roads were rounded away from the intersections indicating an increase in noise levels. Intersections are generally noisier than line sources because traffic volumes increase there. Additionally, many vehicles (e.g., trucks) create more noise under stop-and-go conditions than at steady speeds. The rounding of the contour lines represents this condition, but is not an exact estimate of the magnitude. Precise estimates should be made through site analysis.

The procedure used in contour mapping for this Noise Element is in compliance with Government Code Section 65302(g) as amended. Contours are shown in increments of 5 dB and continue down to 60 dB. Noise exposure levels for parks, schools, hospitals and rest homes were determined by direct measurement (see Appendices D, E, and F).

NOISE ENVIRONMENT

Noise-Sensitive Land Uses

The Noise Contours Maps show the location of existing and proposed parks, schools, nursing homes and hospitals as examples of noise sensitive land uses. Appendix F contains a list of the Health Care Facilities included on the maps and Guest/Rest Homes which may be considered as noise sensitive uses, but were not mapped. The omission of other land uses from the maps is not intended to imply that these are the only noise sensitive uses. Rather, these are the examples required by the Government Code.

All land uses may be considered to be sensitive to noise, but to different levels. Land use sensitivities may be thought of as a continuum with some uses able to tolerate a high level and others unable to tolerate any but the quietest level. The level of tolerable or "acceptable" noise is a function of the subjective desires of the community and the average exposure times of people in different areas. This latter concept is related to the premise underlying the Sound Equivalent Level. That is, it is acceptable to be exposed to high noise levels for part of the day as long as this exposure is compensated by being in a quiet environment later on. For example, the acceptable noise level for industrial land use is 75 dBA (L_{dn}). A person working in that environment, however, should be

compensated by spending a certain amount of time in an interior residential area where the acceptable noise level is 45 dBA (L_{dn}).

The land use noise standards recommended in the Policy Report serve, in effect, to define the sensitivity of each land use. The maximum acceptable noise level for a land use is the level dividing the "Normally Acceptable" and "Normally Unacceptable" noise levels. A summary of these noise level standards is presented in Table 3. These standards may be used in identifying potential noise conflict areas as described in the next section.

Noise Conflict Areas

Potential noise conflict areas are those sections of an existing or proposed land use exposed to noise levels which are incompatible with that use of the land. They are termed "potential" noise conflict areas because both the land use and noise exposure representations are generalized. A site analysis might show that the particular area in conflict is not as sensitive as the general land use. For example, the conflict area of McKinley School occurs within 50 feet of the roadway. It could be that this area is used for parking rather than classrooms. It would also be that structures or other noise barriers exist at the site which reduce the noise to acceptable levels. The intent of identifying noise conflict areas, then, is to point out those places which deserve site analysis in a noise control program.

The actual identification of a noise conflict area is a simple, graphical problem given the noise sensitivities of various land uses and a noise contours map. By overlaying a land use map with a noise contours map, identification of conflicts can be made directly. Once these conflict areas have been identified, it is recommended that a site analysis be conducted to determine the precise nature of the noise problem, if any is confirmed to exist.

Table 4 contains a list of potential noise conflict areas in the City of Santa Barbara based on the noise sensitive land uses listed in the "Guidelines for the Preparation and Content of Noise Elements of the General Plan." It should be noted that this relatively short list of potential noise conflict areas does not consider land uses other than parks, schools and hospitals. Incompatible outdoor noise levels may well impact residential or commercial uses which were not included in this analysis. Appendix F contains a list of rest homes and noise levels at each location.

Noise Exposures

Noise exposure is defined as the total acoustical stimulation reaching a person's ear over a specified period of time. How much noise exposure is acceptable for what land uses and times of day are questions that are addressed in the Policy Report. The recommended land use noise compatibility guidelines in the Policy Report are intended to provide some answers. Using these guidelines (summarized in Table 3) as criteria for analysis, Table 5 lists the major noise sources in the various areas of the City. The guiding criteria in judging whether a transportation noise source is a "major" source is whether it emits an L_{dn} of 65 dBA or more. Noise exposures from these sources are likely to be incompatible with the more sensitive land uses such as parks, schools, hospitals and residences. These sources, then, may be considered as the potential noise problems in the City. In most cases, these sources are generating significant noise during the current year but are projected to generate lower levels in the forecast year, 1990. In other cases, however, the source may continue to be a major problem in 1990.

TABLE 3
SUMMARY LAND USE
COMPATIBILITY STANDARDS

Land Use Category	Normally Acceptable Exterior Noise Exposure, L_{dn} dBA[1]
Residential-Single Family, Duplex, Mobile Homes, Multiple Family, Dormitories, etc.	60
Transient Lodging	70
School Classrooms, Libraries, Churches	65
Hospitals, Nursing Homes	65
Auditoriums, Concert Halls, Music Shells	60
Sports Arenas, Outdoor Spectator Sports	65
Playgrounds, Neighborhood Parks	65
Golf Courses, Riding Stables, Water Recreation, Cemeteries	70
Office Buildings, Personal, Business, and Professional	75
Commercial-Retail, Movie Theaters, Restaurants	75
Commercial-Wholesale, Some Retail Industry, Manufacturing, Utilities	80
Manufacturing-Communications (Noise sensitive)	70
Livestock Farming, Animal Breeding	75
Agriculture (except Livestock), Mining, Fishing	95
Public Right-of-Way	85
Extensive Natural Recreation Areas	75

[1] These noise exposure levels represent the upper limit of the range of "normally acceptable" noise levels. "Normally acceptable" is defined as being an exposure that is great enough to be of some concern, but common building constructions will make the indoor environment acceptable, even for sleeping quarters. Above these levels, unusual and costly building constructions are necessary to ensure adequate performance of activities.

TABLE 4
POTENTIAL NOISE CONFLICT AREAS

Heavily Impacted Areas[1]	Local Noise Source(s)
Oak Park Convalescent Hospital	Highway 101
Santa Barbara Convalescent Hospital	Highway 101
Wilson School	Highway 101
Bohnett Park	Highway 101 & Railroad
A Child's Estate	Highway 101 & Railroad
Andree Clark Bird Refuge	Highway 101 & Railroad
Dwight Murphy Field	Highway 101 & Railroad
Moreton Fig Tree	Highway 101 & Railroad
Municipal Tennis Courts	Highway 101
Palm Park	Cabrillo Blvd. & Railroad

Slightly Impacted Areas[1]	Local Noise Source(s)
Oak Park	Highway 101 & Railroad
Las Positas Park	Las Positas Road
Adams School	Las Positas Road
McKinley School	Cliff Drive
Monroe School	Cliff Drive
Santa Barbara City College	Cliff Drive
Santa Barbara Jr. High	Milpas Street
West Beach	Cabrillo & Railroad
East Beach	Cabrillo
Ambassador Park	Cabrillo
Vera Cruz Park	Haley Street
Municipal Golf Course	Highway 101

Additional Potential Conflict Areas[2]	Local Noise Source(s)
Lincoln School	Anacapa
Santa Barbara High School	Anapamu
Plaza del Mar	Castillo & Cabrillo

[1] Based on estimated contours for 1978.

[2] Based on noise monitoring.

TABLE 5
MAJOR NOISE SOURCES

Existing (1977/1978)	Future (1990)
70 dB(A) and above	
Highway 101	Highway 101
State Street	
Las Positas Road	
Cabrillo Boulevard	
65-70 dB(A)	
Carrillo Street	Carrillo Street
Meigs Road	Meigs Road
Cliff Drive	Cliff Drive
Milpas Street	Milpas Street
Mission Street	State Street
Anacapa Street	Las Positas Road
Santa Barbara Street	Cabrillo Boulevard
De la Vina Street	
Chapala Street	
Haley Street	
San Andres Street	
Foothill Road	
La Cumbre Road	

CONCLUSIONS AND ASSUMPTIONS

The following conclusions and assumptions are a summary of the major technical findings of this analysis of environmental noise in the City of Santa Barbara, and are integral to the objectives of the Policy Report.

Conclusions

1. In general, the City of Santa Barbara may be considered a relatively quiet environment. Ten potential major noise conflict areas were identified from a list of 98 possible problem areas within the City. An additional 12 potential minor conflict areas were also identified, based on the estimated locations of noise contours. Monitoring conducted at locations of noise sensitive uses revealed three more potential minor conflict areas. Of the more than one hundred road segments evaluated for traffic noise, segments on four principal roadways were associated with L_{dn} noise levels of 70 dBA of higher. This is not to say that the City is without noise problems. Rather, the major noise sources are few in number and of limited impact.

2. The most significant source of noise in the City is road traffic, followed by rail and air traffic. Of the roads evaluated for noise exposure, the following were found to be associated with L_{dn} noise levels of 70 dBA or higher: U.S. 101, State Street, Cabrillo Boulevard, and Las Positas Road. Table 5 lists roads with L_{dn} noise levels of 65 dBA or higher.

3. Rail traffic on the Southern Pacific line is infrequent, but creates intense noise events such that the total sound energy associated with the railroad is nearly equivalent to that of U.S. 101. Noise sensitive areas potentially impacted by railroad noise include Wilson School, Bohnett Park, Palm Park, A Child's Estate, Andree Clark Bird Refuge, Dwight Murphy Field and the Moreton Bay Fig Tree.

4. The Municipal Airport is a source of local noise. California Airport Noise Standards require that, by January 1, 1986, no residential dwellings (except acoustically treated units) exist within the Airport's 65 dB CNEL contour. The Draft Noise Element for the County of Santa Barbara estimated that approximately 280 housing units are located within the 65 dB CNEL contour established by Bolt, Beranek & Newman in 1972. If the schedule for reduced aircraft noise set forth in Federal Aviation Regulation, Part 36, is met, and if the number of flights does not significantly increase, the area within the 65 dB CNEL contour could be reduced by 1983. Additional measurements should be made at that time to delineate the new contour line and the number of dwelling units remaining within the 65 dB contour, and if further noise reductions are not anticipated by 1986, these remaining units will have to be acoustically treated. The Federal Aviation Administration should be encouraged to modify aircraft operational procedures in order to reduce noise over sensitive areas. Any further residential use in areas under the City's jurisdiction immediately adjacent to the airport should be prohibited. The County should ensure that additional noise sensitive land uses are avoided within the existing 65 dB contour and preferably within the 60 dB contour as well.

5. Potential major noise conflict areas have been identified at the following sites: Wilson School, Oak Park Convalescent Hospital, Santa Barbara Convalescent Hospital, Palm Park, Bohnett Park, A Child's Estate, Andree Clark Bird Refuge, Dwight Murphy Field, Municipal Tennis Courts, and the Moreton Bay Fig Tree. An additional 12 potential minor conflict areas were also identified, based on the estimated locations of noise contours. Three more potential minor conflict areas were revealed during monitoring of noise sensitive locations (see Table 4). Appendix F contains a list of Rest Homes and approximate noise levels at each location. Further site acoustic studies should be conducted to aid in defining the precise nature of the noise problems, should any be confirmed to exist.

Assumptions

1. Future noise levels due to road traffic are expected to be a function of increased traffic volumes and the applications of noise control technology. The analysis of this report assumes that noise control technology will be applied (as required in the California Vehicle Code, Section 27160), and that this will counteract the expected increase in road traffic in most, but not all cases. Thus, road traffic noise is forecast to remain the same or decrease somewhat by 1990.

2. Current noise levels generated by the Southern Pacific Railroad are assumed to persist for at least the intermediate future, based on the assumption that existing levels of railroad traffic remain constant. If rail traffic increases, noise levels will correspondingly increase.

3. The improvement in aircraft noise exposure resulting from compliance with Federal Aviation Regulation, Part 36, may be partially offset by increased airport activity. No dramatic reductions in aircraft engine noise are anticipated in the next 10 years unless there is a major technological breakthrough. In the absence of accepted projections of air traffic growth for the Santa Barbara Municipal Airport, the noise contours projected by Bolt, Beranek & Newman are considered as adequately describing the 1990 noise exposure.

3. The improvement in aircraft noise exposure resulting from compliance with Federal Aviation Regulation, Part 36, may be partially offset by increased airport activity. No dramatic reductions in aircraft engine noise are anticipated in the next 10 years unless there is a major technological breakthrough. In the absence of accepted projections of air traffic growth for the Santa Barbara Municipal Airport, the noise contours projected by Bolt, Beranek & Newman are considered as adequately describing the 1990 noise exposure.

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Flood Plain Map

Legend
Creeks
FEMA - Flood Zone
A - High Risk, 1% chance flood per year
AE - High Risk, Base Floodplain
AH - High Risk, 1% chance of shallow pond flooding per year
AO -High Risk, 1% chance of shallow stream flow flooding per year
VE - High Risk, 1% chance of coastal storm flooding per year
D - Undetermined but potentially High Risk
LAURO RESERVOIR
LAGUNA BLANCA
ANDRE CLARK BIRD REFUGE
PACIFIC OCEAN
State St
0 750 1,500 3,000 4,500 6,000 Feet
1:30,000
NAD 1983 State Plane
California V FIPS 0405 (Feet)
City of Santa Barbara
General Plan
Flood Map
Map prepared by City of Santa Barbara, Planning Division, Nov 2011