Chapter V.

ENVIRONMENTAL HAZARDS

GEOTECHNICAL ELEMENT

PURPOSE

The Geotechnical Element intends to provide information regarding the geological and seismic conditions and hazards affecting the City of Banning, its Sphere-of-Influence (SOI), and the expanded General Plan planning area. A series of goals, policies, and programs are set forth in the Geotechnical Element focused at providing protection for the general health and welfare of the community and reducing potential impacts, such as loss of life and property damage, associated with seismic and geologic hazards. The Element, including maps and other supporting document will serve as a source of foundational information concerning regional geotechnical hazards, which are significantly essential to establishing future land use policies and decisions.

BACKGROUND

The physical characteristics of the planning area and the safety of the community are examined in the Geotechnical Element. The Element itself is closely related to a number of other elements of a General Plan, such as Land Use, Circulation, Housing, Economic/Fiscal, Public Buildings and Facilities, Emergency Preparedness, Water, Sewer and Utilities. It is also directly related with the many issues addressed in the Flooding/Hydrology and Police and Fire Protection Elements.

Under the California Government Code and Public Resources Code, a General Plan must include an element that addresses seismic safety issues. In compliance to Government Code Section 65302(g), the General Plan must address the need to protect the community from unreasonable risks that could result from seismically induced hazards, such as surface rupture, groundshaking, ground failure, seiching, dam failure, subsidence, and other known harmful geologic risks. The Geotechnical Element meets, in part, Government Code Section 65303, which allows a General Plan to also address other subjects related to the physical development of the community. Government Code Section 8876 sets forth a program that mandates the City and all other jurisdictions located within the most severe seismic shaking zone, designated as Zone 4 (as established in Chapter 2-23, Part 2, Title 24 of the Administrative Code), to identify all potentially hazardous or substandard buildings and implement a program for the mitigation of these structures.

GEOLOGIC CONDITIONS IN THE PLANNING AREA

The City of Banning is bounded to the north by the San Bernardino Mountains and the San Jacinto Mountains to the south. The majority of the City area is located in a narrow, east-trending valley known as the San Gorgonio Pass. The pass extends westward from the Coachella Valley and joins with the Beaumont Plain and the San Timoteo Badlands farther west. Its highest elevation is approximately 2,600 feet, which occurs near Beaumont. A number of major streams, and many other smaller streams and tributaries occur along the canyons of the San Bernardino

Mountains, including the San Gorgonio River that flows through the Banning Canyon. For the greater part of the year, streams in the Banning area are dry and convey significant flows only during the wet winter months.

Geologic and climatic processes have influenced the physical features of the Banning area in the last few million years. The City of Banning is located at the junction of two distinct geomorphic/geologic boundaries. Banning is located at the boundary of two great tectonic plates, the North American Plate and the Pacific Plate. The San Andreas Fault forms the boundary for the said tectonic plates. In addition to this, the City is located within two geomorphic provinces, each of which has its own unique physical characteristics. The Transverse Ranges Province, which encompasses the majority of the planning area, and the Peninsular Ranges Province, which includes the planning area's southern edge. The San Gorgonio Pass marks the boundary between them. The San Gorgonio Pass was created by tectonic forces and constitutes a down-dropped landmass filled with thick deposits of alluvium.

SOIL PROFILE

The following descriptions of soils units in the planning area, including engineering characteristics, have been compiled from various sources, including published regional geologic reports and papers.

There are six types of geologic deposits that underlie the Banning planning area. These consist of: 1) igneous, granitic, and metamorphic rocks associated with the San Bernardino and San Jacinto Mountains; 2) sedimentary rocks located in the eastern, central and southern portions of the Banning planning area; 3) bedrock and rubble associated with landslides and occurring to the north and south of the plan area; 4) older alluvial fan deposits; 5) young or recent alluvium deposits; and 6) artificial fill. Please refer to Exhibit V-1 for the geologic map of the Banning area.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Fault lines on the map are used solely to approximate the fault location. The width and location of the faults should not be used in lieu of site-specific investigations, evaluation, and design.

Detailed geologic investigations, including trenching studies, may make it possible to refine the location and activity status of a fault. All faults may not be shown. This map should be amended as new data become available and are validated.

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Explanation

Young Alluvium

- Qw — Alluvium within active channels and washes. Predominantly unconsolidated sand, gravel, and boulders, with a lesser amount of silt. (Holocene)
- Qyw — Alluvium within recently abandoned channels. Predominantly unconsolidated sand, gravel, and boulders, with a lesser amount of silt. (Holocene)
- Qf — Alluvium of modern alluvial fans - surfaces undissected. Predominantly unconsolidated silt, sand, gravel, locally with boulders. (Holocene)
- Qyf — Young alluvial fans - surfaces slightly to moderately dissected, soil profiles with weak argillic horizons. Predominantly unconsolidated silt, sand, gravel, locally with boulders. (early Holocene to latest Pleistocene)

Older Alluvial Fan Deposits

- Qof — Alluvium of old, inactive alluvial fans - surfaces moderately to well dissected; soil profiles with moderate argillic horizons. Moderately consolidated tan to dark brown silt, sand, gravel, and boulders. In the Banning Bench area, boulder-sized clasts consist predominantly of extremely weathered metamorphic rocks. (late to mid Pleistocene)
- Qof — Alluvium of very old inactive alluvial fans - surfaces moderately to well dissected; soil profiles with well developed argillic horizons. Moderately to well consolidated silt, sand, gravel, and boulders. In the Banning Bench area, boulder-sized clasts consist predominantly of extremely weathered metamorphic rocks. (late to mid Pleistocene)

Landslides

- Qls — Bedrock landslides or suspected landslides. Landslides have been mapped primarily on their topographic expression and have not been investigated.

Sedimentary Rocks

- QTst — San Timoteo Formation: Tan to light gray non-marine sandstone, siltstone, and conglomerate. Common light colored granitic clasts, with minor metamorphic clasts. Interbedded locally with freshwater limestone. Poorly bedded. (Pleistocene and Pliocene)
- Ts — Undifferentiated gray sedimentary and volcanic rocks. (Pliocene and Miocene)

Basement Rocks of the San Bernardino Mountains

- ps — Pelona Schist. Metamorphic rock consisting of massive amphibole, with minor quartzite (Paleozoic) (metamorphic age).
- prb — Mix of igneous and metamorphic rocks of varying composition, commonly with transitional boundaries. Generally consists of a metamorphic complex (metasedimentary and meta-plutonic rocks) intruded by younger plutonic rocks of quartz monzonite composition.

Basement Rocks of the San Jacinto Mountains

- gr — Predominantly coarse-grained, relatively homogeneous granodiorite, with light gray tonalite, and quartz diorite. Contains scattered remnants of an older metamorphic complex consisting of gneisses, schists, phyllites, and quartzites. (Mesozoic, Paleozoic and possibly Precambrian).

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Dibblee, 1981; Matti et al., 1992.; Yule and Sieh, 2003; Morton and Matti, in review; Bloyd, 1971; and review of aerial photographs by Earth Consultants International.

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

- City Limits
- Sphere of Influence
- Planning Area

See Plate 2-2a for unit descriptions

Earth Consultants International

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Banning General Plan
Geologic Map of the Study Area

Exhibit
V-1

Igneous, Granitic, and Metamorphic Basement Rock

Geologic deposits in the Banning planning area include the basement rocks of the San Bernardino and San Jacinto Mountains. The San Bernardino Mountains to the north of the Banning planning area have been formed from a heterogeneous mix of igneous and metamorphic rock estimated to be from the pre-Cambrian to Paleozoic age. North of the Banning fault, in the northern part of the City, Mesozoic igneous rocks have intruded with these ancient rocks. The basement rocks of the San Bernardino Mountains are categorized as ps for Pelona Schist and sgb for metasedimentary and meta-plutonic rocks. The San Bernardino Mountains basement rocks are very dense and generally have low potential for expansion, except in clayey shear zones where soil expansion range from moderate to high. These geologic units are associated with moderate to poor slope stability and the common occurrence of rockfalls, tallus slopes and surficial slides. Given the steep slopes and fractured, crushed conditions, the potential for erosion on these rocks ranges from moderate to high.

The San Jacinto Mountains to the south is composed of granitic and metamorphic rocks from the pre-Cambrian to Mesozoic age. These rocks can be seen in the hills along the southern margin of the City. Further, these rocks are commonly very fractured, locally crushed, and sheared because they are brittle and have been subjected to tectonic activity over millions of years. The San Jacinto Mountains basement rocks are also very dense and have low potential for expansion. Granitic rocks have slope stability ranging from moderate to good, however small suspected landslides exist in the mountains along the southern edge of the Banning area. Erosion potential is based on the degree of rock weathering, ranging from low to moderate.

Sedimentary Rocks

Bedrock materials underlying the Banning planning area include sedimentary rocks formed during the Miocene-to Pleistocene Epoch. There are two types of sedimentary rocks that occur in the Banning planning area. One is the QTst unit that occurs in the southern planning area and in the central part of the City between the Banning and San Gorgonio Pass faults. The QTst unit is primarily composed of non-marine siltstone, sandstone and conglomerate of the San Timoteo Formation. These sediments have been substantially folded, and are overlain by older alluvial fans. The QTst unit is associated with the Pleistocene and Pliocene Epochs. The Ts unit is another type of sedimentary rock which can be found in limited portions along the eastern boundary of the Banning planning area. The Ts unit is associated with the Pliocene and Miocene Epochs and can be described as undifferentiated gray sedimentary and volcanic rocks.

The sedimentary rock units that occur in the Banning planning area have low expansion potential for sandstone and conglomerate substrates, while siltstone and clayey siltstone could have moderate to high expansion potential. Although, these sedimentary rocks demonstrate good slope stability, weak bedding layers (silt and clays) provide potential slip planes if support is removed. Sedimentary rocks have moderate erosion potential, but that may increase with water concentration.

Bedrock and Rubble

The Banning planning area is underlain by bedrock and rubble materials associated with landslides. Landslides are movements of relative large landmasses, either as nearly intact

bedrock blocks, or as jumbled mixes of bedrock blocks, fragments, debris, and soils. The surrounding mountains in the Banning area have experienced numerous large landslides, including one that occurred in the northern part of the City. As previously noted, other smaller suspected landslides occur in the mountains situated along the southern portion of the planning area. Landslides may be very dense, with surface and margins which are often more compressible. Expansion potential is dependent upon soil and rock types. The potential for erosion varies with the condition and weathering of the slide debris. Landslide materials have generally poor slope stability. Therefore, determination of slide stability requires geologic and engineering analysis.

Pleistocene Alluvial Fan Deposits

Surface deposits in the Banning planning area include alluvial fan deposits dating back to the Pleistocene Epoch. These deposits are prevalent in the western portion of the Banning planning area on the valley floor, and in the Banning Bench area to the north. Based upon strategraphic position, degree of stream dissection, and the extent of surface soil development, two types of older fan deposits occur within the Banning area. These are: the Qdf, which represents the older unit, and the Qof. In general, Pleistocene Epoch alluvial fan composition is moderate to well-consolidated sediments combined with silt, sand, gravel and boulders. Older alluvial fan deposits have surfaces that are moderately to well dissected and have argillic (clayey) soil horizons. Movement on the San Gorgonio Pass fault has uplifted and back-tilted older alluvial fan deposits in the southern part of the Banning Bench.

In comparison to young alluvium, older alluvial fan deposits are more consolidated and therefore, could provide better structural support. Soil profiles include high variable potential for expansion due to surface clay materials, and low to moderate erosion potential. Older alluvial deposits have generally good slope stability except in areas where stream erosion has created steep-sided banks, such as along Smith Creek and the San Gorgonio River.

Holocene to Latest Pleistocene Young Alluvium

Young alluvium is the predominant surface material in the entire Banning planning area. It occurs largely in the eastern and central portions of the planning area and is generally found in channels and washes. Based on age, four types of young alluvium units have been identified within the Banning planning area. These are Qw, Qow, Qf, and Qyf. The Qw, Qow, and Qf units represent the most recent deposits in active stream channels and modern flood plains, while the Qyf unit refers to fan deposits of Holocene and latest Pleistocene age. Young alluvium is composed of unconsolidated sediments containing a mixture of silt, sand, gravel, and boulders. Alluvium soil properties are interrelated with location and the manner by which this soil type was deposited. For instance, alluvium deposits at the base of mountains and hills are coarse grained, poorly sorted, usually contain organic debris and commonly deposited at a rapid rate. Engineering issues associated with these alluvium deposit include: 1) compressibility resulting from additional loads, and 2) collapse or hydroconsolidation which occurs when water is introduced if the deposit is dry. Further, alluvium is highly subject to erosion and is also vulnerable to slope failure on slopes with gradients greater than approximately 2:1 (horizontal to vertical). Boulders could pose a challenge to earthwork and foundation construction.

Artificial Fill

Artificial fill refers to deposits of man-made fill widely distributed throughout the City of Banning. Artificial fill include road and bridge embankments, and man-made fills associated with graded developments. This type of deposit varies in size, age, composition, area, and depth.

GEOLOGIC HAZARDS

Landslide and Slope Instability

In the City of Banning, as development reaches higher elevations within the hills, landslides and slope instability are considered a significant risk. Slope failures can occur on the steep slopes of the foothills and mountains that surround Banning during or after periods of intense rainfall or in response to strong seismic shaking. Other areas potentially prone to landslides and slope instability include areas with steep canyon walls and the natural slopes facing the southern edge of the City, which are likely to be impacted by rockfalls, rockslides, and soil slips. Landslides could also occur in southern Banning Bench on shallow subsurface sedimentary rock that are generally massive to thickly bedded. Exhibit V-2 shows the areas in hillside terrain that are susceptible to slope failure. This exhibit also shows the areas where assessments and engineering analyses should be conducted prior to development.

Many factors contribute to slope failure, including slope height, slope steepness, shear strength and orientation of weak layers in the underlying geologic unit, as well as pore water pressures. While slope failures can occur on natural slopes, man-made slopes could also fail generally due to poor engineering or poor construction. Slope failures often occur as elements of interrelated natural hazards in which one event triggers a secondary event, such earthquake-induced landsliding, fire-flood sequences, or storm-induced mudflows. Mitigating risks associated with landslides and slope failures involve careful land planning and management in hillside. This generally includes land use zoning to restrict development in unstable areas, grading codes for earthwork construction, geologic and soil engineering investigation and review, construction of drainage structures, and where required, placement of warning systems. Other important factors are risk assessments (including susceptibility maps), a concerned local government, and an educated public.

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Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Derived from USGS 10m Digital Elevation Model
Matti et al., 1992; and review of aerial photographs by Earth Consultants International.

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

- Low
- Moderate
- High
- Existing Landslide
- City Limits
- Sphere of Influence
- Planning Area

Earth Consultants International

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Date: April 2004

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Banning General Plan
Seismically Induced Settlement and Slope Instability in the Study Area

Exhibit

V-2

Compressible Soils

Compressible soils are those soil units that could compress under the weight of proposed fill embankments and structures. Compressible soils usually involve geologically young (Holocene age) unconsolidated sediments with low density. However, it can also occur in the upper weathered part of older alluvium, colluvium/slope wash that collects near the base of natural slopes, slope failure debris, and in some cases, very weathered bedrock. Soil characteristics such as texture and grain size, natural moisture and density, thickness of the compressible layer(s), the weight of the proposed load, the rate at which the load is applied, and drainage are factors that determine the settlement potential and the rate of settlement in these sediments. Areas of the City where compressible soils are most likely to occur are the San Gorgonio Pass valley, as well as active and recently active stream channels. In the hills, compressible soils are commonly found in canyon bottoms, swales, and at the base of natural slopes. Compression is also associated with landslide deposits particularly at the head or graben area and along the margins. Deep fill embankments, generally those greater than 60 feet deep, will also compress under their own weight. Sound engineering, including a thorough geotechnical soils analysis, could prevent potential hazards associated with compressible soils.

Collapsible Soils

Soil collapse, or hydroconsolidation, occurs when saturated soil units undergo a rearrangement of their grains and a loss of cohesion or cementation, resulting in substantial and rapid settlement under relatively light loads. Soil collapse is generally associated with recently deposited, Holocene-age soils that have accumulated in an arid or semi-arid environment. Wind-deposited sands and silts, and alluvial fan and debris flow sediments deposited during flash floods represent soils that are susceptible to collapse. Irrigation, or a rise in the groundwater table could increase surface water infiltration, which when combined with the weight of a building or structure, can start rapid settlement and cause foundations and walls to crack. Differential settlement of structures generally occurs when landscaping is heavily irrigated in close proximity to the structure's foundation.

The Holocene sediments that underlie the Banning area are vulnerable to soil collapse. This is due to the granular nature of the soils, rapid deposition in the alluvial fan environment, and generally dry condition of the upper soils. Proper surface drainage design, excavation and recompaction, or pre-saturation and pre-loading of the susceptible soils in place to induce collapse prior to construction are some measures that could mitigate hazards associated with soils collapse. The potential for soils to collapse should be assessed on a site-specific basis as part of the geotechnical studies for development.

Expansive Soils

Expansive soils are those with significant amount of clay minerals that have the ability to give up water (shrink) or absorb water (swell). These minerals can undergo significant volumetric changes as a result of changes in moisture content. The upward pressures induced by the swelling of expansive soils can have significant harmful effects upon structures and other surface improvements. In Banning, expansive soils are primarily associated with areas underlain by older fan deposits containing argillic soil profiles that are typically rich in clay and probably fall in the moderately expansive range. While granitic and metamorphic basement rocks have low

expansion characteristics, the faults and shear zones within these rocks commonly contain clays with expansive minerals. Since, the low-lying areas of the City are underlain by alluvial fan sediments that are composed primarily of granular soils, the expansion potential for soils ranges from very low to moderately low. Mitigation of expansive soils includes good surface drainage control, educating the public regarding moisture levels involving landscaping and avoiding placement of expansive soils near the surface.

Ground Subsidence

Ground subsidence, the gradual settling or sinking of the ground surface with little or no horizontal movement, is generally associated with oil, gas or ground water extraction from below the ground surface in sediment filled valleys and floodplains. Evidence of regional subsidence on ground surface includes earth fissures, sinkholes or depressions, and disruption of surface drainage. Ground subsidence could cause damages to canals, levees, underground pipelines, wells, buildings, roads, railroads and other structures and improvements. Good management of local water supplies, including the reduction in local wells pumping, importing water and the use of artificial recharge has mitigated subsidence in affected areas. While subsidence has not been observed in Banning, the most populated part of the City occurs in an area with geologic conditions vulnerable to ground subsidence. At present, the City relies on groundwater for its water supply. The alluvial sediments within the groundwater basins from which the City's water is withdrawn are subject to subsidence if rapid groundwater extraction occurs in response to increased water demands associated with population growth or long periods of drought. The continued implementation of groundwater conservation and recharge activities in the Banning area contributes to the management of ground subsidence. Preventive measures include monitoring groundwater and basin conditions and increasing the use of reclaimed water, storm water or imported water.

Erosion

The Banning planning area is subject to erosion, runoff, and sedimentation due to the extreme topographic relief between the valley and the surrounding mountains. Climate, topography, soil and rock types and vegetation are key factors to erosion, runoff, and sedimentation processes. Human activities such as agricultural or land development accelerate natural erosion. Grading which could involve altering natural drainage patterns, soil compaction, and cut and fill slopes increases the potential for erosion, and sedimentation. Development that creates impermeable surfaces increases the potential for flooding and sedimentation downstream of the project. The most developed part of the City of Banning occurs on alluvial fans that are still receiving sediments from the mountains, while future developments are proposed within the City's upland areas. Mitigation measures against erosion are required for graded slopes that are constructed with the granular soils that occur in the City. Mitigation of erosion and sedimentation includes structures such as check dams, catchment basins, diversion dikes and swales. Terracing slopes, berms, v-ditches and other storm drain systems can reduce erosion potentials associated with manufactured slopes.

Wind Erosion

The Banning area is susceptible to wind erosion due to the strong winds that are funneled through the narrow San Gorgonio Pass. Wind erosion commonly occurs in relatively flat, bare areas; dry sandy soils; or in any areas containing loose, dry, and finely granulated soils. Soil

movement begins when wind forces are exerted against ground surface. Wind velocity, particle size and the cloddiness of particles determine the amount of soil being moved. Generally, soil can be blown away at any height, however, the majority (over 93%) of soil movement occurs at or within 3 feet or one meter of the ground surface. Several physical factors determine the intensity and distribution of wind-blown sand in the Banning/San Gorgonio Pass. One factor is the orientation of the long axes of the hill and mountain masses aligns in a northwest-southeast direction, which provides little resistance to air flow. Another factor is the nature of bedrock, which in this case involves granitic and metamorphic rock-types that easily weather to grain size and are transportable by wind. The episodic flooding of the Whitewater River, located at the eastern end of the San Gorgonio Pass, also influences wind-blown sand given the large amounts of sand and gravel deposited on the Whitewater River floodplain. Air movement is also generally unhindered down the long axis of the valley due to valley floor elevations, which slopes from the summit of the San Gorgonio Pass near Banning approximately 2,600 feet, to below sea level in the Salton Sea area. Dry climate and sparse and wide spread natural vegetation on the valley floor are vulnerable to strong wind activity, while short, and intense rainfall in the local mountains result in torrential run-off that transports large amounts of deposits on the valley floor.

Damage to land and natural vegetation results from strong winds that remove soils from one location and transport it to another. Further, it causes air pollution, loss of soil, deterioration and dryness of soil structure, nutrient and productivity losses and sediment transport and deposition. Wind-blown sand is also associated with environmental hazards when strong winds are funneled through the San Gorgonio Pass into the Coachella Valley. Major health risk to humans including respiratory damage, eye infection, skin disorders and other discomforts could result from sand and dust particles in the air. Dust storms can affect air and highway traffic safety, reduce visibility, cause damage to buildings, vehicles, crops and vegetation. Removal of blow sand from streets, driveways and other areas could also become a considerable expense. Current mitigation measures to wind erosion include wind barriers such as hedges, watering construction sites, and vegetation cover.

SEISMIC ASSESSMENT

The majority of southern California occurs along the boundary between the North American and Pacific tectonic plates that could generate strong seismic activities. Relative to the North American Plate, the Pacific Plate is moving in a northwesterly direction, approximately 50 millimeters per year. As mentioned above, the Banning area is located at the boundary, formed by the San Andreas Fault, between the North American and Pacific plates. The San Andreas Fault crosses the Banning General Plan planning area. Furthermore, the San Andreas fault accommodates approximately 70% of the movement between the North American and Pacific tectonic plates, while the remaining motion is distributed between the Eastern Mojave Shear Zone and a number of the sub-parallel faults of the San Andreas fault, including the San Jacinto, Whittier–Elsinore, Newport-Inglewood, Palos Verdes, and other offshore faults. Given its physical and geologic location, the Banning area is susceptible to potential intense seismic ground shaking that could affect the safety and welfare of the general community.

MEASURING SEISMIC EVENTS

Seismic events are classified according to their magnitude and intensity. Several factors determine the intensity of ground shaking, including the magnitude of the earthquake, the distance from the epicenter, and the geologic composition of local soils and rocks.

The Modified Mercalli Intensity (MMI) scale is most commonly used to measure seismic intensity. The scale includes twelve levels of damage and is derived from actual observations of damage to structures and human reactions to earthquakes. A Level I earthquake tremor is generally not felt and damage potentials are unlikely to occur. However, a Level XII earthquake results in total destruction. Damage varies with earthquake intensities and may include partial or complete collapse of masonry structures, severe to complete destruction of underground pipelines, rock and land slides, massive damage or destruction of bridges, overpasses and other improvements.

The Richter Scale measures earthquake magnitude based on a scale of one to nine. Each increase in the level of magnitude represents a tenfold increase in the amplitude of the waves on a seismogram.

The most notable historic earthquake in the Banning region was the Landers earthquake of 1992. This earthquake had a magnitude of 7.3 on the Richter Scale and also ruptured five other separate faults. Its epicenter occurred near the small desert community of Landers.

The Maximum Probable Earthquake (MPE) refers to the largest earthquake likely to occur on a fault or fault segment, within a specified period of time. The MPE is useful during emergency and engineering planning to assess the potential seismic risk within a region. It is also referenced to establish safe construction and design parameters and facilitate the preparation of policies and programs that are responsive to the potential impacts of an earthquake.

The Maximum Credible Earthquake (MCE) is the largest earthquake a fault is estimated to be capable of generating. As with the MPE, Maximum Credible Earthquake (MCE) is also useful in emergency and engineering planning efforts. In the Banning area, the San Andreas fault (1857 Rupture) is expected to generate a magnitude 7.8 earthquake, which is equivalent to a Level VI – VII on the Modified Mercalli Intensity Scale (MMI). Table V-1 is a list of faults that could generate significant impacts in the Banning area.

Table V-1
Estimated Horizontal Peak Ground Accelerations and Seismic Intensities in the Banning Area

Fault Name	Distance to Banning (km)	Distance to Banning (mi)	Magnitude of M_{max} *	PGA (g) from M_{max}	MMI from M_{max}
San Gorgonio/Banning/Garnet	0.8-8.9	0.5-5.5	7.6	0.51-0.78	X-XI
San Gorgonio Pass	0.8-8.9	0.5-5.5	7.4	0.49-0.78	X-XI
San Andreas (San Bernardino)	0.9-12.1	0.5-7.5	7.3	0.34-0.80	IX-XI
San Jacinto (San Jacinto Valley)	12.8-20.6	5.5-8.9	6.9	0.17-0.37	VIII-X
San Andreas (Southern)	6.2-21.3	3.9-13.2	7.4	0.22-0.48	IX-X
Pinto Mountain	10.6-15.9	17.1-25.6	7.0	0.14-0.22	VIII-IX
Garnet Hill	16.7-22.5	10.4-14.0	7.0	0.16-0.28	VIII-IX
San Jacinto (Anza)	32.1-17.0	20.0-10.6	7.2	0.12-0.26	VII-IX
Banning (Coachella Valley)	20.8-24.0	13.0-14.9	7.2	0.18-0.23	VIII-IX
San Jacinto (San Bernardino)	28.7-32.5	17.8-20.2	6.7	0.08-0.13	VII-VIII
North Frontal Fault Zone (East)	26.8-40.2	16.7-25.0	6.7	0.06-0.15	VI-VIII
North Frontal Fault Zone (West)	27.7-41.3	17.2-25.7	7.0	0.07-0.18	VII-VIII
San Andreas (Coachella)	37.5-43.1	23.3-26.8	7.1	0.08-0.11	VII
Helendale/S. Lockhart	38.5-53.4	23.9-33.2	7.1	0.06-0.10	VI-VII
Lenwood/Lockhart/Old Woman	27.5-35.9	44.3-57.8	7.3	0.07-0.11	VII-VIII
Landers	29.7-34.6	48.7-55.7	7.3	0.06-0.11	VI-VII
Cucamonga	33.1-36.9	53.2-59.4	7.0	0.04-0.10	VI-VII
San Andreas (1857 Rupture)	40.7-46.0	65.5-74.1	7.8	0.06-0.12	VI-VII

Abbreviations: mi – miles; km – kilometer; M_{max} – maximum magnitude earthquake; PGA – peak ground acceleration as a percentage of g, the acceleration of gravity; MMI – Modified Mercalli Intensity.
Source: Technical Background Report to the Safety Element for the City of Banning, prepared by Earth Consultants International, 2004.

MAJOR FAULTS AFFECTING THE PLANNING AREA

Earthquakes can result in substantial property damage, the loss of public services and facilities, and loss of life. Strong ground shaking is the geologic hazard that has the greatest potential to severely impact the Banning planning area. Seismic ground shaking can result in landslides, ground lurching, structural damage or destruction, and liquefaction. It is also associated with other hazards, including fire, disruption of essential facilities (such as water, sewer, gas, electric, transportation, communications, drainage), release of hazardous materials, and flood inundation resulting from dam or water tank failure. The following discussion describes the faults in the Banning planning area. These are shown in Exhibit V-3.

NOTES:

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Earth Consultants International

Project Number: 2235
Date: April 2004

Mission Creek Fault
San Andreas Fault Zone
Cox Ranch Fault Zone
Gandy Ranch Fault
Highland Springs Scarp
Banning Fault (Strand B)
Banning Fault (Strand A)
San Gorgonio Pass Fault
McInnis Fault
Beaumont Plain Fault Zone
Lawrence Fault
McMullen Fault

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Yule and Sieh, 2003; Morton and Matti, in review; California Geological Survey, 1974 & 1995; Bloyd, 1971.

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

Faults; Solid where known, Dashed where approximate, Dotted where concealed.

- Alquist-Priolo Faults (1974, 1995)
- Morton & Matti (in review)
- Yule & Sieh (2003)
- Bloyd (1971)
- Alquist-Priolo Earthquake Fault Zone
- Riverside County Fault Hazard Management Zone
- City of Banning Fault Hazard Management Zone
- City Limits
- Sphere of Influence
- Planning Area

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Banning General Plan
Faults and Fault Zones in the Study Area

Exhibit
V-3

San Andreas Fault

The San Andreas Fault zone passes through the northerly portion of the Banning planning area. It is the longest fault in the state of California, extending approximately 600 miles from the Salton Sea to Cape Mendocino. The San Andreas is a right-lateral transform fault regarded as a "Master Fault" that controls the seismic hazard for central and southern California. The last major earthquake to occur on the southern San Andreas was the magnitude 8.0 Fort Tejon earthquake in 1857.

The Working Group on California Earthquake Probabilities (WGCEP) defines the southern portion of the San Andreas as divided into three segments. From north to south, they include the Mojave, San Bernardino Mountains, and Coachella Valley segments. The boundary between the San Bernardino and Coachella Valley segments occurs in the San Gorgonio Pass area.

The Coachella Valley segment is the southernmost of the San Andreas Fault zone segments, and the least likely of the segments to fail in the next 30 years (22% likelihood of rupturing). However, recent studies indicate that the Landers earthquake of 1992 has increased the stress towards failure on this segment. The Coachella Valley segment extends from the Salton Sea on the southeast to the Indio Hills on the southeast, through Desert Hot Springs, and joins with the Mill Creek and Mission Creek faults to the northwest. Although paleoseismic data indicate that the average time interval between earthquakes on the Coachella Valley segment is about 230 years, the most recent rupture occurred about 300 years ago.

The San Bernardino Mountains segment consists of the fault zone between the San Gorgonio Pass on the southeast and the Cajon Pass to the northwest. (WGCEP, 1988) It includes a near-vertical fault segment at the base of the San Bernardino Mountains. The fault trace turns southerly as it approaches the San Gorgonio Pass and breaks into short continuous segments, in the vicinity of Banning. The San Bernardino fault trace crosses the northernmost part of the City, within the boundary of the San Bernardino National Forest. The San Bernardino segment is considered the most likely to fail within the next 30 years, with a 28% chance of rupturing. The segment's last rupture occur in 1812, however, the Landers earthquake series of 1992 may have accelerated the potential for another great earthquake on this segment by 8 to 22 years.

The Mojave segment is approximately 63 miles long and represents the northernmost segment of the southern San Andreas Fault system. The last rupture on this segment occurred simultaneously with the Carrizo Plain segment to the north during the 1857 Fort Tejon earthquake. It is possible for the Mojave segment to rupture with the Coachella Valley and/or the San Bernardino segments could initiate simultaneous rupture on the San Bernardino and/or Coachella Valley segments, potentially causing severe damage to the Banning area.

The San Gorgonio Pass forms the physical boundary that separates the Coachella Valley and San Bernardino segments of the San Andreas Fault. Its structural complexity includes a 12-mile wide step-over in the fault's surface trace, which creates a localized zone of compression, represented primarily as a reverse and thrust-type faulting. It is believed that the San Gorgonio Pass has absorbed the slip on the Coachella Valley fault segment.

Banning Fault
The Banning fault is an ancient right-lateral strike-slip structure. It has a western segment that is considered inactive and a central segment that includes a 2-mile long section that is active and connects with the Gandy Ranch fault. The Banning fault traverses through the City of Banning as two roughly parallel strands. The northernmost strand consists of thrust-type movement; the southernmost strand demonstrates compressional characteristics and is considered inactive in the Banning Bench area. The eastern portion of the Banning fault, also known as the Coachella Valley segment, from Cottonwood Canyon to its intersection with the San Andreas fault near the Indio Hills, has been reactivated during the Quaternary period.

San Gorgonio Pass Fault Zone
The San Gorgonio Pass fault zone is a series of north-dipping reverse and thrust faults connected by strike tear faults, resulting to a surface trace that appears like an irregular, saw-tooth. This east-west trending fault zone contains faults that were formed during the Pleistocene Epoch, of which some have been active in the later Holocene Epoch. The most recently active strands of faults occur at the base of the Banning Bench, in the central part of Banning. The Highland Scarp along the western edge of the City is considered an active segment of the San Gorgonio Pass fault zone.

San Jacinto Fault Zone
The San Jacinto fault zone is primarily a right-lateral strike-slip fault that trends northwesterly and extends approximately 175 miles in length. It has an annual slip rate of between 7 and 17 mm. The most recent surface-rupturing earthquakes on the San Jacinto fault occurred on the Coyote Creek segment in 1968 and on the Superstition Hills segment in 1987. As with other large fault zones, the San Jacinto fault has been divided into segments. Its closest point is approximately five miles southwest of the Banning. Historically, the San Jacinto fault has generated more large earthquakes than any other fault in southern California. However, none of these seismic activities have been as large as the San Andreas Fault earthquakes of 1857 and 1906.

Garnet Hill Fault
The Garnet Hill fault is predominantly a right-lateral strike-slip fault along most of its trace, but splays into a series of oblique reverse faults at its western base. It trends similarly to the Coachella Valley segment of the Banning fault and extends from a few miles west of Whitewater south to Thousand Palms, where the fault trace dies out. According to seismological data, the Garnet Hill fault merges with the Coachella Valley segment of the Banning fault approximately 5 km deep, and that the underlying single fault plane is responsible for the 1986 North Palm Springs earthquake.

Gandy Ranch Fault
The Gandy Ranch fault is a right-lateral strike slip fault that branches off the active section of the Banning fault at Millard Canyon. It passes through the City and should be considered as an active fault. However, much data regarding this fault is unknown, including slip rate and earthquake potential due to lack of investigation/studies.

Mission Creek Fault
The Mission Creek fault is a right-lateral strike slip fault along most of its trace, but turns into a thrust-type fault at its western end. The western end of the fault occurs at the northern boundary of the City of Banning, within the San Bernardino National Forest. The Mission Creek fault and the western end of the Coachella Valley segment of the San Andreas Fault merge and continues westward to a point truncated by the San Bernardino segment of the San Andreas. The California Geological Survey (CGS) considers this fault active and has designated it as an Alquist-Priolo Earthquake Fault Zone.

Beaumont Plain Fault Zone
The Beaumont Plain fault is located to the west and southwest of the City of Banning. It is comprised of a number of northwest-trending faults represented by the discontinuous northeast-facing scarps. Detailed studies have not been conducted regarding the Beaumont Plain fault zone.

Cox Ranch Fault Zone
The Cox Ranch fault occurs in the mountains between Portero and Whitewater Canyons. This group of discontinuous, west to northwest-trending faults varies in movement, from strike-slip to primarily normal dip-slip. They are considered active faults and have slip rates that appear to be small in comparison to other faults in the region.

SEISMICALLY INDUCED GEOTECHNICAL HAZARDS

Ground Shaking
Seismically induced ground shaking is the most significant potential geotechnical hazard facing the Banning area. Given the City's proximity of the San Andreas and San Jacinto faults, the urban core of the City has the potential to experience very high and extremely high ground shaking values of about 50% of the force of gravity, with a 10% chance of such a seismic event occurring in 50 years. These are probabilistic values, which combine all seismic sources in the area and assess the likelihood of each source to generate an earthquake. These values are among the highest in southern California and are the result of the City's proximity to major fault systems with high earthquake recurrence rates.

The effects of ground motion on structures are difficult to predict, and depend on the intensity of the quake, the distance from the epicenter to the site, the composition of soils and bedrock, building design, and other physical criteria. Based on these factors, ground shaking may cause no, little, or major structural damage or destruction; however, in general, peak ground accelerations and seismic intensity values decrease with increasing distance from the causative fault. Local conditions, such as soft soils, shallow ground water, and the presence of ridge tops, could amplify the effects of seismic waves and result in higher localized accelerations. The Uniform Building Code, California Building Code, and Unreinforced Masonry Law are the primary tools used by local agencies to ensure seismic safety in structures (see Legislation sections below).

Liquefaction

Liquefaction is a common occurrence in loose, saturated, sandy sediments that are subjected to ground vibrations greater than 0.2 g. This geologic process causes the total or substantial loss of shear strength in the affected sediments. During liquefaction, involved soils behave like a liquid or semi-viscous substance and can cause structural distress or failure due to ground settlement, a loss of load-bearing capacity in foundation soils, and the buoyant rise of buried structures.

Three general conditions induce liquefaction. One condition is strong ground shaking of relatively long period. Another condition is the presence of unconsolidated granular sediments. A third condition is the occurrence of water-saturated sediments within 50 feet of the ground surface. These general conditions appear to occur in the Banning planning area, thereby allowing the potential for liquefaction. A number of active faults in the region could potentially generate earthquake characterized by strong ground shaking of long durations. Granular loose sediments are present along the major drainages in the City, as well as, within the valley, wherein the majority of the built environment exists. Because the alluvium that underlies the Banning areas is coarsely granular and percolates well, the water table is not within 50 feet of the ground surface. However, in the past, shallow groundwater was detected on the southernmost part of the valley before water pumping activity. In general, recently deposited sediments are likely vulnerable to liquefaction during an earthquake, if shallow ground water is present. Liquefaction hazards in the planning area are illustrated in Exhibit V-4.

Seismically Induced Settlement

Under certain circumstances, strong ground shaking can cause the densification of soils, resulting in local or regional settlement of the ground surface. This type of ground failure results when loose granular, cohesionless soil grains become tightly packed due to the collapse of voids and pore spaces. Recently deposited alluvial sediments and artificial fills that are not properly compacted are especially susceptible to this hazard. Effects can include structural damage and damage to water, sewer, and other subsurface pipelines. In Banning, areas underlain by late Quaternary alluvial sediments may be susceptible to seismically induced settlement.

Seismically Induced Rockfalls and Landslides

Strong ground motions can result in landslides, rock slides and rock falls, particularly where saturated ground conditions exist. In the Banning planning area, the potential for landslides to occur increases where there is a high seismic potential, rapid uplift and erosion resulting in steep slopes and deeply incised canyons, rock with inherently weak components such as silt or clay layers and highly fractured and folded rock. In addition, slope orientation relative to the direction of the seismic wave also contributes to the occurrence of landslides in the planning area. The northernmost and southernmost portions of the Banning planning area are highly susceptible to seismically induced slope failure given these areas encompass the mountains and hillsides. Areas of Banning which contain slopes steeper than approximately 15 degrees are generally subject to slope failure; however, failures on flatter slopes are also potential when the face of the slope consists of unsupported, weak rock units. During an earthquake, groundwater conditions have an influence in the development of seismically induced slope failures, as well as landslides and mudflows.

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Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Earth Consultants International, 2000

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

Liquefaction Susceptibility

- Moderate
- Low
- Very Low

- City Limits
- Sphere of Influence
- Planning Area

Earth Consultants International

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Date: April 2004

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Banning General Plan
Liquefaction Susceptibility in the Study Area

Exhibit

V-4

Deformation of Sidehill Fills

Strong seismic ground shaking could also result to the deformation of sidehill fills that can cause minor to severe property damage. Sidehill fills are artificial fill wedges typically constructed on natural slopes to create roadways or level building pads. Cracking at the cut/fill contact area, differential settlement in the fill wedge, and bulging on the slope face can develop from strong ground shaking. This phenomenon has occurred most often in relatively thin fills of 27 feet or less placed near the tops of narrow ridges. Hillside grading designs within the planning area may be susceptible to this hazard, and the likelihood of its occurrence should be evaluated during site-specific geotechnical investigations.

Ridgetop Fissure and Shattering

Ridgetop fissuring and shattering is the result of intense amplification or focusing of seismic energy due to local topographic features. Linear fault-like fissures and shattering of surface soils on the crests of steep, narrow ridgelines occurred during the 1989 Loma Prieta and 1994 Northridge earthquakes. Surfaces affected by ridgetop shattering appear as if plowed. This phenomenon can result in severe structural damage, particularly if it occurs on relatively high (greater than 100 feet), narrow (typically less than 300 feet wide) ridges flanked by slopes steeper than about 2.5:1 (horizontal:vertical). Topographically steep areas in Banning are susceptible to ridgetop fissuring and shattering, while continued development into the City's hillsides and mountains increases the potential for this hazard. Concerns include above ground reservoirs, storage tanks and utility towers which are typically located on ridgetops that could fail or topple over, cause severe damage to development downgradient, and disrupt lifeline systems in the event of intense ground shaking.

Seiches and Seismically Induced Inundation

Seiches are seismically-induced oscillation or sloshing of water contained in enclosed bodies of water including lakes, ponds, reservoirs, and swimming pools. This hazard is dependent upon the frequency of seismic waves, distance and direction from the epicenter, and site-specific design criteria of the enclosed body of water. Swimming pools and other small bodies of water are likely to incur minor damages in the event of seismically induced seiches. However, seiching could result in the failure of larger bodies of water, including water tanks, retention basins, recharge basins and other water storage structures, and could result in the inundation of land and structures downslope. Within portions of the northern and southern Banning planning area, there are percolation ponds and man-made lakes, such as those within the Sun Lakes project, which may be subject to seiches. At present, there are no open reservoirs in the City of Banning.

Damage to water storage tanks and systems could substantially affect efforts to suppress fires and limit the supply of potable water after a major earthquake. Design elements, such as baffles, are required to reduce the potential for seiches in tanks, open reservoirs, and ponds where overflow or structural failure may cause damage to nearby properties. Criteria for seismic design of water tanks are provided in the American Water Works Association (AWWA) Standards for Design of Steel Water Tanks.

MITIGATION OF EARTHQUAKE HAZARDS

The majority of injuries and loss of life related to earthquakes are typically linked to the collapse of buildings and structures. While preventing the occurrence of an earthquake is not feasible, their destructive effects can be minimized through comprehensive hazard mitigation measures that include the identification and mapping of potential hazards, sensible planning, strict implementation of building codes, and the retrofitting and rehabilitation of weak structures.

Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Earthquake Fault Zoning Act was signed into law in 1972, primarily to mitigate the hazards of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault. The Act requires the State Geologist to delineate "earthquake fault zones" that show evidence of Holocene surface displacement along one or more of their segments, and are clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The boundary of an earthquake fault zone is generally about 500 feet from major active faults, and 200 to 300 feet from well-defined minor faults. The Act also requires counties and cities to withhold development permits for sites within earthquake fault zones until geologic investigations demonstrate that the sites are not threatened by surface displacement associated with future faulting. State law defines which types of development must be regulated, but local agencies could be more restrictive than state law.

The State Geologist has issued Alquist-Priolo Earthquake Fault Zone mapping for the Banning General Plan planning area. The mapping consists of the Beaumont quadrangle (CDMG, 1995a), Cabazon quadrangle (CDMG, 1995b), and the San Gorgonio SW quadrangle (CDMG, 1974). Several faults within the Banning area are currently zoned under the Alquist-Priolo Act. It is important to recognize that the State Geologist revises the Alquist-Priolo Earthquake Fault Zones occasionally based upon new data resulting from scientific research or fault studies. Additional fault hazard study zones could be imposed by local agencies, either at the county or city level.

Seismic Hazards Mapping Act

In addition to the Alquist-Priolo Earthquake Fault Zoning Act which addresses only the hazard of surface fault rupture, the State enacted the Seismic Hazards Mapping Act (1990). The Seismic Hazards Mapping Act (1990) addresses non-surface rupture earthquake hazards that includes strong ground shaking, liquefaction, and seismically induced landslides. The Act intends to reduce loss of life and property by identifying and mitigating seismic hazards. The California Geological Survey (CGS) is responsible for implementing the Act. CGS provides local governments with seismic hazard zone maps that delineate areas susceptible to seismic hazards and other ground failure hazards termed as "zones of required investigations". When development projects are proposed within the designated hazard zones, site-specific geological hazard investigations are required. CGS has not completed its seismic hazard mapping for the Riverside County, including the City of Banning. However, specific studies conducted for the City General Plan Update have analyzed and mapped this hazard.

Real Estate Disclosure Requirements

Since June 1, 1998, in accordance to the Natural Hazards Disclosure Act, sellers of real estate properties and their agents must provide prospective buyers with a "Natural Hazard Disclosure

Statement" if the property being sold occurs within one or more State-mapped hazard areas. Further, the California State law requires a seller to provide the buyer of a house built before 1960, a completed earthquake hazards disclosure report and a copy of booklet entitled "The Homeowner's Guide to Earthquake Safety." This publication was written and adopted by the California Seismic Safety Commission. Under the Alquist-Priolo Earthquake Fault Zoning Act and Seismic Hazards Mapping Act, realestate agents or sellers of real estate acting without an agent must disclose to potential buyers that the property is located in an Earthquake Fault Zone and/Seismic Hazard Zone.

California Environmental Quality Act

The California Environmental Quality Act of 1970 was passed to ensure that local governmental agencies consider and review the environmental impacts of proposed projects within their jurisdictions. According to CEQA regulations, an Environmental Impact Report (EIR) must be prepared for projects that may have significant impacts to the environment. An EIR must identify geologic and seismic hazards and include potential mitigation measures to reduce potential impacts.

Uniform Building Code and California Building Code

The Uniform Building Code (UBC) is an important tool used by local agencies to ensure seismic safety in structures. It defines minimum lateral forces needed to resist seismic shaking, purpose of the building, seismic zone, type of structural system, building configuration and height, and soil profile types that result in various degrees of shaking. The last version of the UBC was issued in 1997.

The California Building Code (CBC) also known as Title 24 of the California Code of Regulations provides building regulations tailored for California earthquake conditions. By law, every local agency, City and County enforcing building regulations must adopt the CBC within 180 days of its publication. In addition to CBC regulations, a local jurisdiction may adopt more stringent amendments provided that they are based upon local geographic, topographic or climatic conditions.

It is important to note that the Building Codes are minimum requirements. In some cases, these requirements may not be adequate to protect health and safety. Therefore, it is essential for geotechnical consultants, engineers, the City and reviewers of their work to keep up to date with current research.

Seismic Retrofitting

According to the Unreinforced Masonry Law of 1986, all cities and counties in Seismic Zone 4 must identify potentially hazardous unreinforced masonry (URM) buildings in their jurisdictions, establish a URM loss reduction program, and report their progress to the State by 1990. The entire Banning area occurs within Seismic Zone 4. Seismic zones are zones near historically active faults. In compliance to the Unreinforced Masonry Law, the City of Banning conducted an inventory of their URMs and notified building owners about the hazards of URM construction. In 2003, the City reported to the Seismic Safety Commission that 49 non-historic URMs had been identified. Of these, only one building has not been upgraded but is currently not being utilized. Furthermore, past earthquakes have shown that many types of structures, in addition to

URMs, are potentially hazardous. These include pre-cast tilt-up concrete buildings (including pre-1971 structures), soft story structures, unreinforced concrete buildings, and pre-1952 single-family structures. Irregular-shaped buildings and mobile homes are also considered at risk. It is recommended that the City consider developing and adopting a program that inventories and provides mitigation of these structures.

FUTURE DIRECTIONS

Given the continued challenges posed by local seismic and geotechnical conditions, it is important for the City to implement and enforce the regulations and guidelines set forth in the Alquist-Priolo Earthquake Fault Zoning Act, CEQA Statutes and Guidelines, Uniform/International Building Code, zoning ordinance, and other applicable legislation to manage hazards addressed in this Element. Further, it is essential for the City to maintain and/or develop close coordination with state, regional, and county agencies for the purpose of establishing and keeping an up-to-date information database of geotechnical and seismic conditions in the region. The City's development review process must ensure comprehensive and careful evaluation of geotechnical and seismic safety associated with development proposals, including that all necessary special studies are conducted and reviewed, and that comprehensive mitigation measures are implemented.

GOALS, POLICIES, AND PROGRAMS

Goal

Increased protection and safety of human life, land, and property from the effects of seismic and geotechnical hazards.

Policy 1

The City shall establish and maintain an information database containing maps and other information which describe seismic and other geotechnical hazards occurring within the City boundaries, sphere-of-influence and planning area.

Program 1.A

Consult and coordinate with surrounding communities, the California Division of Mines and Geology, Riverside County, other applicable state and federal agencies, and professional engineering geologists to establish, improve and routinely update the database.
Responsible Agency: Planning Department, California Division of Mines and Geology, Riverside County, Consulting Geologists
Schedule: 2005-2006; Continuous

Policy 2

In accordance with state law, all development proposals within designated Alquist-Priolo Earthquake Fault Zones shall be accompanied by appropriate geotechnical analysis.

Program 2.A
Establish a cooperative agreement with the County Geologist, State Geologist, contract state-certified geologist, or contract geological engineer to review and determine the adequacy of geotechnical and fault hazard studies prepared within the City.
Responsible Agency: City Engineer/Consulting Engineering Geologist
Schedule: 2005-2006, Ongoing

Policy 3
Development in areas identified as being susceptible to slope instability shall be avoided unless adequately engineered to eliminate geotechnical hazards.

Program 3.A
The City shall make available copies of the General Plan Slope Instability Susceptibility Map and discourage development within areas so designated, or require detailed geotechnical analysis and mitigation measures that reduce potential hazards to insignificant levels.
Responsible Agency: Planning Department, City Engineer/Consulting Engineering Geologist
Schedule: 2005-2006, Ongoing

Policy 4
To minimize the potential impacts of subsidence due to extraction of groundwater, the City shall actively support and participate in local and regional efforts at groundwater conservation and recharge.

Program 4.A
Consult and coordinate with the City of Banning Public Utilities – Water Department, U.S. Geological Survey, and other appropriate agencies to routinely monitor groundwater levels and surface elevations in the City.
Responsible Agency: City of Banning Public Utilities – Water Department, U.S. Geological Survey
Schedule: Continuous

Program 4.B
The City shall encourage the preparation of, support and participate in, the study of the temporary surplus of the Beaumont Water Basin and its impact on subsidence.
Responsible Agency: Water Department, Beaumont/Cherry Valley Water District, San Gorgonio Pass Water Agency
Schedule: Ongoing

Policy 5
The City shall coordinate and cooperate with public and quasi-public agencies to assure the continued functionality of major utility systems in the event of a major earthquake.

Program 5.A
Maintain working relationships and strategies between the Public Works Department (wastewater and electric), utilities, and other appropriate agencies to strengthen or relocate utility facilities, and take other appropriate measures to safeguard major utility distribution systems.
Responsible Agency: Planning Department, Public Works Department, City Engineer, Public and Quasi-Public Utilities
Schedule: 2004-05; Ongoing

Policy 6
New septic tank leach fields, seepage pits, drainage facilities, and heavily irrigated areas shall be located away from structural foundations and supports to minimize the potential for localized collapse of soils.

Program 6.A
The City shall require that development applications include plans indicating the location of leach fields, seepage pits, drainage facilities, and water-dependent landscaping so that City staff may evaluate the potential for ground saturation.
Responsible Agency: Planning Department, Building Department, City Engineer
Schedule: 2005-2006, Ongoing

FLOODING AND HYDROLOGY ELEMENT

PURPOSE

By providing discussion and setting forth its goals, policies, and programs, the Flooding and Hydrology Element of the Banning General Plan addresses potential drainage and flooding hazards within the community. The foremost goal of this Element is to protect the general health, safety and welfare of the community from potential flood and associated hazards. It references and coordinates with other elements of the General Plan, which also address threats to the lives and property of the community's residents. The potential for and extent of major future flooding is also evaluated. It is the intention of the community to facilitate, plan and implement the phased development of flood control facilities, both project-specific and Citywide.

BACKGROUND

Other General Plan Elements related to this Element include the Geotechnical Element, which addresses some of the City's most primary environmental threats. The Hazardous and Toxic Materials Element is also related, as it discusses the potential of transporting and storing hazardous and toxic materials above and below ground. The Circulation Element, which addresses the need for, and availability of adequate access and evacuation routes in the event of a major community disaster or threat, is another related Element. Policies and programs set forth in the Land Use Element direct the location of open space, essential public facilities, and developed areas which have some effect on flooding issues, and their potential for damage.

State policies and regulations require that the General Plan address potential flooding hazards within a community and offer mitigation measures to lessen their impacts. Chapter 73 of the Statutes of California, 1939, mandates the joint planning of area-wide drainage plans affecting local jurisdictions. In addition, Government Code Section 8401 (c) requires that local governments plan, adopt, and enforce land use regulations for flood plain management. This legislation, also known as the Cobey-Alquist Flood Plain Management Act, also establishes requirements for receiving state financial assistance for flood control measures. California Government Code Section 8589.5 and 65302 (g) require the mapping of areas subject to inundation in the event of dam failures.

Meteorological Setting

Floods that impact the City can be attributed to three different types of storm events: general winter storms, combining high-intensity rainfall and rapid melting of the mountain snowpack; tropical storms out of the southern Pacific Ocean; and summer thunderstorms. A summer storm poses greater threat of flooding than a winter storm because of its high intensity and short duration of rainfall. Most of the rainfall occurs during the cooler months of November through April, but occasional high-intensity thunderstorms and tropical storms occur in late summer and early fall. Although the ground may be generally dry at the beginning of a storm, sufficient amounts and intensities of rainfall can saturate the surface, substantially reducing percolation and

increasing runoff. Since mountain areas generally have higher rainfall, the mountains surrounding the planning area average an annual rainfall of over 25 inches, while the valley floor, including the planning area, averages about 18 inches annually.

Rainfall in southern California is extremely unpredictable on an annual basis. For example, the annual rainfall in Banning between the year 1977 and 2004 ranged from a low of 4.44 inches to a high of 49.54 inches. These readings were recorded at the Riverside County Flood Control rain gage, on the upper part of the Banning Bench (el. 3,600').

General Conditions and Flood Hazards

Floods are natural, recurring events. They become hazardous only when man's encroachment onto floodplains results in modification of the landscape and building structures in the areas intended to convey excess water during flooding. Floodplains typically provide level ground and fertile soils suitable for agriculture, and access to water supplies and transportation routes. However, these benefits come with a price, as flooding is one of the most destructive natural hazards in the world. It is responsible for more deaths per year than any other geologic hazard. Further, the economic costs as measured in average annual flood losses (in dollars) have increased steadily over the last decades as development in floodplains has increased. Major flood events occurred in southern California in 1862, 1884, 1916, 1938, 1969, 1978, 1980, 1983, 1988, 1992, 1995, and 1998. As a result of floods, particularly in dense urbanized floodplains and alluvial fans, awareness of the potential for public and private losses has increased.

With development also comes an increase in impervious surfaces, such as buildings, concrete walks and asphalt roadways. Water that previously absorbed into the ground now becomes runoff to downstream areas. If the storm drain systems associated with new development are not designed or improved to convey increased flows due to runoff from impervious surfaces, areas down stream that may not have flooded in the past may be subject to flooding in the future. This is especially true for developments downstream of canyons and at the base of the mountains. The surrounding mountain slopes generally receive rainfall that increases with elevation. Potential flooding problems in the City of Banning, its Sphere-of-Influence and planning area are associated with storm events in the San Gorgonio River basin.

Banning encompasses sharp contrasts in terrain, with high to moderately steep slopes bordering the City on the south, and a narrow southeastward-sloping valley characterizing the central part of the City. Steep, rugged mountains rise from the northern edge of this valley to form a dramatic backdrop. The mountains have been deeply incised by large, south-flowing streams that have created drainage basins that extend miles beyond the City limits. The San Gorgonio River is the largest of these streams, and has the greatest drainage basin area. It receives runoff from several other large canyons along its lower reaches before it exits the City near Interstate 10 (I-10).

Smith Creek, the largest tributary (within the City) to the San Gorgonio River, drains the west side of the City. Smith Creek originates in the San Bernardino Mountains and flows south across the valley. It then turns east, following the base of the San Jacinto Mountains to its confluence with the San Gorgonio River east of the City. Smith Creek collects runoff from numerous smaller streams that drain the southern part of the Banning Bench, including Pershing,

Montgomery, Gilman Home Channel, and several unnamed drainages. Runoff from the gently sloping alluvial fans that comprise the valley also collect in Smith Creek. Streams in the most populated part of the valley (generally adjacent to, and north of, I-10) have been largely confined to open channels, culverts, and storm drains, although for most of their length, most of these drainages remain in a natural, unmodified state.

Stream Flow and Flood Hazard

Stream flow in the planning area's streams is negligible, except during and immediately after rains, since climate and basin characteristics are not conducive to Ongoing flow. Therefore, the San Gorgonio River is dry most of the year; small flows generally occur only a few times a year. Other drainages in the City exhibit similar characteristics, and in particularly dry years may not have any flows at all.

Flood hazards in the Banning area can be classified into three general categories. These are: flash flooding through natural channels; ponding, with flows impeded by man-made obstructions; and sheet flooding across the alluvial fans upon which most of the City's development is currently located.

Flash floods are of short duration; however, they have high peak volumes and high velocities. Flash flooding takes place in response to the local geology and geography, and man-made structures. Because the San Bernardino Mountains are very steep and fairly impervious to water, little precipitation infiltrates the ground. Therefore, rainwater flows across the surface as runoff, collecting in the major drainages that traverse the City. Water from major storms in the area collects and runs off rapidly, descending the steep mountain slopes into natural and man-made channels within the developed areas. These flood flows often carry large amounts of mud, sand, rock fragments, and scoured vegetation due to the constant shedding of debris from the steep mountain slopes (primarily as dry gravel and rock falls). Ponding can occur near the east-west oriented embankments along I-10 that block or obstruct the south-flowing stream channels. When the capacities of the existing man-made or natural channels are exceeded and water spills over into the adjacent areas, sheet flow can occur.

During the severe winter storms of 1938 (the March 1938 flood is the maximum flood in the historical record), 1965, 1966, and 1969, the Banning area sustained flood damage. Flows recorded on the San Gorgonio River near the Banning levee during the floods of 1969 reached an estimated peak discharge of 17,000 cubic feet per second (cfs). This significantly exceeded the Riverside County Food Control District's estimates for the 100-year flood, and caused extensive damage and loss of life downstream in the Cabazon area. However, damage from the river within the City's corporate limits was limited by the Banning levee. In 1969 this was not the case for Smith Creek and its tributaries. Parts of the City experienced heavy flood damage in January and February of that year. For example, Highland Springs Avenue (all places) was washed out, cutting off access to San Gorgonio Pass Hospital. The concrete lining in Pershing channel was heavily damaged by erosion, and some storm drain inlets became clogged with debris.

Inundation From Above-Ground Storage Tanks

Strong ground shaking can cause structural damage to aboveground water storage tanks, which can result in seismically induced inundation. If tanks are not adequately braced and baffled, sloshing water can lift a water tank off its foundation. This may result in the tank's shell splitting, damage to the roof, and bulging the bottom. Movement can also shear off the pipes leading to the tank, and water may be released through the broken pipes. During southern California's 1992 Landers, 1992 Big Bear, and 1994 Northridge earthquakes these types of damage occurred. About 40 steel tanks were rendered non-functional during the Northridge earthquake. In the Santa Clarita area, a tank failed and inundated several houses below. Lessons learned from these earthquakes resulted in new standards for design of steel water tanks, which were adopted in 1994. The new tank design includes flexible joints at the inlet/outlet connections to accommodate movement in any direction.

There are 7 aboveground water storage reservoirs in Banning, all owned by the City. Together they have a total storage capacity of 11.5 million gallons. With the exception of the Southwest Reservoir, which is constructed with pre-stressed reinforced concrete, all reservoirs consist of welded steel tanks. In 2000, three of the older reservoirs were seismically upgraded. Should the tanks or their connections fail during an earthquake, inundation paths have not been prepared. A determination should be made as to which reservoirs, if any, might pose an inundation hazard to downstream properties.

In the event of an earthquake, water released by any of these tanks can significantly reduce the water resources available to suppress earthquake-induced fires and limit the amount of water available to residents. There are 20 operating production wells that currently serve the City. Currently (2004) seven additional wells are not operational, and one is abandoned. These wells may be subject to damage during an earthquake, especially a near-source earthquake on the any of the active faults in the City. Therefore, it is vital that the water storage tanks in the area retain their structural integrity during an earthquake in order to meet water demands after the earthquake. This requires that the tanks be kept at or near full capacity at all times.

FLOOD CONTROL MEASURES

Regional Flood Control

The Riverside County Flood Control and Water Conservation District (RCFC) is responsible for the management of regional drainage within and in the vicinity of Banning, including rivers, major streams and their tributaries, and areas of significant sheet flows. The District is empowered with broad management functions, including flood control planning and construction of drainage improvements for regional flood control facilities, as well as watershed and watercourse protection related to those facilities. To carry out their mandate, the RCFC also has power of taxation, bonded indebtedness, land and water rights acquisition, and cooperative partnerships with local, state, and federal agencies. The Riverside County Board of Supervisors is the official decision-making body for RCFC.

Local Flood Control

While RCFC has the primary responsibility for managing regional drainage in and around the community, they work in cooperation and coordination with the City. They play a key role in the management of local drainage. The City, however, remains directly responsible for the management of local drainage. The preservation of lands constrained by topography or drainage, including steep slopes, areas rich in vegetation and cover, and alluvial plains and drainage channels greatly reduces runoff and preserves the capacity of downstream facilities. The planned integration of on-site stormwater detention facilities, where possible and appropriate, significantly reduces the needed size of downstream facilities, while creating opportunities for groundwater recharge, and enhanced open space and/or recreation areas.

It is important that hydrologic studies be conducted as new developments are considered. In order to assess the impact that increased development may have on the existing development downgradient, these studies should quantify the effects of increased runoff and alterations to natural stream courses in the earliest stages of planning. The project proponent needs to prove that any deficiencies that are identified can be mitigated to a satisfactory level prior to proceeding forward with the project, in accordance with the California Environmental Quality Act (CEQA) guidelines. Mitigation measures generally include flood control devices, such as catch basins, storm drain pipelines, culverts, detention basins, desilting basins, velocity reducers, and debris basins for protection from mud and debris flows.

RCFC sets forth the methodology for analysis and design of flood control structures. RCFC will also have future responsibility for operation of regional flood control facilities. The local storm drain network outside of the regional system will be with the City of Banning. Therefore, to assure compatibility, both agencies must be involved in the planning and approval of mitigation measures.

The effectiveness with which the City and RCFC manage drainage issues will have a direct effect on the scale, complexity and cost of future flood control facilities. The cost-effectiveness of prevention and on-site management should be actively integrated into community land use planning and regulation, recognizing significant physical and financial constraints in many areas of the City.

Banning Master Drainage Plan

The Banning Master Drainage Plan, published by the RCFC, includes many new structures for future development. These include open channels, storm drains, box culverts, and debris basins.. Though not adopted by the County, the Master Drainage Plan is a working document used by both the City and County to determine the need for facilities in the region.

The flood control structures in the City Limits include the Highland Springs Channel, the Smith Creek Channel, the West and East Pershing Channels, the Montgomery Creek Channel, the Gilman Home Channel, the Indian Canyon Channel, the Ramsey Street Storm Drain, the San Gorgonio Avenue Storm Drain, the Banning Levee, and other numerous culverts beneath Interstate-10.

Existing Flood Protection Measures

Existing flood control consists of pre-1938 rubble-lined channels constructed by the Works Progress Administration (WPA), newer (1950s and later) facilities constructed by the RCFC, and storm drains constructed as part of private developments. At the time FEMA (1978) published their report, the WPA structures were considered substandard in design and inadequate to control flooding in the City. Flood control facilities and improvements later constructed by the County consist of open concrete channels and reinforced concrete box channels designed for 100-year capacity, all designed at mitigating floodwater emanating from the hills to the north as it passes through the developed portions of the City in the valley. With the exception of the San Gorgonio River, runoff from the various channels ultimately reaches Smith Creek, along the southern edge of the City. The following briefly summarizes components of the RCFC flood control network in Banning, from west to east:

Highland Springs Channel

The Highland Springs Channel follows the alignment of Highland Springs Avenue, north of I-10, just outside of the western boundary of the City. North of Wilson Street, to the base of the hills, this primarily consists of a concrete trapezoidal channel 5 feet wide (at the base), which ranges from 4.5 to 5.5 feet deep. This occurs on the western side, nearest the City of Beaumont. A segment approximately 3,000 feet long consists of storm drain where it passes through Tract 14209-1 (again, on the western, or Beaumont side). South of Wilson Street, the channel consists of an enclosed reinforced concrete box to I-10. At this point, flows are conveyed into an open channel that parallels the north side of the freeway eastward for about 3,800 feet, where flows pass under the freeway through a reinforced concrete box culvert and enter the natural tributary channel of Smith Creek. There are two smaller tributary storm drains, one along Wilson Street, and one along Ramsey Street, that connect to this system just west of the freeway box culvert. Where the system crosses Highland Springs Road it is in the City of Banning.

Smith Creek Channel

Smith Creek is predominantly still in its natural state, although intermittent channel modifications have been completed between Wilson Street and I-10. Modifications consist of a storm drain through Tract 21882-1 (a 120-foot long segment of open trapezoidal channel 12-foot wide by 12-feet deep) and box culverts below the freeway and the railroad tracks. These modified segments are separated by short segments of unimproved channel. There are channel modifications and a debris basin planned for the undeveloped portion of the Smith Creek alluvial fan area north of Wilson Street. In the southern part of the City, future storm drains are planned for Hargrave and Hathaway Streets, from which flows will exit into Smith Creek.

There are two small segments of the Smith Creek natural channel along the southern edge of the City that have been somewhat modified for bank protection. However, they still consist of open unlined channels. These segments are located south of the sewage treatment plant, between San Gorgonio and Hargrave Streets.

West Pershing Channel
West Pershing consists of a 5-foot wide by 5-foot deep trapezoidal channel, which follows the alignment of Highland Home Road for about 1,500 north of Wilson Street, and will be extended northward to the base of the hills in the future. At Wilson Street, a reinforced concrete box culvert conveys flows. South of Wilson Street, the open channel continues southeastward to Ramsey Street. In the future, this line will be extended by culverts beneath the freeway and the railroad tracks. South of I-10, the Pershing Creek channel remains in a natural state.

East Pershing Channel
The East Pershing Channel extends southward from the Mountain Reservoir site to where it merges with the West Pershing Channel just north of Ramsey Street. This improvement consists of 72-inch reinforced concrete pipe and is under construction.

Montgomery Creek Channel
Montgomery Creek Channel extends from Sunset Avenue, near the base of the hills, southeastward to Ramsey Street. It consists of an open concrete channel, either trapezoidal or rectangular in shape, which varies from 5 to 6 feet deep and 3 to 10 feet wide. Several smaller tributary storm drains occur in this reach. At the northern end of the channel, planned improvements include a debris basis and a small tributary storm drain along Nicolet Street. At Ramsey Street, flows enter a 10-foot wide by 6-foot high box culvert and exit into the natural channel south of the railroad tracks. Montgomery Creek is in a natural state between this point and its confluence with Smith Creek,

Gilman Home Channel
Gilman Home Channel extends from George Street southeastward to I-10. This portion consists of open concrete channel and storm drain. At the I-10, it merges with the Indian Canyon Channel. It continues southward as an open trapezoidal channel to Westward Avenue, where flows enter an unlined channel that ultimately empties into Smith Creek. Along Ramsey, Williams, and Nicolet Streets are smaller tributary storm drains. There are additional storm drains planned for 8th and Gilman Streets in the future.

Gilman Home Channel splits into two branches north of George Street. East Gilman Home consists of a trapezoidal concrete channel that extends northward to a debris basin at the base of the hills. West Gilman Home Channel has also been improved, consisting of a concrete trapezoidal channel.

Indian Canyon Channel
This channel was originally constructed by the WPA and has been replaced with a concrete trapezoidal channel. It extends from the base of the hills, where a debris basin has been constructed, and continues southeasterly to its intersection with the Line C-1, of the RCFC Master Drainage Plan, at Wilson and Linda Vista Streets. The line continues as a storm drain south of Wilson Street beneath Repplier Park and southward along 4th Street. Indian Canyon Channel joins the Gilman Home Channel at I-10.

Line C-1 extends from the base of the hills, near San Gorgonio Avenue and Lombardy Street, southward to Wilson Street where it joins the Indian Canyon Channel. The northernmost

segment consists of about 880 feet of reinforced concrete pipe, with a concrete trapezoidal channel southward to Wilson Street. A small tributary storm drain is planned for the central part of this line, which would extend to the base of the hills to the west.

Ramsey Street Storm Drain
The Ramsey Street Storm Drain, which extends from Wilson Street southeast to Ramsey Street, continues eastward along Ramsey Street for about 3,500 feet to I-10. Flows passing from north to south beneath I-10 through a box culvert exit into an unimproved channel that runs north of the airport and ultimately joins the San Gorgonio River floodplain to the east. There are two future tributary lines proposed for the Ramsey Street Storm Drain, one along Hargrave Street, and one along Hathaway and George Streets, both north of I-10.

San Gorgonio Avenue Storm Drain
This storm drain is located along San Gorgonio Avenue, between the railroad tracks and Smith Creek. The line consists of reinforced concrete pipe ranging in size from 33 to 42 inches.

Banning Levee
The Banning Levee was constructed along the south side of the San Gorgonio River, about 900 feet north of the intersection of Banning Canyon Road and Summit Drive. It consists of 700 lineal feet of rock and wire mesh.

Other Structures
There is a 600-foot long storm drain along Sunset Avenue, beneath I-10 and the railroad tracks. Additionally, numerous other culverts exist beneath the freeway, most consisting of 18- to 30-inch reinforced concrete pipe.

The existing flood control structures have provided significant protection from flooding. In fact, in 1978 the Federal Emergency Management Agency reported that Montgomery Creek, Pershing, and Sidney Street channels, as well as the San Gorgonio River levee, significantly reduced the amount of flood damage suffered by the City during the severe winter storms of 1969. Nonetheless, current Flood Emergency Management Agency Flood Rate Maps indicate that additional protection is needed, especially as more open space is developed.

Federal Emergency Management Agency and Federal Flood Rate Maps

The Federal Emergency Management Agency (FEMA) has mapped many of the areas of the United States subject to flooding from 100-year storms. The resulting documents, FEMA Flood Insurance Rate Maps (FIRMs), serve as the basis for determining the need for and availability of federal flood insurance. Exhibit V-5, Flood Zones in the Study Area, illustrates a compilation of the data presented in the corresponding FIRM Community Panels (maps).

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Explanation

FIRM Flood Hazard Areas

- A — Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
- A1-A30 — Areas of 100-year flood; base flood elevations and flood hazard factors determined.
- B — Areas between limits of the 100-year and 500-year flood; or certain areas subject to 100-year flooding with average depths less than 1 foot or where the contributing drainage area is less than 1 square mile; or areas protected by levees from base flood.
- C — Areas of minimal flooding (No shading).

USGS Flood-prone Areas

- Flood-prone areas that have a 1 in 100 chance on the average of being inundated during any year. Flood-prone areas have been delineated without consideration of present or future flood-control storage that may reduce flood levels.
- Flood-prone areas from sheet flow.

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Federal Emergency Management Agency (FEMA) 1978, 1980, 1988, and 1991; United States Geological Survey (USGS), 1975.

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

- City Limits
- Sphere of Influence
- Planning Area

Earth Consultants International

Project Number: 2235
Date: April 2004

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Banning General Plan
Flood Zones in the Study Area

BANNING CALIFORNIA ESTABLISHED 1913

Exhibit

V-5

Based on the FEMA maps for the City of Banning planning area, lands within the 100-year flood plain are designated (Zone A) in major portions of the San Gorgonio River. These include portions of the upper Smith Creek drainage and are comprised of washes, channels and areas subject to sheet flow flooding. The San Gorgonio River flows southeasterly near of the eastern boundary of the City. As shown on the FEMA maps, the 100-year flood zone for the San Gorgonio River is generally confined to the area along the channel of the river and its tributaries. However, the bedrock underlying the surrounding hills and mountains of the City has low permeability. Therefore, heavy runoff from these areas during strong storms cannot be prevented.

Each of the applicable flood zones is briefly described below.

Zone A & A1: Areas of 100-year flood for which no base flood elevations have been determined.
Zone B: Areas between limits of 100-year and 500- year flood; or certain areas subject to 100-year flooding with average depths less than 1 foot or where the contributing drainage area is less than 1 square mile; or areas protected by levees from the base flood.
Zone C: Areas that have been determined to be outside the 100-year and 500-year floodplains.

Land Use Planning as a Flood Control Strategy

Land use planning can be one of the most effective and direct methods to control flooding and limit threats to lives and property. Land use planning is consistent with other primary community goals that call for the preservation of natural vegetation in the foothills and mountains. These preserves can function as natural water sheds for local drainage and ground water recharge and can have positive affects to the volume of Stormwater and debris that reach downstream facilities.

Land use planning can also limit human exposure to the hazards of flooding, improvements to storm hazards, and damage. Restrictions on the type and location of structures in the vicinity of major drainages within the community can greatly reduce potential losses. Development should be severely limited and regulated within the limits of improved and unimproved 100-year floodplains. These limits should include prohibitions of the construction of structures for human habitation.

Within flood zones subject to sheet flooding, development approvals should be conditioned to assure protection of improvements from flood damage. Protection measures may include raising the finished floor level above the flood depth projected for the surrounding area and providing protection against scouring. Such measures are incorporated into RCFC Ordinance 458 as the standard that applies to FEMA Zones A (see discussion of FEMA Zones, above). In the planning area, this ordinance is particularly relevant to lands along the Smith Creek Channel and the San Gorgonio River. Until such time as flood protection is provided and removes areas from severe threats of flooding, development in these areas should be carefully regulated.

Flood Protection Measures for Property Owners

As previously discussed, structures and residents located on alluvial fans emanating from the San Bernardino Mountains are subject to significant risk from flooding. Flood hazards are mainly associated with Smith Creek and the San Gorgonio River, as well as, to a lesser extent, other streams than traverse the area.

To reduce the impact of flooding, property owners in susceptible areas can make modifications to their houses. There are several flood protection measures FEMA has identified that can be implemented by property owners to reduce flood damage. These include: installing waterproof veneers on the exterior walls of buildings; putting seals on all openings, including doors, to prevent the entry of water; raising electrical components above the anticipated water level improvements; and installing backflow valves that prevent sewage from backing up into the house through the drainpipes. However, these changes vary in complexity and cost, and some need to be carried out only by a professional licensed contractor. For additional information and ideas, please refer to the FEMA web page at www.fema.gov. In the process of obtaining permits from the City's Building Department, which are required for structural modifications, homeowners may also obtain guidance as to whether or not flood protection measures would be appropriate for any given property or structure.

Other Flood Control Measures

The National Pollution Discharge Elimination System

The Clean Water Act of 1972 set goals to restore and maintain water quality by reducing "point source pollution" such as pollutants from industry and sewage treatment facilities. In 1987, amendments to the Act shifted focus to polluted runoff, requiring states to reduce discharges into waterways. These amendments required the US EPA (Environmental Protection Agency) to formally regulate polluted runoff just as it regulates industry and sewage treatment plants - with permits under the National Pollutant Discharge Elimination System (NPDES). The NPDES program requires communities with populations exceeding 100,000 to apply for a municipal permit. Municipal permits require cities and counties to eliminate or control "non-point source pollution."

In most states, including California, the state administers the NPDES permitting program, rather than the EPA. Nine Regional Water Quality Control Boards administer the program for California. Portions of Riverside County fall under the jurisdiction of three of these Boards: the Santa Ana, the San Diego, and the Colorado River Basin Regional Water Quality Control Boards. Banning is under the jurisdiction of the Colorado Basin Regional Water Quality Board.

Recognizing that this regulation would affect them all, RCFC, the County of Riverside, the 23 Riverside County cities (excluding Blythe) and the Coachella Valley Water District joined forces to apply for joint NPDES municipal permits, rather than separate ones. This has allowed the "co-permittees" to share resources, eliminate duplicate efforts, and minimize program costs to the public.

The program emphasizes pollution prevention, control measure activities, utilization of existing resources and programs, and coordination with regional and state compliance activities. The goals of these activities include the following:

- Eliminate illicit connections and illegal discharges to the storm drain system;
- Promote public awareness and participation through the Program's education program - The Storm Water/Clean Water Protection Program;
- Identify and control stormwater pollution created by industrial and commercial activities;
- Establish stormwater management programs for public agencies to reduce the amount of pollutants that enters and accumulate in storm drains;
- Identify and establish local regulatory control measures for activities that can pollute the storm drain system, such as new development and construction, and residential, commercial and industrial activities;
- Monitor wet and dry weather flows to identify the origin, types, and concentrations of non-point source pollutants;
- Increase existing municipal efforts to clean streets, collect solid waste, and prevent used oil and other hazardous wastes from entering storm drains;
- Develop local ordinances to establish legal authority for cities and counties to regulate stormwater discharges.

Flood Control, Wildlife Habitat and Recreation Enhancement

Controlling stormwater flows is consistent with the goals and policies set forth in the General Plan, and should also be viewed as an opportunity for multiple uses, including recreation and wildlife enhancement. Washes, detention/retention basins and channels should be designed with this multi-use function in mind.

In addition to the opportunity to integrate hiking and equestrian trails into these facilities, these areas are consistently frequented by numerous birds and small and large mammals, and can offer meaningful areas for passive enjoyment. As a retreat from the more urban environments of the area, they are important as a source of forage and cover, and offer opportunities for the continued integration of the natural habitat into the built environment.

FUTURE DIRECTIONS

The Flooding and Hydrology Element is applied through the direct expression of policies and implementation of programs of the Element, and through the implementation of other General Plan Elements, including Water Resources, Open Space and Conservation, Land Use, and Biological Resources Elements.

The principle and direct implementation of this Element, however, will be accomplished through the enforcement and implementation of the Master Drainage Plan. The improvements associated with Master Drainage Plan help control and confine the area-wide drainage pattern to more discreet and focused routes where it can be better managed. It may also point to facilities that complement land use patterns, provide cost-effective flood control alternatives, and maximize opportunities for multiple uses, including enhanced groundwater recharge. The Master Drainage Plan will also set critical parameters for future development along areas subject to area-wide flooding. The Element will also be implemented through the development guidelines and regulations of the Banning Zoning Ordinance, Grading Ordinance, and Subdivision Ordinance.

GOAL, POLICIES AND PROGRAMS

Goal
A comprehensive system of flood control facilities and services effectively protecting lives and property.

Policy 1
Proactively plan and coordinate with other responsible agencies to upgrade the City's local and regional drainage system.

Program1.A
Continued implementation of the recommendations of the 1994 RCFC Master Drainage Plan study.
Responsible Agency: Public Works Department, Planning Department
Schedule: Ongoing

Program1.B
Capital Improvement Plans for drainage management and control shall be developed, updated and maintained and shall be based upon the Master Drainage Plan project descriptions.
Responsible Agencies: Public Works Department, Planning Department
Schedule: Ongoing

Program 1.C
Monitor and update the Master Plan of Drainage every five years to reflect changes in local and regional drainage and flood conditions.
Responsible Agencies: Public Works Department, Planning Department
Schedule: Ongoing

Program 1.D
Require all new development to complete on site drainage analysis and improvements, at their expense, as part of project development.
Responsible Agencies: Public Works Department, Planning Department
Schedule: Ongoing

Policy 2
Major drainage facilities, including debris basins and flood control channels, shall be designed to maximize their use as multi-purpose recreational or open space sites, consistent with the functional requirements of these facilities.

Program 2.A
Coordinate and cooperate with RCFC in achieving multi-use agreements within flood control channels and designing safe, attractive recreational facilities that maintain the functional requirements of the drainage facilities.
Responsible Agencies: Public Works Department, Planning Department, RCFC
Schedule: Ongoing

Program 2.B
Work with RCFC to design drainage and flood control facilities that minimize negative aesthetic impacts and retain natural groundcover and vegetation to the greatest extent possible.
Responsible Agencies: Public Works Department, Planning Department, RCFC, US Army Corps of Engineers
Schedule: Ongoing

Policy 3
The City Engineer shall continue to actively participate in regional flood control and drainage improvement efforts and to develop and implement mutually beneficial drainage plans.

Policy 4
The City shall cooperate in securing FEMA map amendments, recognizing the importance of redesignation of the 100-year flood plains within the City boundaries and sphere-of-influence as improvements are completed.

Program 4.A
In conjunction with the RCFC, the City shall coordinate and cooperate in the filing of appropriate FEMA application materials to incrementally secure amendments to the Flood Insurance Rate Maps for the City, consistent with existing and proposed improvements.
Responsible Agencies: Public Works Department, Planning Department, RCFC
Schedule: Ongoing

Policy 5
Pursue all credible sources of funding for local and regional drainage improvements needed for adequate flood control protection.

Program 5.A
Consider the establishment of Area Drainage Plans or Assessment Districts for purposes of funding necessary drainage improvements in particular geographic areas of the City.
Responsible Agencies: Public Works Department, Planning Department, Economic Development Agency, Developers
Schedule: Ongoing

Program 5.B
Explore County funding, state funding under the Cobey-Alquist Flood Plain Management Act, other State programs, and federal funding options for local and area-wide flood control projects.
Responsible Agencies: Public Works Department, Planning Department, Economic Development, State; County
Schedule: Ongoing

Policy 6
All new development shall be required to incorporate adequate flood mitigation measures, such as grading that prevents adverse drainage impacts to adjacent properties, on-site retention of runoff, and the adequate siting of structures located within flood plains.

Program 6.A
Stormwater retention shall be enforced through the development review process and routine site inspection.
Responsible Agencies: Public Works Department, Planning Department
Schedule: Ongoing

Policy 7
Assure that adequate, safe, all-weather crossing over drainage facilities and flood control channels are provided where necessary, and are maintained for passage during major storm events.

Program 7.A
Bridging of roadways within new development projects shall be the responsibility of the developer on whose project the bridge occurs, and shall be included as a condition of approval.
Responsible Agency: Planning Department, Public Works Department, Planning Commission, City Council
Schedule: Ongoing

Program 7.B
All new development proposals shall pay their fair share of bridge construction needed to serve their project.
Responsible Agency: Public Works Department, Planning Department
Schedule: Ongoing

NOISE ELEMENT

PURPOSE

The Noise Element is intended to coordinate the community's land uses with the existing and future noise environment. Further, this element provides for design measures that are intended to minimize or avoid community exposure to excessive noise levels. The potential for land use conflicts that can result in an unacceptable noise environment increase as the City grows. The implementation of policies and programs set forth in this Element can greatly reduce or even avoid current and future noise impacts and land use conflicts.

BACKGROUND

The Noise Element is directly related to the Land Use and Circulation Elements. Noise levels in the community impact the quality of life, since perceptions of the community's desirability may be affected by noise levels. Therefore, this element is also related to the Economic Development Element.

The noise environment can also have a significant influence on the health and comfort of the community. Portions of the planning area enjoy a relatively quiet noise environment, with existing community noise being dominated by local traffic, commercial heating/ventilation equipment, and industrial/manufacturing sources. Portions of the planning area more impacted by noise from motor vehicles and rail traffic, due to proximity with U.S. Interstate 10 and the railroad, or by airport noise in the southeastern portion of the City.

Primary noise generators include traffic on Interstate-10, as well as major roadways within the City, such as Ramsey Street, and portions of Wilson Street, Eighth Street, Hargrave Street, 22nd Street, San Gorgonio Avenue, and Sunset Avenue. Freight rail service along the railroad lines, which are located immediately south of and parallel to U.S. I-10 are also responsible for generating substantial noise levels in this area. Other community noise generators include the Interstate 10/railroad right of way, Banning Municipal Airport, as well as industrial operations, construction activities, and special event noise. Commercial activities, such as live music, home appliances, and gasoline powered lawnmowers and leaf blowers also constitute noise generators in the planning area. Schools, libraries, a hospital, and senior care facilities are all sensitive receptors that occur in the planning area.

The California Department of Health Services has prepared a Model Community Noise Control Ordinance. Developed in accordance with Section 46026 of the Health and Safety Code, this model assists local agencies in developing ordinances designed to control and abate noise. The City of Banning has adopted such ordinances (Nos. 1138 and 1243). The Noise Element addresses issues such as those set forth in California Government Code Section 65032(f), which requires that the Noise Element identify and evaluate the community's noise problems. Section 21083.1 of the California Environmental Quality Act (CEQA) mandates adherence to the State Guidelines. It empowers communities to determine whether a proposed project may have a

"significant effect on the environment." Noise impacts may range from excessive traffic noise in a residential neighborhood to industrial manufacturing noise impacting a hospital or convalescent home. A community noise control ordinance is recommended by state guidelines in order to resolve local noise complaints.

Community Noise Equivalent Level

Noise is defined as unwanted or undesired sound. The combination of noise from all sources near and far is known as the Ambient Noise Level. Airborne sound results from a very sudden change in air pressure from the immediate "normal" atmospheric pressure. For purposes of this discussion, the ambient noise level at a given location is termed "environmental noise."

To understand environmental noise, it is necessary to have some familiarity with the physical description of noise. The primary physical characteristics of sound are its frequency range, intensity/loudness and temporal/time-varying aspect. The decibel (db), A-weighted level (dBA) and Community Noise Equivalency Level (CNEL) are all used to describe and numerically weight noise. Each of these measurement scales are described briefly below.

Amplitude, or strength of sound, is described by a unit of measurement, the decibel. The A-weighted decibel approximates the subjective response of the ear to a noise source by discriminating against the very low and very high frequencies in the spectrum. The Community Noise Equivalent Level (CNEL) is the average of the intensity of a sound over a 24-hour period, with corrections for time of day. The time of day corrections result in the addition of five decibels to sound levels in the evening between 7 p.m. and 10 p.m., and the addition of ten decibels to sound levels at night between 10 p.m. and 7 a.m. These adjustments are necessary because of the decrease in background noise levels during the evening and night hours, when people are more sensitive to noise as compared with daytime hours. Sounds seem louder during evening and night when ambient noise is lower. During evening and night hours, tolerable noise levels should be 5 to 10 dBA lower, and the CNEL number is weighted accordingly.

Ranges and Consequences of Noise

Noise sources are classified as either "line source" (a busy street) or "point source" (a commercial compressor). Factors that affect noise as it travels through the air include temperature, wind speed and direction, hard and soft ground surfaces, and landscaping and walls. When considering noise generated by a roadway, these factors are particularly important insofar as they can mitigate or intensify the noise level.

The most common sounds range between 40 dB (very quiet) and 100 dB (very loud). Normal conversation is roughly 60 dB at three feet, whereas a loud engine noise is about 100 dB. Most everyday sounds occur in the range of 40 to 100 dB. Due to the logarithmic nature of the sound measuring (decibel) scale, doubling the sound energy of a noise source only increases the decibel rating by 3 dB. However, because of the internal mechanism of the human ear, a sound must be nearly 10 dB higher than another sound to be considered twice as loud. Excessive noise can affect physical health, psychological well-being, social cohesion, property values, and economic productivity.

The effects of noise on people can be grouped into three general categories: subjective effects, such as annoyance and nuisance; interference with activities such as conversation and sleep; and physiological effects, ranging from a startle to hearing loss. With an increase in the difference between background or ambient noise and the noise generated from a particularly intrusive source such as traffic, a barking dog, aircraft or industrial operations, adverse reactions to noise generally intensify. Noise control measures should reduce noise by 5 to 10 dBA in most circumstances to effectively lower the perceived sound. Loud, short duration noises from barking dogs and low-flying aircraft, for example, therefore generally have little impact upon the CNEL levels of an area, because of the averaging techniques used to define CNEL.

Existing Banning Noise Environment

The primary noise source in the City of Banning is motor vehicle traffic. Portions of the planning area also impacted by noise from U.S.-Interstate 10 and the railroad, which run east to west through the planning area. Aircraft noise from the Banning Municipal Airport also contributes to the noise environment to a lesser extent. Other noise sources include mechanical equipment serving commercial and industrial lands.

In preparing this General Plan, a number of sites were monitored to characterize the noise environment. The results of this monitoring are shown in the Table below.

Table V-2
Existing Noise Measurement Results

Location[1]	Description	Date/Time of Measure-ment	Primary Noise Source	Noise Level (dBA)
1	Located in a commercial area 30 feet from Highland Springs Avenue curb in front of the San Gorgonio Memorial Hospital.	10/29/04 9:25 AM	Traffic noise from Highland Springs Avenue	64.9 Leq
2	Located approximately 800 feet from the I-10 Freeway on the northwest portion of the Sun Lakes Retirement Community facing the freeway.	10/29/04 9:00 AM	Traffic noise from the I-10 Freeway	51.6 Leq
3	Located in a residential area 30 feet from the curb in the front yard of a single family home in the corner of Wilson Street and Highland Home Road.	10/29/04 9:45 AM	Traffic noise from Wilson Street	62.4 Leq
4	Located in a residential area 30 feet from the curb in the front yard of a single family home on Lincoln Street east of 22nd Street.	10/29/04 10:50 AM	Traffic noise from the I-10 Freeway and Lincoln Street	65.0 Leq
5	Located in a commercial area in vacant property 30 feet from the corner of Ramsey Street and 8th Street.	10/29/04 11:20 AM	Traffic noise from the I-10 Freeway, Ramsey Street and 8th Street	73.3 Leq
6	Located in a residential area 20 feet from San Gorgonio Avenue in front of High School.	10/29/04 11:40 AM	Traffic noise from San Gorgonio Avenue	63.6 Leq

Table V-2
Existing Noise Measurement Results

7	Located in a residential area 30 feet from Bluff Street.	10/29/04 12:00 PM	Traffic noise from Bluff Street	51.3 Leq
8	Located in a residential area 30 feet from the curb of Hathaway Street in front of a single family home.	10/29/04 12:40 AM	Traffic noise from the I-10 Freeeway and Hathaway Street	70.4 Leq
9	Located in a residential area in the corner of Sunset Avenue and Jacinto View 30 feet from the curb.	10/29/04 10:30 AM	Traffic noise from Sunset Avenue	68.1 Leq
10	Located in a commercial area 30 feet from the curb of Ramsey Street west of 8th Street.	10/29/04 2:30 PM	Traffic noise from Ramsey Street and the I-10 Freeway	67.9 Leq
11	Located west of Sunset Avenue approximately 500 feet from the railroad track adjacent to the Freeway.	7/27/04 11:17 AM	Traffic noise from the I-10 Freeway	53.0 Leq
12	Located west of Sunset Avenue approximately 200 feet from the railroad track at the at-grade intersection with Sunset Avenue.	7/27/04 10:24 AM	Traffic noise from the I-10 Freeway and two freight trains pass-by blowing the horn	76.7 Leq
13	Located approximately 20 feet from the curb at Sunset Avenue adjacent to a 7-foot high backyard wall of 533 Saboba St.	7/27/04 10:10 AM	Traffic noise from the I-10 Freeway and Sunset Avenue.	63.1 Leq
14	Located approximately 10 feet from the curb of Highland Home Road behind a 6-foot high backyard wall.	7/27/04 10:48 AM	Traffic noise from the I-10 Freeway	56.2 Leq
15	Located west of Sunset Avenue approximately 300 feet from the railroad track.	7/27/04 11:30 AM	Traffic noise from the I-10 Freeway	57.2 Leq
16	Located west of Sunset Avenue approximately 200 feet from the railroad track.	7/27/04 11:20 AM	Traffic noise from the I-10 and train noise	71.4 CNEL
17	Located west of Sunset Avenue approximately 400 feet from the railroad track.	7/27/04 11:30 AM	Traffic noise from the I-10 and train noise	69.3 CNEL

[1] See Exhibit 4-A for the location of the monitoring sites, and Appendix "B" for Study Area Photos.

[2] Measurement locations 1 to 10 taken with a Larson Davis LD-700 type 2 noise meter, measurement locations 11 to 15 taken with a Larson Davis 824 type 2 noise meter and measurements 16 and 17 taken with a Quest Q-300 noise dosimenter.

[3] Measurement locations 1 to 15 were monitored for a period of 10 minutes and are expressed in dBA Leq.

[4] Measurement locations 16 and 17 were monitored for a period of 24 hours and are expressed in dBA CNEL.

[5] Weather conditions: clear, winds=up to 7 mph

Motor Vehicle Noise

Motor vehicle noise includes automobiles, trucks, buses, and motorcycles, and is the major noise source measured (2004) within the City. Cars generate noise from engine vibration, the interaction of tires and the roadway, and the exhaust system. Factors that impact noise levels include traffic volumes, the percentage of trucks, and average speeds. Table V-3 lists existing noise levels at several locations, while Table V-5, below illustrates the General Plan buildout noise levels. The City has established truck routes within the City, which include Ramsey Street, and portions of Hathaway Street, Sunset, 8th, San Gorgonio and Hargrave. As illustrated in the Table, the noise levels along truck routes in the City are currently high.

The Table below illustrates the distance from centerline for current noise levels on City streets.

Table V-3
Existing Noise Contours on City Streets

ROAD	SEGMENT	CNEL AT 100 FEET (dBA)	DISTANCE TO CONTOUR (FEET)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Highland Springs Ave.	n/o Brookside Ave.	54.3	9	19	42	90
Highland Springs Ave.	s/o 14th Street	59.9	21	46	99	213
Highland Springs Ave.	n/o Ramsey St.	61.6	28	60	128	276
Highland Springs Ave.	n/o Ramsey St.	61.6	28	60	128	276
Highland Springs Ave.	n/o I-10 Freeway	65.7	52	112	241	518
Highland Springs Ave.	s/o I-10 Freeway	64.6	43	94	202	434
Highland Springs Ave.	s/o Sun Lakes Blvd.	56.3	12	26	57	122
Sunset Ave.	n/o Wilson St.	46.7	3	6	13	28
Sunset Ave.	n/o Ramsey St.	60.4	23	49	106	229
Sunset Ave.	n/o I-10 Freeway	60.9	25	53	115	248
Sunset Ave.	s/o I-10 Freeway	55.9	12	25	54	115
Sunset Ave.	s/o Lincoln St.	54.9	10	21	46	99
22nd Street	n/o I-10 Freeway	61.0	25	54	117	253
22nd Street	s/o I-10 Freeway	55.3	10	22	48	104
22nd Street	s/o Lincoln St.	50.8	5	11	24	52
San Gorgonio Ave.	s/o Lincoln St.	57.0	13	29	63	135

Table V-3 Existing Noise Contours on City Streets						
Hargrave St.	s/o I-10 Freeway	57.8	15	33	71	153
Wilson St.	w/o Highland Springs Ave.	57.2	14	30	65	141
Wilson St.	w/o Highland Home Rd.	59.9	21	46	99	213
Wilson St.	w/o Sunset Ave.	59.0	19	40	86	186
Wilson St.	w/o 22nd Street	58.9	18	39	84	182
Ramsey St.	w/o Highland Springs Ave.	62.2	30	65	141	304
Ramsey St.	w/o Highland Home Rd.	62.0	29	63	135	292
Ramsey St.	w/o Sunset Ave.	60.6	24	51	110	238
Ramsey St.	w/o 22nd Street	60.6	24	51	110	238
I-10 Freeway	w/o Sunset Ave.	84.1	875	1,885	4,060	8,748
I-10 Freeway	w/o 22nd Street	84.1	875	1,885	4,060	8,748
I-10 Freeway	w/o 8th Street	83.8	827	1,781	3,838	8,268
I-10 Freeway	e/o San Gorgonio Ave.	83.6	805	1,734	3,737	8,050
I-10 Freeway	e/o Hathaway St.	83.7	816	1,758	3,787	8,160
Sun Lakes Blvd.	e/o Highland Springs Ave.	58.3	17	36	77	166
Lincoln St.	w/o 22nd Street	53.2	8	16	35	76
Lincoln St.	w/o 8th Street	54.5	9	20	43	93
Lincoln St.	e/o San Gorgonio Ave.	55.4	11	23	49	106
Barbour St.	e/o Morongo Blvd.	49.8	4	10	21	45
Westward Ave.	w/o 22nd Street	49.7	4	10	21	44
Westward Ave.	w/o 8th Street	50.7	5	11	24	52

U.S. Interstate-10 and Railroad Lines

In addition to traffic along major arterial roadways impacting the City, rail and vehicular traffic associated with the railroad and U.S. Interstate-10, respectively, impact the planning area. The passage of trains occurs only periodically and with limited duration; nonetheless, rail traffic does represent an intrusive noise source in the community. However, the influence of Interstate-10 traffic noise, which can increase at night due to persistent truck volumes can be more significant.

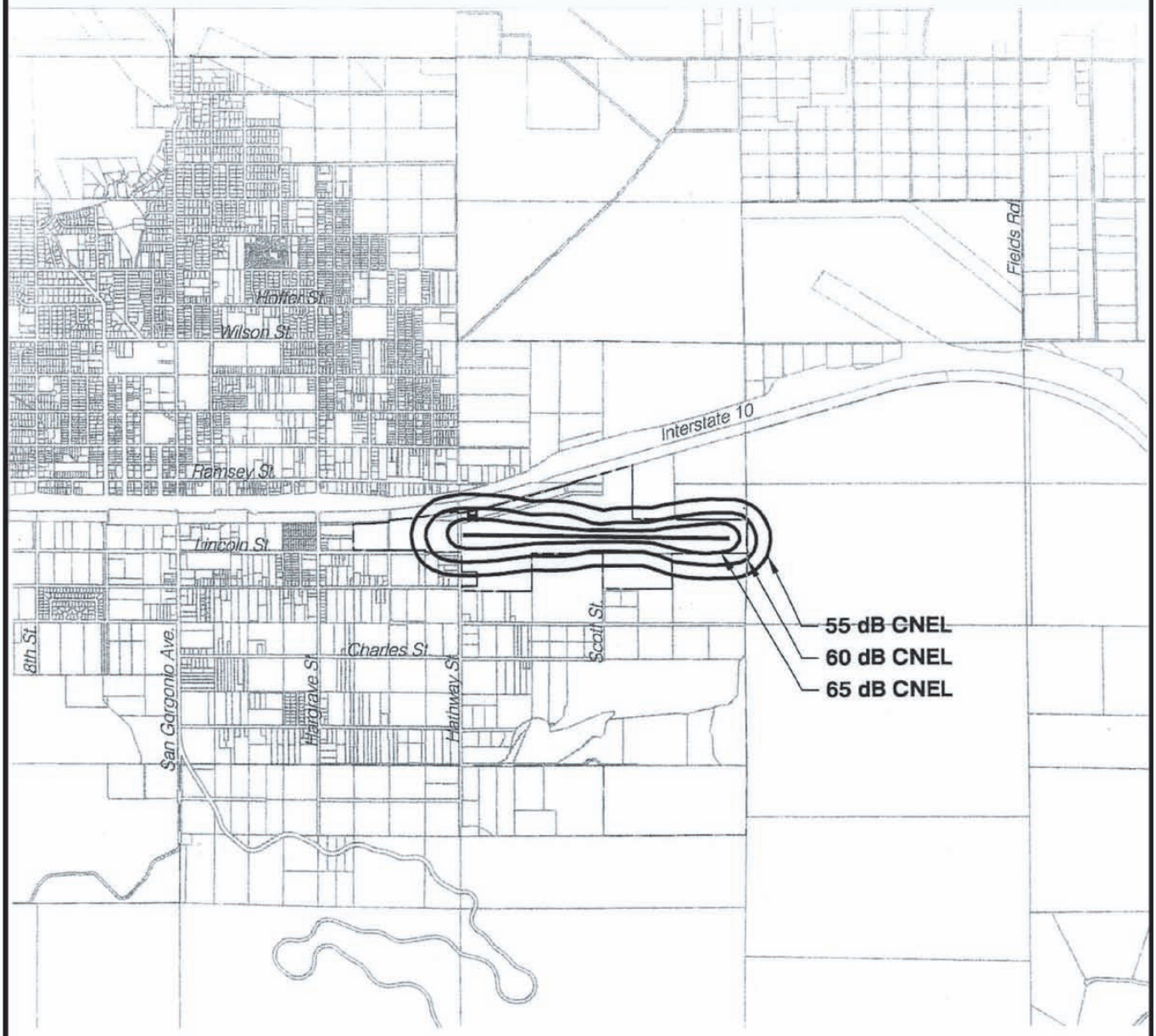
Currently (2004), local rail facilities carry approximately 60 trains per day, which average 7,000 feet in length and generally travel up to 60 miles per hour (mph) in the planning area. The noise levels at a distance of 200 feet from the railroad tracks is estimated at 71.4 dBA CNEL, while the noise level at a distance of 400 feet is estimated at 69.3 dBA CNEL when trains are passing. These noise levels exceed the acceptable level of 65 dBA CNEL for sensitive receptors, such as homes, schools and medical facilities. In addition to audible noise, train traffic also creates vibration, which can also negatively impact surrounding development.

Several segments of U.S. Interstate 10 in the planning area average more than 100,000 vehicle trips per day. Vehicle trips along U.S. Interstate 10 are projected to increase over the buildout period. 2004 estimates place the distance to a 65 dBA CNEL along the Interstate 10 corridor at between 1,758 and 1,885 feet without mitigation, depending on the location. Sensitive receptors proposed near the freeway must therefore be carefully planned to ensure that noise levels are mitigated.

Aircraft Noise

The Banning Municipal Airport, located south of U.S. Interstate 10 in the southeastern portion of the City, averages approximately 10 to 15 takeoffs and landings daily, and about 12,000 operations per year. Air traffic is comprised primarily of private, single-engine fixed-wing aircraft. The Banning Municipal Airport Master Plan (December 1990), shows typical takeoff noise levels for such aircraft. Levels range from approximately 56 dBA to 68 dBA at 7,100 feet from brake release.

Exhibit V-6 and V-7, respectively, show existing (2003) noise contours, and projected noise contours for the Banning Municipal Airport. The current noise contours are generally contained within the airport boundary, and extend to lands designated for airport and related industrial uses, which are considered less sensitive.



H = Helipad

2002/2003	
Annual Operations	12,000
Average Annual Day	33

N

0 3,000' 6,000'

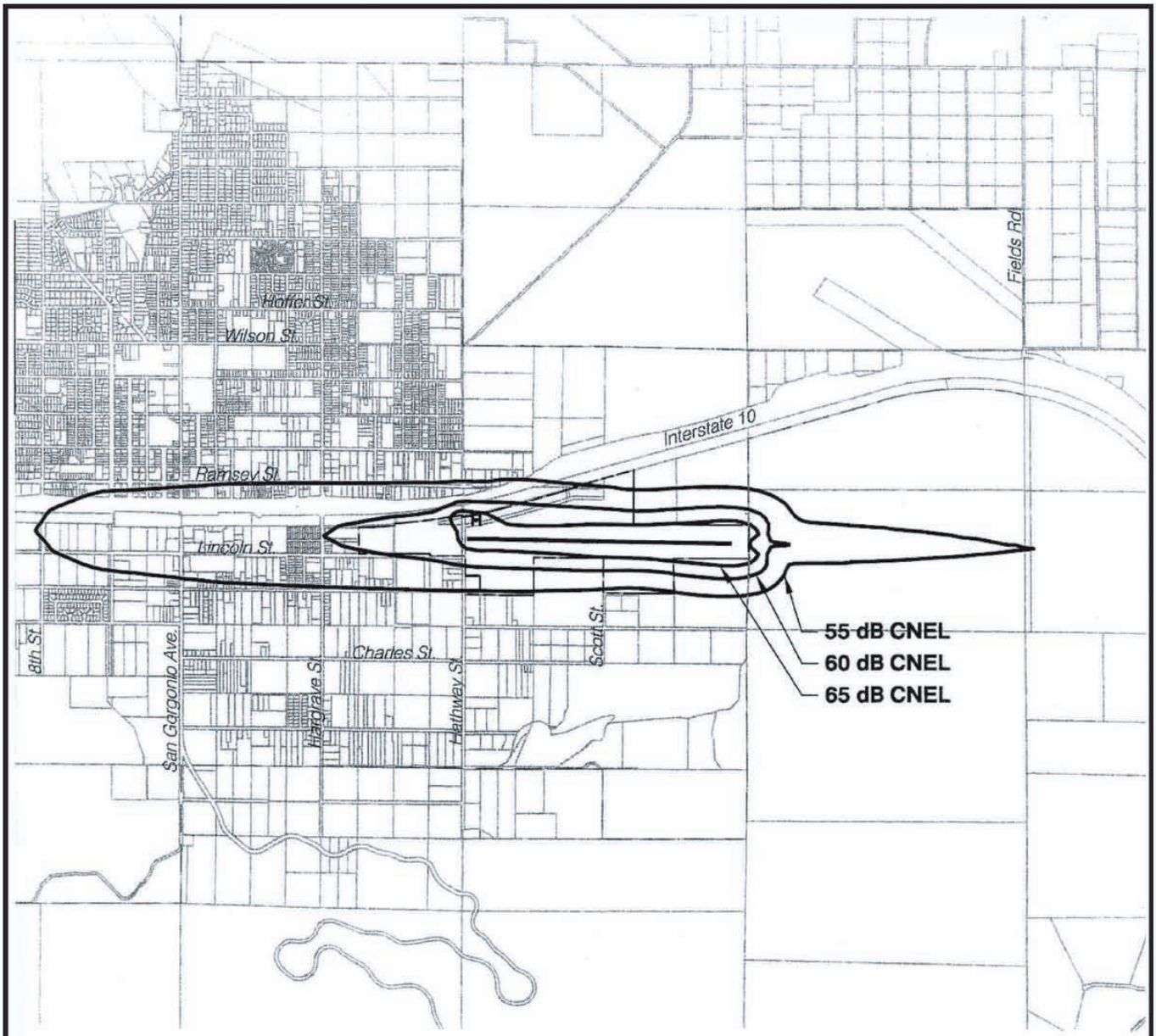
FEET

Source: Mead & Hunt, Inc. (August 2003)

TERRA NOVA®
Planning & Research, Inc.

Banning General Plan
Existing Airport Noise Contours

Exhibit
V-6



H = Helipad

Ultimate	
Annual Operations	70,000
Average Annual Day	192

N

3,000'

0 FEET 6,000'

Source: Mead & Hunt, Inc. (August 2003)

TERRA NOVA®
Planning & Research, Inc.

Banning General Plan
Airport Noise Contours at Buildout

Exhibit
V-7

The buildout noise contours extend considerably east and west of the airport, but the 65 dBA CNEL contour remains in the area of the airport itself, and the surrounding industrial lands. Lower noise levels, within the range of acceptable noise levels for sensitive receptors, occur further east and west, over lands designated for industrial and residential development.

The Federal Aviation Administration (FAA) recommends that schools not be located within noise contours of 65 dBA CNEL and above. For schools within urban areas, the State of California Noise Standards specify 65 dBA CNEL as the point of general acceptability. No schools are located within or in proximity to the airport's annual projected 65 dBA CNEL noise contour.

Mechanical and Industrial Noise

In addition to noise generated by automobile traffic and aircraft, there are other generators in the City that could create substantial noise-related dissonance. Construction activities, automotive repair, and aggregate operations can result in unacceptable noise levels. Loading and materials transfers and other acoustically unscreened operations also raise issues of impact and compatibility.

Significant noise can also result from mechanical equipment operation, including refrigerator units and heating/air conditioner equipment in commercial centers. Noise from roof-mounted equipment can travel to bordering neighborhoods and impact sensitive receptors. Fans and compressors emit a constant hum and can adversely affect the quality of life in a residential neighborhood. The City should include design and location of this equipment in review of new development projects, in order to mitigate this potential impact.

The Community Noise and Land Use Compatibility Model

For the City of Banning, the applicable limit one-hour average for outdoor noise levels in residential areas is 55 dBA during daytime hours, and 45 dBA during evening and nighttime hours (Ordinance 1138). The standard used for maximum outdoor noise levels in residential areas in California and the City specifically is a CNEL of 65 dBA. These noise impacts are characteristically "unmitigated" and represent the worst-case noise impact without any obstruction of the noise. As discussed below, a variety of design and technical measures are available to substantially reduce noise impacts. Land use compatibilities are directly related to the user's sensitivity to noise and the potential for impacts to be mitigated.

Sensitive noise receptors include residences, schools, libraries, churches, hospitals, nursing homes, and destination resort areas. Golf courses, parks, and other outdoor activity areas can also be sensitive to noise levels. Commercial and industrial uses, conventional hotels and motels, neighborhood ballparks and playgrounds, and other outdoor spectator sport areas comprise less sensitive land uses. Table V-4 shows the CNEL ranges of allowable exterior ambient noise levels for various land uses at buildout.

Table V-4
Land Use Compatibility for Community Noise Environments

Land Uses	CNEL (dBA)						
	50	55	60	65	70	75	80
Residential - Single Family Dwellings, Duplex, Mobile Homes	A	B			C	D	
Residential – Multiple Family	A		B		C	D	
Transient Lodging: Hotels and Motels	A		B		C		D
School Classrooms, Libraries, Churches, Hospitals, Nursing Homes and Convalescent Hospitals	A		B		C		D
Auditoriums, Concert Halls, Amphitheaters		B				C	
Sports Arenas, Outdoor Spectator Sports			B			C	
Playgrounds, Neighborhood Parks	A				C	D	
Golf Courses, Riding Stables, Water Recreation, Cemeteries	A				C		D
Office Buildings, Business, Commercial and Professional	A				B	D	
Industrial, Manufacturing, Utilities, Agriculture	A					B	D

Source: *California Department of Health Services, "Guidelines for the Preparation and Content of the Noise Element of the General Plan," 1990*

A **Normally Acceptable**: With no special noise reduction requirements assuming standard construction.

B **Conditionally Acceptable**: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design

C **Normally Unacceptable**: New construction is discouraged. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

D **Clearly Unacceptable**: New construction or development should generally not be undertaken.

Banning Noise Ordinance

The City has established noise standards by adopting amendments to its Municipal Code. Chapter 11D of the Banning Ordinance Code establishes community-wide noise standards and emphasizes the value of an acceptable noise environment. The City Council passed Ordinance 1138 in 1994, which provides regulations for noise measurement and monitoring and cites special provisions of and exemptions to the ordinance. In addition to establishing criteria and standards for the regulation of noise levels in the City, it is intended to implement the noise provisions in the City's General Plan. This Ordinance also provides definitions of key terms and defines exterior noise level standards on a time-of-day basis, along with adjustments for intensity and duration. In 1999, Ordinance No. 1234 was passed to further amend and augment the City's Ordinance code with regard to noise standards and regulations.

Violations of these Noise Ordinances are defined as a nuisance. The Ordinances establish procedures, remedies and penalties to which violators are subject. The City's Noise Ordinances are intended to regulate excessive noise from existing uses and their activities. The noise standards in the General Plan are intended to guide the location of future noise generators and sensitive land uses.

Noise Measurements and Computer Modeling: Projected Future Noise Levels

Based on increases in traffic level on Interstate 10, and the land use map for this General Plan, noise level estimates have been prepared, and are depicted in the Table below.

Table V-5
Buildout Noise Contours

ROAD	SEGMENT[1]	CNEL AT 100 FEET (dBA)	DISTANCE TO CONTOUR (FEET)[2]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Highland Springs Avenue	n/o Wilson Street	67.0	63	135	291	628
Highland Springs Avenue	n/o Ramsey Street	67.3	66	142	307	661
Highland Springs Avenue	n/o I-10 Fwy. EB Ramps	67.4	68	146	314	676
Highland Springs Avenue	n/o I-10 Fwy. EB Ramps	67.4	68	146	314	676
Highland Springs Avenue	n/o Sun Lakes Boulevard	64.9	RW	99	213	458
Highland Home Road	n/o I-10 Fwy. WB Ramps	66.8	61	132	285	613
Highland Home Road	n/o I-10 Fwy. EB Ramps	64.8	RW	96	208	447
Sunset Avenue	n/o Wilson Street	64.2	41	89	191	411
Sunset Avenue	n/o Ramsey Street	65.6	51	110	237	510
Sunset Avenue	n/o I-10 Fwy. WB Ramps	66.2	56	121	261	562
Sunset Avenue	n/o I-10 Fwy. EB Ramps	65.6	51	109	235	507
Sunset Avenue	n/o Lincoln Street	65.5	50	107	231	498
8th Street	n/o Wilson Street	59.4	RW	43	92	198

Table V-5
Buildout Noise Contours

8th Street	n/o Ramsey Street	62.9	RW	73	156	337
8th Street	n/o I-10 Fwy. WB Ramps	66.3	57	122	263	566
8th Street	n/o I-10 Fwy. EB Ramps	65.5	50	107	231	499
8th Street	n/o Lincoln Street	64.5	RW	93	200	431
Hargrave Street	n/o Ramsey Street	63.8	RW	83	178	384
Hargrave Street	n/o I-10 Fwy. WB Ramps	67.2	65	140	301	649
Hargrave Street	n/o I-10 Fwy. EB Ramps	66.1	55	118	255	549
Hargrave Street	n/o Lincoln Street	66.4	58	124	267	576
Fields Road	n/o I-10 Fwy. WB Ramps	62.7	RW	71	152	328
Highland Springs Avenue	s/o Wilson Street	66.8	61	131	283	610
Highland Springs Avenue	s/o Ramsey Street	67.9	73	157	339	730
Highland Springs Avenue	s/o I-10 Fwy. WB Ramps	67.8	72	155	333	718
Highland Springs Avenue	s/o I-10 Fwy. EB Ramps	67.2	65	140	301	648
Highland Springs Avenue	s/o Sun Lakes Boulevard	65.0	RW	100	215	463
Highland Home Road	s/o I-10 Fwy. WB Ramps	64.8	RW	96	208	447
Highland Home Road	s/o I-10 Fwy. EB Ramps	61.8	RW	61	131	283
Sunset Avenue	s/o Wilson Street	63.8	RW	84	180	388
Sunset Avenue	s/o Ramsey Street	66.1	55	119	256	552
Sunset Avenue	s/o I-10 Fwy. WB Ramps	65.5	50	107	231	498
Sunset Avenue	s/o I-10 Fwy. EB Ramps	66.4	58	124	267	575
Sunset Avenue	s/o Lincoln Street	61.1	RW	55	118	254
8th Street	s/o Wilson Street	61.0	RW	54	117	251
8th Street	s/o Ramsey Street	66.3	57	122	263	566
8th Street	s/o I-10 Fwy. WB Ramps	65.5	50	107	231	499
8th Street	s/o I-10 Fwy. EB Ramps	64.8	RW	97	210	452
8th Street	s/o Lincoln Street	60.2	RW	RW	103	222
Hargrave Street	s/o Ramsey Street	67.2	65	140	301	649
Hargrave Street	s/o I-10 Fwy. WB Ramps	66.1	55	119	256	551
Hargrave Street	s/o I-10 Fwy. EB Ramps	66.7	60	130	280	603
Hargrave Street	s/o Lincoln Street	66.4	58	124	267	576
Fields Road	s/o I-10 Fwy. WB Ramps	62.7	RW	71	152	328
Wilson Street	e/o Highland Springs Avenue	64.9	RW	99	213	460
Ramsey Street	e/o Highland Springs Avenue	65.4	50	107	230	496
Sun Lakes Boulevard	e/o Highland Springs Avenue	64.8	RW	98	211	454
Wilson Street	e/o Sunset Avenue	64.4	RW	91	197	424
Ramsey Street	e/o Sunset Avenue	64.8	RW	97	208	449
Lincoln Street	e/o Sunset Avenue	65.6	51	109	236	508

Table V-5
Buildout Noise Contours

Wilson Street	e/o 8th Street	64.0	RW	85	184	397
Ramsey Street	e/o 8th Street	65.1	RW	102	219	472
Lincoln Street	e/o 8th Street	66.4	58	124	267	576
Ramsey Street	e/o Hargrave Street	64.3	42	90	193	416
Lincoln Street	e/o Hargrave Street	65.0	RW	100	214	462
Wilson Street	w/o Highland Springs Avenue	61.9	RW	62	133	287
Ramsey Street	w/o Highland Springs Avenue	64.7	RW	95	205	442
Sun Lakes Boulevard	w/o Highland Springs Avenue	64.0	RW	85	184	396
Wilson Street	w/o Sunset Avenue	65.4	RW	106	229	494
Ramsey Street	w/o Sunset Avenue	65.0	RW	100	216	464
Lincoln Street	w/o Sunset Avenue	64.9	RW	99	213	460
Wilson Street	w/o 8th Street	63.5	RW	79	171	368
Ramsey Street	w/o 8th Street	64.5	RW	93	200	431
Lincoln Street	w/o 8th Street	65.7	52	112	242	521
Ramsey Street	w/o Hargrave Street	60.3	RW	49	105	227
Lincoln Street	w/o Hargrave Street	65.0	RW	101	217	467
Highland Home Road	n/o Wilson Street	65.9	53	114	246	530
Highland Home Road	s/o Wilson Street	65.6	51	110	237	510
Wilson Street	e/o Highland Home Road	64.9	RW	99	213	458
Wilson Street	w/o Highland Home Road	66.0	54	116	250	539
I-10 Freeway	w/o Sunset Avenue	88.0	1586	3417	7362	15860
I-10 Freeway	w/o 22nd Street	87.6	1495	3221	6939	14950
I-10 Freeway	w/o 8th Street	87.4	1450	3125	6732	14504
I-10 Freeway	e/o San Gorgonio Avenue	87.2	1393	3001	6465	13927
I-10 Freeway	e/o Hathaway Street	86.7	1291	2781	5992	12909

[1] n/o: North of, s/o: South of, e/o: East of, w/o: West of

[2] RW: Noise contour within roadway right-of-way

Managing the Noise Environment
A variety of strategies are available for managing the City's noise environment. To preserve a quiet noise environment, thoughtful transportation and land planning, project design mitigation, simple and sophisticated technical measures, and acoustical barriers should be applied to community noise compatibility issues. Site planning and design standards should provide direct noise impact mitigation for areas particularly impacted by noise. Applied mitigation measures include the use of buffer zones consisting of earthen berms, walls and landscaping between sensitive land uses and roadways, and other noise sources. Building orientation, particularly the placement of windows, can significantly mitigate impacts on residential land uses. Incorporating effective acoustical materials into building walls and windows can effectively reduce outdoor noise. Development proposals planned adjacent to the roadways described in Table V-4 should be required to complete a noise analysis; these analyses will include mitigation measures to ensure that buildout of the project will not result in unacceptable noise levels.

FUTURE DIRECTIONS

Although the City of Banning has an essentially quiet noise environment, highway and major roadway noise sources clearly impact the City. The Land Use Element and the assignment of land use designations will play a critical role in the City's ability to control noise for sensitive receptors in the future. Zoning designations provide another level of land use control, as they establish development standards that reduce impacts and enhance compatibility. Where possible, the Circulation Element has also been designed to protect the City's residential areas from excessive traffic noise and assure appropriate noise levels. As the City's population continues to grow, coordination of these two elements of the General Plan must play a key role as the City considers development projects, public works improvements and City-sponsored construction.

GOALS, POLICIES, AND PROGRAMS

Goal
A noise environment that complements the community's residential character and its land uses.

Policy 1
The City shall protect noise sensitive land uses, including residential neighborhoods, schools, hospitals, libraries, churches, resorts and community open space, from potentially significant sources of community noise.

Program 1.A
The City shall require building setbacks, the installation of wall and window insulation, soundwalls, earthen berms, and/or other mitigation measures in areas exceeding the City's noise limit standards for private development projects as they occur.
Responsible Agency: Planning Department
Schedule: Ongoing

Program 1.B
The City shall maintain and enforce its Noise Control Ordinances that establish community-wide noise standards and identify measures designed to resolve noise complaints.
Responsible Agency: Planning Department, Code Enforcement, Police Department
Schedule: Ongoing

Program 1.C
The City shall use the development review process to assure the use of buffers between sensitive receptors and incompatible land uses.
Responsible Agency: Planning Department, Planning Commission, City Council
Schedule: Ongoing

Program 1.D
The City shall require that commercial compactors, loading zones, and large trash bins be located at a sufficient distance from residential properties to reduce noise impacts to its acceptable standard.
Responsible Agency: Planning Department
Schedule: Continuous

Program 1.E
The City shall purchase, maintain and operate its own noise monitoring equipment.
Responsible Agency: Code Enforcement
Schedule: 2006-2007, Ongoing

Policy 2
The relationship between land use designations in the Land Use Element and changes in the circulation pattern of the City, as well as individual developments, shall be monitored and mitigated.

Program 2.A
The City shall develop guidelines and minimal criteria requirements for noise analyses for proposed development projects. Studies shall evaluate project impacts and the effectiveness of proposed mitigation measures.
Responsible Agency: Planning Department, Public Works Department
Schedule: July 1, 2005; every five years.

Program 2.B
The City shall periodically review and amend the Land Use Map to assure reasonable land use/noise level compatibility.
Responsible Agency: Planning Department
Schedule: Annually

Policy 3
Private sector project proposals shall include measures that assure that noise exposures levels comply with State of California noise insulation standards as defined in Title 25 (California Noise Insulation Standards) and/or Banning Ordinances 1138 and 1234, whichever is more restrictive.

Policy 4
The City shall maintain a General Plan Circulation Map and assure low levels of traffic within neighborhoods by assigning truck routes to major roadways only.

Program 4.A
The City shall review designated primary truck routes and ensure they are clearly marked throughout the community. Except for traffic providing location-specific services and deliveries, construction trucks and delivery trucks shall be limited to designated truck routes, including: Ramsey Street, and those portions of Lincoln Street, Highland Springs Avenue, Hathaway Street, Sunset Avenue, Eighth Street, San Gorgonio Avenue and Hargrave Street so designated.
Responsible Agency: Public Works Department, City Engineer
Schedule: Annually

Program 4.B
The City shall discourage development projects that result in through-traffic in residential neighborhoods.
Responsible Agency: Planning Department, Planning Commission, City Council
Schedule: Ongoing

Policy 5
The City shall ensure that flight paths and airport improvements adhere to all local, state and federal noise regulations.

Policy 6
All development proposals within the noise impact area of the Interstate and the railroad shall mitigate both noise levels and vibration to acceptable levels through the preparation of focused studies and analysis in the development review and environmental review process.

Policy 7
The City shall coordinate with adjoining jurisdictions to assure noise-compatible land uses across jurisdictional boundaries.

Policy 8
The City shall impose and integrate special design features into proposed development that minimize impacts associated with the operation of air conditioning and heating equipment, on-site traffic, and use of parking, loading and trash storage facilities.

Policy 9
The City shall support development that results in grade separated railroad tracks.

Program 9.A
The City shall assure that new development and project expansions pay their fair share toward grade separations based on their impacts.
Responsible Agency: Planning Department, City Engineer
Schedule: Ongoing

WILDLAND FIRE HAZARDS ELEMENT

PURPOSE

By providing discussion and setting forth its goals, policies, and programs, the Wildland Fire Hazards Element of the Banning General Plan addresses potential wildland fire hazards within the community. The foremost goal of this Element is to protect the general health, safety and welfare of the community from potential fires and associated hazards. It references and coordinates with other elements of the General Plan, which also address threats to the lives and property.

BACKGROUND

Other General Plan Elements related to this Element include the Geotechnical Element, which addresses some of the City's most primary environmental threats. The Circulation Element, which addresses the need for and availability of adequate access and evacuation routes in the event of a major community disaster or threat, is another related Element. Policies and programs set forth in the Land Use Element direct the location of open space, essential public facilities, and developed areas which have some effect on wildfire issues, and their potential for damage.

State policies and regulations require that the General Plan address potential wildfire hazards within a community and offer mitigation measures to lessen their impacts. Public Resources Code section 4290 requires minimum statewide fire safety standards pertaining to: road standards for fire equipment access; standards for signs identifying streets, roads, and buildings; minimum private water supply reserves for emergency fire use; and fuel breaks and greenbelts. With certain exceptions, all new construction after July 1, 1991 in potential wildland fire areas has been required to meet the statewide standards. The State requirements, however, do not supersede more restrictive local regulations.

Historic Context

Wildland fires are also called chaparral or brush fires, and are typically associated with the indigenous vegetation in the mountain and foothill areas of southern California. This vegetation has a very high oil content that creates severe fire danger. Wildland fires can also occur in suburban and rural areas where developed lands are adjacent to uncultivated lands, undeveloped lands, timber, range, watershed, brush or grasslands.

Prior to the arrival of European settlers, many areas of the United States experienced small but frequent wildfires. These primarily impacted grasses and low-lying bushes, without severely damaging the tree stands. Native Americans in California reportedly used fire to reduce the density of vegetation (fuel load) and thus improve their ability to hunt and forage. It is estimated that various tribes burned perhaps as much as 12 percent of the State every year. However, as development began to encroach onto the foothills in the early 20th Century, wildfire suppression was practiced. In the early 1920s, the Fire Service began campaigns to prevent wildfires from

occurring. Over time this suppression has led to increased fuel loads. Therefore, wildfires that reach areas with fuel buildup can burn more intensity and result in significantly more damage than historic fires of high frequency and low intensity.

Over time, fire suppression and increasing populations have led to:

- Increased loss of life, property, and resources;
- Increased difficulty in fire suppression, increased safety problems for firefighters, and reduced productivity by fire crews on perimeter lines;
- Longer periods between recurring fires;
- Increased volume of fuel per acre; and
- Increased taxpayer costs and property losses.

Large areas of southern California are particularly susceptible to wildfire due to the region's weather, topography and native vegetation. The typically mild, wet winters result in an annual growth of grasses and plants that dry out during the hot summer months. This dry vegetation provides fuel for wildfires in the autumn when the area is intermittently impacted by Santa Ana winds, hot, dry winds that blow across the region in the late fall and can help spread fires. However, wildfires are a necessary part of the natural ecosystem of southern California. Many of the native plants require periodic burning to germinate and recycle nutrients that enrich the soils.

The most common causes of wildfires are arson, improperly maintained campfires, smoking, and improper use of incendiary devices. Multiple ignitions can develop under the right conditions and as a result of the wind transport of burning cinders over distances of a mile or more. In those areas where the wildland approaches or interfaces with the urban environment (referred to as the urban-wildland interface area, or UWI area), wildfires can be particularly dangerous and complex and pose a severe threat to public and firefighter safety. Wildfires can cause devastating losses of life and property. Therefore, continuous planning, preparedness, and education are required to reduce fire hazards, and to limit the potential destruction caused by fires.

Historical Wildland Fires in the Banning Area

As shown in Exhibit V-8, since the early 1900s, a large portion of the Banning area has burned, often repeatedly, with many fires that have been recorded in this area burning thousands to tens of thousands of acres. In areas where fire has been suppressed for more than 30 years, especially in undeveloped areas, there is the greatest potential for future fires to burn uncontrollably. This is due to the fact that there is likely to be a thick accumulation of fallen branches and dry litter on the ground. Areas that have burned periodically therefore may have less destructive fires that will burn with less intensity.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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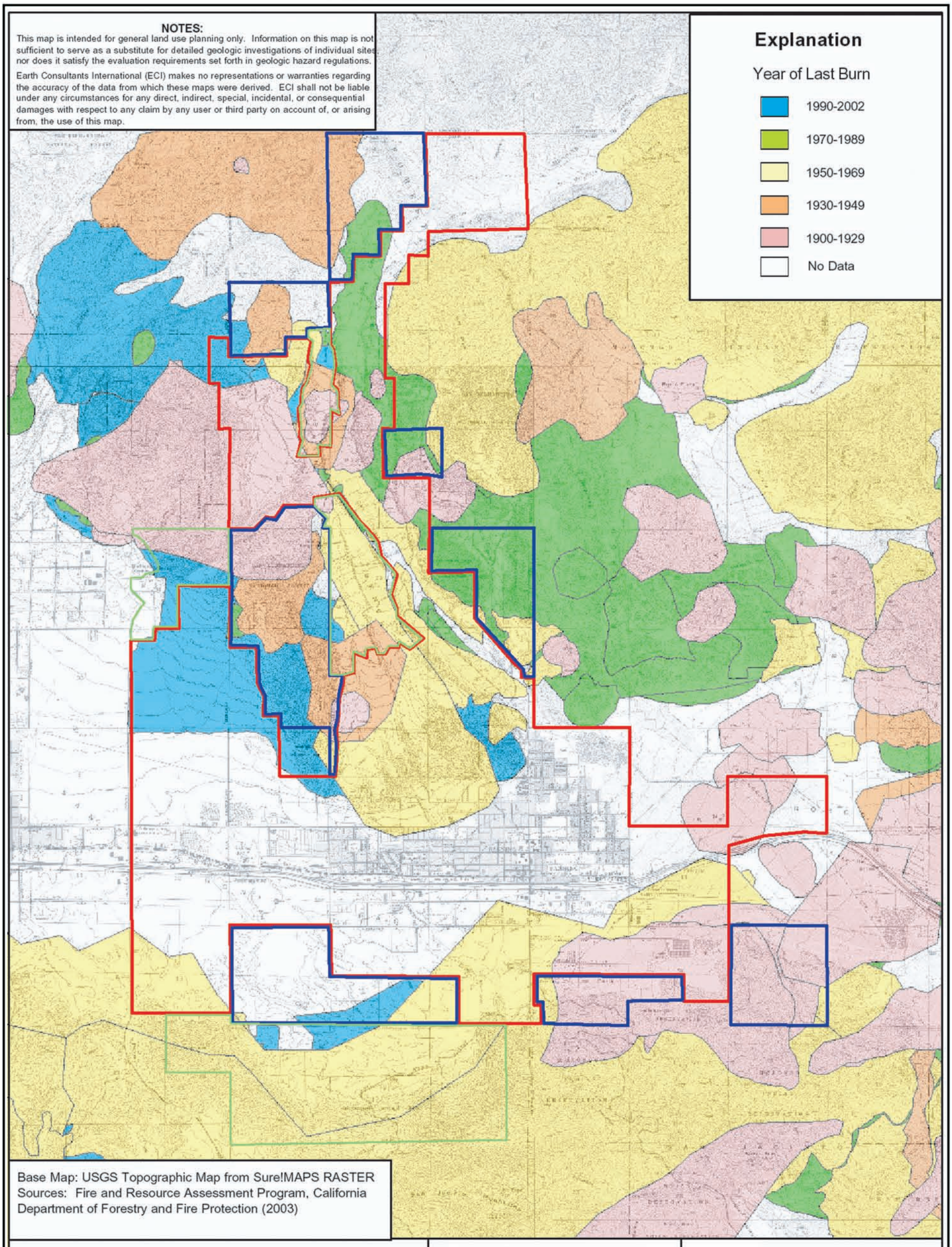

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Fire and Resource Assessment Program, California Department of Forestry and Fire Protection (2003)

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

City Limits

Sphere of Influence

Planning Area

Earth Consultants International

Project Number: 2235
Date: April, 2004

TERRA NOVA®
Planning & Research, Inc.

Banning General Plan
Historical Fire Map

Exhibit

V-8

Wildfire Susceptibility of the Banning Area

The fire hazard of an area is typically based on the combined input of several parameters. These include: fuel loading, topography (slope), weather, dwelling density, and wildfire history. Further, fire hazard is related to whether local mitigation measures are in place that help reduce an area's fire rating (such as an extensive network of fire hydrants, fire-rated construction, fuel modification zones, etc.).

As the historical fire exhibit illustrates, there are large areas of the City susceptible to damage from wildland fire. Portions of the Banning region and surrounding areas to the north, south and east include grass and brush covered hillsides, which, along with significant topographic relief, facilitate the rapid spread of fire, especially if fanned by Santa Ana winds.

Fire Hazard Assessment Systems

Several fire hazard assessment systems have been developed since the early 1970s for the purpose of quantifying the severity of the hazard in a given area. Early systems based characterization of the fire hazard of an area on a weighted factor that typically considered fuel, weather and topography. More recently, systems have been developed that rely on the use of Geographic Information System (GIS) technology to integrate the factors listed above to map hazards, and to predict fire behavior and the impact on watersheds. Those that have been developed in California are described further below.

State Responsibility Areas

Senate Bill 81, (Ayala, 1981) and Senate Bill 1916, (Ayala, 1982) became effective on July 1, 1986, and required the California Department of Forestry and Fire Protection (CDF) to develop and implement a system to rank the fire hazards in California. The legislation applies to non-federally owned lands which are covered in whole or in part by timber, brush, undergrowth or grass, and over which the state has primary financial responsibility for fire protection and suppression. Based primarily on fuel types, areas were rated as moderate, high or very high, and were referred to as State Responsibility Areas (SRAs) (Public Resources Code Section 4125). Exhibit V-9 illustrates the Fire Severity Zones in the Banning area that are State Responsibility Areas.

Local Responsibility Areas

As a result of Assembly Bill 337 (September 29, 1992), the CDF, in cooperation with local fire authorities was given the task of identifying Very High Fire Hazard Severity Zones (VHFHSZs) in Local Responsibility Areas (LRAs). The boundaries of a VHFHSZ are delineated, and the CDF notifies the local fire authorities within that area. The State is not financially responsible for LRAs, therefore, local jurisdictions have final say regarding whether or not an area should be included in a VHFHSZ (Government Code Section 51178). The Local Responsibility Areas in the Banning are shown on Exhibit V-9.

NOTES:

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Fire Station 20
1550 E. 6th Street
Beaumont, CA

Fire Station 89
172 North Murray
Banning, CA

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Fire and Resource Assessment Program, California Department of Forestry and Fire Protection (2001)

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

Very High Fire Hazard Severity Zones

- City Limits
- Sphere of Influence
- Planning Area
- Active Fire Stations
- Local Reponsibility Areas
- State Responsibility Areas

Earth Consultants International

Project Number: 2235
Date: April, 2004

TERRA NOVA®
Planning & Research, Inc.

Banning General Plan
Very High Fire Severity Zone

Exhibit

V-9

Fire Threat Zones

The California Fire Plan was established in 1996 and is a cooperative effort between the State Board of Forestry and Fire Protection and the CDF. Using four main criteria, this system ranks the fire hazard of the wildland areas of the State. The criteria are: fuels, weather, assets at risk, and level of service (a measure of Fire Department's success in initial-attack fire suppression). Fire Threat Zones in the Banning area as mapped by the CDF are shown on Exhibit V-10. History of fire frequency, fuel loads (vegetation), terrain, and assets at risk were used to develop this map.

The planning area is broken into five fire threat zones: Extreme, Very High, High, Moderate, and No Fuel. The Extreme Fire Hazard Zone primarily includes the undeveloped canyon and hillside areas where native vegetation predominates (chaparral scrub and tree assemblages). The Very High Fire Hazard Zone includes areas of moderate relief at the interface with the more developed areas of the City. This zone is comprised of undeveloped or partially undeveloped areas where grasses predominate. The High Fire Hazard Zone includes most of the developed central portion of the City along the Interstate 10 freeway (I-10). In this zone, relief is minimal and hardscape (concrete, asphalt and structures) and landscaping vegetation predominate. This zone also includes most of the bed of the San Gorgonio River, where some vegetation is present seasonally. The Moderate and No Fuel Fire Hazard Zones include those areas where there is either no fuel for fires to burn, or no structures that can burn.

NOTES:

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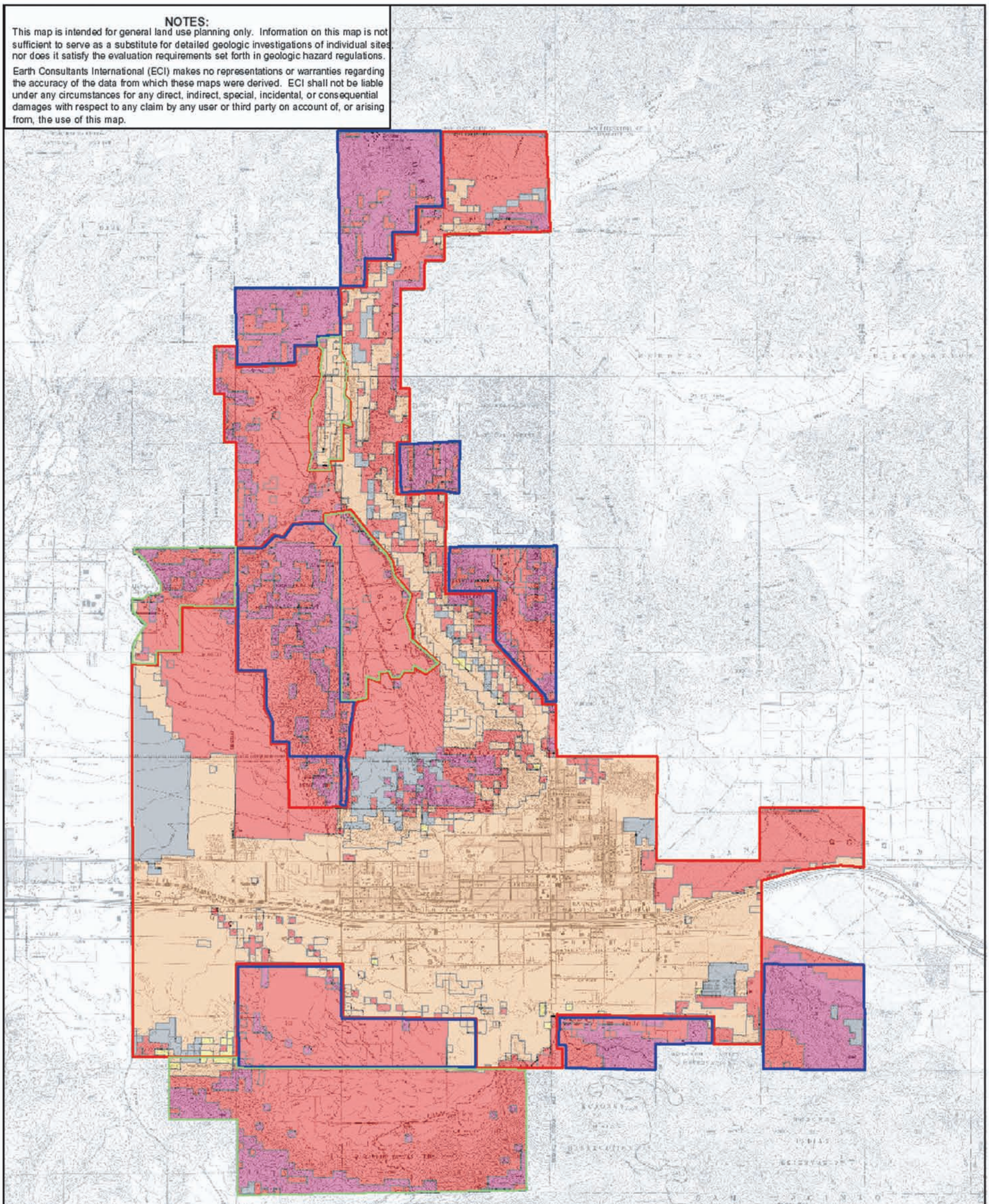


Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Fire and Resource Assessment Program, California Department of Forestry and Fire Protection (2003)

Scale: 1:60,000

4000 0 4000 8000 12000 Feet

1000 0 1000 2000 3000 Meters

Explanation

City Limits

Sphere of Influence

Planning Area

Fire Threat Zones

- Extreme
- Very High
- High
- Moderate
- No Fuel

Earth Consultants International

Project Number: 2235
Date: April, 2004

TERRA NOVA®
Planning & Research, Inc.

Banning General Plan
Fire Threat Zones

Exhibit

V-10

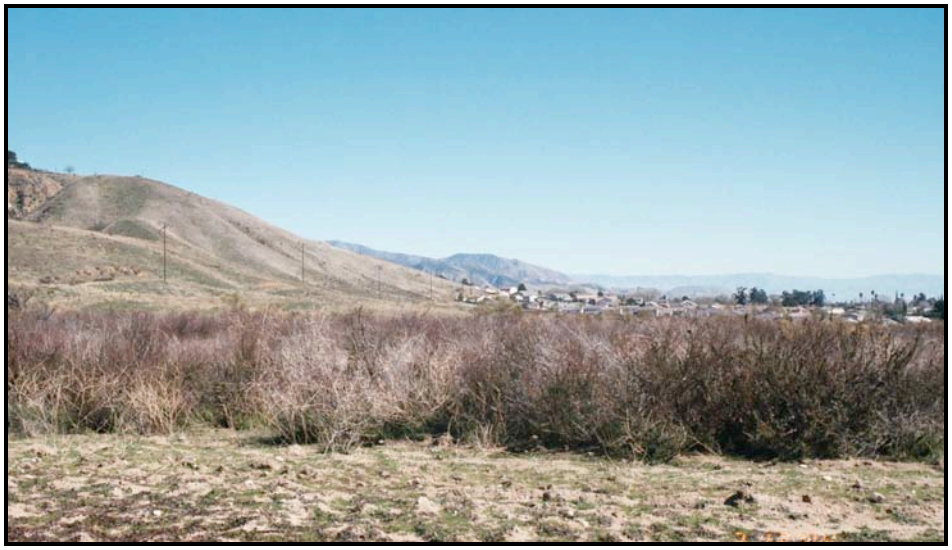
WILDLAND FIRE PROTECTION STRATEGIES

The northern and southern portions of Banning and adjacent areas are particularly susceptible to wildfires because they are vegetated with high fire hazard plants such as tall grasses and chaparral; include steep slopes and canyons. They are also subjected to strong seasonal Santa Ana wind conditions that can transport embers up the canyons. Even if no special wind conditions exist, fire department response can be hindered by heavy traffic during peak hours, and by the long travel distances in the canyon and hillside areas of the City. Enhanced onsite protection for structures and people in and near these wildfire-susceptible areas is therefore necessary.

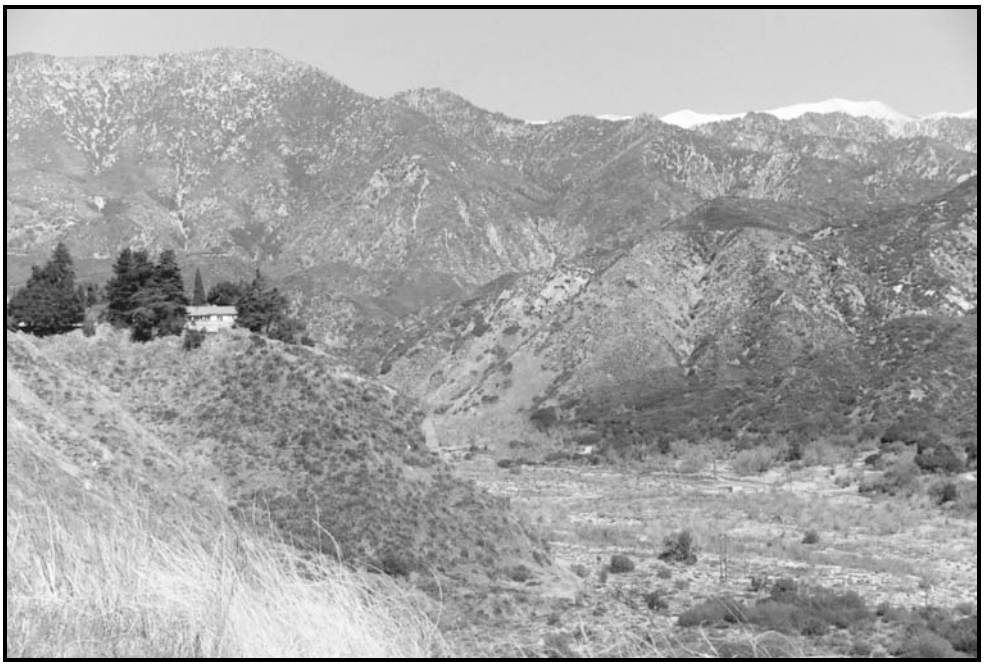
Vegetation Management

Based on experience and research, vegetation management is an effective means of reducing the wildland fire hazard. Land development is governed by special State, county and local codes in those areas identified as susceptible to wildland fire. In these areas, property owners are required to follow maintenance guidelines aimed at reducing the amount and continuity of the fuel (vegetation) available. By following strict vegetation management practices at the urban-wildland interface (UWI), damage resulting from fire can be significantly reduced.

Following the 1993 wildland fires that impacted large areas of Orange, Los Angeles and Ventura counties, requirements for vegetation management at the UWI in California were revisited. The Urban-Wildland Interface Code was developed as a result of the 1993 Southern California wildfires, with support from the Federal Emergency Management Agency Grant Program, administered by the California Governor's Office of Emergency Services through the Office of the State Fire Marshal. The first draft of this code was published in 1995, with revisions in 1997, 2000 and 2003.



Tall Grasses and Chaparral on the Banning Bench



Vegetated Canyons in the Banning Area

Hazard Reduction and Fuel Modification

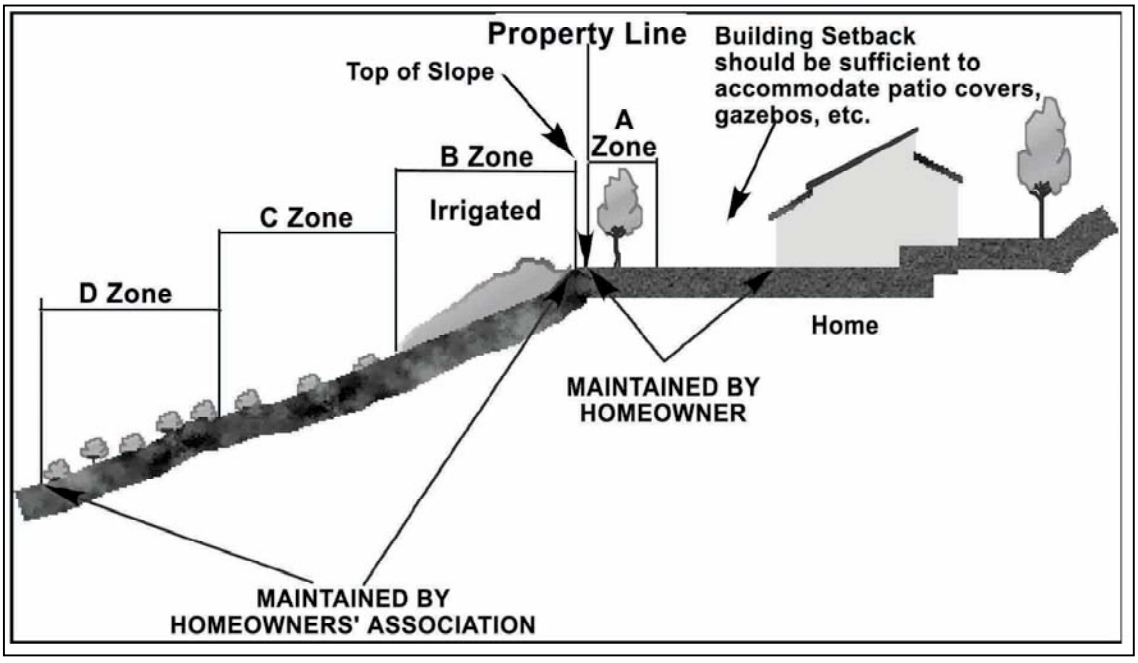
Communities most often use hazard reduction and fuel modification to reduce the amount of combustible fuel available and thus reduce the amount of heat, associated flame lengths, and the intensity of the fire that may threaten adjacent structures. These methods are intended to reduce the hazard of wildfire by establishing a "defensible space" around buildings or structures in the area. Defensible space, defined as a man-made or natural area where plant materials and natural fuels have been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire, can also act as an area for firefighters to suppress fires and save the structures.

Residents are required to comply with fuel modification zone requirements in some communities or developments proposed adjacent to a wildland area. A fuel modification zone is a ribbon of land surrounding a development within a fire hazardous area that is designed to diminish the intensity of a wildfire as it approaches the structures. Fuel modification includes both the thinning of native combustible vegetation, as well as the removal and replacement of native vegetation with fire-resistive plant species. The optimum width of a fuel modification zone is generally 170 feet. Fuel modification zones may be owned by individual property owners or by a homeowners' association. Space near structures that provides natural landscape compatibility with wildlife, water conservation and ecosystem health is emphasized. This approach provides immediate benefits, including improved aesthetics, increased health of large remaining trees and other valued plants, and enhanced wildlife habitat.

Fuel modification zones can be divided into four areas, referred to as the A, B, C and D zones. Each of these zones is described below.

- The **A Zone** is the defensible space where firefighters can set up hose lines to extinguish the approaching fire. The A Zone is the closest to the homes, and is the last 20-feet of the backyard of the private residences. All plants in this area are required to be irrigated and must be fire-resistive.
- The **B Zone** represents the next 50 feet adjacent to the back fence line. This zone is an area where natural vegetation has been replaced with fire-resistive, drought-tolerant plants. The B zone should be fitted with automatic water sprinklers on a permanent basis. Non-approved vegetation must be removed from this zone.
- The **C and D Zones** include the next 100 feet from the B Zone. The C and D Zones are each a minimum of 50 feet in width. These zones are called the thinning zones. Natural vegetation is reduced by 50 percent in the C zone, and by 30 percent in the D zone. Conceptually, in 50 percent thinning zone (C zone) two people can walk side by side around clusters of vegetation. In a 30 percent thinning zone (D Zone), two people would have to walk single file between clusters of natural vegetation. These areas are not irrigated.

The guidelines for vegetation management in defensible areas are designed to be a fire prevention partnership between property owners and the City and County in order to prevent disastrous fires. They are further designed to minimize fire danger by controlling density and placement of flammable vegetation. The local Fire Marshal may determine that conditions in some high fire hazard areas warrant greater fire protection measures than those provided by minimum standards. Further, higher standards may be warranted during certain times of the year when there is an increased risk of wildfires.



Fuel Modification Zones

Notification and Abatement

As set forth in City and County Codes, property owners are required to mitigate the fire hazard in their property by implementing vegetation management practices such as those discussed above. If uncontrolled or high weeds, brush, plant material, or other prohibited items are present on a property, the authority that has jurisdiction (Code Enforcement and Fire Marshal) has the authority to serve notice to the property owner of record to abate the hazard within a specified time period. If the owner does not comply, the City may take further action to reduce the fire hazard, including the following:

- The City or its contractor may enter the parcel of land and remove or otherwise eliminate or abate the hazard;
- Upon completion of the work, the City can bill the property owner for the cost of the work plus any administrative costs, or the cost can become a special assessment against that parcel; and
- Upon City Council confirmation of the assessment and recordation of that order, a lien may be attached to the parcel, to be collected on the next regular property tax bill levied against the parcel.

The applicable authority (Code Enforcement and Fire Marshal) must notify the property owner by certified mail, of the intention to abate the fire hazard. Typically, notices must be mailed at least 15 days prior to the date of the proposed abatement. The property owner may appeal the decision of the City Code Enforcement requiring the maintenance of an effective firebreak by sending a written appeal to the City (Planning Department Code Enforcement) within 10 days of the notice. For additional information regarding the Notification and Abatement procedures, refer to the City's Municipal Code.

Prescribed Fire

A prescribed fire is a fire that is deliberately set under carefully controlled and monitored conditions in order to remove brush and other undergrowth. Prescribed fire is used to modify, maintain or restore vegetative communities, and to achieve desired resource conditions. Further, it is used to protect life and property that would be degraded by wildland fire. Prescribed fire is only accomplished through managed ignition. It should be supported by the appropriate documentation and environmental analyses.

Prescribed fire has been the primary means of fuel management in Federal and State-owned lands since 1981. An average of 30,000 acres a year, or approximately 500,000 acres total, have been treated with prescribed fire under the vegetation management program throughout the State. In the past, the typical vegetation management project targeted large wildland areas, however, development at the urban-wildland interface often precludes the use of large prescribed fires. Prescribed fire is not presently being used in the City of Banning to mitigate the wildland fire hazard.

The wildfire susceptibility of an area changes throughout the year, and from one year to the next, in response to local variations in precipitation, temperature, vegetation growth, and other

conditions. The fire season in Riverside County typically begins in mid April and lasts until the first rains. Site-specific vegetation maps available from the US Geological Survey (USGS) assess the regional and local condition of vegetation throughout the year, including growing season profiles and water content of vegetation. Fire departments and land managers can use these maps to establish regional prevention priorities that can help reduce the risk of wildland fire ignition and spread. They can also help improve the allocation of suppression forces and resources, which can lead to faster control of fires in areas of high concern. Further, these maps can be used for scheduling of prescribed burns and study of long-term vegetation changes resulting from human or natural factors

Building to Reduce the Fire Hazard

Structural Fires

The density of construction can be an important issue in the spread of fires. Residences that are close to each other can hinder emergency access to the back of residences. A3-foot wide area should be maintained cleared at all times between buildings so as to allow firefighters and emergency response personnel to access the back of the structures. Therefore, window projections and other additions, or storage of household items (such as trash bins, bicycles, etc.) in these areas should be discouraged or prohibited. Efforts to evacuate an area during a fire or other disaster may be hindered by narrow city streets. These can also make it difficult to maneuver and position response vehicles so as to be most effective in fighting a fire.

Construction Materials

Building construction standards for such items as roof coverings, fire doors, and fire resistant materials help protect structures from external fires and contain internal fires for longer periods. Due to the deposition of burning cinders or brands, the roof is the portion of a structure most susceptible to ignition from a wildland fire.. Burning brands are often deposited far in advance of the actual fire by winds, and roofs can also be ignited by direct contact with burning trees and large shrubs. The City of Banning has established standards for roofing and construction materials, with specialized requirements within Very High Fire Hazard Severity areas. The City requires that roofing materials be (at a minimum) effective against moderate fire exposures (Class B roof). New construction and reconstruction in Very High Fire Hazard Security Areas are required to have, as a minimum, roof coverings that are effective against severe fire exposures per Section 6.6 of Appendix II-A-2 of the 2001 California Fire Code (Class A roof).

Another concern regarding the fire survivability of a structure attic ventilation openings, which are typically provided by openings to the outside of the structure. However, these opening can also provide pathways for burning brands and flames to be deposited within the attic. Therefore, it is important that all ventilation openings be properly screened. The use of non-combustible exterior siding materials and to site trees and shrubs far enough away from the walls of the house to prevent flame travel into the attic even if adjacent trees or shrubs catch fire can also reduce the potential for ignition of attic spaces. The type of windows used in a structure can also help reduce the potential for fire to impact a structure.

Model Ordinances and Fire Codes

An area's infrastructure, including adequacy of nearby water supplies, transport routes and access for fire equipment, addresses, and street signs, as well as maintenance, must also be considerations for effective fire suppression. The City of Banning has adopted the 2001 California Fire Code with City amendments. Provisions within the Fire Code include constructions standards in new structures and remodels, road widths and configurations designed to accommodate the passage of fire trucks and engines, and requirements for minimum fire flow rates for water mains. Construction requirements are a function of building size, type, material, purpose, location, proximity to other structures, and the type of fire suppression systems installed. Some of the more significant fire codes that help reduce the hazard of structural fire pertain to the installation of fire sprinklers, which can help contain a fire that starts inside a structure from spreading to other nearby structures. Sprinkler systems can also help prevent total destruction of a building. For building construction standards in the City of Banning please refer to the City's Municipal Code.

Real-Estate Disclosure Requirements

As required in California state law, fire hazard areas must be disclosed in real estate transactions. This means that real-estate sellers are required to inform prospective buyers whether or not a property is located within a wildland area that could contain substantial fire risks and hazards [Assembly Bill 6; Civil Code Section 1103(c)(6)]. These disclosure requirements are particularly important because in California the average period of ownership for residences is typically five years. Uninformed homeowners may attempt landscaping or structural modifications that could be a detriment to the fire-resistant qualities of the structure, with negative consequences.

Fire Safety Education

There are other actions homeowners can take to significantly reduce the risk of fire throughout the City, in addition to the specific code requirements and guidelines mentioned above regarding defensible space, appropriate landscaping and construction materials. These actions may include the following:

- Become familiar with local regulations regarding vegetation clearings, disposal of debris, and fire safety requirements for equipment.
- When building, selecting or maintaining a home, consider the slope of the terrain. Be sure to build on the most level portion of the lot, since fire spreads rapidly on slopes, even minor ones.
- Avoid construction on ridges and cliffs. Keep a single-story structure at least 30 feet away from edges; increase distance if structure exceeds one story.
- Use construction materials that are fire-resistant or non-combustible whenever possible.
- Driveways should provide easy access for fire engines. The driveway and access roads should be well maintained, clearly marked, and include ample turnaround space near the house.
- Provide at least two ground level doors for safety exits and at least two means of escape (doors or windows) – in each room.

- Install automatic seismic shut-off valves for the main gas line to your house. Information for approved devices, as well as installation procedures, is available from the Southern California Gas Company.
- Use of signs during high and extreme fire conditions along the freeways and major roads that cut through the City and adjacent areas can also help reduce the fire hazard by alerting and educating motorists about the potential fire hazard in the area.

Peakload Water Supplies

Emergency water storage is critical, especially when battling large wildland fires. Problems can occur when water reservoirs are located at lower elevations because the water cannot be supplied to the higher elevations as fast as the fire engines can pump from it. Leaks and breaks in the water distribution system, including leaking irrigation lines and open valves in destroyed homes also reduced the amount of water available to the fire fighters. A seven-day emergency storage supply is recommended, especially in areas likely to be impacted by fires after earthquakes. As discussed in the Geotechnical/Seismic Hazards Element, earthquakes can damage water distribution systems through ground failure due to fault rupture, liquefaction, or landslides.

Maintaining fire flow is critical in fighting fires. Fire flow is the flow rate of water supply (measured in gallons per minute – gpm) available for fire fighting measured at 20 pounds per square inch (psi) residual pressure. Available fire flow is the total water flow available at the fire hydrants, also measured in gallons per minute. As of the writing of this report, Banning had adopted the section of the 2001 California Fire Code that lists the minimum required fire-flow and flow duration for buildings of different floor areas and construction types. For additional information regarding the required fire-flow for your building, contact the Fire Department. Local water districts are required to test their fire protection capability for the various land uses per the flow requirements of the 2001 California Fire Code.

POST-FIRE EFFECTS

Fires usually last only a few hours or days, but their effects can last much longer, especially in the case of intense fires that develop in areas where large amounts of dry, combustible vegetation have been allowed to accumulate. If wildland fires are followed by a period of intense rainfall, flood control facilities may be severely taxed by the increased flow from the denuded hillsides and the resulting debris that washes down. If the flood control structures are overwhelmed, widespread damage can ensue in areas down gradient from these failed structures. However, if remedial measures are taken after a wildland fire in anticipation of the next rainy season impacts can be reduced. As shown in the photo below, sandbags, plastic covers and other measures can be implemented in order to increase slope stability following a fire.

Denuded Slopes Due To Fire

There may also be economical and social effects of wildfires. Loss of homes due to wildfires may affect homeowners financially and emotionally for years thereafter. Recreational areas that have been affected may be forced to close or operate at a reduced scale. Local property tax revenues may be reduced, since the buildings that are destroyed by fire are usually eligible for re-assessment.

The impact of wildland fire on plant communities is generally beneficial. However, it often takes time for plant communities to re-establish. While grasslands will re-sprout the following spring, chaparral plant communities take three to five years. Oak woodland requires at least five to ten years for a new crop to start if most of the seedlings and saplings are destroyed by fire.

FIRE SUPPRESSION RESPONSIBILITIES

The City contracts with the Riverside County Fire Department for fire services. In turn, the County contracts with the California Department of Forestry. This agreement has been in place since 1998. The City's Fire Marshal is authorized and directed to enforce the provisions of the Fire Code throughout the City. As part of these responsibilities, the Fire Marshal reviews plans for new construction and additions, coordinates with the City for disaster preparedness programs, and manages the weed abatement program described above. The Fire Marshall also manages inspections and the Hazardous Materials Business program.

The County's fire stations may include a mix of state, county, contract city, and volunteer staffed equipment. All stations dispatched by the same County Fire 9-1-1 Center and are part of the "Integrated fire protection system," under contract with the State. The Riverside County Fire Department monitors the fire hazard in the City constantly. The Fire Department has ongoing programs for investigation and alleviation of hazardous situations. In the Banning Area, fire fighting resources include Fire Station Nos. 89 and 20. Fire Station No. 89 is located at 172

North Murray in Banning, and Fire Station No. 20 is located at 1550 E. 6th Street, in Beaumont, to the west of Banning. If additional resources are needed due to the intensity or size of the fire, a second alarm may be requested. Additional fire units are requested via automatic or mutual aid agreements.

Automatic and Mutual Aid Agreements

The Riverside County Fire Department operates under a Regional Fire Protection Program. Automatic aid agreements obligate the nearest fire company to respond to a fire regardless of the jurisdiction. Numerous other agencies are available to assist the City if needed. These include local law enforcement agencies that can provide support during evacuations due to wildfire. Several State and Federal agencies have roles in fire hazard mitigation, response, and recovery, including: the Office of Emergency Services, the Fish and Wildlife Service, US Forest Service, National Weather Service, and, the Department of Agriculture, the Department of the Interior. Private companies and individuals may also assist. The California Master Mutual Aid Agreement is the overall agreement negotiated and signed by all participating agencies to provide emergency resources.

Standardized Emergency Management System (SEMS)

The Standardized Emergency Management System (SEMS law) is described by the Petris Bill (Senate Bill 1841; California Government Code Section 8607, made effective January 1, 1993). The SEMS law is intended to improve the coordination of State and local emergency response in California, and requires all jurisdictions within the State of California to participate in the establishment of a standardized statewide emergency management system.

Emergency response in every jurisdiction in the State of California is handled in accordance with SEMS. Individual City agencies and personnel take on their responsibilities as defined by the City's Emergency Plan. The City's Emergency Plan describes the different levels of emergencies, the local emergency management organization, and the specific responsibilities of each participating agency, government office, and City staff.

Insurance Services Office Rating for the City of Banning

The Insurance Services Office (ISO) provides rating and statistical information for the insurance industry in the United States. The ISO does this by evaluating a community's fire protection needs and services, and assigns each community evaluated a Public Protection Classification (PPC) rating. The PPC rating, which is developed as a cumulative point system, is based on the community's fire-suppression delivery system, including fire dispatch (operators, alarm dispatch circuits, telephone lines available), fire department (equipment available, personnel, training, distribution of companies, etc.), and water supply (adequacy, condition, number and installation of fire hydrants). Insurance rates are based upon this rating, which ranges from Class 1 (best) to Class 10 (worst). Banning currently has a Class 4 ISO rating.

FUTURE DIRECTIONS

With substantial challenges posed by local wildfire conditions, the City will need to rely upon the regulations and guidelines set forth in the Urban-Wildland Interface Code, zoning ordinance, and other applicable legislation to adequately mitigate hazards addressed in this Element. The City will benefit from close coordination with state, regional, and county agencies in establishing and maintaining an up-to-date information database of wildfire hazard conditions in the region. Furthermore, the City's development review process must assure that development proposals are thoroughly evaluated with regard to fire safety and the urban wildland interface, that all necessary special studies are conducted and reviewed, and that comprehensive mitigation measures are implemented.

As more development occurs in the City planning area, and the demand for developable lands increases, the threat of wildfire will continue to impact the Banning community. Mitigation of this hazard will require a regional approach to fuel reduction and fire wise education. The City is responsible for actively participating in these efforts to assure that hazards associated with wildfire are minimized.

State Government Code 54119 mandates that the State Fire Marshal, in consultation with the Director of Forestry and Fire Protection and the Director of Housing and Community Development, shall, pursuant to Section 18930 of the Health and Safety Code, recommend building standards that provide for comprehensive space and structure defensibility to protect structures from fires spreading from adjacent structures or vegetation and vegetation from fires spreading from adjacent structures. These building and fire codes are scheduled for public review January 2006. Once these codes are adopted by the state they will subsequently be adopted by the City.

GOAL, POLICIES, AND PROGRAMS

Goal

Protect human life, land, and property from the effects of wildland fire hazards.

Policy 1
The City shall establish and maintain an information database containing maps and other information which describe fire hazard severity zones, fire threat zone, and other wildfire hazards occurring within the City boundaries, sphere-of-influence and planning area.

Program 1.A
Consult and coordinate with surrounding communities, the State Board of Forestry and Fire Protection, California Department of Forestry and Fire Protection, Riverside County Fire Department, other applicable state and federal agencies to establish, improve and routinely update the database.
Responsible Agency: Planning Department, Banning Fire Department, Beaumont Fire Department, State Board of Forestry and Fire Protection, California Department of Forestry and Fire Protection, Riverside County Fire Department, Morongo Band of Mission Indians.
Schedule: 2005-2006; Ongoing

Program 1.B
The City shall make available copies of the Fire Severity Map and discourage development within areas so designated, or require detailed mitigation measures that reduce potential hazards to insignificant levels.
Responsible Agency: Planning Department, Fire Department
Schedule: Immediately; Ongoing

Program 1.C
Prepare an informational handout to be distributed to developers, property owners, and other appropriate parties, which describes the need for and design of fire safe developments.
Responsible Agency: Planning Department, City Engineer, Fire Department
Schedule: 2005-2006; Ongoing

Program 1.D
Establish and maintain a program by which all potentially hazardous structures, which pose a threat due to inadequate fire hazard construction are identified, inventoried, and retrofitted with fire retardant materials. Program shall include informational handouts describing appropriate methods of retrofitting and possible sources of funding to facilitate the rehabilitation of such structures.
Responsible Agency: Building and Safety Department, City Engineer, Fire Department
Schedule: 2005-2006

Policy 2
On going coordination between the Banning Fire Department, Beaumont Fire Department, the Riverside County Fire Department, the California Department of Forestry, the Morongo Band of Mission Indians and the US Forest Service in fire prevention programs.

Program 2.A
Cooperate with all neighboring agencies in order to identify opportunities for fuel breaks in very high hazard severity zones and to ensure that fire breaks are provided where necessary and appropriate.
Responsible Agency: Fire Marshall, City of Beaumont, County of Riverside, Morongo Band
Schedule: 2005-2006, Ongoing

Program 2.B
Development proposals shall be transmitted to the Police Department and the City Fire Marshal, and input shall be incorporated into project design or conditions of approval, as appropriate.
Responsible Agency: Building and Safety Department, Planning Department, Police Department, Fire Department
Schedule: Ongoing

Program 2.C
The Police and Fire Departments shall closely coordinate and cooperate with the City and County emergency preparedness teams and shall assure the most effective disaster response practical.
Responsible Agency: City Manager's office, Fire Department, Police Department, County of Riverside, PassCom
Schedule: Immediately; Ongoing

Program 2.D
Contact and establish working relationships and strategies with Banning Heights Mutual Water Company, High Valley Water District, public utilities, and other appropriate agencies to strengthen or relocate utility facilities, and take other appropriate measures to safeguard major utility distribution systems to the greatest extent practical.
Responsible Agency: Planning Department, Public Works Department, City Engineer, Public and Quasi-Public Utilities
Schedule: 2005-2006; Continuous

Program 2.E
Encourage and cooperate with CalTrans and the railroad to reduce hazardous fuel loads (vegetation) near bridges, roadways, rail lines and state highways, which may be subject to closure during major wildland fire events.
Responsible Agency: Public Works Department, City Engineer, CalTrans, railroad
Schedule: Continuous

Program 2.F
The public will be educated regarding disaster prevention and emergency responses including evacuation procedures.
Responsible Agency: Police and Fire Departments, School Districts, PassCom
Schedule: Immediately; Ongoing

Policy 3
Continue to identify wildfire hazard areas, and to enforce special standards for construction in wildland fire hazard areas.

Program 3.A
New and substantially remodeled structures or developments shall incorporate wildfire prevention design techniques, such as the use of "defensible space," fire retardant sidings, optimal site planning and building orientation, landscaping orientation, and other design approaches to reduce wildfire hazards.
Responsible Agency: Building and Safety Department, Planning Department, Police Department, Fire Department
Schedule: Ongoing

Program 3.B
Require that adequate emergency vehicle access and evacuation routes be available with approval of any new development.
Responsible Agency: Building and Safety Department, Planning Department, Police Department, Fire Department
Schedule: Ongoing

Program 3.C
The City shall adopt standard requirements for all development proposal in High Fire Hazard Areas, including requirements for the preparation of Fire Protection Plans prior to the approval of Tentative Tract Maps, Tentative Parcel Maps, or other land use permits.
Responsible Agency: Fire Marshal
Schedule: 2005-2006

Policy 4
The City shall make every attempt to assure that adequate water supplies and pressures are available during a fire, earthquake or both.

Program 4.A
Coordinate with Banning Heights Mutual Water Company, High Valley Water District and other agencies responsible for supplying water to the region to assure sufficient water supplies and pressures are available to provide adequate fire flows for all existing and proposed development.
Responsible Agency: Public Works Department, Building and Safety Department, Planning Department, Fire Department, Banning Heights Mutual Water Company, High Valley Water District
Schedule: Ongoing

Program 4.B
Special on-site fire protection measures may be required on well vegetated, hilly areas with slopes of 10 percent or greater, with possible access problems, and/or a lack of sufficient water and/or water pressure. Such measures shall be specified during project review.
Responsible Agency: Building and Safety Department, Planning Department, Fire Department, Banning Heights Mutual Water Company, High Valley Water District
Schedule: Ongoing

HAZARDOUS & TOXIC MATERIALS ELEMENT

PURPOSE

The purpose of the Hazardous and Toxic Materials Element is to present methods of safe management for hazardous and toxic materials in the community. This Element highlights the City's concern for the protection of residents and visitors from harmful impacts associated with hazardous and toxic materials that may pose a threat to life and property, and may call for costly public improvements. Reduction or elimination of these hazards can be accomplished through the City's continued establishment of policies and programs that identify hazard areas and reviews and regulates development where such hazards occur, assuring effective and safe use, storage, and transport of hazardous and toxic substances in the City of Banning.

BACKGROUND

New technologies and chemical processes, often developing at a rapid pace, can result in the introduction of new and potentially hazardous materials into the environment. Accidental spills, illegal dumping, and other uncontrolled discharges of these materials can pose a significant threat to the community and its environment.

General Plan Elements that directly relate to the Hazardous Materials Element include Air Quality and Water Resources Elements, whose efforts are to preserve clean air and protect against water resource contamination, as well as the Land Use Element, with the potential of hazardous material use, storage, or disposal undermining land use compatibility. Improper management of these materials may also negatively impact the Biological Resources Element. In addition, the Emergency Preparedness Element plays an important role in establishing policies and programs to protect the general public from adverse impacts associated with toxic and hazardous materials.

California Government Code Section 65302(g) mandates that the General Plan of a community address safety issues, including but not limited to hazardous materials. Responsibility for regulating and monitoring the management, disposal, labeling, and use of toxic and hazardous materials lies with a variety of federal, state, and local agencies, including the U.S. Environmental Protection Agency, the California Office of Health Planning and Development, and the Riverside County Department of Health. AB 2948 (Chapter 1504, Statutes of 1986), commonly known as the Tanner Bill, authorizes counties to prepare Hazardous Waste Management Plans (HWMP) in response to the need for safe management of hazardous materials and waste products.

The California Regional Water Quality Control Board (CRWQCB), as well as the City, Banning Heights Mutual Water Company, and High Valley Water District maintain information concerning contaminated water wells and groundwater. The state and federal Environmental Protection Agencies (EPA) and the State Department of Health also provide information concerning specific hazardous waste sites.

Hazardous and Toxic Materials

A search of the US EPA Envirofacts Data Warehouse for the City of Banning identified two facilities that produce and release air pollutants, two facilities that have reported toxic releases, 31 facilities that have reported hazardous waste activities, and one facility that is permitted to discharge to waters of the United States.[1]

The EPA database identifies three large industrial/commercial users of hazardous materials in the City of Banning, which include electronic switchboard/connector manufacturing, metal plating, and a gas station with a convenience store. Twenty-three small quantity hazardous/toxic material generators are located in the City, and these are associated with commercial, and quasi-industrial and medical operations, which have the potential to be associated with accidental spills, purposeful illegal dumping, air emission, and other uncontrolled discharges into the environment. In addition, two hazardous materials transporters are located in the City. Improper use and management of these materials by service stations, petroleum product and equipment suppliers, pesticide vendors and users, automotive dealers, medical practitioners, hospitals and clinics pose a significant potential threat to the community and its environment.

A wide variety of chemical and purified chemical compounds, products, and elements that are considered hazardous or toxic are used in households, commercial businesses and industrial operations and processes. These chemicals can include chlorine products, chemical fertilizers, herbicides and pesticides, stored fuels and waste oil, chemical solvents and lubricants, and a variety of medical materials. All are considered “small quantity generators”.

There are a limited number of potentially hazardous waste sites in the City, and these are generally restricted to the previously mentioned and regulated “small quantity generators”. In addition to those mentioned above, there are other sites that have been or should be monitored. These include waste-generating medical clinics and facilities, gasoline service stations, equipment and fuel storage yards, and waste haulers.

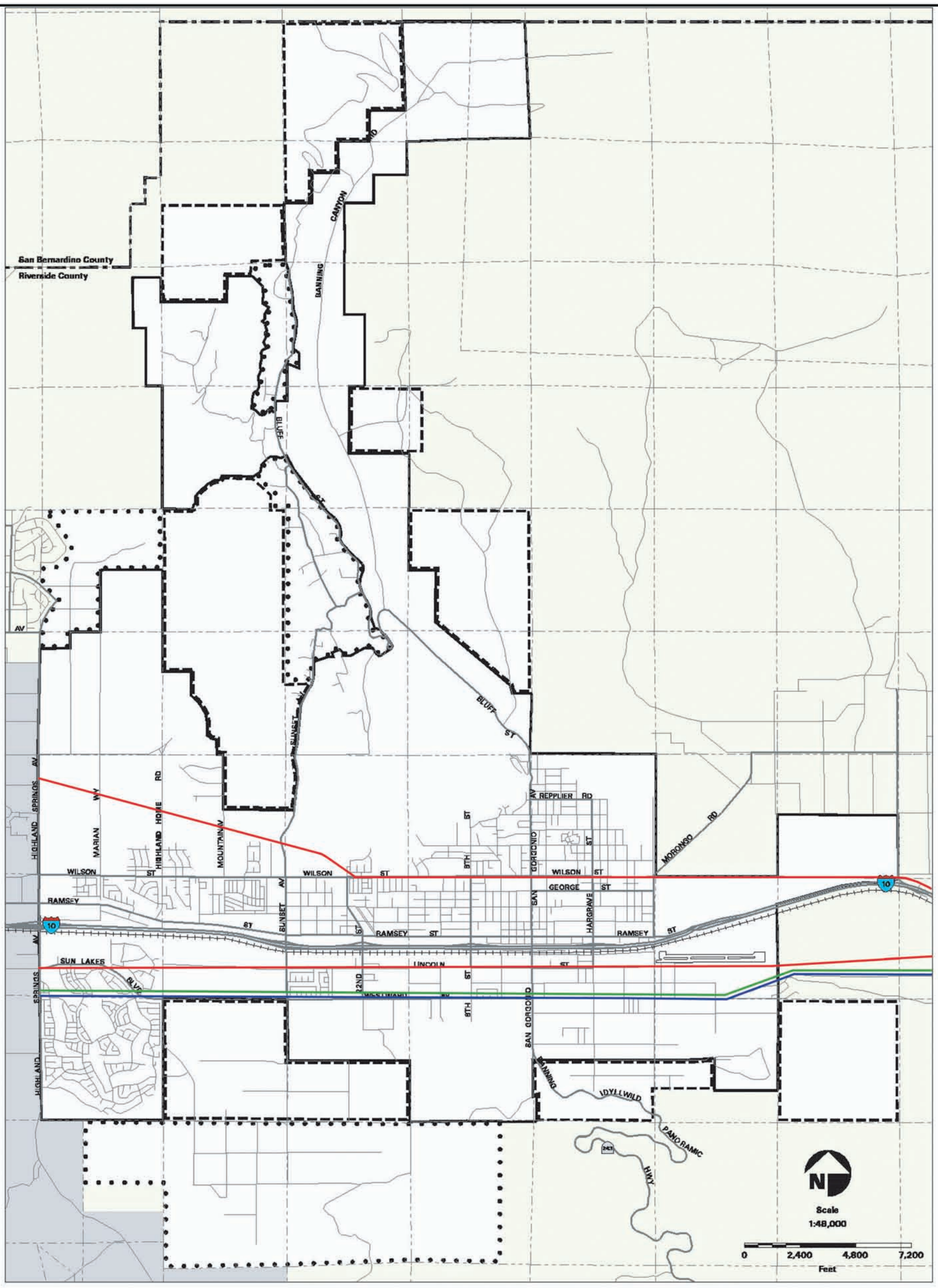
Underground storage tanks, such as those typically located at service stations and the City Maintenance Yard, and at the airport, pose the most significant hazards due to potential leakage. The U.S. EPA requires all service stations to retrofit or replace underground storage tanks with double-walled construction. Several sites in the City have already complied with this rule**.**

In the southern portion of the City, various industrial activities also have the potential for uncontrolled discharge of hazardous materials.

[1] “ http://www.epa.gov/enviro/html/toxic_releases.html” accessed May 17, 2005.

Natural Gas and Fuel Lines

The Gas Company provides natural gas services and facilities to the City of Banning. Natural gas supply to the City originates from Texas, transported by two major east-west trending gas lines. These high pressure gas lines, of varying sizes up to 36 inches in diameter, traverse through the eastern desert areas to the western end of Riverside County. In addition to the two major east-west trending high-pressure transmission gas lines, other natural gas high pressure lines are located underground in Wilson and Lincoln Streets. A pipeline designed to carry liquid fuels runs east-west through the City. Though not currently in use, this pipeline has been used to transport crude oil, diesel fuel and gasoline. These lines are illustrated in Exhibit V-11, Major Natural Gas and Fuel Lines in the Study Area



Banning City Limits
Banning Sphere of Influence
Banning Planning Areas
County Line
Township - Range - Section
Major Roads
Minor Roads
Railroads
City of Beaumont
30" Gas Lines
16" Crude Oil Line
12" Refined Petroleum

City of Banning
General Plan
Natural Gas and Fuel Lines

Map Prepared on: February 11, 2004

TERRA NOVA®
Planning & Research, Inc.

Banning General Plan
Major Natural Gas and Fuel Lines in the Study Area

Exhibit
V-11

The primary danger from these pipelines is fire resulting from accidental leaks or spillage. As part of the right-of-way and maintenance easements for these lines, the appropriate identification and setbacks should be maintained in order to insure the safety of adjacent development. Any construction activities in proximity to these lines should be appropriately restricted.

Responsible Agencies
There are several sources of information concerning hazardous waste sites in the City of Banning area.

The California Regional Water Quality Control Board (CRWQCB) the City, Banning Heights Mutual Water Company and the High Valley Water District maintain information concerning contaminated wells and groundwater. The state and federal Environmental Protection Agencies (EPA) and the State Department of Health also supply information concerning specific hazardous waste sites and their locations. The California Department of Industrial Relations, Cal-OSHA Division, regulates the proper use of hazardous materials in industrial settings. Private database screening and documentation services are also available, which will search, extract, and summarize reports on contaminated sites recorded in various state and federal databases.

Hazardous Waste Management Planning
The City of Banning has the opportunity to coordinate with appropriate county, state and federal agencies in the identification of hazardous material sites, and the active regulation of their timely cleanup. Management strategies may include establishing and maintaining information on these sites, and periodic monitoring of facilities and operations that produce, utilize or store hazardous materials in the city. Involvement in multi-agency monitoring of illegal dumping in the City, conferring in the regulation of underground storage tanks and septic systems, and regulating the transport of hazardous materials through the community is also appropriate.

AB 2948 (Chapter 1504, Statures of 1986), commonly known as the Tanner Bill, authorizes counties to prepare Hazardous Waste Management Plans (HWMP) in response to the need for safe management of hazardous materials and waste products. The Riverside County HWMP was adopted by the Board of Supervisors and approved by the California Department of Health Services in 1990. The County HWMP identifies the types and amounts of wastes generated in the County and establishes programs for managing these wastes.

To comply with Health and Safety Code Section 25135, the Riverside County HWMP assures that adequate treatment and disposal capacity is available to manage the hazardous wastes generated within the jurisdiction, and addresses issues related to manufacture and use of hazardous waste. This plan was developed jointly by the County, Banning and other cities within the County, the State, the industry and widespread public participation in order to address the disposal, handling, processing, storage and treatment of local hazardous materials and waste products.

HWMP policies require the coordination of County efforts with state and federal agencies in the identification and establishment of programs for managing these wastes. As an integral part of

the County HWMP, the City of Banning hazardous waste management policies for the General Plan are basically extensions of the County Plan and are hereby incorporated by reference.

Hazardous Materials Response

The City of Banning has a Hazardous Response Area Plan that was developed as part of its requirements as a participating agency in the statewide Certified Uniform Program Administration. The agency responsible for insuring that the Hazardous Response Plan addresses hazardous and toxic materials is the County of Riverside Health Hazardous Materials Division and/or the Regional Water Quality Control Board.

When the City dispatcher receives a hazardous materials related call, a local engine will respond in conjunction with the Riverside County Hazardous Materials Team. Currently, the local fire stations have responsibility as the First Response Team, and, depending on the location of the call, either Banning's Fire Station No. 89 (located at 172 North Murray) or Fire Station No. 20 (located at 1550 E. 6th Street in Beaumont) will respond. Future fire stations will respond to their service areas. The County Hazardous Materials Team includes Riverside County Fire Department personnel and a member of the County Health Department. The County Hazardous Materials Team is located at the Riverside County Fire Department headquarters in Perris.

Under the Hazardous Response Area Plan, during emergency circumstances where hazardous and toxic materials are determined unsafe by the County Department of Health, the City can require property owners to test, temporarily close and/or remove all hazardous liquids, solids or sludge located on the site. Leaking underground storage tanks must be removed by contractors having Hazardous Waste Certification and a General Engineering license. Between termination of storage and actual closure of a site, monitoring is generally required by the site's operating permit.

When soil contamination is detected, the clean up procedure to be followed, the degree or level of cleanliness required by the regulator, and the method of treatment (if permitted) will be directed by the County Health Hazardous Materials Division and/or the Regional Water Quality Control Board. The City of Banning has the opportunity to coordinate with appropriate county, state, and federal agencies in the identification of hazardous material sites, and the active regulation of their timely cleanup.

FUTURE DIRECTIONS

It is the City's responsibility to coordinate with the appropriate agencies in the identification and regulation of sites where hazardous materials are stored within the City. In response to incidents, it is also the City's responsibility to work with other agencies to identify contaminated sites as they occur and actively regulate their timely cleanup. The Hazardous and Toxic Materials Element can most efficiently be implemented through regular consultation with the Regional Water Quality Control Board and the County Health Department, by updating information on hazardous material sites, and by monitoring facilities that utilize or produce hazardous materials within the City. The City should also remain current regarding the monitoring and regulating of underground storage tanks and septic systems, and monitoring the transport of hazardous materials through the community.

Oversight and management between responsible agencies through a carefully coordinated program will be essential. Regular consultation and coordination between the City Emergency Preparedness Director and responsible county and state agencies is also appropriate. Processes for determining appropriate levels of local, County and State personnel and facilities will also be critical. The goals, policies and programs of this element help to guide the planning and development of appropriate strategies to address hazardous and toxic materials in the community.

GOAL, POLICIES AND PROGRAMS

Goal

Maintain and promote measures to protect life and property from hazards resulting from human activities and development.

Policy 1
The City shall continue to encourage research on potential and known hazards to public health and safety and make this information available to the general public, commercial interests, and governmental organizations.

Policy 2
The City shall continue to conduct and participate in studies with other agencies to identify existing and potential hazards to public health and safety.

Program 2.A
Maintain, coordinate, and update the location of hazardous spills as a result of accident or intentional action, and community evacuation plans.
Responsible Agencies: Fire Department, Planning Department, County Health Department
Schedule: Ongoing

Program 2.B
The Fire Department shall maintain a citywide Emergency Response Program, which provides for emergency services in the event of a hazardous spill or airborne release.
Responsible Agencies: Fire Department, City Manager's Office, County Health Department
Schedule: Ongoing

Program 2.C
Coordinate with responsible agencies to assure enforcement of state and federal regulations for the testing and monitoring of underground fuel storage tanks for leakage.
Responsible Agencies: Fire Department, state and federal EPA, County Health Department
Schedule: Ongoing

Policy 3
The City shall thoroughly evaluate development proposals for lands directly adjacent to sites known to be contaminated with hazardous or toxic materials, traversed by natural gas transmission lines or fuel lines, or sites that use potentially hazardous or toxic materials.

Program 3.A
Consult with the County of Riverside Department of Health on a quarterly basis to identify existing and new hazardous waste sites within the General Plan study area.
Responsible Agencies: Planning Department, Fire Department, County Health Department
Schedule: Ongoing

Program 3.B
A Conditional Use Permit shall be required for all new development that generates, transports, uses or stores significant amounts of hazardous materials.
Responsible Agencies: Planning Department
Schedule: Ongoing

Policy 4
Require and facilitate the adequate and timely cleanup of contaminated sites identified within the City of Banning and its sphere-of-influence.

Program 4.A
Coordinate with responsible county, state and federal agencies to activate cleanup procedures, and monitor the status of cleanup efforts on an ongoing basis.
Responsible Agencies: Planning Department, Fire Department, State and federal EPA, County Health Department, California Regional Water Quality Control Board
Schedule: Ongoing

Policy 5
The City shall designate appropriate access routes to facilitate the transport of hazardous and toxic materials.

Program 5.A
Coordinate with the Fire Department, Police Department, neighboring jurisdictions, and other appropriate agencies to identify segments of highway or local roads that shall be restricted from transporting hazardous and toxic materials in order to preserve public safety.
Responsible Agencies: Planning Department, Fire Department, Police Department
Schedule: 2005-2006

Program 5.B
Enforce roadway access restrictions and consider the implementation of fines or penalties for violations.
Responsible Agencies: Fire Department, Police Department
Schedule: 2005-2006

Policy 6
Continue to promote programs that encourage or educate the public in the proper handling and disposal of household hazardous waste or dangerous materials.

Program 6.A
Establish a Household Hazardous Waste program through the City's solid waste contractor.
Responsible Agencies: City Manager's office, solid waste contractor
Schedule: Ongoing
Policy 7
The City shall actively oppose plans to establish hazardous or toxic waste dumps, landfills, or industrial processes that may potentially adversely affect the City and its Sphere-of-Influence.

Policy 8
Maintain an inventory and information database, including mapping, of all major natural gas transmission lines and liquid fuel lines within the City limits and Sphere of Influence.

Program 8.A
The City shall insure that location of all major natural gas transmission lines and liquid fuel lines that run though the City are clearly identified, that right-of-way and maintenance easements are maintained, and that all existing and proposed development are located a safe distance from these lines.
Responsible Agencies: Building and Safety, Planning Department, Fire Department
Schedule: Ongoing