III. ENVIRONMENTAL ANALYSIS

The following issues are addressed in this section: Land Use, Agriculture, Traffic/Circulation, Noise, Biological Resources, Cultural Resources, Public Services/Safety, Air Quality, Visual Resources, Water Quality, Geology/Soils, and Flood Control/Hydrology.

A. Land Use

This land use section examines land use conflicts posed by the proposed Plan Update. It begins with a discussion of existing conditions within the County of Imperial with respect to land use patterns. A broad overview of the present distribution of land uses and population within the county is presented. The second part of the land use section discusses the potential land use conflicts associated with the Plan Update. The impact analysis can be grouped into two categories. The first category consists of an examination of:

- Contrasts between the land use designations of the proposed General Plan Update and the previously adopted General Plan

The second category of the impact analysis is somewhat more involved. It deals with the potential land use impacts associated specifically with the Plan Update itself. Land use impacts identified in this portion of the analysis could result from either a conflict between a land use proposed by the Plan Update and an existing land use, or a land use impact resulting from adjacent but incompatible proposed land uses. Specific areas of analysis consist of examinations of:

- Compatibility of the Urban Area designations in the proposed General Plan Update with the spheres of influence of the various municipalities within the County.
- Potential adverse land use impacts associated with the designation of the proposed Specific Plan Areas
- Specific land use impacts associated with the Special Purpose Facility designation

1. Existing Conditions

Imperial County is located in the southeastern portion of the State of California bordering the state of Arizona and Mexico. Imperial County is, and will continue for the foreseeable future to be, a predominantly agricultural area. Presently, approximately one-fifth of the nearly 3 million acres of the County is irrigated for agricultural purposes. In addition, approximately 50 percent of County lands are largely undeveloped and under federal ownership. The developed area where the County's incorporated cities, unincorporated communities, and supporting facilities are situated comprise less than one percent of the land (Table 1).

TABLE 1
IMPERIAL COUNTY
LAND USE DISTRIBUTION (IN ACRES[1])

Irrigated (Agriculture)		
	Imperial Valley	512,163
	Bard Valley (Including Reservation)	14,737
	Palo Verde Valley	7,428
	Total	**534,328 (18.2%)**
Developed		
	Incorporated	9,274
	Unincorporated	8,754
	Total	**18,028 (0.6%)**
Salton Sea[2]		211,840 (7.2%)
Desert/Mountains		
	Federal	1,459,926
	State	37,760
	Indian	10,910
	Private	669,288
	Total	**2,177,884 (74.0%)**
IMPERIAL COUNTY TOTAL		**2,942,080 Acres**

[1] All acreages are approximations and should, therefore, only be used for informational purposes.
[2] Calculated at elevation of -230.
Source: Imperial County General Plan, County Overview-September 1985.

Imperial County Planning Department bases its population estimates on building permits and housing unit change. From this annual compilation, the Population Research Unit of the California Department of Finance calculates the estimate of annual change in population. According to these 1992 estimates, the population estimate for the unincorporated area is 28,826, with the total population estimate for Imperial County being 117,421. This compares to the 1990 census results of 27,360 for the unincorporated area and 109,303 for the entire County (Table 2).

TABLE 2
IMPERIAL COUNTY POPULATION AND HOUSING (1990)

Community	Population	Housing Units
Brawley	18,923	6,124
Calexico	18,633	4,832
Calipatria	2,690	757
El Centro	31,384	10,180
Holtville	4,820	1,477
Imperial	4,113	1,372
Westmorland	1,380	432
City Subtotal	**81,943**	**25,184**
Unincorporated Area	27,360	11,375
Total	**109,303**	**36,559**

Source: Bureau of the Census/U.S. Department of Commerce

IMPERIAL COUNTY POPULATION AND HOUSING
UNINCORPORATED COMMUNITIES
1990

Community	Population	Housing Units
Heber	2,566	600
Niland	1,183	535
Seeley	1,228	365
Ocotillo, Nomirage, Plaster City	719	648[1]
Salton Sea	1,953	1,263
Winterhaven/Bard	3,155	1,637[1]
Total	**8,345**	**4,694**

[1] Estimated from 1980 figures, adjusted based on 1990 population.
Source: 1990 Census, Department of Finance

Population in the unincorporated areas of the County tends to concentrate in agricultural areas and in recreation/retirement communities. Agricultural related communities include the townsites of Heber, Niland and Seeley in the Imperial Valley. Along the Colorado River, in the eastern portion of the County, small population clusters exist within the townsites of Palo Verde and Winterhaven with most of the activities related to recreation. Other recreation/retirement communities include Ocotillo/Nomirage located in the southwest portion of the County; Bombay Beach, on the northeastern shore of the Salton Sea; and the West Shores communities of Salton City, Salton Sea Beach, and Desert Shores. These communities experience a noticeable increase in population during the winter months when visitors converge to the area to avoid cold/wet winters in other parts of the country.

The seven incorporated cities: Brawley, Calexico, Calipatria, El Centro, Holtville, Imperial, and Westmorland, account for 75 percent of the total population (see Table 2). The average population density within incorporated communities is 8.8 persons per acre. In the past, incorporated cities have grown at a faster pace than the rural areas. The City of El Centro is the County Seat and with a 1990 estimated population of 31,384, the largest city in the County, and the administrative/commercial center for the County.

Increasingly, the local economy is becoming more diversified and less reliant on the economic cycles of agriculture. In addition to economic diversification, there are a number of other factors which may accelerate population growth in the future and alter the above forecasted figures. For example, the construction of two State prisons in the area; the growth of the geothermal industry in the area; the expansion of the Naval Air Facility; an additional Mexico/USA border crossing; and approval of the North American Free Trade Agreement (NAFTA) between the U.S., Mexico, and Canada.

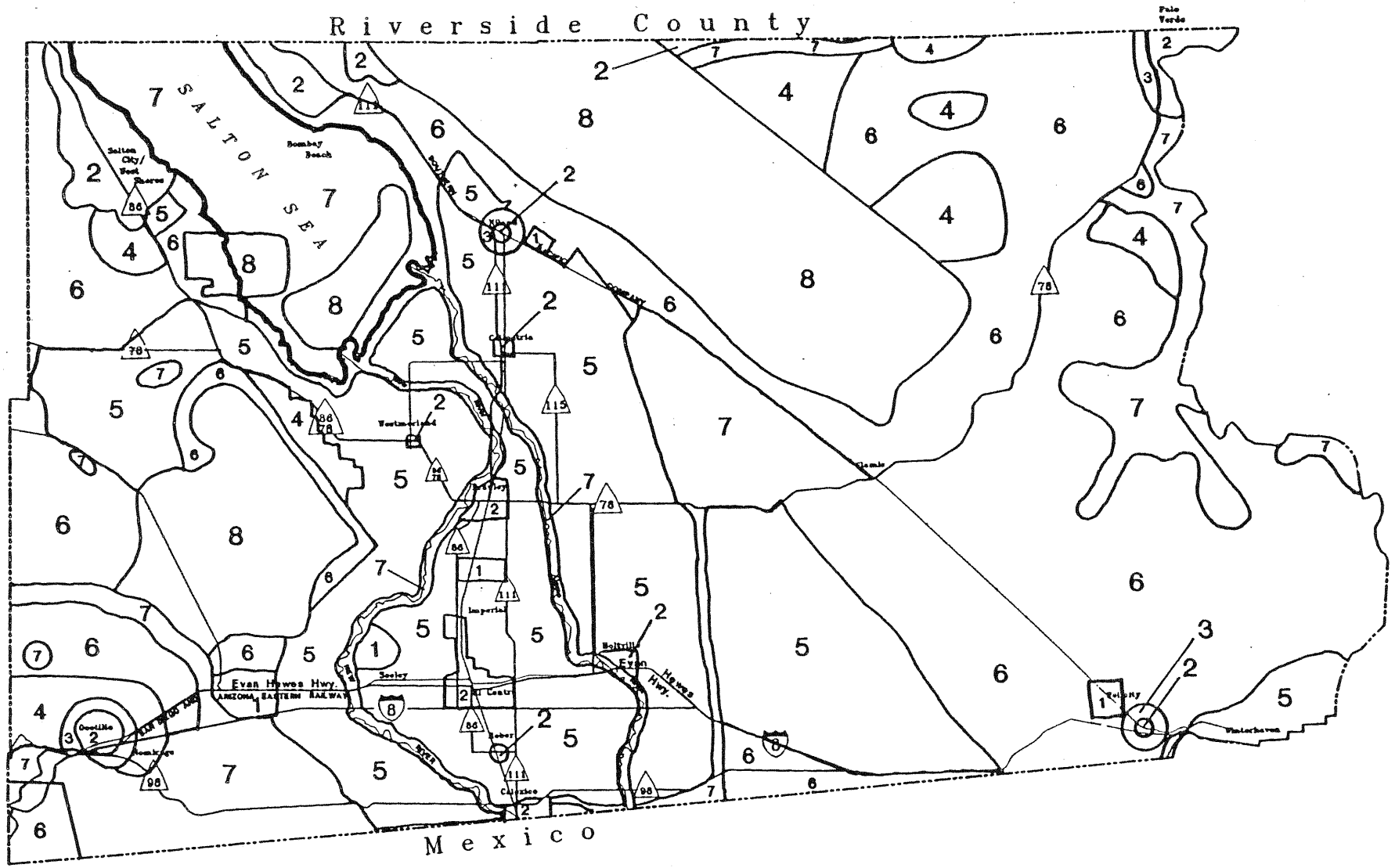
a. Existing General Plan

Land use within the Imperial County is currently guided by the Ultimate Land Use Plan, adopted in 1973 (County of Imperial). The Ultimate Land Use Plan (1973 Plan), in recognition of agriculture as "...the mainstay of Imperial County's economy," framed as its overriding land use policy a statement that "..it is imperative that the agricultural land be guarded against noncompatible uses." A set of "additional land use policies" was also adopted. These are presented below:

The 1973 Plan includes eight different land use classifications. These consist of:

- General Agriculture
- Urban
- Rural Residential
- Desert Residential
- Recreation
- Heavy Industry
- Preservation
- Special Public

The distribution of land use designations under the 1973 Plan is depicted in Figure 3. The primacy of agriculture among the County's land uses is reflected in the 1973 designations. A large portion of land in the County was designated General Agricultural. This classification allows for entire range of agricultural uses. Certain agriculture-related industrial uses are also allowed in areas covered by this designation. Urban, commercial and industrial type uses may be allowed under a conditional use permit. The General Agriculture designation covers the entire Imperial Valley floor outside of the developed areas. East Mesa is also designated for agriculture use. Areas within the Colorado River drainage basin east of Winterhaven have an agricultural designation. The Borrego Valley floor is designated for agriculture, as is a portion



Imperial County General Plan	1973 Land Use Plan	Figure 3

of the Tule Wash watershed on the west side of the Salton Sea. A total of approximately 878,336 acres, or roughly 30% of the total land area in Imperial County, is designated for General Agriculture use in the 1973 plan. Table 3 provides a summary of the acreages covered by the various land use designations.

TABLE 3 ULTIMATE LAND USE PLAN (1973)	
Urban	122,026
Rural Residential	20,883
Desert Residential	154,231
Agricultural	878,336
Recreation	1,058,340
Heavy Industry	24,900
Special Public	72,083
Preservation	611,281
Total	**2,942,080**

The Urban designation in the 1973 Plan covers the incorporated cities of El Centro, Imperial, Calexico, Holtville, Brawley, Calipatria, and Westmorland. It also covers the unincorporated communities of Ocotillo/Nomirage, Heber, Niland, Salton City/West Shores, Hot Mineral Spa, Palo Verde, and the Felicity area. The areas covered by an Urban classification are for low and high density residential, commercial, and industrial development. Most Urban designations are sufficiently greater in size than the existing developed area they encompass so as to allow considerable expansion. A total of approximately 122,026 acres of land are covered by the Urban designation in the 1973 Plan.

Rural Residential designations were placed in concentric rings around the three urban areas of Westmorland, Ocotillo/Nomirage, and Niland. The areas designated for a Desert Residential land use category are those areas not suitable for irrigation but which nevertheless are suitable for habitation. Typically, these areas overlay available ground water resources. Lower density, Desert Residential designations are distributed over a number of different areas in the County. These include an outer ring around Ocotillo/Nomirage, an area southwest of Salton City/West Shores, the land on the east side of State Route 86 west of Westmorland, and several large tracts between the Chocolate Mountains and the Colorado River in the northeast portion of the county.

A Recreation designation covers the largest area of any land use in the County. Approximately 1,058,984 acres, or roughly 36% of all land within the County, is covered by this designation. The Recreation designation covers areas located in the vicinity of natural scenic and recreational attractions. These typically encompass areas adjacent to navigable bodies of water or areas utilized by campers and off-road vehicles. The Recreation designation is applied to large areas in both the western and eastern portion of the County, largely outside of Imperial Valley. This

large area of land covered by a the Recreation designation is a result of the large portion of the county in public ownership and devoted to public use. The areas covered by a Recreation designation in the western portion of the county are largely within the Anza-Borrego Desert State Park. Areas in the eastern portion of the county are federal lands administered by the Bureau of Land Management (BLM). These lands are covered by several of the "Multiple-Use" classifications maintained by the BLM.

Several areas in the County are set aside for Heavy Industry. These areas consist of a tract straddling the railway corridor northwest of Winterhaven, an area bounded by State Routes 86 and 111 between Brawley and Imperial, an area along the New River north of Seeley, the Plaster City mining operations located along Evans Hewes Highway roughly midway between Seeley and Ocotillo/Nomirage, and a small tract along the railway line east of Niland.

The Preservation designations covers areas which, in conformance with the policies of the 1973 Plan concerning the protection of significant biological, natural, or cultural features, are reserved from intensive use. Areas covered by this designation consist principally of the Salton Sea, the New and Alamo Rivers, the dunes comprising the northern portion of the Algodones Sand Dunes, the Yuha Basin, portions of the western shoreline of the Colorado River, and the Indian Pass area in the southern portion of the Chocolate Mountains. Smaller areas covered by the Preservation designation consist of the Corrizo Badlands and a portion of the San Felipe Wash.

A Special Public designation covers large portions of the county devoted to military operations and certain other public functions. Included within this designation are an ordinance testing area in the Chocolate Mountains, a parachute testing area in the west mesa, a test area in the Salton Sea, a desalting pond in the Salton Sea. These areas may be used also for such recreation uses as do not conflict with respective primary function of the area. Most such areas, however, are restricted to military personnel.

The 1973 Plan does not include a separate designation for solid waste disposal facilities. Currently there are ten County-operated Class III disposal sites throughout Imperial County which accept non-hazardous wastes. The current disposal capacity of existing landfills is considered to be sufficient to meet the needs of the County to at least year 2005.

Three of the County landfills, near Brawley, Imperial, and Calexico, are under the ownership or control of the County; six, Holtville, Niland, Salton City, Hot Mineral Spa, Ocotillo, and Palo Verde, are on BLM property; and one, the Picacho landfill, serves the Winterhaven/Bard area and is located on land owned by the Quechan Indian Reservation. Since the Quechan Indians have the right to terminate the County's use of the site on short notice, a nearby alternate site, on Bureau of Land Management land, has been reserved on a contingency basis.

In addition to the public sites, Imperial Republic Acquisitions operates a private Class III waste disposal facility in the unincorporated area northwest of the City of Imperial; Laidlaw Environmental Services operates a Class I facility west of the City of Westmorland, and Desert Valley Company operates a Class II solid waste disposal/storage site northwest of the City of Westmorland.

b. Proposed General Plan Update

The proposed General Plan Update (Plan Update) contains nine land use designations: Agriculture, Community Area, Government/Special Public, Industry, Recreation/Open Space, Rural Residential, Special Purpose Facility, Specific Plan Area, and Urban Area. A map of the land use designations included in the Plan Update is presented as Figure 4. Each of these designations, as well as the areas to which they are applied, is summarized below. Table 4 indicates the acreage that would be encompassed by each land use classification.

TABLE 4
DRAFT GENERAL PLAN UPDATE (IN ACRES)[1]

	Proposed Land Use
Agriculture	588,417
Community Area	136,862
Government/Special Public	550,464
Industry	600
Recreation/Open Space	1,558,507
Rural Residential	4,500
Specific Plan Area	22,520
Special Purpose Facility	1,970
Urban Area	78,240
Total	**2,942,080**

[1] All acreages are approximations and should only be used for informational purposes.

Agriculture

This category would encompass lands designated primarily for agricultural production and related industries including aquaculture (fish farms), ranging from light to heavy agriculture and those low intensity uses that do not conflict with agriculture. Examples of land uses within the Agriculture category include most of the central irrigated area known as the Imperial Valley, the Bard/Winterhaven Valley and the south end of the Palo Verde Valley.

Community Area

The Community Area category represents land uses associated with the unincorporated communities of Hot Mineral Spa/Bombay Beach, Ocotillo/Nomirage, and Palo Verde. Except for Hot Mineral Spa, the land use within Community Areas is planned to be oriented primarily toward relatively low density second home and retirement dwellings and recreation services,

rather than urban residential, commercial, and industrial uses. Community Areas usually include small local-and tourist-serving central business districts with a rural orientation.

Residential densities are from less than one dwelling unit per acre to a maximum of seven dwelling units per acre. Higher densities may be allowed pursuant to an approved Master Plan, such as has been approved by the County for Hot Mineral Spa/Bombay Beach Community Area. Until adequate public infrastructure improvements are provided to support the Master Plan, limited development is expected in the foreseeable future. Neighborhood and general commercial uses are allowed; manufacturing and industrial land uses are generally not allowed within this category, except pursuant to a Master Plan.

Government/Special Public Category

This designation indicates lands generally owned by public agencies which are presently, and for the foreseeable future, used for a specific governmental purpose. This designation includes military bases and public parkland and may also be applied to airports, sewer and water facilities, cemeteries, and other public utilities and facilities.

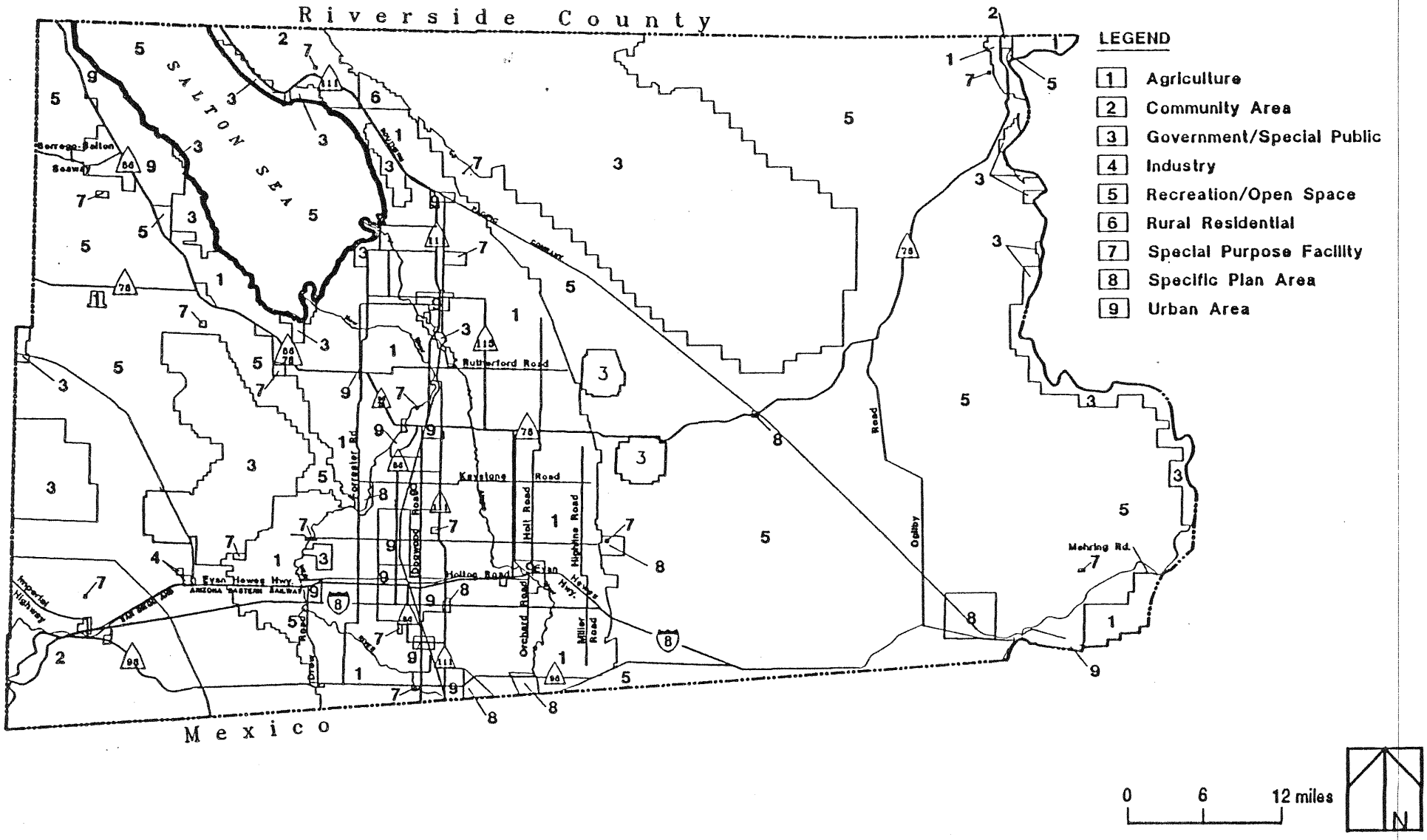
Industry

Industrial land uses within this category would consist of heavy manufacturing and other industrial land uses located in areas with the necessary supporting infrastructure away from conflicting existing or planned land uses. Generally, these lands are not suitable for agricultural use and are located adjacent to major transportation systems. An example of area within this category is Plaster City.

Recreation/Open Space

The Recreation/Open Space category recognizes the unique recreational character of Imperial County and includes desert, mountain, and waterfront areas with the potential for development as public or private parks and recreation facilities in appropriate areas. The area covered by this designation would be characterized by a low intensity of human utilization and includes mountain areas, sand dunes, desert lands and other open lands that are essentially unimproved and not predominantly used for agriculture. Recreation-related uses that would be allowed would include mobilehome and recreational vehicle parks, and resort and recreation facilities. Examples include Sunbeam Lake, Imperial Lakes, Rio Bend, Red Hill Marina, Goldrock Ranch, and Colorado River camps such as Mitchell Camp and Walter's Camp.

The Recreation/Open Space category would also restrict the intensity of uses on lands important for the preservation of natural resources; areas for the recharge of ground water basins; rivers and lakes which are important as wildlife habitat and for the enjoyment of recreational sportfishing; areas for the conservation and managed production of mineral resources; areas for the preservation of areas of outstanding scenic, historic and cultural value; and areas of public health and safety hazards, such as floodplains, unstable soils, or earthquake areas.



Imperial County General Plan	Proposed Land Use Plan	Figure 4

Land uses allowed would include low density residential use, with not more than one single family dwelling per 20 acres. Greater densities may be permitted by Specific Plan encompassing at least 160 acres for appropriate recreation-oriented residential development where adequate facilities and services for such use exist or can be provided. Light to medium agricultural land uses including row and field crops, orchards, aquaculture, grazing, and apiaries would be allowed. Landfills would not permitted.

Rural Residential

The Rural Residential category represents predominately low density residential, recreational, and agricultural land uses in areas where public water and sewer service is limited or non-existent. Permitted development within this category is based upon the availability of public services and facilities, the adequacy of the circulation system, and compatibility with the existing and planned adjacent development. The only area designated as Rural Residential by the Land Use Plan of this Plan Update is adjacent to the Hot Mineral Spa area. Development densities allow between one dwelling unit per five acres up to two dwelling units per acre. Limited commercial and agriculture is allowed but not industrial uses or landfills.

Specific Plan Area

This designation would be applied where a specific plan must be approved prior to development. Land within this category usually has environmental constraints or unique land use concerns or opportunities which require special land use and/or design control. Suitable areas also include lands proposed for large-scale urban development, natural resource protection, historic preservation, or other use requiring more detailed planning than would typically be required by the County Zoning or Subdivision Ordinances.

The proposed Specific Plan Areas are: East Border Crossing, Bravo Ranch, Felicity, Glamis, Holtville Air Strip, Mesquite Lake, Tamarack Canyon Ranch, and the I-8 and Highway 111 Interchange.

Special Purpose Facility

This designation would be applied to lands which are necessary for basic governmental services which have physical or operational characteristics incompatible with most other land use categories. In particular, noise, odors, air and water quality impacts, aesthetics, and traffic may create dangerous or objectional conditions. This includes Class I, II, and III solid and liquid waste facilities, prisons, and general aviation airports, or sites approved for those purposes. It is the intent of this designation that such proposed and existing facilities would be protected from encroachment by development or incompatible land uses.

The County-operated landfills, excluding those situated on land managed by the BLM or on Indian Reservation lands, would be designated as Special Purpose Facility in the Plan Update. No new landfill within the County's jurisdiction may be established except within this category.

Urban Area

The Urban Area designation is applied to the cities of Brawley, El Centro, Holtville, Calexico, Calipatria, Imperial, and Westmorland; and the unincorporated communities of Heber, Niland, Winterhaven, Seeley, and West Shores/Salton City. These areas are characterized by a full level of urban services, in particular public water and sewer systems, and contain or propose a broad range of residential, commercial, and industrial uses. In the case of the cities, the Urban Area designation encompasses not only the corporate boundaries, but also the majority of the city's sphere of influence as approved by the Local Agency Formation Commission.

Allowed uses in Urban Areas would include residential uses at a density of 1 to a maximum of 29 dwelling units per acre. Low to high intensity commercial land uses including professional offices, neighborhood and general commercial uses would be permitted. Light to medium industrial uses would be allowed. Heavy industry may be located within the limits of incorporated cities or in the "Industry" land use category described above. Landfills are not allowed within this category.

2. Environmental Impacts

a. Contrasts with the 1973 Plan

The proposed General Plan Update is intended to minimize land use conflicts. The land use patterns follow the historical pattern of development and reflect the jurisdiction of state and federal agencies. There are differences between the land use designations of the 1973 Plan and the Plan Update. The impacts associated with these differences are discussed below.

Urban and Residential Development

Under the 1973 Plan, a total of 122,026 acres were covered by the "Urban" designation. The acreage allocated to urban land uses is reduced sharply in the Plan Update, with a total of 78,240 acres designated as Urban Area. This reduction in the total area designated for urban land uses is not regarded as an adverse impact due to the fact that it still maintains a very large pool of developable land in the periphery of existing developed areas in the county. As of 1985, a total of 18,028 acres of land, within both incorporated and unincorporated portions of the county, were developed. The proposed Plan Update, therefore, would still retain a very large quantity of land designated for the expansion of existing urban and developed areas. Existing developed areas would only represent one quarter of the total amount of land designated as Urban Area.

It should be noted that the intensity of land use designations of some communities within the county would be substantially lessened under the Plan Update. The area surrounding the communities of Ocotillo and Nomirage were designated for urban level development which would have greatly expanded these small, predominantly retirement communities. Extensive Rural Residential and Desert Residential development were also anticipated on the periphery of

the Urban area for these communities. A surrounding ring of Rural Residential development was also anticipated for Niland and the Felicity area.

In the cases of Ocotillo/Nomirage and Hot Mineral Spa, the urban designation would be removed entirely and replaced with the new Community Area designation. The Urban designation applied to Niland would be retained in a smaller and better-defined form; the Felicity area would be designated as a Specific Plan Area; and the outlying Rural Residential designations would be removed entirely from these communities.

The proposed Plan Update would sharply reduce the acreage designated for lower intensity residential uses. The Desert Residential category included in the 1973 Plan is eliminated entirely. The Rural Residential category is retained, but limited to a relatively small area east of Hot Mineral Spa. In the 1973 Plan a total of 175,114 acres were allocated to the two former categories. In the Plan Update, a total of only 4,500 acres are designated for Rural Residential land use. This reduction is not viewed as an adverse impact. This determination is a result of the fact that the Community Area designation provides an adequate reservoir for low density residential uses on the periphery of appropriate communities. It must also be noted that the Recreation/Open Space land use designation also provides opportunity for a range of seasonal and permanently occupied residential units in desert areas.

The reduction in the allocation of land for urban levels of land use intensity, as well as the reduction in areas designated for lesser intensity residential development on the periphery of urban areas, is not viewed as an adverse land use impact. A reduction in the overall area allocated for urban and other residential uses reflects community concerns regarding retention of agricultural land, preservation of the character of existing rural desert communities, and the restriction of urban land uses to the periphery of existing urbanized areas. These community concerns are addressed in the Plan Update. A sufficiently large supply of appropriately designated land is retained outside of existing cities and urban communities so as to provide for development needs in the foreseeable future.

Designation of Specific Plan Areas

The Plan Update includes the designation of eight separate Specific Plan Areas (SPAs); and others are proposed by landowners and evaluated later in this document as an alternative to the Plan Update. These SPAs are planned areas of new urban growth, in most cases, and will involve new residential, commercial, industrial, and recreational development. Site-specific and county-wide land use impacts will occur as a result of these SPAs.

Site-specific land use impacts include: conversion of agricultural lands and impacts to bordering agricultural areas; creation of new traffic patterns, new noise sources, and other new physical and operational effects which will change the character of the areas designated as SPAs and surrounding property; potential impacts to biological, cultural, air, land, and water resources which may be present at each site; and public facility impacts. County-wide impacts will result from the creation of new urban settlement areas and land use patterns which could detrimentally

effect existing cities and communities due to relocation of economic or cultural activities from these existing areas.

The Plan Update proposes to mitigate these potential land use impacts of SPAs by requiring site specific environmental studies; and by establishing standards and criteria for SPA approval, and requiring findings to be made by the Board of Supervisors that the proposed specific plans clearly demonstrate fiscal, economic, social, public facility, or other local public benefit with respect to the following:

(a) Will the Specific Plan have a positive fiscal impact for the County of Imperial?

(b) Will the Specific Plan create new and permanent jobs?

(c) Will the Specific Plan minimize or mitigate adverse environmental impacts?

(d) Will the Specific Plan offer diverse or unique opportunities to the County and its citizens?

(e) Will the Specific Plan result in the achievement or significant progress toward accomplishing an unmet goal of the County General Plan?

This process of SPA evaluation should assure that significant adverse land use impacts will not result or will be adequately mitigated on a project-specific basis.

Agricultural Land

A principal goal of both the 1973 Plan and the Plan Update is the retention of agriculture as the dominant feature in the economy of Imperial County. As agriculture is a land-intensive activity, the importance of agriculture has important land use ramifications. The Plan Update reduces the amount of land designated for agricultural uses. In the 1973 Plan a total of 878,336 acres was designated for agriculture. The Plan Update proposes an agricultural designation for 588,417 acres. Virtually the entire difference between the plans is a result of the East Mesa being designated for Recreation/Open Space uses in the Plan Update.

This loss of land covered by an agricultural designation is not considered an adverse impact. This is because the Recreation/Open Space designation allows for a range of light to medium agricultural land uses including row and field crops, orchards, aquaculture, grazing, and apiaries. It is important to note that any substantial agricultural use within Recreation/Open Space designation must utilize imported water which is an increasingly limited resource due to diversion of Colorado River water to Arizona and other areas.

The issue of agriculture, and the potential impacts associated with the loss of land covered by an agricultural designation is discussed in greater detail in the Agriculture section of this document.

Preservation versus Recreation/Open Space

The Plan Update deletes the "Preservation" category that was included in the 1973 Plan. These areas have instead been included in the Recreation/Open Space designation. At first glance, this change would appear to have potential adverse effects. Potentially impactive uses such as agriculture would be allowed in areas that were previously designated for Preservation. It must be noted, however, that the vast majority of land covered by the Recreation/Open Space designation is in fact federal land administered by the BLM. Land uses in these areas are governed by the Multiple Use Classifications established by the California Desert Plan (Bureau of Land Management 1980), as well as the various subsidiary planning documents maintained and administered by the BLM. The BLM is the permitting authority for proposed land uses on most areas covered by the Recreation/Open Space designation. The BLM, therefore, is the principal entity charged with the protection of natural resources within these areas. The designation proposed by the Plan Update would not conflict with the underlying BLM designations, and therefore no adverse land use effects are anticipated.

The issues associated with the preservation of biological resources in areas designated for Recreation/Open Space in the Plan Update are discussed in greater detail in the Biological Resources section of this document.

Industry

The "Heavy Industry" designation contained in the 1973 Plan has been deleted. In two instances, that of Felicity and Mesquite Lake, a former Heavy Industry designation has been designated as an SPA in the Plan Update. In the case of Mesquite Lake, the change in intended land use is not substantial; the area is still intended for industrial uses, but will have a more detailed development review process. Felicity would also accommodate some industrial uses, but only within the context of a balanced community developed as a "New Town." This is not viewed as a change resulting in adverse land use effects, as it avoids the range of potential problems associated with the development of a large industrial area distant from established population centers.

The Heavy Industry designation covering the El Centro Naval Air Facility in the 1973 Plan has been replaced with a Government/Special Public designation. This change better reflects the actual land uses at the site and has no practical adverse land use effects.

The Heavy Industry designation covering the Plaster City gypsum wallboard manufacturing plant has been retained, although it has been circumscribed to better reflect the actual area occupied by plant operations. This change has no adverse impacts.

The Heavy Industry designation situated immediately east of Niland in the 1973 Plan has been subsumed within the community's Urban Area designation. This change is not considered an adverse land use impact as industrial uses are allowed on appropriately zoned land within urban area designations.

Changes in the Plan Update with respect to the deletion or modification of Heavy Industry designations contained in the 1973 Plan are not seen as resulting in adverse land use impacts.

Government/Special Public Designation

The Government/Special Public designation included in the Plan Update is the functional equivalent of the Special Public designation contained in the 1973 Plan. Areas designated as Special Public, such as the Chocolate Mountains Bombing Range, various military installations, and tracts along the Salton Sea shoreline, in the 1973 Plan are carried over with a similar designation in the Plan Update. The boundaries of the lands in question are far more precisely delineated in the proposed plan. Somewhat more land is covered by the Government/Special Public designation in the Plan Update. This is a result of the designation being applied to additional areas within the County. These additional areas consist of military installations such as the Carrizo Impact Area and the Yuma Proving Grounds, and El Centro Naval Air Station; County parks, and various wildlife refuges. Most of this additional land was designated in the 1973 Plan as either Recreation or Preservation. This change would not result in any adverse land use impacts.

b. Land Use Issues of the Plan Update

Conflicts between the Urban Area Designations and Adopted Spheres of Influence

The Local Agency Formation Commission (LAFCO) has established spheres of influence for the cities of Brawley, Calexico, Calipatria, El Centro, Holtville, Imperial, and Westmorland. LAFCO has also designated spheres of influence for unincorporated towns of Heber, Niland, Seeley, West Shores/Salton City, and Winterhaven. These spheres mark the outer limits of the area into which future expansion of a community is anticipated. Each of the communities listed above is covered by an Urban Area designation in the Plan Update. The limits of this designation were compared to the LAFCO approved sphere of influence. The purpose of this examination was to compare these approved spheres with the Urban Area designations proposed in the Plan Update. Examination of the spheres revealed that, in most cases, the amount of undeveloped land within the sphere was substantially greater than the already urbanized area. Existing spheres were judged to provide sufficient land for all needs in the foreseeable future within these communities and within the County as a whole. Given this fact, it was determined that a potential adverse land use impact would occur in an instance where the proposed urban area designation covered any substantial area outside of the current sphere. Not only would the designation exceed the sphere limits in such a case, it would also extend an urban area designation into an area not currently covered by a city's General Plan.

Only two instances were found in which a proposed Urban Area designation was greater than a city's sphere of influence. These occurred in the placement of the Urban Area designations of the cities of Calexico and Calipatria. In the case of Calexico, a small area west of the All American canal is included in the Plan Update Urban Area designation but is outside the approved sphere of influence. Application of the proposed Urban Area designation to the area in question is logical in that it would allow Dogwood Road to form the western edge of the

Calexico Urban Area along its entire length. Despite the logic of the change, the discrepancy between the Urban Area designation and the sphere conflicts with LAFCO policy and represents an adverse land use impact.

In the case of Calipatria, there is a substantially different orientation to the Urban Area designation in the Plan Update as compared to the sphere of influence. The presently approved sphere is oriented primarily north-south along Highway 111. It covers an area several times larger than the city limits. The proposed Urban Area designation would channel future expansion to the east and west of the existing city limits along Highway 115. This change in which portion of the city's environs is designated for future growth is logical in that the underlying zoning and the existing pattern of parcelization in the newly designated area is more compatible with urbanization.

Land Use Impacts Associated with the Specific Plan Area Designations

As was described above, Specific Plans are "planning tools" used to implement the General Plan for large development projects such as a planned community or to designate an area of the County where further studies are needed prior to development. Upon adoption, the Specific Plan serves as an amendment to the General Plan for a very defined and detailed area. The land use impacts associated with each of the individual SPA designations is discussed below. There are factors generic to all of the proposed SPAs, however, that require impact assessment. Each SPA proposes a mix of land uses within a delineated area. To the extent that the proposed mix of uses includes incompatible land uses, a potential for significant land uses could occur. An example of such a situation in an SPA allotted a broad range of land uses, would be placement of a residential development adjacent to a heavy industry area. This potential for incompatible adjacent land uses is exacerbated by the fact that SPAs will typically develop in phases over a somewhat extended period of time; land use impacts may only be apparent long after approval of a Specific Plan.

Land use impacts can also result from the incompatibility of land uses on the periphery of the SPA with adjacent land uses. The most obvious example of such a potential impact in Imperial County is the conflict between residential land uses and ongoing agricultural operations. Spraying of pesticides and fertilizers on crops inevitably leads to conflicts with nearby homeowners.

The above factors lead to the conclusion that because of possible conflicts between land uses within the SPA, and between uses on the periphery of the SPA with adjacent areas, a potential for significant adverse land use impacts exists.

Mesquite Lake. The Mesquite Lake SPA replaces a Heavy Industry designation contained in the 1973 Plan. The Mesquite Lake SPA is an area of poor agricultural land located between the Cities of Imperial and Brawley. Uses anticipated for the Mesquite Lake SPA in the Plan Update would provide an opportunity to develop new light, medium, and heavy industrial land uses. Residential uses are not permitted.

The following policies, contained in the Plan Update, are to be implemented in conjunction with the Mesquite Lake Specific Plan:

> The Specific Plan shall focus on job-producing industrial uses. Agriculture-related uses such as packing and processing, waste processing, equipment manufacturing and maintenance, and production and distribution of farm chemicals would be permitted.
>
> The area also contains geothermal resources which should be developed if economically feasible. Direct geothermal heat uses are also strongly encouraged in this area.

The implementation of these policies will preclude the occurrence of an adverse land use impact. The Mesquite Lake SPA does not represent a change in intended use compared to the 1973 Plan, rather a mechanism by which the County can exercise greater control over future industrial and related development within the designated area.

Interstate 8/State Route 111. The I-8 and Highway 111 SPA is approximately 280 acres encompassing all four quadrants of this major intersection. It is located immediately east of the proposed Urban Area designation encompassing the City of El Centro. Proposed development within this SPA would include retail, restaurant, and service commercial outlets, a truck service center, motel/hotel accommodations, and industrial, office, and warehouse space. Residential uses would not be permitted. An RV Park may be allowed if not impacted by noise or air quality.

The following policies, derived from the Plan Update, are to guide the development of this SPA:

> The Specific Plan shall contain a mix of retail and service commercial, industrial, and visitor serving land uses and shall include a detailed market analysis to support proposed land uses. Separate specific plans may be processed for the north and south sides of I-8.
>
> The Specific Plan shall include architectural and landscape design guidelines.
>
> The Specific Plan shall include a public facilities financing plan outlining capital improvements needed for the project, feasible financing mechanisms, and timing for their construction. This includes, sewer, water, and fire and police protection.
>
> The Specific Plan shall be accompanied by an Environmental Impact Report which includes an analysis of project impacts to include the following: Air and water quality, growth inducement, traffic, visual/aesthetics, growth inducement, and such other issues as required by the County of Imperial and other Responsible Agencies.

This SPA is designated for an area outside of the Urban Area designation covering the City of El Centro, yet it proposes uses that could be accommodated within an Urban Area. Several miles of largely undeveloped land is situated between the periphery of El Centro and the proposed SPA. A concentration of commercial development at the proposed location, well-

removed from existing developed areas in El Centro, represents a potentially significant land use impact despite the policies outlined above.

Felicity. The Felicity Specific Plan Area encompasses approximately 8,960 acres located on both sides of Interstate 8 at the Sidewinder Road interchange. In the 1973 Plan, the area was designated for Heavy Industrial, Urban, and Rural Residential uses. The Specific Plan Area surrounds the emerging development of Felicity which contains attractions and services for travelers on Interstate 8. The Felicity SPA is intended as a potential "New Town" which can provide a balanced community of jobs, housing, recreation, and community and tourist services.

The following policies, listed in the Plan Update, are to guide development within the SPA:

> The Specific Plan shall contain a broad mix of residential, commercial, industrial, and recreational land uses and shall include a detailed market analysis to support proposed land uses. Clustering of development into nodes or neighborhoods will be encouraged.
>
> The proposed number of residential units shall be justified by the amount of job-creating land uses proposed. The need for retirement or recreational housing shall also be supported by the market analysis.
>
> The Specific Plan shall include design guidelines for the following: The physical arrangement of streets, land use areas, and open space/recreation; the project's desired architectural character; and appropriate landscape materials. Simple, traditional architectural forms which avoid the overly busy clutter of architectural elements are preferred.
>
> The Specific Plan shall include a public facilities financing plan outlining capital improvements needed for the project, feasible financing mechanisms, and timing for their construction. This includes, sewer, domestic water, transportation, fire and police protection, and schools.
>
> The Specific Plan shall be accompanied by an Environmental Impact Report which includes an analysis of project impacts to include the following: Air and water quality, biology, cultural resources, growth inducement, traffic, visual/aesthetics, and such other issues as required by the County of Imperial and other Responsible Agencies.

Implementation of these policies would avoid the occurrence of adverse land use impacts in association with the Felicity SPA designation.

Glamis. The proposed Glamis Specific Plan Area encompasses approximately 160 acres bisected by State Highway 78 approximately 25 miles east of the City of Brawley. The Southern Pacific Railroad crosses the site on the east. Glamis is the center of off-road vehicle activity at the Algodones Sand Dunes and Osborne Scenic Park. The Glamis Specific Plan Area is intended to accommodate recreation-supporting land uses including retail and service commercial, motel accommodations, recreational vehicle and mobilehome parks, and community facilities.

The following policies, included in the Plan Update, are to be implemented in the Glamis SPA:

> The Glamis Specific Plan Area is intended to accommodate recreation-supporting land uses including retail and service commercial, motel accommodations, recreational vehicle and mobilehome parks, and community facilities.
>
> The Specific Plan shall be coordinated with the BLM and affected local agencies.
>
> Public services to the SPA shall be provided concurrent with need.

The designation of this relatively restricted area as an SPA would provide the County with a mechanism to assure that future development designed to serve the intensive recreational use of the area would proceed in an orderly manner and that compatible uses are implemented. With the implementation of the land use policies outlined above, no adverse land use impacts are foreseen as a result of this designation.

Holtville Air Strip. The Holtville Air Strip encompasses approximately 1,830 acres located 6 miles east of the City of Holtville. Holtville Airport is now owned and operated by the County of Imperial. The airstrip is presently unattended, contains no facilities, and is seldom used; but represents an opportunity to develop job-producing land uses benefitting the City of Holtville and the region. It has the longest and widest runway, plus the greatest land area of any of the public use airports in the County and was one of the preferred site for a "wayport," a super-regional airport hub that would primarily serve as a place where passengers would transfer between local and long-haul flights. In addition to airport-related facilities, the development of light and medium industrial uses within the SPA.

The following policies, included in the Plan Update, are to be implemented in the Holtville Air Strip SPA:

> The Specific Plan shall focus on job producing manufacturing and service uses. Establishment of an airport at or adjacent to the site is not a requisite for development, but should be evaluated for feasibility throughout the process. The land use plan should be designed to accommodate a potential future decision to site a regional airport.
>
> The Specific Plan shall include a public facilities financing plan outlining capital improvements needed for the project, feasible financing mechanisms, and timing for their construction. This includes, sewer, water, and fire and police protection.
>
> The Specific Plan shall be accompanied by an Environmental Impact Report which includes an analysis of project impacts to include the following: Agriculture, air and water quality, biology, cultural resources, growth inducement, noise, traffic, visual/aesthetics, and such other issues as required by the County of Imperial and other Responsible Agencies.

These policy statements are considered adequate to assure that significant land use impacts do not occur.

East Border Crossing. The East Border Crossing Specific Plan Area is located adjacent to the International Boundary approximately 6 miles east of the City of Calexico. It encompasses approximately 1,700 acres bounded on the west by the Ash Canal, on the north by a line approximately 1,300 feet north of Highway 98, on the east by the Alamo River, and on the south by the Republic of Mexico. The East Border Crossing SPA surrounds the new 87-acre port of entry (POE) on the U.S. side of the border which is being developed by the U.S. General Services Administration (GSA). Construction of the POE should begin in 1993 and will result in the largest land crossing located along the 2,000-mile Mexico-U.S. border. Upon completion, the GSA expects that all commercial traffic currently using the Calexico crossing and much of the east-bound commercial traffic from the Otay Mesa crossing in San Diego County, will be diverted to the new POE. Caltrans is proposing to construct SR-7 between the new POE and SR-98. This segment of SR-7, which will involve a right-of-way of approximately 60 acres, is tentatively scheduled to coincide with the opening of the POE in early 1995. Caltrans has proposed several alternatives for this segment of SR-7 which are currently undergoing environmental review; SR-7 is described in the California Streets and Highways Code as eventually extending to Interstate 8.

The East Border Crossing Specific Plan Area is intended to be developed primarily with industrial, office, and warehouse space for manufacturers, customs brokers, freight forwarders, and corporate or administrative offices. Secondary land uses would include retail, restaurant, and service commercial outlets, a truck service center, motel accommodations, housing, and recreation.

Policies to be followed in the planning and implementation of the East Border Crossing SPA require that:

> The primary land uses of industrial, office, and warehouse space shall account for not less than 65 percent of the net developable area of the SPA. Net developable area excludes land for major roadways, other infrastructure improvements, and natural or recreational open space. The remaining 35 percent is limited to retail, restaurant, service commercial outlets, truck service center, motel accommodations, and housing.
>
> An adequate, independent market analysis shall be required to support proposed land uses. The market analysis shall include an analysis of the need for housing, including employee housing affordable to low to moderate income households.
>
> Development plans shall be coordinated with the U.S. General Services Administration, Border Patrol, and other appropriate federal agencies; landowners on the Mexican side of the border and appropriate agencies of the Mexicali city government and the Republic of Mexico; the City of Calexico; Imperial Irrigation District; and Caltrans and other appropriate State agencies.

The Specific Plan shall include a public facilities financing plan outlining capital improvements needed for the project, feasible financing mechanisms, and timing for their construction. This includes, sewer, domestic water, transportation, fire and police protection, and schools.

The Specific Plan shall be accompanied by an Environmental Impact Report which includes an analysis of project impacts to include the following: Agriculture, air and water quality, biology, cultural resources, growth inducement, traffic, visual/aesthetics, and such other issues as required by the County of Imperial and other Responsible Agencies.

These measures are adequate to assure that no adverse land use impacts would occur if the SPA is implemented.

Tamarack Canyon Ranch Specific Plan Area. The Tamarack Canyon Ranch Specific Plan Area is approximately 1,200 acres of privately owned land. It is bounded on the west by Forrester Road, on the north by Keystone Road, and on the south by Larsen Road. The east boundary is the New River. The Tamarack Canyon Ranch Specific Plan Area is intended to be developed as a resort community. Primary uses would include a destination resort hotel, golf courses, lakes, attached and detached housing. The objective is to create an attractive recreation oriented community for use by local residents and vacation visitors.

Specific Plan objectives and policies call for the following measures to be implemented in conjunction with development in the SPA:

The Specific Plan shall contain a mix of hotel, recreation uses, housing, and other resort oriented uses. The Specific Plan shall include a detailed market analysis and land use plan.

The Specific Plan shall include architectural and landscape design guidelines.

The Specific Plan shall include a public facilities financing plan outlining needed capital improvements, feasible financing mechanisms, and timing for their construction. This includes sewer, water, transportation, fire and police protection, parks, and schools.

The Specific Plan shall be accompanied by an Environmental Impact Report which includes an analysis of project impacts to include the following: Agriculture, air and water quality, biology, cultural resources, growth inducement, traffic, visual/aesthetics, and such other issues as required by the County of Imperial and other Responsible Agencies.

Implementation of these policies would preclude the occurrence of adverse land use impacts.

Bravo Ranch Specific Plan Area. The Bravo Ranch Specific Plan Area is a triangular-shaped area of approximately 1,790 acres located 2 miles east of the City of Calexico. Its west

boundary is approximately 2,500 feet west of Bowker Road, the north and east boundary is the Central Main Canal, and the south boundary is Anza Road adjacent to the International Boundary.

The Bravo Ranch Specific Plan Area is intended to be developed as a recreation-oriented residential community with lakes, golf course, and an equestrian center. Other uses would include a motel, neighborhood and general commercial uses, school and park sites, and the historic C&M Ranch House.

The Land Use Element of the Plan Update calls for the following measures to be implemented in conjunction with development in the SPA:

> The Specific Plan shall contain a mix of residential, recreation, commercial, and public facility uses, and shall include a detailed market analysis and land use plan.
>
> The Specific Plan shall include architectural and landscape design guidelines.
>
> The Specific Plan shall include a public facilities financing plan outlining capital improvements needed for the project, feasible financing mechanisms, and timing for their construction. This includes sewer, water, transportation, fire and police protection, parks, and schools.
>
> The Specific Plan shall be accompanied by an Environmental Impact Report which includes an analysis of project impacts to include the following: Agriculture, air and water quality, growth inducement, traffic, visual/aesthetics, and such other issues as required by the County of Imperial and other Responsible Agencies.

Implementation of the above measures will preclude the occurrence of significant land use impacts.

Land Use Conflicts Associated with the Special Purpose Facility Designation

As was described above, this designation would be applied to lands which are necessary for basic governmental services which have physical or operational characteristics incompatible with most other land use categories. This includes Class I, II, and III solid and liquid waste facilities, correctional facilities, general aviation airports, or sites approved for those purposes.

Proposed development standards and the requirement of a Conditional Use Permit for uses within the Special Purpose Facility designation are considered sufficient to preclude the occurrence of land use impacts.

Some existing solid waste disposal facilities are located within Community Area designations and in other locations where residential or recreational uses could eventually be developed in close proximity to the Special Purpose Facility. This incompatibility of potential future uses represents a significant adverse land use impact.

3. Mitigation Measures

a. Contrasts with the 1973 Plan

The analysis of the differences between the 1973 Ultimate Land Use Plan and the Plan Update did not identify any adverse land use effects; no mitigation measures are required.

b. Land Use Issues of the Plan Update

Conflicts Between the Urban Area Designations and Adopted Spheres of Influence

Two proposed Urban Area designations, those of the cities of Calipatria and Calexico, cover areas outside the LAFCO approved sphere of influence for these municipalities. This difference was identified as an adverse land use impact. This impact shall be mitigated through the processing through LAFCO of an amendment to the sphere of influence that would extend the sphere to cover the additional area affected.

Land Use Impacts Associated with the Specific Plan Area Designations

Potential significant adverse land use impacts were identified as a result of the possible development of incompatible land uses within an area covered by a SPA designation. This impact shall be mitigated through the preparation of a Specific Plan that, as is required by law, specifies the distribution, location, and extent of the uses of land, including open space, within the area covered by the plan.

Potential significant adverse land use impacts were also identified as a result of the possible incompatibility of land uses developed at the periphery of the SPA with those located on immediately adjacent land outside the SPA designation. This impact shall be mitigated through the inclusion, in each Specific Plan prepared for each SPA, of a land use compatibility study. This study will analyze the compatibility of land uses proposed along the perimeter of the SPA with existing and future uses on adjacent land. The identification of potential land use conflicts would necessitate revisions to the arrangement of planned uses within the SPA.

In addition to the above measures that apply to all SPAs, each SPA has specific implementation policies. These policies are listed above under the Impacts section. These policies are designed to preclude the occurrence of adverse effects, including adverse land use impacts. These policies are hereby incorporated by reference as mitigation measures and will be included in the mitigation monitoring program implemented pursuant to this EIR.

Land Use Conflicts Associated with Special Purpose Facility Designations

Proposed development standards and the requirement of a Conditional Use Permit for uses within the Special Purpose Facility designation are considered sufficient to preclude the occurrence of land use impacts. A potential for significant adverse impacts occurs, however, in those instances where existing Special Purpose Facilities are located within a Community Area

designation, or other area where incompatible residential or recreation land uses could occur on surrounding property. Eventual development pursuant could conflict with Special Purpose Facility operations. This impact shall be mitigated through the preparation of an Environmental Initial Study for any proposed project within one-half mile of the facility. If any potential for a land use conflict between the proposed land uses and the uses associated with the Special Purpose Facility exists, an EIR shall be prepared. The EIR shall focus on the environmental effects of the land use conflict. In the case of a solid waste disposal facility, for instance, the EIR would examine the odor, noise, traffic, public health, visual, and water quality effects of the facility upon the proposed development. Implementation of this environmental review requirement would mitigate the potential impact to below a level of significance.

Impacts associated with new facilities for the permanent placement of solid waste shall be mitigated as follows:

- The minimum required buffer for any area proposed for the permanent placement of solid waste (i.e., the actual landfill footprint portion of the facility) shall be 1,320 feet (one-quarter mile) from any lands not owned or controlled by the landfill owner or operator. Where public lands dedicated to open space uses or landfill related industrial development or mining operations are located within the said 1,320 feet, the buffer may not be required as determined by the lead agency. The potential long term environmental impacts to the neighboring land uses or development may be considered in making this determination.

B. Agriculture

Imperial County contains one of the finest agricultural areas in the world. This accomplishment is due to several environmental and cultural factors including good soils, a year-round growing season, the availability of adequate water transported from the Colorado River by a complex canal system, extensive areas committed to agricultural production, a gently sloping topography, and a climate that is well-suited for growing crops and raising livestock. A major land use issue in the County is the continued viability of agricultural production and preservation of agricultural land. This section describes the existing conditions related to agriculture in the County, analyzes impacts to it that would occur under implementation of the proposed General Plan Update, and recommends mitigation measures for those impacts.

1. Existing Conditions

Agriculture has been the single most important economic activity of Imperial County throughout the 1900s, and is expected to play a major economic role in the foreseeable future. The gross annual value of agricultural production in the County has hovered around one billion dollars for the last several years, making it the County's largest source of income and employment. Agriculture also represents a major source of tax revenue for the County, and supports the purchase of numerous local goods and services. The County's overall economic stability and well-being are intricately related to the economic status of this industry.

In addition to economic benefits, Imperial County agriculture is a major international producer and supplier of high quality plant and animal foods and non-food products. Over 120 types of crops are grown in the County, and the agricultural system is currently diversifying by the establishment of aquaculture and possible reintroduction of significant dairy production.

a. History of Imperial County Agriculture

Ethnohistoric research has demonstrated that upon European contact in Imperial County in the 1700s, the Kamia Indians, a desert subgroup of the Kumeyaay (Diegueño) Indians whose territory included coastal and inland regions of San Diego County, were using dams and ditch systems to irrigate land along the New and Alamo Rivers. Annual flooding of the Colorado River made desert cultivation of corn, beans, squash, pumpkins, gourds, and watermelon possible.

Dr. Oliver M. Wozencraft, in 1849, was one of the first newcomers to the County to recognize the region's potential for irrigation development. Irrigation water was first delivered to the Imperial Valley in June 1901, by the California Development Corporation by diverting it from the Colorado River through a channel cut in Mexico to the Alamo River. After crossing the International Border east of Calexico, water was diverted from the stream to irrigate crops. Until this time, although many people traveled through Imperial County, the area held little attraction for settlers. Irrigation by the Alamo Canal Project soon led to a substantial population base in the area and the establishment of several towns. More irrigation ditches were completed and rapid development occurred as farmers and others settled in the area.

In 1905 the Colorado River flooded and ran uncontrolled through Imperial Valley, inundating 488 square miles of farmland and creating the Salton Sea. Several decades were required to improve the water delivery system, culminating in the completion of the All American Canal, which replaced the Alamo Canal, in 1941. With a reliable water system, operated by the Imperial Irrigation District since 1911, and the construction of the Southern Pacific Railroad and paved highways, the County's population and agricultural industry grew. All larger towns and most smaller communities grew up as agricultural centers or shipping stations. Today, agriculture remains the main economic resource in Imperial County.

b. Current Irrigation Agriculture in Imperial County

Imperial County covers an area of 4,597 square miles or 2,942,080 acres. Approximately 20 percent of the land is irrigated for agricultural purposes, most notably the central area known as Imperial Valley (512,163 acres; *Imperial County General Plan Overview*, September 1985). Two other major irrigated areas are Bard Valley (14,737 acres) in the southeast corner of the County, and Palo Verde Valley (7,428 acres) in the northeast corner (Figure 5).

Favorable climate, productive soils, and the availability of irrigation water have permitted Imperial County to become a leading producer of agricultural products. Irrigation agriculture in the County is extremely diverse and includes numerous types of vegetable crops including lettuce, carrots, onions, tomatoes, cauliflower, and broccoli; alfalfa, Sudangrass, and other animal feed; sugar beets; wheat and other grains; melons; cotton; and various citrus, fruits, and nuts. In 1990, Imperial County surpassed one billion dollars in gross income from all agricultural products combined, and in 1988, 1989, and 1991, the gross income was a little under the one billion dollar figure (Table 5). Vegetable and melon crops, as a category, have traditionally represented the highest gross value, followed by field crops, fruit and nut crops, seed crops and nursery products, and apiary products (Figure 6). Detailed descriptions of crop production values and acreages cultivated are provided annually in the Imperial County *Agricultural Crop & Livestock Report* by the Agricultural Commissioner.

Two resources that are vital to past and future agricultural production are productive soils and adequate water. A review of these two resources is important for placing the existing agricultural conditions into perspective.

Productive Soils

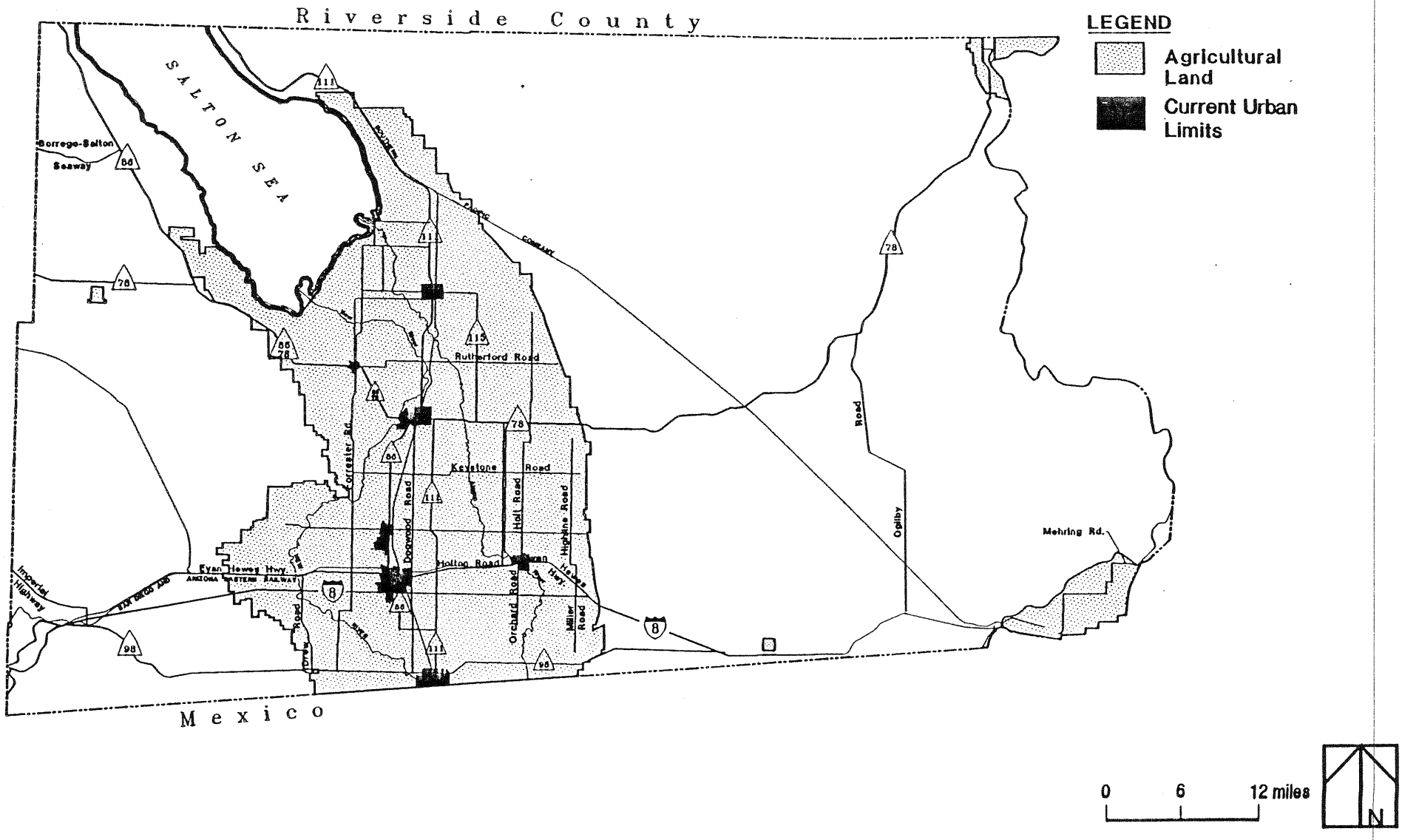
The rich soils of Imperial County, and particularly of the Imperial Valley, were created by periodic flooding of the Colorado River over thousands of years which left deep, rich deposits of silt. Information on the adequacy and importance of soils in the County, taking into account general soil conditions and characteristics, is available from the U.S. Department of Agriculture Soil Conservation Service and the California State Department of Conservation. The Soil Conservation Service (SCS) has grouped soils into eight capability classes according to their suitability for most kinds of field crops. These classes are defined as follows:

Class I. Soils have few limitations that restrict their use.

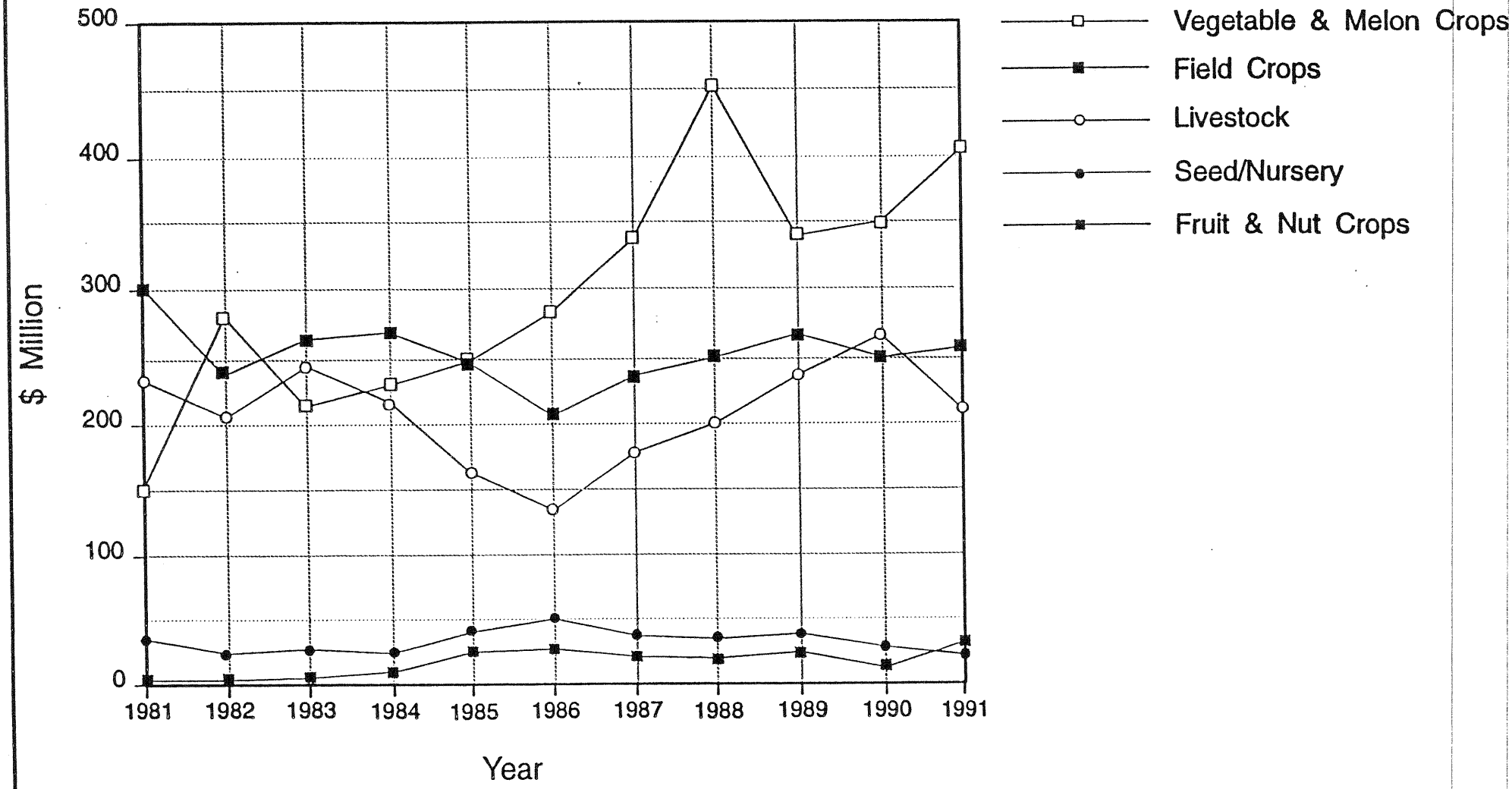
TABLE 5
SUMMARY OF IMPERIAL COUNTY AREA HARVESTED AND GROSS INCOME, BY MAJOR AGRICULTURAL COMMODITY CATEGORY, FOR 1987-1991

Commodity	1991	1990	1989	1988	1987
Vegetable & Melon Crops					
Harvested Acreage	136,119	149,425	136,887	119,064	109,831
Value	$409,470,000	$354,868,000	$399,013,000	$452,069,000	$337,853,000
Field Crops					
Harvested Acreage	380,534	371,598	373,250	349,281	345,138
Value	$254,895,000	$346,497,000	$272,114,000	$250,815,000	$226,934,000
Livestock					
Value	$217,696,000	$264,262,000	$240,298,000	$204,061,000	$177,725,000
Fruit & Nut Crops					
Harvested Acreage	4,433	3,527	4,483	4,371	7,374[1]
Value	$35,239,000	$20,915,000	$25,483,000	$28,458,000	$22,000,000
Seed Crops & Nursery Products					
Harvested Acreage	40,391	41,248	49,293	49,592	47,662
Value	$32,833,000	$26,868,000	$36,968,000	$33,601,000	$36,525,000
Apiary Products					
Value	$2,596,000	$3,401,000	$3,565,000	$4,613,000	$4,778,000
Total					
Harvested Acreage	561,477	565,798	563,913	522,308	510,005
Value	$952,729,000	$1,016,811,000	$977,441,000	$973,617,000	$805,815,000

[1] Included jojoba; moved to field crops in 1988.
Source: Imperial County Agricultural Crop and Livestock Reports



Imperial County General Plan	Existing Agricultural Land in Imperial County	Figure 5



Imperial County General Plan	Gross Values of Selected Imperial County Agricultural Crop and Livestock Commodities, 1980-1991	Figure 6

Class II. Soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV. Soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V. Soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI. Soils have severe limitations that make them generally unsuitable for cultivation.

Class VII. Soils have very severe limitations that make them unsuitable for cultivation.

Class VIII. Soils and landforms have limitations that nearly preclude their use for commercial crop production.

Although only Class I and II soils are normally considered as prime (Section 51201(c) of the California Government Code), the Open Space Element of the 1973 Imperial County General Plan indicated that Class III soils, which comprise most of the Imperial Valley and about 90% of the irrigated area in Imperial County, have the potential for prime agricultural production, given appropriate climatic and water conditions. As described in the proposed Agricultural Element, the SCS definition of prime agricultural soils continues to be applicable to Class I, II, and III soils. A significant portion of Imperial County is therefore highly suited for agricultural production if adequate quantities of irrigation water are available.

Class II soils are scattered in the northwest, west, and southeast portions of the irrigated area; the San Felipe Creek areas; in the vicinity of the Salton Sea Test Base, and the Bard area. While some of these Class II soils are presently not irrigated, they warrant preservation as prime soils. An extensive area of nonirrigated Class III soils is located east of the East Highline Canal. Barring the availability of substantial amounts of irrigation water from a new source, noticeable expansion of irrigated acreage appears unlikely.

Additional detail on soil characteristics are provided in the Conservation and Open Space Element of the General Plan. Also, the Soil Conservation Service maintains an office in El Centro with detailed maps depicting the various types and locations of soils found in the County, and should be consulted for more information.

The Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) was implemented in 1982, largely as a result of growing public concern over farmland losses in California. The program is mandated by Government Code Section 65570, Open Space Subventions. For land inventory purposes, categorical definitions of important farmlands were

developed by the SCS, recognizing the land's suitability for agricultural production, rather than reflecting only the physical and chemical characteristics of soils.

The first Important Farmland Maps were compiled in 1984 and subsequently updated in 1986, 1988, and 1990. The major purpose of the FMMP is to monitor conversion of the state's agricultural land. The aim of the program is to provide for: 1) an inventory of important farm and grazing lands in the form of Important Farmland Series Maps; 2) an inventory of land locally planned for, and/or committed to, future urban development; and, 3) biennial revision of the Important Farmland Series maps to identify and report conversion of land to and from agricultural use to the legislature, local government, and the public. Lands mapped in Imperial County coincide with those lands included by the SCS in the soil survey of the Imperial Valley, the Palo Verde, and the Winterhaven-Bard areas.

The Important Farmland Series maps use the eight classification categories summarized below and defined in Appendix A.

Prime Farmland. Land with the best combination of physical and chemical characteristics for the production of crops.

Farmland of Statewide Importance. Land with a good combination of physical and chemical characteristics for the production of crops.

Unique Farmland. Land of lesser quality soils used for the production of the State's leading agricultural cash crops.

Farmland of Local Importance. Nonirrigated and uncultivated land with Prime and Statewide soil mapping units.

Grazing Land. Land on which the existing vegetation is suited to the grazing of livestock.

Urban and Built-Up Land. Land occupied by structures or infrastructure to accommodate a building density of at least one unit to one and one-half acres, or approximately six structures to ten acres.

Other Land. Land which does not meet the criteria of any other category.

Land Committed to Nonagricultural Use. Land that may currently be in agriculture but which has been permanently committed by local elected officials to nonagricultural development.

The FMMP regards four of the categories -- prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance -- as "Important Farmland." Based upon the most recent (1992) FMMP map and report, Imperial County currently has a little less than 560,000 acres of Important Farmland.

As part of the FMMP, the Department of Conservation produces a Land Conversion Report to accompany each biennially updated Important Farmland Series map. Table 6, adopted from the 1988-1990 Land Conversion Report, summarizes Imperial County land use data for 1988 and 1990. As indicated in Table 6, a total of 559,435 acres were classified as Important Farmland in 1990, which represented a net loss of 1,395 acres from 1988. Although there was a slight increase in "prime farmland" (165 acres), the other three Important Farmland categories represented losses (1,560 acres combined).

It is noteworthy that "Urban and Built-Up Land" increased by 1,189 acres from 1988 to 1990 (Table 6). As indicated in Table 7 which details actual conversions from category to category, 908 acres of the 1,189 acres of new Urban and Built-Up Land came from Important Farmland; the remaining 281 acres came from "Other Land".

The County Board of Supervisors has recognized the potential threats to agricultural productivity posed by increased non-agricultural land uses, and on August 7, 1990 approved the "Right-to-Farm" Ordinance (Ordinance No. 1031; see Appendix B). Upon adoption of this ordinance, the following "notice," prepared by the Agricultural Commissioner's Office, was mailed to all owners of real property in Imperial County. This notice is also provided to potential purchasers of property in Imperial County, and is attached to all building permits issued for projects that exist on or within 1/4 of a mile of agricultural land:

IMPORTANT NOTICE
FROM THE BOARD OF SUPERVISORS OF IMPERIAL COUNTY
DISCLOSURE REQUIRED BY IMPERIAL COUNTY CODIFIED ORDINANCE
SECTION 62103

RIGHT TO FARM

The County of Imperial permits operation of properly conducted agricultural operations within the County. If the property you are purchasing or own is located near agricultural lands or operations or included within an area zoned for agricultural purposes, you may be subject to inconvenience or discomfort arising from such operations. Such discomfort or inconvenience may include, but are not limited to: noises, odors, light, fumes, dust, smoke, insects, chemicals, operation of machinery (including aircraft) during any 24 hour period, storage and disposal of manure, and the application by spraying or otherwise of chemical fertilizers, soil amendments, herbicides and pesticides. One or more of the inconveniences described may occur as a result of any agricultural operation which is in conformance with existing laws and regulations and accepted customs and standards. If you live near an agricultural area, you should be prepared to accept such inconvenience or discomfort as a normal and necessary aspect of living in a county with a strong rural character and an active agricultural sector. Imperial County has established a grievance committee to assist in the resolution of any disputes which might arise between residents of this county regarding agricultural operations. If you have any questions concerning this disclosure, please contact the Agricultural Commissioner's Office at 339-4314.

TABLE 6
IMPERIAL COUNTY LAND USE SUMMARY AND CHANGE FROM 1988 TO 1990

Land Use Category	Total Acreage Inventoried		1988-90 Acreage Changes			
	1988	1990	Acres Lost (-)	Acres Gained (+)	Total Acreage Changed	Net Acreage Changed
Prime Farmland	214,369	214,534	863	1,028	1,891	165
Farmland of Statewide Importance	318,364	317,757	1,519	912	2,431	-607
Unique Farmland	831	783	48	0	48	-48
Farmland of Local Importance	27,266	26,361	909	4	913	-905
Important Farmland Subtotal	**560,830**	**559,435**	**3,339**	**1,944**	**5,283**	**-1,395**
Grazing Land	0	0	0	0	0	0
Agricultural Land Subtotal	**560,830**	**559,435**	**3,339**	**1,944**	**5,283**	**-1,395**
Urban Build-Up Land	19,219	20,408	0	1,189	1,189	1,189
Other Land	447,744	447,879	1,379	1,514	2,893	135
Water Area	375	446	0	71	71	71
Total Area Inventoried	**1,028,168**	**1,028,168**	**4,718**	**4,718**	**9,436**	**0**

Source: Table C-7, 1992 Farmland Mapping and Program Land Use Conversion Report (Department of Conservation)

TABLE 7
IMPERIAL COUNTY LAND USE CONVERSIONS FROM 1988 TO 1990

Land Use Category		Prime Farmland	Farmland of Statewide Importance	Unique Farmland	Farmland of Local Importance	Grazing Land	Total Agricultural Land	Urban Built-up Land	Other Land	Water Area	Total Converted to Another Use
Prime Farmland	to:	0	40	0	0	0	40	154	621	48	863
Farmland of Statewide Importance	to:	16	0	0	4	0	20	706	770	23	1,519
Unique Farmland	to:	0	0	0	0	0	0	48	0	0	48
Farmland of Local Importance	to:	266	520	0	0	0	786	0	123	0	909
Grazing Land	to:	0	0	0	0	0	0	0	0	0	0
Agricultural Land Subtotal		**282**	**560**	**0**	**4**	**0**	**846**	**908**	**1,514**	**71**	**3,339**
Urban Build-Up Land	to:	0	0	0	0	0	0	0	0	0	0
Other Land	to:	746	352	0	0	0	1,098	281	0	0	1,379
Water Area	to:	0	0	0	0	0	0	0	0	0	0
Total Acreage Converted	to:	**1,028**	**912**	**0**	**4**	**0**	**1,944**	**1,189**	**1,514**	**71**	**4,718**

Source: Table C-7, 1992 Farmland Mapping and Monitoring Program Land Use Conversion Report (Department of Conservation)

Although a major intent of this ordinance is to reduce the loss to the County of its agricultural resources, an important related purpose is to promote a good neighbor policy by advising purchasers and users of adjacent properties about the potential problems and inconveniences associated with agricultural operations. The ordinance also establishes a "County Agricultural Grievance Committee" to settle disputes between agriculturalists and adjacent property owners.

In summary, the USDA Soil Conservation Service and the California Department of Conservation's Farmland Mapping and Monitoring Program have established that the soils currently cultivated in Imperial County are productive and Important Farmland; the gross annual value of agricultural production has averaged close to one billion dollars over the past few years; and the County has taken a strong position towards maintaining and encouraging agricultural production, as reflected in the "Right-to-Farm" Ordinance.

Water Resources

Water for irrigation in Imperial County is diverted from the Colorado River at the Palo Verde Diversion Dam north of Blythe by the Palo Verde Irrigation District, and at Imperial Dam through the All-American Canal headworks and desilting basins by the Imperial Irrigation District (IID) and the Bard Water District for use in the Yuma, Bard, Imperial, and Coachella Valleys. In the Imperial Valley, approximately 2.9 million acre-feet of water is delivered annually to over 500,000 acres of agricultural lands via an elaborate gravity-flow system of about 5,600 water delivery points, 1,675 miles of canals and laterals (more than 1,000 miles of which are concrete-lined) and six regulatory reservoirs. The IID also maintains a 1,457-mile drainage system, which collects surface runoff and subsurface drainage from 32,222 miles of tile drains. For more information on the water transportation system, see the Water Element of the General Plan.

Irrigation is critical for crop production in Imperial County. Most basically, irrigation permits farmers to apply measured amounts of water to particular crops as required. The water delivery system is sophisticated enough such that next-day water orders can normally be accommodated when necessary. Although some crops are affected by salinity, extreme temperatures, and other environmental factors, the existing water delivery system overcomes the lack of precipitation in this otherwise arid region as a significant limiting factor to intensive crop production. Detailed information on the water delivery systems is available from the IID, the Palo Verde Irrigation District, and the Bard Water District.

c. Current Livestock Production in Imperial County

Livestock production, or animal husbandry, represents the second major form of agricultural production in Imperial County. Livestock production focuses on the production of beef cattle, sheep, wool, dairy products, swine, and, more recently, fish and other aquatic products. Horses are also used for work and pleasure. Imperial County offers many advantages to livestock producers. Locally grown crops provide a variety of feed ingredients for beef cattle, dairy cattle, sheep, and other animals, and adequate supplies of clean, fresh water are available from the water delivery systems described above. Although hot in the summer, the climate is dry and mild in winter, making feeding conditions ideal for cattle and sheep.

As indicated in Table 5, the annual gross income from livestock production in the County ranged between 177 and 264 million dollars from 1977 to 1991, thereby typically representing 20-25% of the total agricultural gross income. Within the general category of livestock production, beef cattle represent the single most important product to date. Indeed, taking into account all agricultural products, cattle has long been the highest ranked million dollar product, surpassed only in 1988 by lettuce as the top performer (see Figure 7 and annual issues of the Imperial County *Agricultural Crop & Livestock Report* by the Agricultural Commissioner).

Cattle production therefore represents a major role in the County's economy by providing income, tax revenue, employment and the purchase of local goods and services. Feedyards use many crops grown by Imperial County farmers including alfalfa, bermuda hay, bermuda straw, oat hay, Sudangrass hay, ryegrass hay and wheat straw.

It is noteworthy that alfalfa has typically been the second highest million dollar product in Imperial County; a considerable portion of this field crop is consumed by locally raised livestock. Winter grazing of these crops in recently harvested fields is also important to cattle production and farmers alike, as are sugar beet tops which are grazed by cattle from April to July. Several crop culls including melons and carrots are also fed to cattle, and locally produced beet pulp and molasses are used in feedyards; lower quality roughages that do not meet nutrient requirements for dairy cattle or retail markets are suitable for use in feedyard rations. In addition, wheat and other locally grown grains are sold to cattle feeders when export or domestic markets are unfavorable, giving the farmers an alternative market for these crops.

Dairy cattle also represent a significant agricultural product in Imperial County, although the number of dairies has declined recently. Sheep are an important commodity, particularly in the winter when other regions throughout the West are unsuitably cold.

Aquaculture, which involves the controlled growing of aquatic plants and animals in marine, brackish, or fresh water, has increased rapidly over the past decade as a significant form of agriculture in Imperial County. Aquaculture products include fish, especially, and also fiber, pharmaceuticals, and chemicals. Aquaculture uses a variety of systems including ponds, raceways, silos, circular tanks, cages, and recirculating systems to grow fish, plants and animals.

Aquaculture is attracted to Imperial County because of a long growing season made possible by bright sunshine and cloudless days, and the abundant water supply offered by the Colorado River. Also available are heavy clay soils for pond construction, compatible uses of adjoining lands, relatively low cost flat land, and relatively low cost electricity. The proximity of this area to Los Angeles County, Orange County, and San Diego County markets is an additional advantage in locating here. Although not currently exploited, three other important resources may, in the future, prove attractive for aquaculturalists: water from the Salton Sea (although this may be limited due to the current high levels of salts and toxic elements); carbon dioxide trapped in groundwater; and direct heat use of the County's geothermal resources.

Aquatic products in Imperial County had a gross annual value of 8.6 million dollars in 1991, representing a steady increase in gross income from 2.6 million dollars in 1985. According to

a report published by the Economic Research Service of USDA, aquaculture is the fastest growing segment of the overall agriculture industry.

High population areas in Southern California, Baja California and Arizona give livestock producers in Imperial County a market unmatched in other areas in the country; rail access to the Port of Los Angeles provides convenient access to international markets.

d. Agricultural-Related Trends and Issues

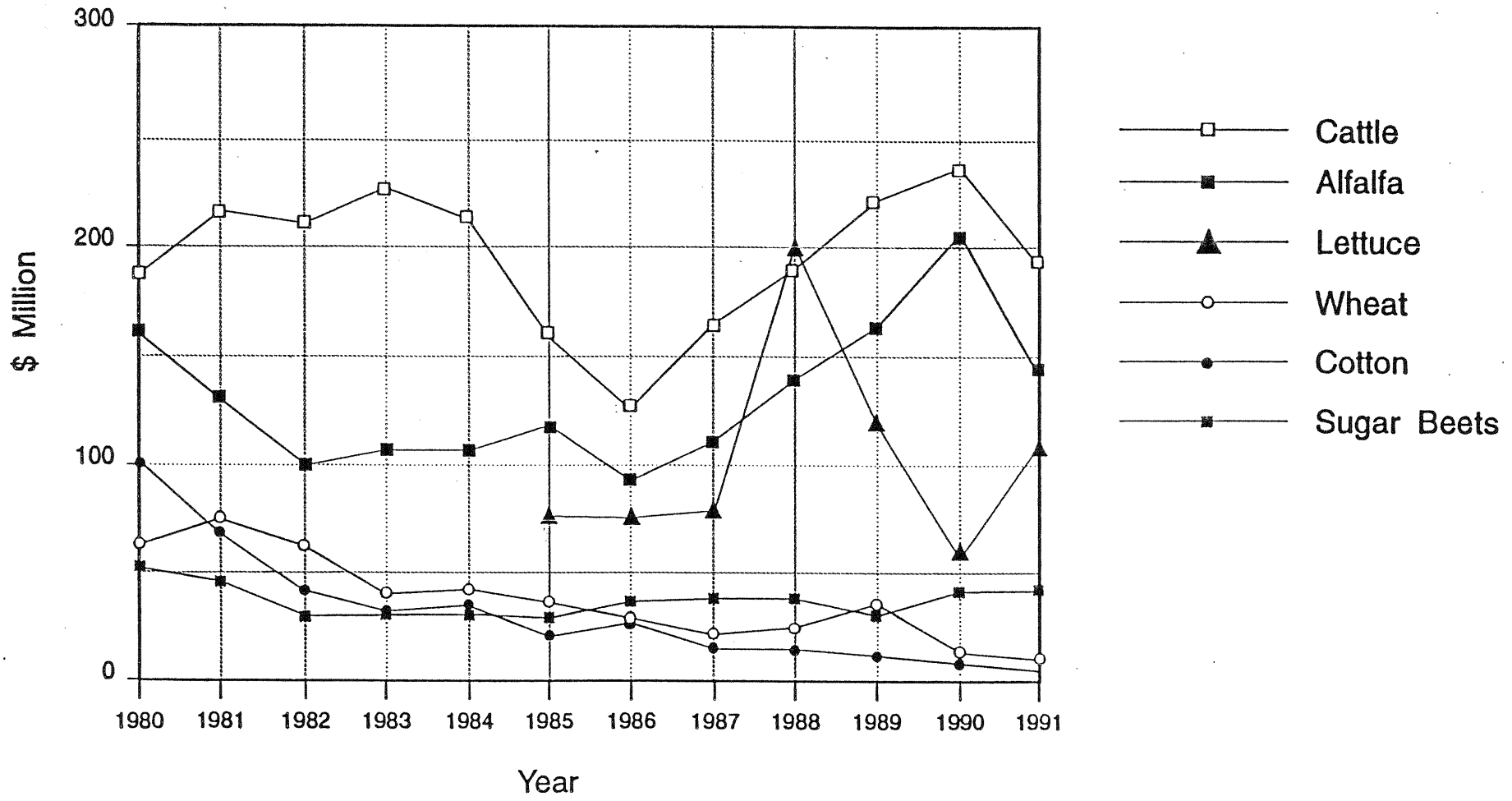
Several important trends and/or issues are related to future agricultural production in Imperial County and may be summarized as follows:

Loss of Important Farmland to Urban and Other Uses

As indicated in the Land Use Element, the estimated total population for Imperial County increased from 109,303 in 1990 to 117,421 in 1992. Projections of population and household numbers by the Southern California Association of Governments (SCAG) in 1992 estimate that Imperial County will have 140,100 people (and an additional 5,110 households) in year 1999. These projections by SCAG may prove to be low, however, in view of several factors including the rapid population growth that the County appears to be experiencing, the relative affordability of local housing, completion of the new prisons, the proposed new border crossing, and the proposed North American Free Trade Agreement. In 1991, the State Department of Finance had estimated the year 2000 population would range from approximately 143,400 to 184,700, with the "most likely" projection being 164,115.

It must be recognized that the County's population may increase significantly over the next decade or two. New households will need places to live and cities and unincorporated areas will need to grow. These observations are relevant to future agricultural production since, with few exceptions, virtually all land surrounding cities and unincorporated communities is Important Farmland. More specifically, most land that surrounds existing urban uses is "Prime Farmland" or "Farmland of Statewide Importance," as defined by the California State Department of Conservation. Indeed, these two important categories comprise approximately 95% of all agricultural land in the County.

Recognizing that population growth will occur, it is obvious that there will be some net losses of existing Important Farmland. Important agricultural lands are already under extreme pressure for urbanization in several areas, particularly in the vicinities of El Centro, Imperial, and Calexico. Since the County's economy has historically been dependent upon agricultural production, and this dependency will exist in the foreseeable future, the permanent conversion of significant amounts of Important Farmland to non-agricultural uses will negatively impact the local economy and the County's ability to provide important agricultural products to the nation and elsewhere.



Imperial County General Plan	Selected Imperial County Million Dollar Crops, 1980-1991	Figure 7

Leapfrogging Patterns of Non-Agricultural Developments in Agricultural Areas

Leapfrogging or "checkerboard" patterns of development occur when new subdivisions and other land uses are constructed in the midst of agricultural land near a city or rural community. Agricultural fields typically become bounded by new residential or urban land uses, and often become isolated as they are cut off from existing farmland. This isolation or stranding of fields leads to several major problems relating to agricultural operations including irrigation, the application of pesticides and other chemicals by aerial spraying and other means, and access by tractors, trucks and other farm equipment. Eventually, these fields become too small or circumscribed by other land uses to be economically or conveniently farmed.

Leapfrogging has increased in the past few years and is a major concern of farmers. Agricultural uses of the type practiced in Imperial County, as opposed to "gentry farming" common in other Southern California communities, are not compatible with residential uses. When a leapfrog residential development is allowed to occur, this inherent incompatibility creates land use conflicts on all four sides of the new development. Inevitably, farming loses out and residential expands to create new boundaries of conflict.

During interviews conducted for the preparation of this EIR, farmers, agricultural advisors, and others from the agricultural community invariably identified leapfrogging as a significant recent trend and major threat to agricultural production. Statements such as "keep the houses near the towns," "don't let people just develop houses or whatever in the middle of agricultural areas," and "growth should happen in an organized way, like spreading out around existing towns," are standard opinions. The consensus is that leapfrogging disrupts agricultural operations and reduces agricultural productivity significantly more than would be the case by expanding out from existing non-agricultural uses.

Difficulty of Cultivating Crops and Raising Livestock Near Urban Development

Any new growth beyond existing urban limits, especially including leapfrogging developments, but also well-planned expansions at the boundaries of existing urban limits, introduces new land use conflicts. Normal agricultural operations are disrupted where non-agricultural land uses extend into or alongside areas that previously were entirely agricultural. Aerial spraying, for example, is a standard and efficient pest control practice for the production of many crops in Imperial County. Interruptions or restrictions of this practice, alone, threaten the economic viability of producing certain crops.

As another example of land use incompatibility, new developments commonly impact well-established irrigation practices by requiring that new canals be constructed to route water and agricultural runoff around such developments. Since the irrigation and drainage of farmland is based entirely on gravity flow, any new development in existing agricultural land poses potential difficulties for farming adjacent farmland, particularly on the downstream side.

Another important difficulty imposed upon farmers by increased development is the transportation of farm equipment. Most farmers in Imperial County cultivate fields in different

locations, and must move various tractors, planters, cultivators, harvesters, landplanes, and other equipment, most of which is oversized, from area to area within the County. With increased growth, and particularly with increased linear development between existing urban uses, the transportation of machinery has become increasingly difficult and dangerous.

From another perspective, increased growth leads to increased nuisance complaints about farm and livestock production operations. The inhabitants of new subdivisions, in particular, are often from non-agricultural areas and not accustomed to the activities, sounds, dust, night lights, and odors associated with farmland, feedlots, dairies, and other agricultural operations.

The establishment of "buffer zones" between agricultural and urban areas would reduce much of the incompatibility between these land uses. The use of buffer zones to date, however, has not been common or especially effective. The buffer zones that exist often become overgrown with weeds, which attract various insects and other pests, or depositories for trash, making them aesthetically unpleasing.

The recently adopted Right-To-Farm Ordinance (Appendix B) goes far towards protecting the ability of agriculturalists to perform normal farm and livestock operations. This ordinance should help reduce losses to the County of its agricultural resources. Nevertheless, it is likely that future "nuisance" complaints and other difficulties of farming and raising livestock related to urbanization will force or encourage some agriculturalists to cease or curtail their operations. Such actions may discourage investments in farm improvements to the detriment of the County's agricultural industry as a whole.

Agricultural Production and Salinity/Selenium Runoff

Colorado River water is naturally somewhat saline, as are the soils that were deposited in Imperial Valley by thousands of years of periodic flooding. Since the flood of the Colorado River in 1905-1906, the Sea has been sustained by agricultural drainage from the Imperial, Coachella, and Mexicali Valleys, as well as from rainfall, storm runoff from the surrounding mountains, and groundwater inflow.

Agricultural production was adversely affected by high salt levels in the first half of the 1900s. This hazard has been overcome by the installation of subsurface tile drains. To date, about 32,222 miles of tile drains have been installed and drain most irrigated land in Imperial Valley. The drainage system has reduced previously existing soil salinity levels and prevents salt accumulation in farmland from irrigation water. A consequence of tile drains, however, is that since 1949 more salt has been carried by drainage water to the Salton Sea than has been brought in by irrigation water.

Because the Salton Sea is a terminal sea, with no outlet except for evaporation, all salts that drain from agricultural lands of the lower Colorado River and Mexico are deposited there. A result of being a terminus for Colorado River water is that approximately five million tons of salt per year are carried into the Salton Sea. The high evaporation rate of the desert climate removes water from the Sea each year, but leaves the salt behind to become more and more

concentrated. The salinity level of the Salton Sea is currently more than 43,000 ppm, which exceeds the salinity of ocean water (about 35,000 ppm), and the Salton Sea's sportfishing industry is threatened by rising salinity levels.

Another problem facing the Salton Sea is that of selenium. Studies have shown that the selenium entering the Sea is originally from the Colorado River, which contains approximately one to two parts per billion (ppb) of selenium. As water passes through Imperial Valley, the selenium becomes concentrated due to the evapotranspiration that occurs during irrigation. The agricultural drains then carry this selenium-enriched water into the Salton Sea where it is taken up and concentrated by small organisms, which in turn are eaten by larger organisms. This process increases selenium concentrations. Fish in the Salton Sea have an average concentration of approximately ten ppb. Birds that feed off these fish have tissue levels of up to 40 ppb. This has a potential to cause health problems in birds.

Environmental concerns related to increased salinity and selenium levels of the Salton Sea have implications for future agricultural production practices. While irrigation water contributes additional salt and selenium to the Sea, the drainage water also prevents the Sea's existing levels of these substances from becoming even more concentrated by providing dilution. The solution to increased salinity and selenium levels is not simply to reduce irrigation water, since this would actually be accompanied by a rise in salinity and selenium concentrations. Nevertheless, it behooves the agricultural community to remain sensitive to and cooperate with environmental efforts to stabilize salinity and selenium of the Salton Sea.

Agricultural Chemicals and Environmental Issues

Similar to the problems of high salinity and selenium levels of drainage water, several water quality and environmental issues are related to the runoff of agricultural chemicals. The intensive agricultural production of Imperial County necessarily results in the introduction of agricultural chemicals from pesticides, herbicides, and fertilizers into downstream waters. Studies performed by the California Regional Water Quality Control Board and the U.S. Geological Survey indicate that drainage water in the Imperial Valley contains pesticides in quantities that often exceed the Environmental Protection Agency's criteria for protection of fish and wildlife. The concentration levels of these chemicals in the fish and birds of the agricultural drains and the New and Alamo Rivers are higher than the levels found in Salton Sea fish and wildlife by several factors. The U.S. Fish and Wildlife is currently conducting studies of the pesticide DDT and its metabolites on piscivorous birds. It must be noted that a considerable portion of the pesticide and other contamination of the New and Alamo Rivers and Salton Sea comes from irrigation drainage, industrial, and municipal waste discharges in Mexico.

The agricultural community needs to be concerned with environmental issues related to downstream water quality. Instead of the blanket use of pesticides, the implementation of Integrated Pest Management (IPM) policies and programs that focus on long-term prevention or suppression of pest problems with minimum impact on human health, the environment, and nontarget organisms would go far towards reducing the environmental problems associated with pesticides and other toxic chemicals.

e. 1973 General Plan

Although the proposed Agricultural Element is the first to be prepared by Imperial County, the County has long recognized the value and need for preservation of agriculture and its related industries. As described in the 1973 Ultimate Land Use Plan, agriculture is "the mainstay of Imperial County's economy," and "it is imperative that the agricultural land be guarded against noncompatible uses." The preservation of agricultural land was the purpose for designating considerable portions of County land as "General Agriculture." More specifically, "most of the available agriculture lands in the irrigated areas [are] designated for agriculture and, in addition, those areas outside of the irrigated areas suitable for agriculture are so designated." A total of approximately 878,336 acres, or roughly 30% of the total land area in Imperial County, is designated for General Agriculture use in the 1973 Plan.

2. Environmental Impacts

The current existing conditions related to agricultural production in Imperial County could be affected by implementation of the proposed General Plan Update. In particular, the Land Use Element has the potential to create significant impacts that include the following:

- Loss of Important Farmland within Urban Areas
- Loss of Important Farmland in Agriculture area following termination of five-year prohibition on development
- Agriculture/urban land use conflicts within Urban Areas
- Agriculture/urban land use conflicts along designated Agriculture/Urban Area boundaries
- Loss of Important Farmland with Specific Plan Areas
- Agriculture/non-agriculture land use conflicts in the vicinity of Specific Plan Areas

These potentially significant impacts may be described as follows.

a. Loss of Important Farmland Within Designated Urban Areas

The expansion of cities and other urban areas in Imperial County will result in the loss of Important Farmland, defined as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance by Federal and State agencies. Currently, approximately 18,000 acres are developed in the County, primarily within the Imperial Valley agricultural region. Under the proposed General Plan Update, some 46,000 acres in the agricultural area would be designated Urban Area (the Salton City/West Shore area, an additional 32,000 acres designated Urban Area, is not situated on Important Farmland). In effect, approximately 28,000 acres of Important Farmland would be lost to full build-out of Urban Area under the General Plan Update.

These 28,000 acres represent about 5% of the 560,000 acres currently under production in the County. Considering that the gross annual value of agricultural production in the County has hovered around one billion dollars for the last several years, this loss would represent an annual economic loss of 50 million dollars. Since agriculture is the County's largest source of income and employment, this direct economic impact would be accompanied by a loss of tax revenue for the County and reduced purchases of numerous local goods and services. These adverse impacts are considered to be justified for the following reasons:

- The areas involved are designated Urban under the existing 1973 General Plan.
- The areas involved are situated within cities' existing Spheres of Influence, with the exceptions of portions of Calipatria and Calexico.
- The expansion of cities and other urban areas is expected to be gradual and accompanied by, if not dependent on, an expanded and more diversified local economy.
- The Agricultural Element contains goals, policies, and programs that call for increased agricultural packaging/processing facilities, which would stabilize and increase the value of farm products, increase local employment, and diversify the overall agricultural industry. Such operations would generally represent light to medium industry, which would be allowed in Urban Areas; heavy industry would be allowed within the limits of incorporated cities.
- The Agricultural Element, while urging that all Important Farmland be reserved for agricultural uses, states that agricultural land may be converted to non-agricultural uses where a clear and immediate need can be demonstrated, such as requirements for urban housing, commercial facilities, or employment opportunities.
- The Agricultural Element states that all existing Agriculture land will be preserved for irrigation agriculture, livestock production, aquaculture, and other agriculture-related uses except for non-agricultural uses identified in the General Plan or in previously adopted City General Plans.
- The Land Use Element states that for a period of five years after adoption of this General Plan Update by the County Board of Supervisors, no land shall be removed from the Agriculture category except where needed for use by a public agency, for geothermal purposes, where a mapping error may have occurred, or where a clear long term economic benefit to the County can be demonstrated through the planning and environmental review process.

These policies and measures, taken together, would justify and offset impacts related to the conversion of Important Farmland to non-agricultural land uses with Urban Areas as identified in the proposed General Plan Update. Any increase in the size of Urban Areas, or elimination of the above measures, would result in significant impacts.

b. Loss of Important Farmland After Five-Year Protection Period

The Plan Update would restrict land from being removed from the Agriculture category for five years after adoption by the County Board of Supervisors. Exceptions would be allowed where land is needed for use by a public agency, for geothermal purposes, where a mapping error occurred, or where a clear long-term economic benefit to the County is demonstrated through the planning and environmental review process.

Assuming that Important Farmland in Agriculture area may be converted to non-agricultural uses after termination of the five-year protection period, any such conversion of an area that exceeds 100 acres would constitute a significant impact to the preservation of Important Farmland. This would not preclude an area of less than 100 acres from being a significant impact, particularly if such an area is prime farmland or part of a large area presently utilized solely for agriculture, or if it contains other characteristics that deem it unusually important for agricultural production.

Implementation of the Agricultural Element would prevent "leapfrogging" and associated land use conflicts from occurring in Agriculture areas for at least five years since the development of non-agricultural land uses would be strictly prohibited in these areas during this period. As discussed below, the conversion of Important Farmland in area designated Agriculture, after termination of the five-year period, would constitute a significant agriculture/non-agriculture land use impacts.

c. Land Use Conflicts Within Urban Areas

The Land Use Element of the General Plan Update creates a potential for "leapfrogging" or "checkerboard" patterns of development within Urban Areas. Leapfrogging results in significant impacts to the efficient and economic production of adjacent agricultural land. From an agricultural perspective, leapfrog conversions adversely affect the efficiency of remaining farming operations in an area by disrupting normal agricultural operations such as aerial spraying, irrigation, and the transportation of farm equipment. Other common impacts to adjacent agricultural land include rising land costs, theft and vandalism of farm equipment, crop pilferage, road congestion, and personal injury liability associated with farm trespass.

The Agricultural Element states that, as a policy of the County, leapfrogging will not be allowed in the future. Within Urban Areas, all new non-agricultural development must adjoin existing urban uses. Non-agricultural residential, commercial, or industrial uses will only be permitted if they adjoin at least one side of an existing urban use, and only if they do not significantly impact the ability to economically and conveniently farm adjacent agricultural land. "Urban uses" in this sense refers to lands occupied by existing residential, commercial, industrial, public water and sewer facilities, and other uses that comprise a city's corporate boundaries. Any non-agricultural development that does not adjoin at least one side of an existing urban use would be considered a significant impact. The Agricultural Element also states that the Planning Department shall review all proposed development projects during the subdivision, zoning, and environmental impact review process to ensure that any new residential or non-agricultural

commercial uses located on agriculturally zoned land be adjoined on at least one entire property line to an area of existing urban uses. Developments that do not meet this criteria should not be approved. Any leapfrog project that is approved would constitute a significant impact.

The Agricultural Element recognizes that any new growth increases the potential for new conflicts with existing agricultural land uses, and states that the burden for preventing or mitigating agricultural/non-agricultural land use conflicts falls on the developer of the non-agricultural land use. The Element also calls for enforcement of the provisions of the Imperial County Right-to-Farm Ordinance (No. 1031), and provisions are made for all applicants of non-agricultural uses on land zoned or designated for agriculture to be receive a copy of this ordinance. Among other provisions, this ordinance states that residential uses in agricultural areas must recognize that agriculture may create nuisances such as flies, odors, dust, noise, night light, and chemical spraying.

The Agricultural Element also seeks to protect agricultural operations by requiring that appropriate buffer zones be created and maintained between agricultural land and new developments. These buffers shall occur on the parcel for which the development permit is sought and shall favor protection of the maximum amount of farmland. The Element also calls for the maintenance of agricultural transportation routes which are essential for the transportation of farm products and oversized farm equipment through non-agricultural areas.

An intent of the Agricultural Element is to reduce the introduction of conflicting uses into farming areas. Implementation of this Element would not impact agricultural production with regard to land use conflicts.

c. Agriculture/Urban Land Use Conflicts Along Agriculture/Urban Area Boundaries

Upon extension of urban land uses to the Agriculture/Urban Area boundaries, significant impacts similar to the land use conflicts described above would occur to agricultural areas that currently are not affected by residential, commercial, and industrial uses. Normal agricultural operations such as aerial spraying, irrigation, and the transportation of farm equipment would be disrupted, and production costs due to rising land costs, theft and vandalism of farm equipment, crop pilferage, road congestion, and personal injury liability associated with farm trespass would increase. The establishment of buffer zones along the periphery of Urban areas and the enforcement of the Right-To-Farm Ordinance (No. 1031) would reduce Agriculture/Urban Area land use conflicts. Significant impacts to adjacent agricultural operations would occur otherwise.

d. Proposed Specific Plan Areas

The proposed Land Use Element includes the designation of eight Specific Plan Areas (SPAs). This land use designation was not included in the 1973 Plan; all SPA designations, therefore, represent changes from the earlier Plan. Five of these SPAs -- Mesquite Lake, Interstate 8/State Route 111, East Border Crossing, Tamarack Canyon Ranch, and Bravo Ranch -- include land identified as Important Farmland. Approval of these five SPAs and conversion of these Important Farmland areas to non-agricultural uses would potentially represent significant impacts

to agricultural production. In all, approximately 8,870 acres of Important Farmland would be taken out of agricultural production. Aside from this significant and irreversible loss of Important Farmland, this area represents nearly 1.6% of the existing 560,000 acres of farmland in the County. Considering that the gross annual value of agricultural production in the County has hovered around one billion dollars for the last several years, this loss would represent an annual economic loss of about 16 million dollars. Approval and subsequent build-out of the SPAs would also create significant land use conflicts on surrounding agricultural land.

The specific impacts resulting from development of each SPA are as follows:

Mesquite Lake

As described in the Land Use section, the Mesquite Lake SPA, with an area of approximately 6,800 acres, replaces a Heavy Industry designation contained in the 1973 General Plan. Much of the Mesquite Lake SPA is an area of poor agricultural land, and other portions have been developed to include the Holly Sugar factory and a waste water disposal area. Approximately 4,260 acres of the Mesquite Lake SPA comprises Important Farmland. Most of this Important Farmland is situated in the northern and southern thirds of the SPA, whereas much of the central third is developed or has not been recently used for agricultural production.

The direct loss of 4,260 acres of Important Farmland in the Mesquite Lake SPA would be justified if a major portion of this proposed industrial park is devoted to agricultural- related operations. In particular, as detailed in the Agricultural Element, the County requires and would benefit from additional agricultural processing and packaging facilities. The development of packaging and processing facilities in the Mesquite Lake SPA would stabilize and increase the value of farm products; increase local employment; diversify the overall agricultural industry and thereby stabilize the local economy; and lower the prices of many locally produced commodities for local consumption.

Indirect impacts in the form of land use conflicts on surrounding agricultural land could occur from approval of this SPA. Impacts to agricultural operations north of Keystone and south of Harris Road would be mitigated to levels below significance by the creation of on-site buffer zones. Significant impacts west of SR-86 and east of SR-111 would not be expected since these highways would buffer adjacent agricultural land from the industrial park. Construction of the industrial park could, however, lead to growth inducement impacts on surrounding agricultural land.

Interstate 8/State Route 111

The I-8 and Highway 111 SPA is approximately 280 acres encompassing all four quadrants of this major intersection. The SPA stretches approximately one-half mile north and south from I-8, and approximately one-fourth mile west and east from Highway 111. These two highways occupy approximately 40 acres in this SPA; the remaining 240 acres comprise Important Farmland.

Approval and build-out of this SPA would result in the direct loss of 240 acres of Important Farmland, and indirect impacts to surrounding agricultural land along approximately three linear miles of boundary between the SPA and remaining agricultural land. These significant impacts could be mitigated by bringing suitable off-site replacement land into agricultural production, contributing fees to an agricultural "banking" fund for preservation of Important Farmland, and the establishment of on-site buffer zones.

East Border Crossing

The East Border Crossing SPA is located adjacent to the International Boundary approximately six miles east of the City of Calexico. It encompasses approximately 1,700 acres bounded on the west by the Ash Canal, on the north by a line approximately 1,500 feet north of Highway 98, on the east by the Alamo River, and on the south by the Republic of Mexico. The East Border Crossing SPA surrounds the new 87-acre port of entry on the U.S. side of the border which is being developed by the U.S. General Services Administration. The East Border Crossing SPA is intended to be developed primarily with industrial, office, and warehouse space for manufacturers, customs brokers, freight forwarders, and corporate or administrative offices. Secondary land uses would include retail, restaurant, and service commercial outlets, a truck service center, motel accommodations, low to moderately priced housing, and recreation.

Virtually the entire East Border Crossing SPA, approximately 1,600 acres, consists of Important Farmland. The direct loss of this Important Farmland to the County would be compensated for by the development of industrial and other economically beneficial uses. The inclusion of agricultural warehouses and agricultural packaging and processing facilities would mitigate the loss of Important Farmland to a level below significance. Under the proposed North American Free Trade Agreement, facilities within the East Border Crossing SPA would facilitate the export of local agricultural products to Mexico and thereby further compensate for the direct loss of agricultural land within this SPA.

Indirect significant impacts to existing agricultural land along the western and northern boundaries would occur with build-out of this SPA. These impacts would be mitigated by the establishment of adequate buffer zones along these boundaries.

Tamarack Canyon Ranch

The Tamarack Canyon Ranch SPA is approximately 1,200 acres bounded on the west by Forrester Road, on the north by Keystone Road, on the south by Larsen Road, and on the east by the eastern bank of the New River. The SPA is intended to by developed as a resort community that would include a destination resort hotel, golf courses, lakes, and attached and detached housing.

Approximately 890 acres of Important Farmland would be lost under build-out of this SPA. The majority of this land exists between the western bank of the New River and Forrester Road, although approximately 144 acres of prime farmland also exist in the New River floodplain. This loss of Important Farmland would constitute a direct significant impact to agricultural

production in the County. Significant indirect impacts would also occur to remaining agricultural operations on the west, north, and east boundaries. These significant impacts could be mitigated by bringing suitable off-site replacement land into agricultural production, contributing fees to an agricultural "banking" fund for preservation of Important Farmland, and the establishment of on-site buffer zones.

Bravo Ranch

The Bravo Ranch SPA is a triangular-shaped area of approximately 1,790 acres located two miles east of the City of Calexico. Its west boundary is approximately 2,500 feet west of Bowker Road, the north and east boundary is the Central Main Canal, and the south boundary is Anza Road adjacent to the International Boundary. This SPA is intended to be developed as a recreational-oriented residential community with lakes, golf course, and an equestrian center. Other uses include a motel, commercial uses, school and park sites, and the historic C&M Ranch House.

The entire SPA area of approximately 1,790 areas is Important Farmland. The loss of this farmland would constitute a significant impact to agricultural production. Significant indirect impacts would also occur to surrounding agricultural land alcng approximately seven linear miles of boundary between the SPA and remaining agricultural land on the west, north, and east boundaries. These significant impacts could be mitigated by bringing suitable off-site replacement land into agricultural production, contributing fees to an agricultural "banking" fund for preservation of Important Farmland, and the establishment of on-site buffer zones.

e. 1973 General Plan

A discrepancy between the proposed General Plan and the 1973 General Plan is that the new Plan reduces the amount of land designated for agricultural uses. In the 1973 Plan, a total of 878,336 acres was designated for agriculture. The new Plan proposes an agricultural designation for 588,417 acres. Virtually the entire difference between the plans is a result of the East Mesa being designated for Recreation/Open Space uses in the new Plan. This loss of land covered by an agricultural designation is not considered an adverse impact. This is because the Recreation/Open Space designations allows for agricultural uses including row and field crops, orchards, aquaculture, grazing, and apiaries. No loss of actual farmland would occur by this land use redesignation.

As indicated above, conversion of Important Farmland to non-agricultural uses in the Mesquite Lake, Interstate 8/State Route 111, East Border Crossing, Tamarack Canyon Ranch, and Bravo Ranch Specific Plan Areas would represent significant impacts to agricultural production and the preservation of Important Farmland in Imperial County.

The proposed Agricultural Element draws upon and strengthens the intent of the 1973 General Plan to preserve and protect agricultural production and the existence of agricultural land. In strengthening this intent in a more comprehensive manner, the proposed Agricultural Element poses no impacts to the existing goals and policies regarding agricultural production.

3. Mitigation Measures

Mitigation measures would be required to reduce two types of agricultural production impacts that would occur under implementation of the General Plan Update: the direct loss of Important Farmland, and the indirect impact on adjacent agricultural operations associated with the conversion of agricultural land to non-agricultural uses. Significant direct impacts to agricultural production would include the loss of Important Farmland in Specific Plan Areas and the loss of Important Farmland in areas designated Agriculture following termination of the five-year prohibition on development. Significant indirect impacts would be associated with conversion of the same properties, as well as with the expansion of urban uses within Urban Areas.

Mitigation measures can avoid, minimize, or compensate for these impacts. The direct and indirect impacts of any SPA or other proposed development could be mitigated by the following:

- Avoid the impacts by proposing alternative sites that do not contain Important Farmland, or sites with less productive soils, less intensive agricultural uses, or less potential for land use conflicts.

If an alternative site is not chosen, the direct impacts of losing Important Farmland associated with the SPAs and future developments in the Agriculture area shall be mitigated by one or more of the following measures:

- Minimize direct impacts by reducing the amount of agricultural land converted to nonagricultural uses and by retaining on-site agricultural uses.

- Establish agricultural packaging and processing facilities on these properties. These facilities should be constructed and operated on a scale such that they exceed the gross agricultural production of the entire property on an annual basis. Farmers markets would also reduce the impacts to local agricultural production stemming from conversion of Important Farmland.

- Compensate for direct impacts to Important Farmland by locating and securing replacement Important Farmland that has not been in agricultural production for at least the preceding five years. Such replacement shall be on a 1 to 1 basis (i.e., 1 acre replaced for each acre impacted) and shall be accomplished by the improvement with necessary irrigation water delivery and drainage systems, planting of crops, and managed production.

- Protect offsite productive Important Farmland subject to conversion through the purchase or transfer of its development rights.

- For any development impacting less than 160 acres of Important Farmland, an in lieu fee may be established based on the current cost of non-agriculturally used land with soils suitable for agriculture, together with the cost to improve and plant crops on such land on a 1 to 1 basis for impacted Important Farmland.

The indirect impacts on adjacent agricultural operations that would be associated with the conversion of agricultural land to non-agricultural uses shall be mitigated by one or more of the following measures:

- Minimize indirect impacts on adjacent agricultural lands by creating and maintaining on-site buffers zones in the form of agricultural land, greenbelts, recreational or vacant land that protect adjacent agricultural properties from new residential, commercial, and other non-agricultural uses. The widths of the created buffer zones would vary depending upon the existence of existing features such as roads and canals, and the types of agricultural commodities produced on adjacent lands.

- Restrict the intensity (e.g., lot size or dwelling units per acre) of non-agricultural uses adjacent to agricultural lands.

- Demonstrate that indirect impacts will not significantly affect future agricultural operations on an adjacent property by obtaining a signed statement to this effect from the adjacent property owner.

- For the conversion of agricultural land to urban uses within Urban Areas, require that at least one entire property line of the new uses adjoin an area of existing urban uses.

In addition, communities/developers are required to fund pipeline/canal/drain modifications to accommodate urban developments.

Project-specific mitigation measures for direct and indirect impacts are to be provided on a project by project basis during the subdivision, zoning, and environmental impact review process. SPAs and other developments that do not meet these criteria should not be approved. In all instances, the provisions of the Right-To-Farm Ordinance (No. 1031) must also be strictly enforced.

C. Traffic/Circulation

The following discussion is based on information obtained from a technical report prepared for the County of Imperial by Willdan Associates. Willdan Associates was retained to evaluate potential transportation impacts which may occur due to the update of the County's General Plan. The report is attached as Appendix C.

1. Existing Conditions

a. State Highways

Existing regional access to the County of Imperial is provided via Interstate 8, State Route 111, State Route 78, State Route 86, State Routes 115, and State Route 186. The existing conditions of these routes are described below.

Interstate 8 (I-8) is the primary east/west route through the County between San Diego and Yuma, Arizona. It is constructed with two travel lanes in each direction with complete grade separation at all intersections. The volumes on this facility range between 6,200 average daily trips (ADT) to 22,900 ADT.

State Route 111 (SR-111) commences at the international border at Calexico and consists of two travel lanes in each direction north to I-8. Traffic volumes on these segments range between 22,000 and 41,000 ADT. North of I-8, SR-111 narrows to a two-lane undivided roadway providing connection to Brawley, Calipatria, and along the eastern shore of the Salton Sea to the City of Indio in Riverside County where it connects with I-10. Daily traffic volumes north of I-8 are 12,100 ADT, decreasing to 3,500 ADT south of the Riverside County line.

State Route 86 (SR-86) is generally a north/south route with two travel lanes in each direction. This facility runs from I-10 in Indio, parallels the western side of the Salton Sea, joins with SR-78 south of Salton City, continues through Westmorland to Brawley, then splits from SR-78 and continues south through Imperial and El Centro to I-8. South of I-8, it serves the community of Heber and terminates at SR-111. Daily traffic volumes on SR-86 in the unincorporated portions of the County vary between 4,100 ADT (north of SR-78) to 13,500 ADT south of Brawley. Ultimately, Caltrans has plans to widen and realign SR-86 to four-lane conventional highway and expressway standards between I-8 and the Riverside County line.

State Route 78 (SR-78) commences at I-10 at Blythe in Riverside County, traverses Imperial County in an east/west fashion through Palo Verde, Brawley, and Westmorland, and continues through San Diego's north county and terminating at I-5. Most sections are constructed as a two-lane conventional highway (one travel lane in each direction) with the exception of a 1.8 mile section through the incorporated city of Brawley. Outside Brawley, SR-78 tends to carry very low traffic volumes ranging between 600 ADT east of the San Diego County line, to 5,300 ADT just west of Brawley. The portion of SR-78 east of Brawley to the Riverside County line carries daily traffic volumes ranging from 1,300 ADT to approximately 3,500 ADT.

State Route 98 (SR-98) is an east/west facility separating from I-8 near the community of Ocotillo, traversing in a southeasterly fashion through Calexico and reconnecting to I-8 near the Algodones Sand Dunes. The majority of SR-98 is currently constructed with one travel lane in each direction, with the exception of a 2.2 mile stretch within Calexico which provides two travel lanes in each direction. Daily traffic volumes on this facility range from 700 ADT west of the eastern connection of this route to I-8 to 10,500 ADT just west of the Calexico western city limits. With implementation of proposed SR-7 between the new East Border Crossing and SR-98, Caltrans is proposing to relocate SR-98 through the City of Calexico on a more northerly alignment using Cole Road, which would be upgraded from two to four travel lanes.

State Route 115 (SR-115) is a north/south two-lane undivided highway (with a few four-lane sections along its route) and primarily serves travel north of I-8 to Holtville, Brawley, and Calipatria. Existing daily traffic volumes range between 1,200 ADT and 5,800 ADT.

State Route 186 (SR-186) is a short north/south facility connecting I-8 to the southeastern portion of Imperial County at the Andrade border crossing from the Mexican border community of Algodones. SR-186 accommodates international travel and commercial travel. Currently, this roadway is constructed with one travel lane in each direction and accommodates approximately 2,000 daily vehicle trips.

b. County Street Classifications

The County of Imperial's existing roadway network consists of the following street types:

Prime Arterial classification generally provides four travel lanes within a 100-foot right-of-way with no parking permitted and a raised median. Its primary purpose is to carry through traffic and provide a direct connection to the State Highway system.

Major Arterial classification generally provides four travel lanes within an 64-foot paved width and an 84-foot right-of-way width. The primary function of a major arterial is to carry through traffic and its secondary purpose is to provide access to abutting property.

Minor Arterial classification generally provides two travel lanes within a 40-foot paved width and an 84-foot right-of-way width, with provision for a 22-foot wide parkway strip. Its primary purpose is to provide for local traffic movement and access to abutting property, and for movement between local streets and streets of higher classification. Minor arterials provide traffic circulation service within residential, commercial, and industrial areas.

Collector classification generally provides one lane in each direction with a 40-foot paved width and a 70-foot right-of-way width, allowing for a 15-foot parkway strip and provision for parking and bike lanes. Its primary purpose is to provide for local traffic movement and direct property access. Many Collectors serve industrial and business areas.

c. North/South Arterials

The following County roadways accommodate most of the north/south traffic movement between local cities and communities:

Drew Road connects Evan Hewes Highway south to SR-98. Currently, this roadway is a two-lane undivided roadway and provides access to I-8 via a diamond-type interchange with stop sign controls at the east and westbound off ramps. Drew Road carries 2,400 and 1,300 ADT north and south of I-8, respectively.

Forrester Road provides a connection between Brawley and I-8 west of El Centro and continuing south to McCabe Road. This facility consists of one travel lane in each direction with traffic volumes ranging between 5,300 ADT south of Keystone Road to 6,100 ADT north of Evan Hewes Highway. Forrester Road also provides a diamond-type interchange with I-8 with stop sign controls on both east and westbound off ramps. It should be noted that Forrester Road is planned to be upgraded to a four-lane facility and designated as a State Route in the future. Field observations and traffic counts confirm a very high percentage of heavy vehicles traversing this roadway.

Dogwood Road connects SR-78 in Brawley to State Route 98 west of Calexico on an alignment which bypasses El Centro on the east. This facility is a two-lane undivided roadway with high travel speeds and currently carries between 3,300 and 4,000 ADT.

Holt Road and Orchard Road provide primary access to the southcentral portion of Imperial County. This facility provides a diamond-type interchange with I-8 with stop sign controlled intersections for the east and westbound off ramps. This roadway is constructed with one travel lane in each direction. According to the latest available traffic counts, it carries 1,300 ADT between Evan Hewes Highway and I-8. It should be noted that an extension of Orchard Road to the south connecting with State Route 98 and ultimately providing service to a proposed international border crossing is undergoing environmental studies at this time.

d. East/West Arterials

The following County roadways accommodate most of the east/west traffic movement between local cities and communities:

Evan Hewes Highway (S80) parallels I-8 to the north and served as the primary travel route between San Diego County and Arizona prior to the construction of I-8. Daily traffic volumes on this facility range from 300 ADT in the Ocotillo vicinity to 9,000 ADT just east of the El Centro city limits. Through El Centro, Evan Hewes Highway changes names to Adams Street and is constructed with two travel lanes in each direction. Most portions of this facility are constructed with one travel lane in each direction. East of Holtville, Evan Hewes Highway shares the same alignment as SR-115 and carries 2,100 ADT.

McCabe Road is located south of I-8 between Brockman Road (S30) and Orchard Road. Daily traffic volumes on this roadway vary between 500 and 600 ADT.

Ross Road connects the communities of Seeley and Holtville and traverses through El Centro. East and west of Forrester Road, Ross Road carries 1,300 and 1,200 ADT, respectively. East of the El Centro city limits, this facility carries 3,000 ADT.

Aten Road commences west of Forrester Road and terminates at SR-111. It is a two-lane undivided roadway and traverses the southernmost portion of the City of Imperial. According to the most recent daily traffic volume counts, Aten Road carries 4,900 and 5,000 ADT east and west of Dogwood Road, respectively.

Worthington Road commences north of Seeley and terminates north of Holtville. It is a two-lane undivided roadway and traverses the northernmost section of Imperial and carries 300 ADT west of Forrester Road. East and west of SR-111, it carries 1,000 and 1,800 ADT, respectively.

Keystone Road connects Forrester Road and Highline Road through central Imperial Valley. This two-lane undivided roadway carries 1,000 and 800 ADT east and west of SR-86, respectively. Currently, traffic volume data are not available for the eastern segments of this roadway.

Rutherford Road provides connection between Westmorland and northcentral Imperial County. East and west of SR-111, it carries 1,100 and 1,400 ADT, respectively.

County Road S24 is located in the Winterhaven and Bard communities on the far southeastern edge of the County. It follows several roadway alignments (Picacho Road, Ross Road, Collins Road, York Road, and Imperial Dam Road) and traverses in an east/west and north/south manner through the Quechan Indian Reservation. The most recent daily traffic volume information indicates that this roadway carries between 2,000 and 2,800 ADT.

Winterhaven Drive between I-8 and Picacho Road serves as the connector between County Route S24 and I-8. The most recent daily traffic volumes on this segment indicate Winterhaven Drive carries 4,700 ADT.

e. Public Transportation

Imperial County Transit (ICT) is funded by the Imperial Valley Association of Governments (IVAG), and is managed by the County Department of Public Works.

North and southbound travel through the County of Imperial is provided on a daily basis between Niland and the international border at Calexico. The route numbers corresponding to this service are 10, 15, 20, 30, 40, 45, 50, 60, 90, 100, 110, 120, 130, 140, and 170. These routes

commence at 6:25 a.m. and terminate at 6:00 p.m. On a weekly basis, the routes extend north to Desert Shores (Tuesdays) and Bombay Beach/Hot Mineral Spa (Thursdays).

East and westbound travel is provided by bus routes 180 and 185 between the Naval Air Facility north of Seeley and Winterhaven, via El Centro and Holtville. Service to Winterhaven, however, is only provided on Wednesdays. Service to Seeley and the Naval Air Facility is not provided on Wednesdays.

f. Scenic Highways

Four areas within the County have the potential as State-designated scenic highways. Senate Bill 1467 established the Scenic Highway Program. SB1467 required a "Master Plan" of scenic highways. The Plan and a list of highways resulted from statewide public hearings in 1963. The following routes have been designated or are eligible for State scenic highway designation:

Interstate 8. A portion of I-8 is in the "Master Plan of State Highways Eligible for Official Scenic Highway Designation." The initial segment for future status lies between the San Diego County line and its junction with State Route 98. This segment known as Mountain Springs Grade has a long, rapid elevation change, remarkable rock and boulder scenery and plant life variations.

State Route 78. The "Master Plan of State Highways Eligible for Official Scenic Highway Designation" also includes SR-78 from the junction with SR-86 to the San Diego County line. The area is considered scenic because of its desert characteristics and view of Salton Sea.

State Route 111. SR-111 travels along the northeast shore of the Salton Sea and is included in the *Master Plan of State Highways Eligible for Official Scenic Highway Designation* from Bombay Beach to the Riverside County line. The drive along this body of water is a study in primitive beauty and an interesting and startling anomaly. The contrast between the flat, wide Salton Sea with its sandy beach, and the rugged rise of the Chocolate Mountains has many variations. The panoramic view of the opposite (southwest) shore and its backdrop of mountains is also a sight of pristine beauty.

Borrego-Salton Seaway. County Highway S-22 is also known as the Borrego-Salton Seaway. It begins in Salton City and ends at the community of Borrego Springs in San Diego County. Along its route is Clay Point, located a mile and a half west of SR-86, which is a formation ring above the flat desert shore which shows the bed of pre-Columbian Lake Cahuilla. Three and a half miles farther west, the Anza Verde Wash parallels the Borrego-Salton Seaway with uniquely scenic desert landforms and vegetation.

Caltrans has developed an official guide called the "Guidelines for the Official Designation of Scenic Highways" (April 1988) which can be utilized for protecting the County's Scenic Highways from potential aesthetic impacts from any development projects.

g. 1973 General Plan

The Circulation Element of the 1973 General Plan consisted of a highly simplified street classification system which did not include pavement widths, traffic projections, or level of service projections.

2. Environmental Impacts

The proposed Circulation and Scenic Highways Element was designed to accommodate projected traffic growth in Imperial County through the year 2015. Factors taken into consideration in forecasting traffic volumes on future roadways include trend line analysis, future population projections, Caltrans projections and manual assignment of approved projects and land use decisions. The proposed Circulation and Scenic Highways Element include the growth assumptions contained within the proposed Land Use Element.

The proposed Circulation and Scenic Highways Element for the County of Imperial revises the existing system of street classifications for the entire road network (Figure 8). Table 8 lists the proposed classifications, the roadway dimensions and levels of service for each classification. The proposed street classifications are further described below:

Prime Arterial classification generally provides six travel lanes within a 106-foot paved width and a 126-foot right-of-way, with no parking permitted and a raised median. Its primary purpose is to carry through traffic and provide a direct connection to the State Highway system.

Major Arterial classification generally provides four travel lanes within an 82-foot paved width and a 102-foot right-of-way width and a raised median. The primary function of a major arterial is to carry through traffic and provide a direct connection to the State Highway system. It also may provide access to abutting commercial and industrial property.

Secondary Arterial classification generally provides four travel lanes within a 64-foot paved width and an 84-foot right-of-way width. The primary function of a secondary arterial is to carry through traffic and its secondary purpose is to provide access to abutting property. It may also be constructed with two travel lanes and a 22-foot wide parkway strip.

Collector classification generally provides two travel lanes within a 40-foot paved width and a 60-foot right-of-way width. Its primary purpose is to provide for local traffic movement and access to abutting property, and for movement between residential streets and streets of higher classification.

TABLE 8
PROPOSED IMPERIAL COUNTY STANDARD STREET CLASSIFICATIONS AND AVERAGE DAILY VEHICLE TRIPS

Road		Level of Service				
Class	X-Section	A	B	C	D	E
Prime Arterial	106/126	22,200	37,000	44,600	50,000	57,000
Major Arterial	82/102	14,800	24,700	29,600	33,400	37,000
Secondary Arterial	64/84	13,700	22,800	27,400	30,800	34,200
Collector	40/60	1,900	4,100	7,100	10,900	16,200
Residential Street	40/60	*	*	1,500	*	*
Residential Cul-de-Sac or Loop Street	40/60	*	*	200	*	*

* Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

Local Street — this street is designed to provide direct access to abutting properties and to give access from neighborhoods to the Collector Street system. In the central Imperial Valley, local streets have historically been created along section and half-section lines forming a north/south and east/west grid. This local street network provides alternative routes to connect with Collector and Arterial streets. Design standards include provision for two travel lanes and parking.

Residential Street - this street type also includes residential cul de sac and loop street and is designed to provide direct access to abutting properties and to give access from neighborhoods to the Local Street and Collector Street system. This classification should be discontinuous in alignment such that through trips are discouraged. Typical design standards include provision for one travel lane in each direction, parking on both sides, and direct driveway access.

The proposed Circulation and Scenic Highways Element applies the new classification to the existing and proposed roadway system. The proposed roadways with a classification of Collector and larger are shown in Figure 8. The proposed classification of all Circulation Element roadways is shown in Table 2 of the Circulation Element; Table 2 also shows the projected increase in volumes and the projected street segment level of service (LOS) for each roadway.

LOS is a qualitative measure describing the perceived efficiency of traffic flow considering variables such as speed and travel time, freedom to maneuver, traffic interruptions, traveler comfort and convenience, and safety. LOS A is a free flow condition; LOS F reflects highly congested traffic conditions.

a. Circulation Impacts

The County's goal for an acceptable traffic service standard during AM and PM peak periods is LOS C for all streets and intersections. With the new proposed classifications, all street segments under County jurisdiction are expected to operate at LOS C or better. Therefore, if future volumes conform to the projections, and the roads are built to the Circulation and Scenic Highways Element specifications, there would be no adverse circulation impacts with implementation of the General Plan. Mitigation measures would be required to assure the conformance of volume projections and road capacities to the General Plan.

It is noted that LOS D is projected for some State Highway segments. The County of Imperial has no jurisdiction over State Highways, and planning for these facilities is undertaken by the State of California. County roads that intersect with State Routes should be given special consideration since delays at intersections tend to deteriorate operating conditions along street segments. The State Highway segments that are projected to operate at LOS D are I-8 between Fourth Street and State Route 111 and State Route 86 between Heber and Dogwood Roads.

b. Other Impacts

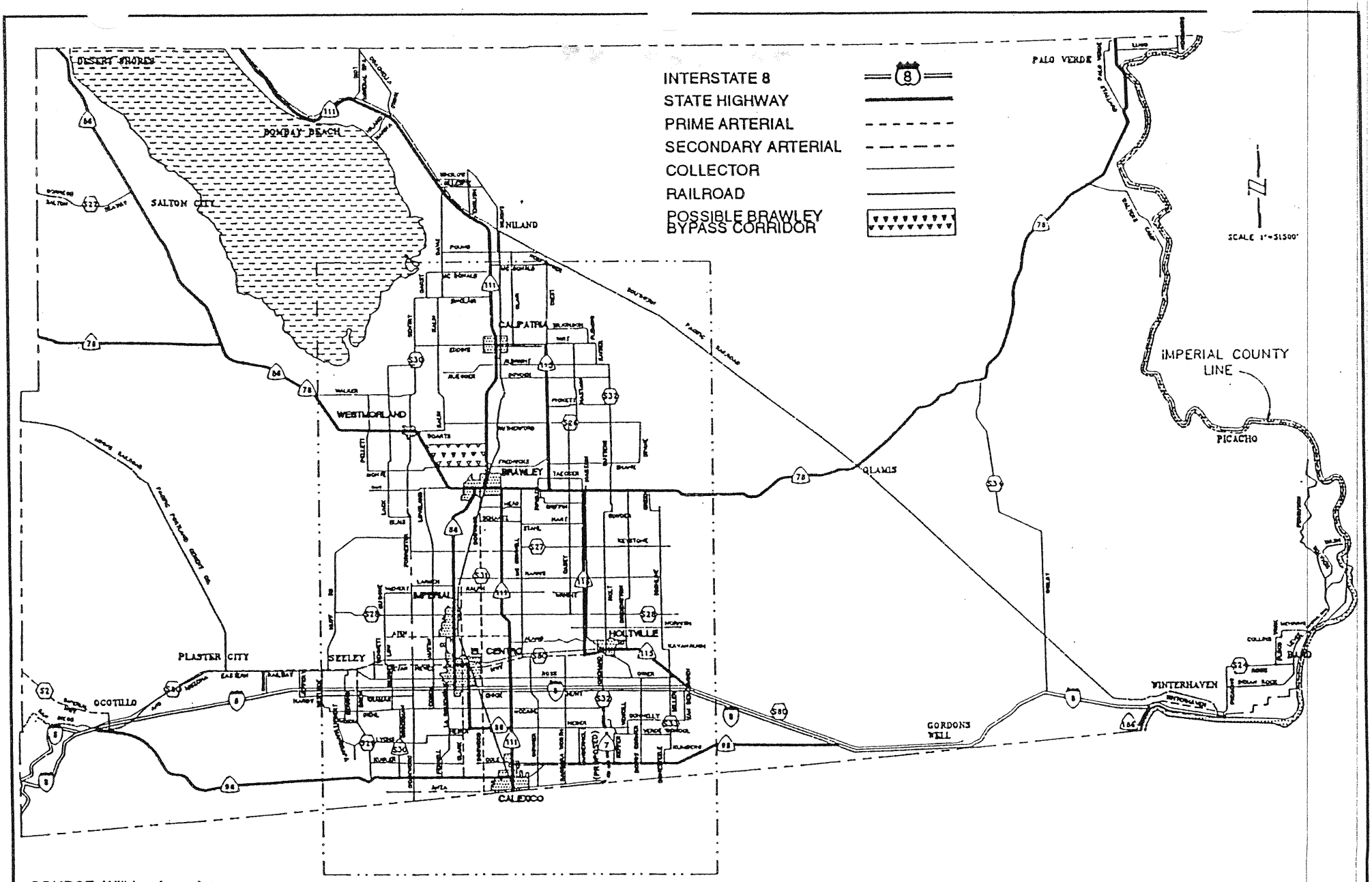
The implementation of the proposed Circulation and Scenic Highways Element would result in the widening of many existing roadways and the building of some new roadways (such as SR-7). Each of these roadway projects may contain the potential for adverse, non-circulation impacts. The issues for consideration, which would be project-dependent, include biological resources, cultural resources, visual resources, agriculture, hydrology, noise and air quality. The first five issues should be considered in connection with the direct, or physical action of a proposed roadway project. Noise and air quality are functions of the projected traffic volumes and speeds and the existence of sensitive receptors in the area. To avoid or minimize adverse impacts, proposed roadway projects should be evaluated for each of these issues.

c. 1973 General Plan

The Circulation and Scenic Highways Element of the 1973 General Plan contains smaller roads than does the proposed Plan Update. The 1973 General Plan does not specify pavement widths, traffic projections, or level of service projections. Therefore, the proposed General Plan represents an improvement to the traffic circulation planning for Imperial County from the 1973 General Plan. There would be no adverse impacts resulting from the update of the Circulation and Scenic Highways Element.

3. Mitigation Measures

Proposed development projects which would increase traffic in Imperial County shall be evaluated for conformance to the Circulation and Scenic Highways Element. If the projected traffic volumes exceed those stated in the Circulation and Scenic Highways Element, and LOS would be less than C, then the project should be redesigned, or the Circulation and Scenic Highways Element amended, to bring the project into conformance. If the affected roads would



SOURCE: Willdan Associates

Imperial County General Plan	Circulation Plan	Figure 8

not be of the capacity shown in the Circulation and Scenic Highways Element, then consideration of roadway improvement as a condition of the project should be included in the analysis. Developers will be required to dedicate right of way needed for State highway improvements before a subdivision or the development of property adjacent to or straddling an existing or future State highway is approved. All project-specific traffic studies shall be distributed for comment to any city where an arterial continues into a city's Sphere of Influence.

Proposed new roadway and roadway improvement projects shall be evaluated for conformance to the Circulation and Scenic Highways Element. Proposed new roadway and roadway improvement projects shall also be evaluated for potential impacts related to biological resources, cultural resources, visual resources, agriculture, hydrology, noise, air quality and other environmental issues which may be appropriate. New roadway and roadway improvement plans shall also be coordinated with the appropriate irrigation and water districts to assure efficient compatibility with current and future water and power plans.

D. Noise

Noise is generally defined as unwanted sound. Exposure to noise can result in interference with speech, distractions at home and at work, disturbance of rest and sleep, and the disruption of various recreational pursuits. Long-term exposure to high noise levels can affect psychological and physiological health. The description of noise requires the use of terms which may not be familiar to most readers of this EIR. Some terms are described briefly in the following paragraphs. A glossary of terms and descriptions of noise metrics to assist the reader is included in Appendix A of the Noise Element of the General Plan Update.

Noise is a form of energy. A standard unit of measure of the noise level, or sound pressure level, is the decibel (dB). Sound is also described by frequency, or pitch, and comprehensive measurements describe the sound level for each specified frequency range. For the assessment of noise levels to a human receptor, the frequency range measurements are combined into a single value, the "A-weighted" decibel, often written dB(A) or dBA. A-weighting gives values to the individual frequencies which correspond to the human hearing spectrum. In this noise section, the use of the term dB means the A-weighted decibel.

Average Noise Levels. The most commonly used short-term average is L_{eq}, the equivalent noise level. When L_{eq} is used, a time for averaging may be stated, such as 15 minutes, 1 hour, 8 hours or 24 hours. If no time is stated, a one hour average is assumed. L_{eq} is usually used in the description of noise near a point source or group of sources, such as a tractor or a construction site. Policies and ordinances which regulate noise at the source are usually stated in terms of L_{eq}.

Community Noise Levels. Community noise is a term used to describe the outdoor noise environment in the vicinity of inhabited areas. Community noise is generally a combination of noise from varied and widespread sources, such as highways and railroads. Community noise usually varies in time, with the cyclic pace of noise-making activities. Therefore, an averaging of the noise level over a period of time is necessary to describe community noise levels. Further, the sensitivity to noise in the community varies during the day. People are less sensitive to noise when they are engaged in activities which in themselves make noise, such as recreation, than when they are engaged in quiet activities, such as sleeping.

The long term averages used for the assessment of community noise are the Community Noise Equivalent Level, CNEL, and the Day-Night Level, L_{dn} or DNL. These averages weight the noise levels over a 24-hour period to account for increased human sensitivity during the evening and night time periods. The difference between CNEL and L_{dn} is that CNEL considers the 24-hour day divided into three periods, while L_{dn} uses two periods. The two measurements are very close, and are generally accepted as equivalent in community noise studies. L_{dn} is the measure used by the U.S. Environmental Protection Agency (EPA) for a community noise descriptor, while CNEL is commonly used in California. The proposed Imperial County General Plan Update and this EIR use CNEL.

Sensitive Receptors. Sensitive noise receptors are, in general, areas of habitation where the intrusion of noise has the potential to impact adversely the occupancy, use or enjoyment of the

environment. Sensitive receptors include, but are not limited to, residences, schools, hospitals, parks and office buildings. Sensitive receptors may also be non-human species. Many riparian bird species are sensitive to excessive noise.

1. Existing Conditions

Many activities which create objectionable noise levels in Imperial County, such as industrial operations and rail switching yards, are located within cities which are not a part of the County General Plan. The highest traffic volumes, which are major noise sources, are within the cities of El Centro and Calexico. The General Plan Update, and thus this section, address only noise sources which affect unincorporated areas of the County.

a. Transportation Sources

Aircraft Noise

Aircraft are used in Imperial County for private, commercial, and military purposes. Aircraft noise which may affect sensitive land uses occurs in the vicinity of seven airports in the County: Imperial County, Brawley Municipal, Calexico International, Calipatria Municipal, Holtville, Salton Sea, and the Naval Air Facility (NAF) El Centro which is located north of the townsite of Seeley. The locations of these airports are shown in Figure 9. Descriptions of each airport, the aircraft operations, and the noise impacts are discussed in the *Airport Land Use Compatibility Plan, Imperial County Airports* (ALUCP 1991). Aircraft noises also occur as part of agricultural operations, where aircraft are used for crop spraying operations.

Railroad Noise

The Southern Pacific Railway is the primary source of railroad transportation noise in the County. The main line right-of-way runs from the Riverside County border, just east of the Salton Sea, southeast to Niland. From Niland, the main line continues southeast to Yuma, Arizona; a branch runs south to Calipatria, Brawley, Imperial, El Centro and Calexico. A branch of this line runs east from El Centro along Evan Hewes Highway to Holtville and north along SR-115 to just south of Highway 78, although the line between Holtville and SR-78 has been shut down by the Interstate Commerce Commission. This branch is used primarily to transport agricultural produce, such as sugar beets from fields west of Holtville. The railroad lines are shown in Figure 9.

Two other railways, which are located west of Seeley, are the U.S. Gypsum rail line to their mining site in the Fish Creek Mountains; and the San Diego and Eastern Railroad (S.D.& A.E.) from San Diego through the Jacumba Mountains. The U.S. Gypsum line passes through uninhabited areas, including a military bombing range and does not impact sensitive receivers. The S.D.& A.E. line has been non-operational east of Jacumba to Plaster City following Tropical Storm Kathleen in 1976 which destroyed tracks and bridges along much of its route.

Railroad noise on the Southern Pacific line, just north of the Riverside County border, was studied in 1990. A combination of measurements, operations data (from 1988) and modeling

resulted in the data shown in Table 9. Operations data in 1992, for the main Southern Pacific line, are similar to that of 1988 (i.e., an average of about 40 trains per day) and the noise levels of Table 9 would apply to existing conditions. Railroad noise from the branch tracks would be much less. The branch to Imperial and Calexico averages four trains per day. The branch to Holtville averages four trains per week.

TABLE 9
EXISTING RAILROAD NOISE LEVELS

Distance (ft)	100	200	300	400	500	700	1,000	2,000	5,000
CNEL (dBA)	74	70	67	64	62	60	57	51	44

Roadway Noise

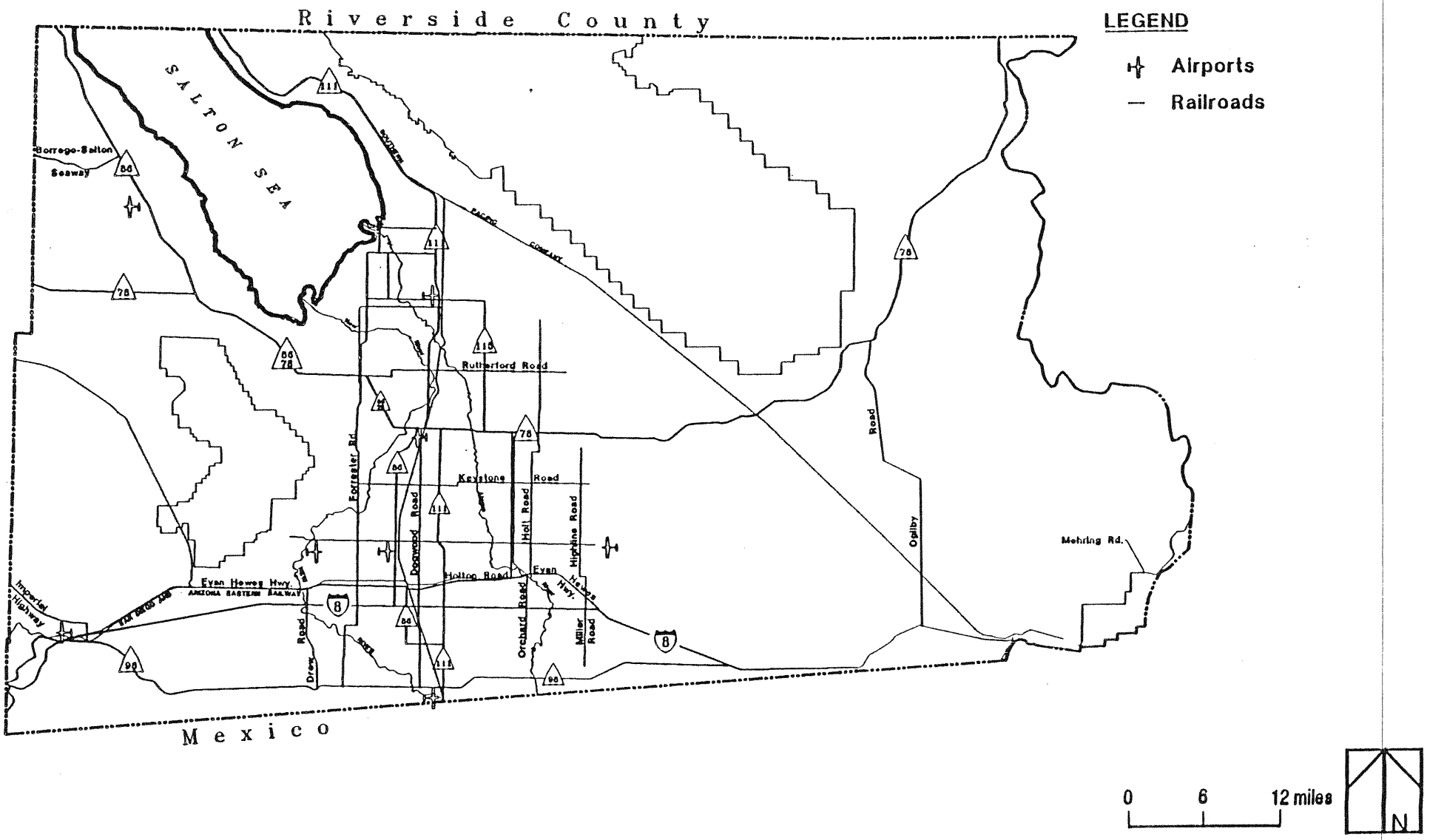
Motor vehicle noise level information is obtained from measurements using a sound level meter, and is calculated using highway traffic volume, speed, and vehicle mix information. Figure 9 shows the location of existing principal roadways within Imperial County. The major east-west roadway in the county is I-8, which runs from Yuma, Arizona to San Diego County, through the city of El Centro.

State Route (SR) 98 parallels I-8 on the south to serve the City of Calexico. SR-78 parallels I-8 to the north, and serves the cities of Westmorland and Brawley, and continues northeast to the community of Palo Verde. The Evan Hewes Highway is Old Highway 80 which parallels I-8 on the north from Ocotillo to Seeley, El Centro, and Holtville, then back southeast to again join I-8.

SR-86 and SR-111 are the main north-south roadways. SR-86 runs from SR-111 north of Calexico, through Heber and the cities of El Centro, Imperial, Brawley and Westmorland and northward to eventually connect with Interstate 10 at Indio. It is a principal farm-to-market route for Imperial County agricultural products, and carries a high percentage of heavy trucks. SR-86 also carries heavy recreational traffic on weekends. SR-111 is located east of El Centro from Calexico to the cities of Brawley and Calipatria; and continues north along the east side of the Salton Sea past Niland and Bombay Beach to also connect with I-10 at Indio.

Other state roads include SR-115, which runs northwest from I-8 to Holtville, then north to Brawley and Calipatria; and SR-186, a short spur running south from the eastern end of I-8 to the international border.

Table 10 lists the interstate and state highways, and shows the vehicle volumes, mixes, and calculated noise levels. Due to the relative low volumes on most of the roadways in the unincorporated area of the County, noise contours would not be distinguishable at a scale which could be included with this EIR. Large scale maps (1"=2 miles) with the 60 dB CNEL noise contour per Tables 10 and 11 have been provided and are on file at the County Planning Department. More detailed descriptions of the state highways and local roadways may be found in the Circulation and Scenic Highways Element of the General Plan Update.



Imperial County General Plan	Existing Noise Sources	Figure 9

TABLE 10
IMPERIAL COUNTY INTERSTATE
AND STATE HIGHWAY TRAFFIC AND NOISE DATA
EXISTING CONDITIONS

Road/Segment	Traffic					Noise			
	Volume (thousands)	Speed (mph)	Vehicle Mix (percent)			Reference CNEL dB	Distance to ___ dB (feet from centerline)		
			Auto	Med	Heavy		70	65	60
I-8									
w/o Ocotillo	10.7	65	84	4.8	11.2	76	180	565	1605
e/o Ocotillo	8.6	65	84	4.8	11.2	75	145	455	1355
w/o El Centro	10.9	65	87	4.0	9.0	75	170	525	1455
e/o El Centro	22.9	65	89	3.4	7.6	78	325	1005	2205
e/o 111	8.4	65	83	5.0	12.0	75	145	455	1355
w/o 115	6.5	65	81	4.8	14.2	74	125	380	1155
e/o 115	7.2	65	77	4.6	18.4	75	160	495	1405
e/o 98	8.7	65	80	4.4	15.6	75	170	530	1505
w/o 186	10.7	65	80	4.4	15.6	76	215	655	1705
e/o 186	14.0	65	80	4.4	15.6	77	275	855	2005
SR-78									
w/o 86	0.6	55	66	6.1	27.9	64	**	**	135
e/o 111S	3.5	55	70	2.1	27.9	72	80	240	775
e/o 115S	1.5	55	73	7.0	20.0	67	**	85	275
SR-86									
w/o 111	4.3	55	93	4.8	2.2	68	**	105	315
s/o 8	9.2	55	94	4.1	1.9	71	70	205	630
s/o 78E	13.5	55	90	4.8	5.2	74	130	385	1180
nw/o Brawley	5.3	55	78	6.8	15.2	72	85	245	780
s/o 78W	4.6	55	52	5.1	42.9	75	150	465	1380
n/o 78W	4.1	55	52	5.0	43.0	74	135	410	1225
SR-98									
e/o Ocotillo	1.8	55	89	4.6	6.4	65	**	55	175
w/o Drew	2.1	55	89	2.6	8.4	66	**	70	220
w/o 111	12.0	55	93	2.8	4.2	73	95	300	950
w/o 8	0.9	55	77	2.3	20.7	65	**	50	160
SR-111									
s/o 86W	25.0	55	92	4.4	3.6	76	205	635	1655
s/o 8	22.0	55	93	3.7	3.3	75	170	535	1505
n/o 8	9.5	55	87	5.9	7.1	73	100	310	980
s/o 78	6.9	55	84	7.2	8.8	72	80	240	775
n/o 78	7.1	55	82	7.5	10.5	73	90	285	900

TABLE 10
IMPERIAL COUNTY INTERSTATE
AND STATE HIGHWAY TRAFFIC AND NOISE DATA
EXISTING CONDITIONS

Road/Segment	Traffic					Noise			
	Volume (thousands)	Speed (mph)	Vehicle Mix (percent)			Reference CNEL dB	Distance to ___ dB (feet from centerline)		
			Auto	Med	Heavy		70	65	60
s/o 115	7.1	55	79	7.5	13.5	73	100	210	980
n/o 115	5.6	55	82	7.5	10.5	72	70	225	700
s/o Riv. Cty.	3.5	55	71	12.2	16.8	71	60	190	600
SR-115									
n/o 8	2.1	55	63	9.3	27.7	70	49	155	485
s/o 78	2.7	55	68	7.9	24.1	70	55	175	560
n/o 78	1.3	55	18	19.7	62.3	71	60	185	590
SR-186	2.0	55	90	8.8	1.2	65	**	50	150

** indicates contour lies within the right-of-way.
All calculations assume flat, hard terrain with no obstructions; actual conditions may reduce noise significantly.

b. Industrial Sources

Industrial sources include manufacturing, mining, utility and similar enterprises. These activities often emit noise which may impact sensitive receptors in the area of the industrial operation. Existing major manufacturing sites within Imperial County are generally located away from concentrations of sensitive receptors. These include a gypsum plant in Plaster City, Holly Sugar and Calcot between Imperial and Brawley, and geothermal power plants in the southeast Salton Sea, Heber, and East Mesa areas. Additional geothermal plants are planned. More detailed descriptions of the geothermal plants may be found in the Geothermal and Transmission Element of the General Plan. Descriptions and locations of the mining sites may be found in the Conservation and Open Space Element of the General Plan. Industrial activities often entail the ingress and egress of cars and heavy trucks; thus, they will contribute to roadway noise sources on roads used for plant access.

c. Agricultural Sources

The predominant land use in Imperial County is agriculture. Noise sources associated with agricultural operations include field machinery, especially when diesel engine driven; heavy trucks, used for the delivery of supplies and the distribution of products; and aircraft, used for the spraying of crops.

In recognition of the role of agriculture in the County, the Board of Supervisors has adopted a Right to Farm ordinance. This ordinance requires a disclosure to owners and purchasers of property near agricultural lands or operations, or areas zoned for agricultural purposes. The

disclosure advises persons that discomfort and inconvenience from machinery and aircraft noise resulting from conforming and accepted agricultural operations are a normal and necessary aspect of living in the agricultural areas of the County. The complete disclosure notice is contained in Appendix B.

d. Other Sources

Noise sources not included above which are likely to be included in planning analyses include: construction noise; noise from commercial activities, such as automotive and truck repair, kennels, and entertainment facilities; noise from building heating, ventilating, and air conditioning (HVAC) systems; and noise from recreational areas, including off-road vehicles. Noise from residential stereos, tools, parties and pets can be a source of noise complaints. This type of noise is not generally addressed in planning activities, but in ordinances specifically for controlling nuisance noise or generally for maintaining the peace.

e. Existing General Plan/Noise Plan

The Noise Element of the existing General Plan is the "Proposed 'Amended Noise Plan,' Imperial County General Plan, June 1990." The noise plan includes standards for noise/land use compatibility and for residential building interiors as well as requirements for acoustical analysis of projects proposed for areas which may be exposed to noise levels greater than 60 dB CNEL.

2. Environmental Impacts

The implementation of the Housing, Seismic and Public Safety Element, Conservation and Open Space Element, and Water Element will not have an adverse impact on noise levels in the County. The following analysis focuses on the following General Plan Elements which may have significant noise impacts: Noise, Circulation and Scenic Highways, Land Use, Agricultural, and Geothermal and Transmission.

a. Noise Element

The Noise Element provides information relative to potential increases in noise in Imperial County; the impacts of these increases are discussed below. The Noise Element also contains programs and policies to assure analysis of potential impacts, and to provide measures for avoiding or mitigating the adverse impacts. These policies and programs are discussed in the Mitigation Measures below.

Aircraft Noise

Future airport noise levels for Brawley Municipal, Calexico International, Calipatria Municipal, and Imperial County airports, and NAF El Centro are shown on contour maps in Appendix B of the proposed General Plan Noise Element. These maps are taken from the *Airport Land Use Compatibility Plan, Imperial County Airports* (ALUCP 1991). The Airport Land Use Compatibility Plan indicates that future noise contours for the Holtville and Salton Sea airports

have not been determined. At the present time, Holtville Airport has no facilities other than its large runway, and its use is limited to irregular operations from military facilities at El Centro and Yuma. The future use of the airport is uncertain (ALUCP 1991). Current airport activity at Salton Sea Airport is negligible. An expansion plan for the airport exists; implementation in the foreseeable future is unlikely (ALUCP 1991).

For any proposed development within the 60 dB CNEL contours, as shown on the maps, there are potential adverse noise impacts. For airports such as Brawley, where an expansion of the area within the 60 dB CNEL contour is predicted, there are potential impacts to existing sensitive receptors within the expansion zone.

Railroad Noise

Two proposed projects could add branch line, drill track, and/or spurs to the existing railway network. A proposed new international border crossing and bi-national industrial area east of Calexico could include a rail line. The route of the rail line could be east-west from Calexico or north-south from Holtville, depending on availability of right-of-way and accompanying land use, environmental and economic considerations. The potential for adverse noise impacts exists along the proposed right of way. There is also a potential for adverse noise impacts along the rights-of-way of existing tracks, if use of the new line generates greater use of the existing lines.

A second proposed project is the Mesquite Landfill, which would require a spur near Glamis, running northeasterly for a distance of four to five miles. This spur would end at the landfill, and be used exclusively for the transportation of solid waste. A preliminary analysis of the impacts indicates an increase of 2 dB CNEL along the main line serving the spur. This increase would not be significant to existing sensitive receptors. The additional traffic would also increase the area within the 60 dB CNEL contour adjacent to the main line. While there is a potential for adverse noise impacts adjacent to the new spur, the very small number of receptors, the distance to receptors, and the small number of projected trips minimize the potential.

Roadway Noise

A new State Highway, SR-7, is planned for south central Imperial County, providing a north-south connection from SR-98 to a planned border crossing and bi-national industrial area east of Calexico. SR-7 may continue north to connect with I-8. A "Brawley Bypass" is also planned to connect SR-111 and SR-78/86 on an alignment north of the city. Improvements are planned to SR-86 which is expected to follow a more westerly alignment from south of Salton City to reconnect with existing SR-86 southwest of Brawley. Improvements to, and addition of non-state roads to the Imperial County roadway system are described in the Circulation and Scenic Highways Element.

Table 11 shows the projected traffic volumes and noise levels for the major roadways in the county. The increases in CNEL and in distance to the 60 CNEL noise contour are shown. The increases in noise levels to existing sensitive receptors along these roadways will be adverse noise impacts. Where traffic volumes more than double, the increases will be greater than 3 dB CNEL, and potential for significant impact exists.

TABLE 11
IMPERIAL COUNTY INTERSTATE
AND STATE HIGHWAY TRAFFIC AND NOISE DATA
FUTURE/YEAR 2015 CONDITIONS

Road/Segment	Traffic Volume (thousands)	Noise				Increases	
		Reference CNEL dB	Distance to ___ dB (feet from centerline)			CNEL dB	Distance to 60 CNEL feet
			70	65	60		
I-8							
w/o Ocotillo	26.1	79	440	1300	2600	3	995
e/o Ocotillo	18.3	78	310	970	2150	3	795
w/o El Centro	29.2	79	445	1310	2625	4	1170
e/o El Centro	50.4	81	705	1790	3230	3	1025
e/o 111	15.9	77	280	870	2020	2	665
w/o 115	12.7	77	240	755	1850	3	695
e/o 115	14.1	78	305	960	2120	3	715
e/o 98	13.9	77	275	865	2010	2	505
w/o 186	21.5	79	425	1255	2560	3	855
e/o 186	37.5	82	735	1840	3290	5	1285
SR-78							
w/o 86	1.6	69	**	114	362	5	227
e/o 111S	6.0	74	130	412	1230	2	455
e/o 115S	3.0	70	55	172	545	3	270
SR-86							
w/o 111	6.0	69	44	137	435	1	120
s/o 8	26.9	76	186	590	1600	5	970
s/o 78E	20.0	76	180	570	1560	2	380
nw/o Brawley	7.7	74	118	372	1145	2	365
s/o 78W	17.6	80	550	1520	2905	5	1525
n/o 78W	9.9	78	310	975	2160	3	755
SR-98							
e/o Ocotillo	6.1	71	59	187	590	6	415
w/o Drew	7.1	72	74	234	740	6	520
w/o 111	26.1	76	209	660	1710	3	760
w/o 8	1.1	66	**	61	193	1	33
SR-111							
s/o 86W	43.0	78	349	1075	2305	2	650
s/o 8	37.8	78	294	920	2095	3	590
n/o 8	16.3	75	168	532	1480	2	500
s/o 78	11.9	74	138	438	1290	2	515

TABLE 11
IMPERIAL COUNTY INTERSTATE
AND STATE HIGHWAY TRAFFIC AND NOISE DATA
FUTURE/YEAR 2015 CONDITIONS

Road/Segment	Traffic Volume (thousands)	Noise				Increases	
		Reference CNEL dB	Distance to ___ dB (feet from centerline)			CNEL dB	Distance to 60 CNEL feet
			70	65	60		
n/o 78	16.3	76	206	655	1685	3	785
s/o 115	17.0	77	246	780	1890	4	910
n/o 115	14.3	76	182	576	1565	4	865
s/o Riv. Cty.	6.7	74	116	369	1130	3	530
SR-115							
n/o 8	3.5	72	81	257	810	5	535
s/o 78	3.7	72	77	243	765	2	205
n/o 78	3.4	75	155	490	1400	4	810
SR-186	4.4	68	**	104	330	3	180

** Indicates contour lies within the right-of-way.
All calculations assume flat, hard terrain with no obstructions; actual conditions may reduce noise significantly.

Industrial and Commercial Noise

New industrial and commercial development in specific plan areas and urban areas may include noise-generating operations with the potential for significant noise impact upon adjacent or nearby sensitive receptors.

Construction Noise

Construction of residential, commercial and industrial facilities and of roads and utilities will generate noise with a potential for significant impact to existing sensitive receptors.

b. Circulation and Scenic Highways Element

The Circulation and Scenic Highways Element provides the input for the roadway portion of the potential Noise Element impacts described above.

The Circulation and Scenic Highways Element includes goals and policies to expand railroad service, implement rail service between the international border crossings in Calexico and the Coachella Valley, and encourage the use of railroad freight service to minimize long haul truck traffic. If implemented, these goals and policies would increase the potential railway noise impact, and could reduce potential roadway noise impact.

c. Land Use Element

The Land Use Element describes eight Specific Plan Areas which propose development with potentials for adverse noise impacts. Each Specific Plan shall be accompanied by an EIR which shall analyze project impacts. The factors in the individual Specific Plans which pose potential for adverse noise impact are as follows:

East Border Crossing. Industrial facilities, a railroad spur, SR-98 and a new major roadway may be developed. Sensitive receptors in the SPA will include residences, motels, recreation areas and commercial facilities.

Mesquite Lake. Heavy industrial uses are planned, though no residential uses are expected, and only limited commercial uses. Potential noise impacts from industrial uses to community facilities within the SPA, and to other sensitive receptors outside the SPA, would need to be analyzed.

Felicity. Sensitive receptors in the SPA would include residences, recreation areas and commercial facilities. Noise sources include existing I-8, the Southern Pacific railway and proposed industrial facilities.

Glamis. Sensitive receptors would be visitor-serving accommodations and services and a limited number of permanent residences. Noise sources include the Southern Pacific railway, SR-78, and off-road vehicles.

Tamarack Canyon Ranch. Sensitive receptors in the SPA would include residences and recreation areas. Noise sources include Forrester Road.

Bravo Ranch. Sensitive receptors in the SPA would include residences, visitor-serving accommodations, and recreation areas. Noise sources include SR-98.

Holtville Air Strip. A regional airport and industrial facilities may be proposed. While no residential receptors would be included, potential noise impacts from aircraft to community facilities within the SPA, and to other sensitive receptors outside the SPA, would need to be analyzed. A regional airport also has the potential to increase traffic noise on roadways leading to the facility.

I-8 and Highway 111. Visitor-serving accommodations and commercial facilities could be adversely impacted by noise from the included major roadways.

d. Agricultural Element

It is a goal and policy of the Agricultural Element to preserve and protect the agricultural lands and economy of Imperial County. Implementation of this Element will maintain the existing and potential noise impacts associated with agriculture. It is also a goal and policy of the

Agricultural Element to enforce the Right To Farm Ordinance, which will tend to minimize the number of new sensitive receptors to agricultural noise.

e. Geothermal and Transmission Element

The Geothermal and Transmission Element encourages the continuing development of geothermal resources. The exploration, construction and operation activities associated with geothermal plants have the potential for adverse noise impacts. To avoid these impacts, the Geothermal and Transmission Element contains development and operation standards which include provisions to ensure that the impacts are mitigated to less than significant.

f. Existing General Plan

The policies in the proposed Noise Element are more protective of the noise environment than those in the existing Noise Element (Noise Plan). The proposed Noise Element deletes detailed specifications for the content of acoustical analysis reports; this is not an adverse impact.

3. Mitigation Measures

The Noise Element of the General Plan Update sets forth noise standards for the County, and contains provisions to analyze potential noise impacts, determine whether noise impacts are significant, and determine if mitigation of potential noise impacts is feasible and adequate. The standards include noise/land use compatibility guidelines, interior noise standards, property line noise standards, construction noise standards, and guidelines for the determination of significant noise level increase.

The Noise Element defines Noise Impact Zones and requires acoustic analysis of discretionary projects proposed within noise impact zones. Analysis is also required for proposed projects which could generate noise in excess of property line noise limits, and for projects which have the potential to result in a significant increase of noise levels to sensitive receptors. The following specific mitigation measures should be taken to ensure that potentially significant noise impacts which could result from the development activities described in the Environmental Impacts section above are reduced to a level less than significant. Where these mitigation measures are specified in the proposed General Plan Update, the Element is indicated.

- Aircraft Noise. Acoustical analysis shall be required of all discretionary projects within the existing or projected 60 dB CNEL contour of any airport, as shown in the Imperial County Airport Land Use Compatibility Plan or an approved airport master plan which supersedes the ALUCP (Noise Element).

- Railroad Noise - new sensitive receptors. Acoustical analysis shall be required of all discretionary projects within 750 feet of the centerline of any railroad or within 1,000 feet of the boundary of any railroad switching yard (Noise Element).

- Railroad Noise - new railroads/expanded service. Acoustical analysis shall be required of all discretionary projects which provide new railroad lines, or which increase the frequency of service or the size of trains on existing lines.

- Roadway Noise - new sensitive receptors. Acoustical analysis shall be required of all discretionary projects within the distances from the centerlines of existing or proposed roadways as shown in Table 12. The roadway classifications are provided in the Circulation and Scenic Highways Element of the General Plan Update (Noise Element).

TABLE 12
ROADWAY NOISE IMPACT ZONES

Roadway Classification	Distance from Centerline - feet
Interstate	1,500
State Highway or Prime Arterial	1,100
Major Arterial	750
Secondary Arterial	450
Collector Street	150

- Roadway Noise - new roadways, expanded roadways, increased traffic volumes on existing roadways. Acoustical analysis shall be required of all discretionary projects which have the potential to result in a significant increase to noise levels to sensitive receptors in the community (Noise Element).

- Roadway Noise - new industrial, commercial and residential development. Acoustical analysis of development projects shall include the investigation of the potential for the project to cause significant noise impact to sensitive receptors along project access roadways.

- Industrial Noise - new projects. The County shall identify and evaluate projects which have the potential to generate noise in excess of the Property Line Noise Limits specified in Table 8 of the Noise Element. An acoustical analysis must be submitted which demonstrates the project's compliance with the Property Line Noise Limits, and/or required mitigation measures to reduce noise to acceptable levels.

- Industrial Noise - existing sources. The County shall enforce the property line noise limits as specified in Table 8 of the Noise Element.

- Agricultural Noise. Acoustical analysis shall be required of all discretionary projects which are proposed within one-quarter mile (1,320 feet) of existing farmland which is in an agricultural zone (Noise Element). Purchasers or owners of property near

agricultural lands or operations or included within an area zoned for agricultural purposes shall be provided with the disclosure statement from the Right to Farm Ordinance (No. 1031).

- Construction Noise. The County shall enforce construction noise standards as specified in the Noise Element. These standards limit the hours of construction and the level of noise emitted by the construction operations.

- Specific Plans. Each Specific Plan shall be accompanied by an EIR which includes an analysis of project impacts; the issues analyzed are determined by the County of Imperial and other Responsible Agencies (Land Use Element). The County of Imperial shall assure that noise impacts are analyzed where appropriate.

- Where mitigation measures require acoustical analyses of discretionary projects, the County shall use the standards and criteria set forth in the Noise Element. Specifically, the Noise/Land Use Compatibility Guidelines and the definition for significant increase of ambient noise levels are noted. The significance criteria are as follows:

  "The increase of noise levels generally results in an adverse impact to the noise environment. The Noise/Land Use Compatibility Guidelines are not intended to allow the increase of ambient noise levels up to the maximum without consideration of feasible noise reduction measures. The following guidelines are established by the County of Imperial for the evaluation of significant noise impact.

  a. If the future noise level after the project is completed will be within the "normally acceptable" noise levels shown in the Noise/Land Use Compatibility Guidelines, but will result in an increase of 5 dB CNEL or greater, the project will have a potentially significant noise impact and mitigation measures must be considered.

  b. If the future noise level after the project is completed will be greater than the "normally acceptable" noise levels shown in the Noise/land Use Compatibility Guidelines, a noise increase of 3 dB CNEL or greater shall be considered a potentially significant noise impact and mitigation measures must be considered."

The Noise Element describes project design strategies to reduce adverse noise impacts. Design strategies include reductions at the source, along the noise path and at the receptor. Most noise reduction measures are taken along the path, and occur through the means of noise barriers, site planning and architectural layout.

E. Biological Resources

This section is compiled from numerous sources including the *California Desert Conservation Area Plan* (BLM 1980); *A Guide to Wildlife Habitats of California* (State Resources Agency 1988); *Natural Diversity Data Base* (CDFG 1990); *The Status of the Flat-Tailed Horned Lizard in California* (CDFG 1989); and communication with resource agency staff from the U.S. Department of the Interior, Bureau of Land Management (BLM) and Fish and Wildlife Service (USFWS), U.S. Department of Agriculture, Soil Conservation Service (SCS), California Department of Fish and Game (CDFG), and California Parks Service (CPS).

1. Existing Conditions

Figure 10 shows the distribution of major vegetation types throughout Imperial County. Appendix D contains a representative species list of native plants and animals in the County, as compiled from the Imperial County Overview Plan (Imperial County Planning Department 1985).

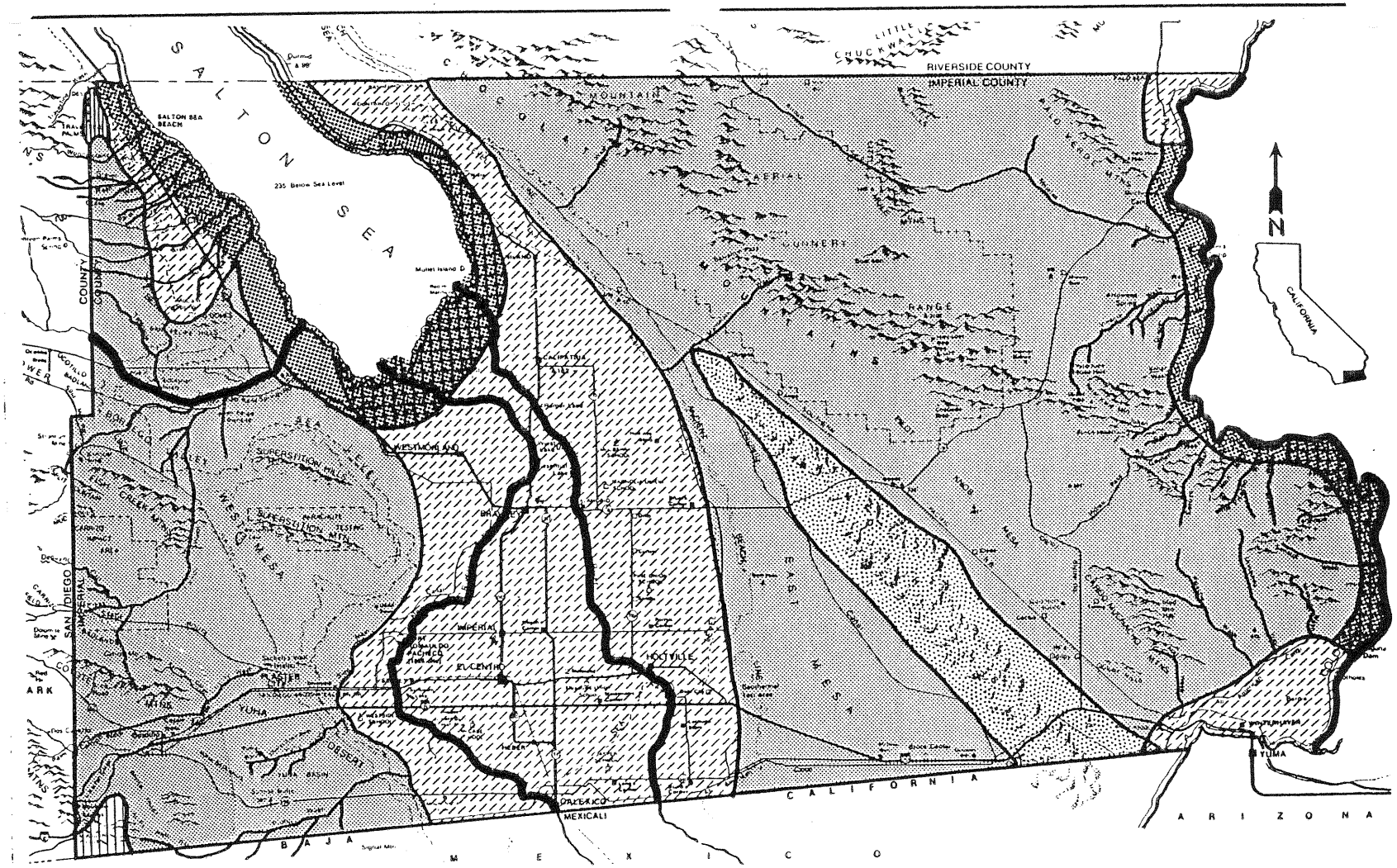
a. Plants and Vegetative Habitats

A broad range of biotic communities have been identified in Imperial County, ranging from those dependent upon the river ecology of the Colorado to the saltbush-alkali scrub habitats. The predominant plant community in the County is cultivated/ruderal, and is associated with agricultural and other human activities. This plant community, which consists of cropland, pasture land and orchards, is most widespread in the Imperial Valley. The Valley floor historically consisted of a creosote scrub plant community, but was replaced by agricultural activity after 1900. The dominant crops now being cultivated in the Valley include lettuce, fruit and nut crops, alfalfa, Sudangrass and other animal feeds, carrots, melons, sugar beets, onions, and wheat and other grains.

Agricultural activities have encouraged the spread of opportunistic plant species including weedy varieties and larger plants, such as salt cedar, most of which are not native to the area. The Valley floor consists largely of non-native and introduced plants, including date palms, a variety of grasses, and ornamental specimen trees and shrubs.

The term "ruderal" refers to the type of vegetation which grows in response to human disturbance: along roadsides, at the borders of cultivated fields, and in canal riparian/levee areas. This generally weedy vegetation can intrude rapidly into moist and periodically disturbed areas, and includes such plants as cheeseweed, shepherds purse, white horse-nettle, saltbush, Russian thistle, Bermuda grass and other opportunistic plants.

The undeveloped portions of the County support limited and much more specialized native plant communities. Where naturally occurring sources of water are available, special and often unique communities thrive. Eleven indigenous plant communities are identified within the County: desert riparian (cottonwood-willow), fresh emergent wetlands (freshwater marsh), alluvial



Desert Scrub/ Succulent Shrub *

Sand Dunes *

Pinyon-Juniper & Mixed Chaparral

Montane Hardwood Conifer

Alkali Desert Scrub

Disturbed (Agriculture/Urban)

Freshwater/Salt Marsh *

Desert Riparian *

Desert Wash

* SENSITIVE HABITATS

0 6 12 miles

N

Imperial County General Plan

Imperial County Habitat Map

Figure 10

washes, palm oases, desert scrub (creosotebush), desert succulent shrub, alkali desert scrub (saltbush), sand dune, mixed chaparral, pinyon-juniper, and montane hardwood-conifer.

Imperial Valley has many waterways that contribute to the distribution, consumption and discharge of water within the County. The Colorado River, which generally runs in a north-south direction, makes up Imperial County's eastern boundary. Extending westerly from the Colorado River, the All-American Canal is just north of the International Border with Mexico. The Alamo and New Rivers cross the All-American Canal, and convey irrigation runoff into the Salton Sea. Branching off of the All-American Canal, the East Highland, Central Main and Westside Main Canals provide fresh water to various agricultural crops via smaller canals and laterals. This system of smaller canals and laterals also assists in the drainage and diversion of excess water into regulating reservoirs and for discharge to the Salton Sea. These waterways support riparian and freshwater marsh habitats. Characteristic wetland plant species associated with these habitats include willows, western cottonwood, mesquite, and velvet ash in the overstory; big-leaf sedge, cattails, baltic rush, bulrushes, quailbush, Mojave seablight, desert lavender, seep willow, red-root nutgrass, saltgrass, and arrowweed in the understory; as well as a variety of weedy species such as ripgutgrass, dallisgrass, mustard, telegraphweed, curly dock, spiny clotbur, western ragweed, white sweetclover, wild lettuce, and doveweed.

Desert wash habitat is characterized by the presence of arborescent, often spiny, shrubs generally associated with intermittent streams (washes) or alluvial deposits adjacent to washes. This habitat occurs throughout the drier portions of the County, outside of the Imperial Valley. Canopy species typically found in washes include paloverde, desert ironwood, smoketree, cat-claw acacia, mesquite, and tamarisk. Plants of the subcanopy include desert broom, desert willow, crucillo, Anderson's wolfberry, and arrowweed. Groundcover species include white brittlebush, desert goldenbush, saltbush, barrel cactus, white bursage, desert lavender, snakeweed, as well as a variety of forbs and grasses.

All natural or naturalized plant assemblages that include California fan palms are recognized as a palm oasis habitat. This habitat exists at localized sites around the Salton Sea basin where the following soil and water requirements are met: moist alkaline soils near seeps, springs and permanent streams. Coyote willow, western cottonwood, California sycamore, velvet ash, mesquite and tamarisk are other tree species associated with palm oasis habitat. Understory species include alkali goldenbush, squaw waterweed and arrowweed. Forbs and grasses include alkali sacaton and wiregrass.

Desert scrub is the most widespread habitat in the California deserts. This habitat is well-developed on valley floors and alluvial deposits adjacent to washes. Creosotebush is generally the dominant plant species in this habitat. Other species include saltbush, indigo bush, desert goldenbush, white brittlebush, burrobush, white bursage, cat-claw acacia, bladderpod, desert agave, barrel and hedgehog cactus, branched pencil and teddybear cholla, Palmer's coldenia, Wiggins croton, desert globemallow, jojoba, little-leaf krameria, ocotillo, beavertail pricklypear, Douglas and rubber rabbitbrush, desert sand verbena, desert senna, squaw waterweed, Anderson's wolfberry, and Mojave yucca. Forbs and grasses include triangle evening primrose, big galletagrass and Spanish-needles.

Desert succulent shrub habitat is generally found on southfacing slopes and rocky soils that are well-drained. These succulent-dominated stands are usually denser than creosotebush, and constituent plants are more evenly spaced. Shrub dominants include ocotillo, Mojave yucca, desert agave, buck-thorn cholla, branched pencil and teddybear cholla, grizzlybear and beavertail pricklypear, barrel and hedgehog cactus, and saguaro. Nonsucculent subshrubs typically comprise the understory.

Alkali scrub habitat can generally be found surrounding the receding shores of large prehistoric lakes, such as the Salton Sea, or alkali playas that mark the locations of dry lake beds. It also occurs along the Colorado River, particularly in areas of old river bed meanders. This habitat is subdivided into a xerophytic phase, which generally consists of species with low salt tolerance, and a holophytic phase, or more salt-tolerant species which exhibit varying degrees of succulence. The diversity of cacti and other succulents is relatively low.

The Algodones Sand Dunes in south-central Imperial County contain many important plant species that have adapted to the extreme arid conditions. Some examples of rare and/or endangered plant species in this area are the Peirson's milk-vetch, Wiggins' croton and Algodones Dunes sunflower. Other sand dune species include yellow spiderwort, desert dicoria, dune primrose, and plicate coldenia.

Mixed chaparral and pinyon-juniper habitats are restricted to a small, overlapping area in the extreme southwestern corner of Imperial County, in the Jacumba Mountains adjacent to the San Diego County line. Generally found on north-facing slopes in southern California, mixed chaparral supports approximately 240 species of woody plants. Characteristic species found on transmontane slopes include shrub live oak, desert ceanothus, desert bitterbrush, bigberry manzanita, chamise, birch-leaf mountain mahogany, California fremontia, and wild lilac. Natural California fan palms are also found in the Jacumba Mountains.

Pinyon-juniper habitat is generally found on east-facing slopes and at higher elevations than mixed chaparral. Characteristic canopy species include single-leaf and Parry's pinyon, western and California juniper, oaks, and Mojave yucca. Subcanopy plants include big sagebrush, blackbrush, narrow-leaf goldenbush, Parry's nolina, curly leaf mountain mahogany, antelope bitterbrush, Parry's rabbitbrush, chamise, and snakeweed. Grasses and forbs associated with this habitat include western wheatgrass, blue grama and Indian ricegrass.

As with the mixed chaparral and pinyon-juniper habitats discussed above, the montane hardwood-conifer forest is restricted to a small area in the extreme northwestern corner of Imperial County, in the Santa Rosa Mountains adjacent to the Riverside County line. Common plant associations for this habitat type found in the Transverse Mountain Range of southern California include Pacific madrone, oaks, ponderosa pine, sugar pine, and incense-cedar.

b. Wildlife

The conditions created by continued expansion of agriculture and the arid desert climate have resulted in an abundance and diversity of wildlife habitats that vary substantially across Imperial

County. Many species occurring in the County are highly localized, in many instances, and are dependent upon the type of vegetative communities available. For example, the Imperial Valley provides a dramatic mix of arid desert and water-oriented habitat areas which support a broad range of native and introduced year-round and migrant animal species. The sizable areas in active cultivation also provide important foraging habitat for numerous birds and small mammals.

The variety and diversity of wildlife species occurring in the County can be characterized as three types: (1) those which tolerate intense human activity in an urban environment; (2) those which are seemingly tolerant of the agricultural activities occurring in the Valley; and (3) those which are quite shy of human activity and avoid areas frequented by people. The first two wildlife types, comprising the common and exploitative species that are not sensitive to human presence or activity, are the most prevalent in the County.

Fish

The Salton Sea is home to at least twelve species of fish which have been introduced either directly by CDFG biologists or indirectly through migration from local irrigation canals. Very few fish can tolerate the high salinity of the Salton Sea. The introduction of several species of marine fish into the Salton Sea in 1950 resulted in the largest inland fishery in California. Some of these introduced saltwater species include orangemouth corvina, sargo, gulf croaker, sailfin molly, longjaw mudsucker, and tilapia. The endangered desert pupfish is a native fish found in the Salton Sea, Whitewater River, San Felipe Creek, Salt Creek, and at least 72% of all agricultural drains at the Sea.

Freshwater fish are found in rivers, canals and some marsh areas. Some of the introduced species include threadfin shad, mosquitofish, red shiner, California killifish, largemouth bass, white and channel catfish. Tilapia is found in both fresh and saltwater. Native freshwater fish species include the endangered Colorado squawfish, bonytail chub and humpback sucker.

Amphibians and Reptiles

Some of the amphibian species found in or near freshwater habitats of Imperial County include the Colorado river toad, couch's spadefoot toad, red-spotted toad, Woodhouse's toad, lowland leopard frog, and bullfrog.

Desert scrub and rocky outcrops throughout the County provide excellent burrowing, foraging, and cover habitat for a variety of reptiles. Typical reptile species include the chuckwalla, Sonoran mud turtle, spiny softshell turtle, barefoot gecko, banded gecko, desert iguana, desert horned lizard, flat-tailed horned lizard, zebra-tailed lizard, long-tailed brush lizard, long-nosed leopard lizard, Colorado Desert fringe-toed lizard, collared lizard, side-blotched lizard, desert spiny lizard, western whiptail lizard, western diamondback rattlesnake, sidewinder, red racer, common kingsnake, gopher snake, checkered garter snake, western blind snake, western patch-nosed snake, western ground snake, desert glossy snake, long-nosed snake, rosy boa, leaf-nosed snake, shovel-nosed snake, speckled rattlesnake, and desert tortoise.

Birds

Imperial County is located along one of the most important flyway corridors in the Western Hemisphere for migrant waterfowl, shorebirds and songbirds. Generally, the greatest numbers and diversity of birds are found during the spring and fall months. The variety and diversity of bird species is greater than for most animals, undoubtedly due to their high degree of mobility and broad foraging habits. Approximately 378 species of birds have been identified in Imperial County, as compared to only 41 species of mammals and 31 species of reptiles and amphibians. The food potential of cultivated areas is a contributor to the broad range of bird species frequenting the County, although agricultural monocultures generally produce a low diversity of wildlife species. Some of the species associated with these agricultural areas include waterfowl, gulls, herons, cranes, ibises, egrets, doves, Gambel's quail, sparrows, finches, and juncos. Raptors include the northern harrier, red-tailed hawk, kestrel, and burrowing owl. Flocks of ring-billed gulls, red-winged black birds, and cattle egrets will frequent area agricultural fields after recent harvests or plowing.

The presence of the Salton Sea, as well as rivers, canals, drainage ditches and fish farms, offer attractive food sources, nesting and resting sites for many bird species. A list of bird species observed in and around the Salton Sea area, which includes 279 species and 96 accidental occurrences, has been compiled from various publications by the CDFG. This checklist is in accordance with the 6th edition (1983) of the *American Ornithologists' Union Checklist of North American Birds*, and can be obtained by writing to the CDFG Imperial Wildlife Area (Wister Unit). The importance of the relatively rare desert riparian systems, freshwater marshes, palm oases, and alluvial washes in supporting wildlife populations cannot be overstated. These habitats support more bird species at greater densities than other desert habitats.

The diversity of resident bird species is relatively low in desert scrub habitats, although the black-throated sparrow is common in these habitats. The restricted areas of mixed chaparral, pinyon-juniper and montane hardwood-conifer habitats found along the western San Diego/Imperial County boundary offer valuable food sources, cover, nesting, roosting and foraging opportunities for many bird species.

Mammals

Most indigenous medium and large-sized mammals, such as foxes, coyotes and badgers, have disappeared from the Valley floor, but can still be found in relatively undisturbed areas near sources of water. Coyotes are often found around orchards, where they feed on fruit and small mammals. Smaller mammals have adapted better to the intense human activities within the Imperial Valley agricultural areas, especially small rodent species capable of exploiting marginal habitats along canals, agricultural drains, roadsides, and around buildings. Some of these rodents include the western harvest mouse, house mouse, Norway and black rat, valley pocket gopher, and muskrat. The striped and spotted skunk are also common in the Imperial Valley agricultural areas. Raccoons are strongly associated with water, and may also be attracted to the Valley floor due to the presence of agricultural canals. Desert cottontail rabbit is likely to feed on various non-native grasses and small plants within the Valley. Finally, many species

of bats, some residents to the area and others migrants, are found in all areas of Imperial County due, in part, to agricultural canals which provide abundant insects and reliable water sources. It is also true that agriculture pesticides have greatly led to the demise of bat populations in the U.S.

Characteristic mammalian species found in native desert scrub habitats surrounding the Imperial Valley and Salton Sea include cactus and deer mouse, desert and spiny pocket mouse, little and long-tailed pocket mouse, desert and Merriam kangaroo rat, desert and whitethroated woodrat, Arizona and hispid cottonrat, white-tailed antelope and roundtail ground squirrel, blacktail jackrabbit, desert cottontail, desert shrew, desert kit and gray fox, coyote, badger, bobcat, mountain lion, wild burro, mule deer, and peninsular and Nelson's bighorn sheep.

c. Sensitive Species and Habitats

Figures 11a, 11b, and 11c shows the locations of sensitive plants and unusual plant assemblages, and the extent of sensitive wildlife areas and habitats within Imperial County. Table 13 lists the 28 sensitive plant species known to occur within Imperial County, based on the *California Desert Conservation Area Plan* (BLM 1980), *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 1988), and Imperial County Overview Plan (Imperial County Planning Department 1985). Table 14 lists the sensitive animal species found in Imperial County, based on the Natural Diversity Data Base (CDFG 1990) and Imperial County Overview Plan (Imperial County Planning Department 1985). These tables present a brief overview of the habitat preferences for the sensitive species discussed below, as well as locations within Imperial County where they can be found.

Plants

Sensitive plant species are determined by their rarity, endangerment and limited distribution. There are three listing authorities for sensitive plants in California: the California Native Plant Society (CNPS), a private organization; the CDFG; and the USFWS. Of the 24 sensitive plant species listed on Table 13, the following three are officially listed as "Rare", "Threatened" or "Endangered" by either the USFWS or CDFG: Peirson's milk-vetch, Wiggins' croton and Algodones Dunes sunflower.

None of the sensitive plant species listed on Table 13 are designated by the USFWS as candidates for inclusion on the "Endangered" species list. The remaining 21 plants are considered "Rare, Threatened or Endangered" by the CNPS, or are placed on a "Watch List" by the USFWS and/or CNPS. These include sand-food, parched milk-vetch, California ayenia, elephant tree, fairyduster, saguaro, Las Animas colubrina, foxtail cactus, Parish's larkspur, low bush monkeyflower, flat-seeded spurge, crucifixion thorns, Baja California ipomopsis, crown-of-thorns, Mountain Springs bush lupine, Munz's cholla, Wiggins' cholla, giant Spanish-needle, Thurber's sandpaper-plant, Orocopia sage, and Orcutt's woody aster.

Figure 11a

Sensitive Plants

- Pierson's Milk-Vetch
- Munz's Cactus
- Sand Food
- Orcutt's Aster
- Orocopia Sage
- (1) Algodones Dunes Sunflower
- (2) Wiggins' Croton
- (3) Wiggins' Cholla
- (4) Mountain Springs Bush Lupine

Figure 11b

Sensitive Wildlife Areas

- Desert Bighorn Sheep
- Golden Eagle
- Potential Desert Tortoise Habitat
- Large Areas of Sensitive Animal Species
- (A) Andrew's Dune Scarab Beetle
- (C) California Black Rail
- (M) Barefoot Banded Gecko
- (Y) Yuma Clapper Rail
- (P) Desert Pupfish
- (B) Brown Pelican, Aleutain Canada Goose, Bald Eagle, Osprey, Peregrine Falcon
- (S) Sandhill Crane
- Probable Wildlife Corridors
- Known Wildlife Corridors

Flat-tailed Horned Lizard
(See Figure 13 for Current Range)

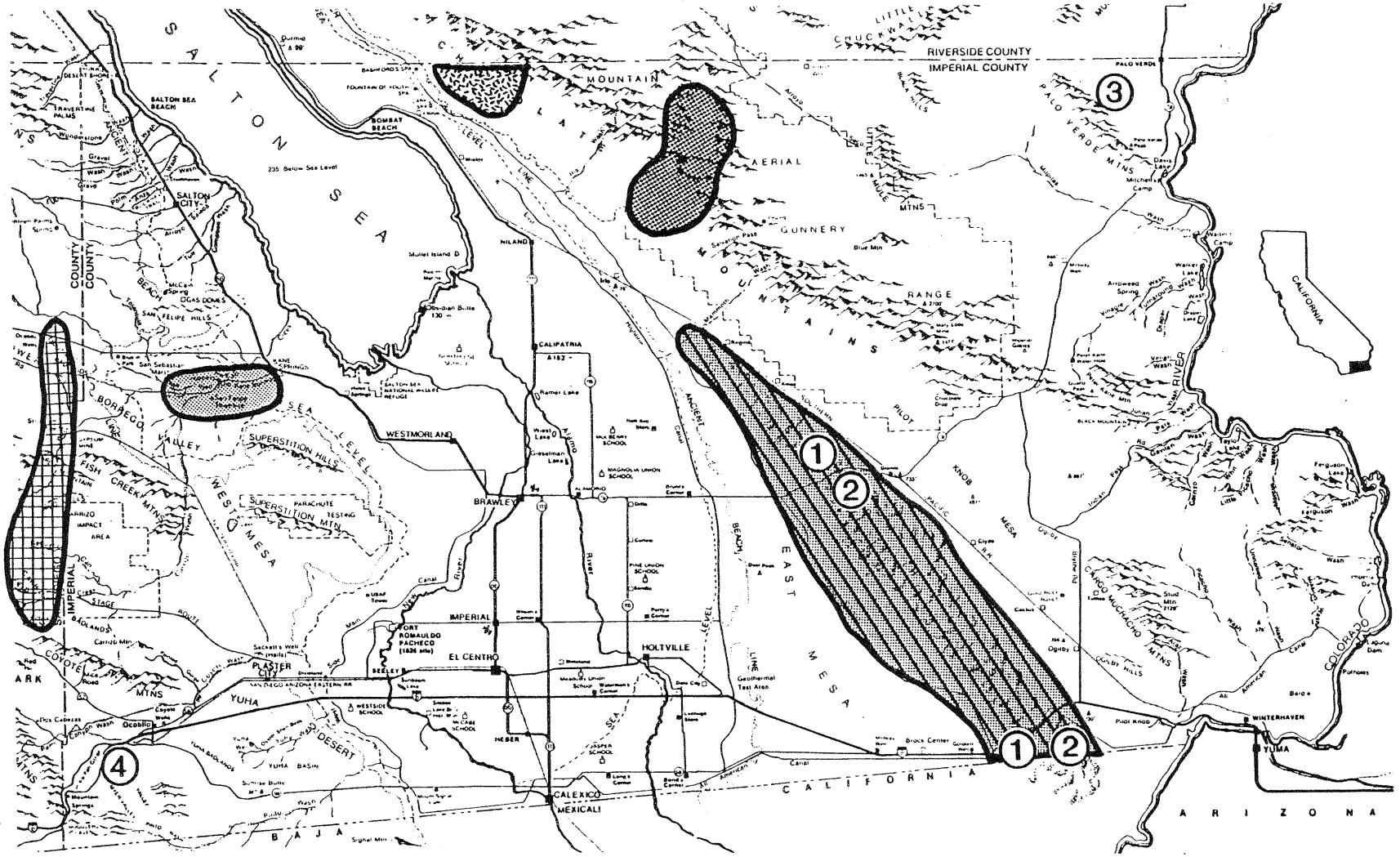
Figure 11c

Unusual Plant Assemblages

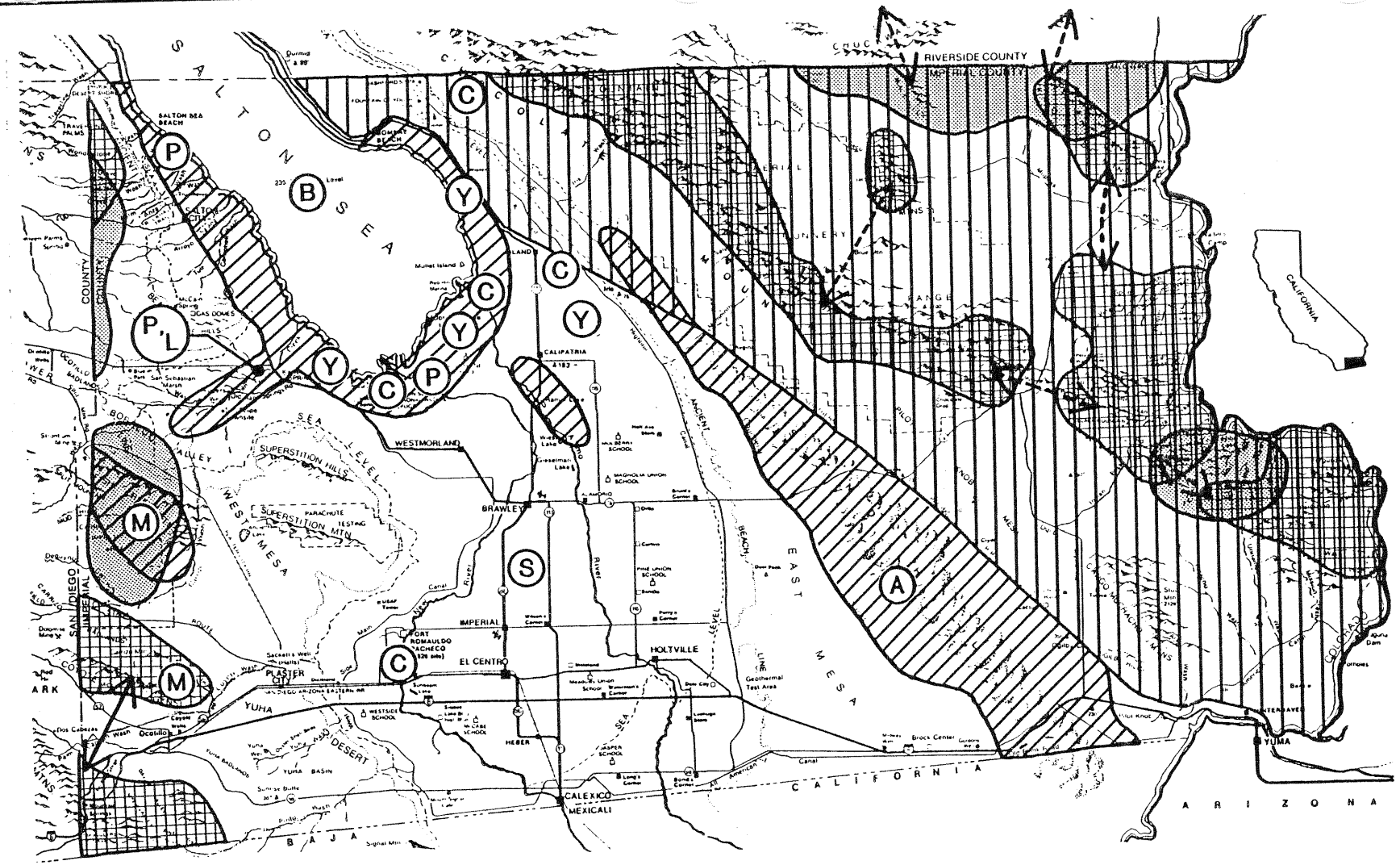
- Mountain Springs Grade Blackbrush
- Smugglers Cave Chaparral
- Chocolate Mountains Munz Cholla
- Yuha Desert Crucifixion Thorn
- Mesquite Hummocks*
- Davies Valley Succulent Scrub
- Imperial Sand Dunes
- Picacho Peak/Chocolate Mountians All-Thorn

* (any Mesquite Hummock in the County is considered a UPA)

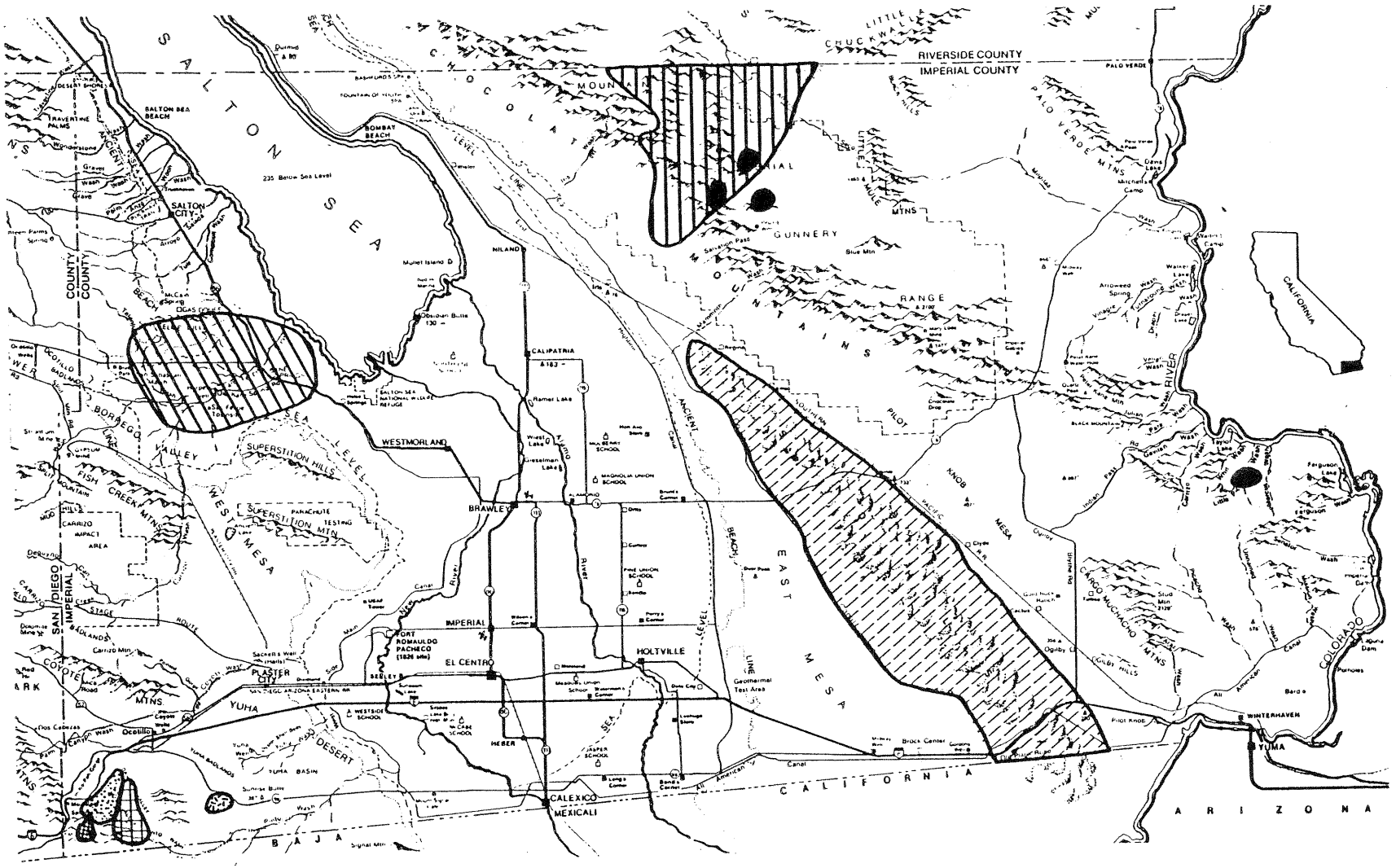
Imperial County General Plan	Sensitive Plants, Wildlife Areas and Unusual Plant Assemblages	Figure 11 LEGEND



Imperial County General Plan	Sensitive Plants	Figure 11a



Imperial County General Plan	Sensitive Wildlife Areas	Figure 11b



Imperial County General Plan	Unusual Plant Assemblages	Figure 11c

TABLE 13
SENSITIVE PLANT SPECIES KNOWN OR EXPECTED TO OCCUR WITHIN IMPERIAL COUNTY

Species	Status and Authority	Habitat Preference	Locale
sand food *Pholisma sonorae*	Federal - category 3c CNPS - list 1B	Desert dunes	Algodones Sand Dunes, East Mesa (between Imperial Valley and Coachella Canal)
parched milk-vetch *Astragalus aridus*	Local-rare	Desert dunes	Algodones Sand Dunes, Salton Sea area, lower Colorado River, Palo Verde Mountain
Peirson's milk-vetch *Astragalus magdalenae* var. *peirsonii*	State - endangered Federal - category 2[1] CNPS - list 1B	Desert dunes	Algodones Sand Dunes, Sand Hills Impact Range (near Grays Well), Kane Spring (near San Felipe Creek), Salton Sea (near Highway 78/99 junction), Tortuga, Grays Well off Highway 80
California ayenia *Ayenia compacta*	CNPS - list 2	Riparian scrub	
elephant tree *Bursera microphylla*	CNPS - list 2	Sonoran desert scrub	In-Ko-Pah Gorge off I-8
fairyduster *Calliandra eriophylla*	CNPS - list 2	Sonoran desert scrub	Cargo Muchacho Mountains, Picacho Peak
saguaro *arnegiea gigantea*	CNPS - list 2	Sonoran desert scrub	Imperial Reservoir, Palo Verde Mountain
Las Animas colubrina *Colubrina californica*	Federal - category 3c CNPS - list 4	Mohavean desert scrub	Chocolate Mountains, Gavilan Wash (near Indian Pass)
foxtail cactus *Coryphantha alversonii*	Federal - category 2 CNPS - list 1B	Sonoran desert scrub	
Wiggins' croton *Croton wigginsii*	State - rare Federal - category 3c CNPS - list 2	Desert dunes, Sonoran desert scrub	Algodones Sand Dunes, Sidewinder Dunes, Sand Hills Impact Range, Pilot Knob Mesa, Clyde, Ogilby, Grays Well off Highway 80
Parish's larkspur *Delphinium parishii* ssp. *subglobosum*	CNPS - list 4	Chaparral, pinyon/ juniper woodland	Mountain Springs Grade near Imperial/San Diego County line
low bush monkeyflower *Diplacus aridus*	Federal - category 2 CNPS - list 4	Chaparral	
flat-seeded spurge *Euphorbia platyspermum*	Federal - category 2 CNPS - list 3	Desert dunes	
Algodones Dunes sunflower *Helianthus niveus* ssp. *tephrodes*	State - endangered Federal - category 2 CNPS - list 1B	Desert dunes	Algodones Sand Dunes, Sand Hills Impact Range, Clyde, Grays Well off Highway 80
crucifixion thorns *Holocantha emoryi*	CNPS - list 2	Sonoran desert scrub	Yuha Desert (near International Border), Coyote Wells off Highway 98
Baja California ipomopsis *Ipomopsis effusa*	CNPS - list 2	Alluvial fans, Sonoran desert scrub	Yuha Desert

TABLE 13
SENSITIVE PLANT SPECIES KNOWN OR EXPECTED TO OCCUR WITHIN IMPERIAL COUNTY

Species	Status and Authority	Habitat Preference	Locale
crown-of-thorns *Koeberlinia spinosa*	CNPS - list 2	Sonoran desert scrub	Chocolate Mountains, Picacho Peak
Mountain Springs bush lupine *Lupinus excubitus* var. *medius*	Federal - category 2 CNPS - list 1B	Sonoran desert scrub, pinyon/juniper woodland	Jacumba Mountains, In-Ko-Pah Gorge, Myer Valley, Yuha Desert, Mountain Springs Grade, Smugglers Cave Road off Highway 80
Munz's cholla *Opuntia munzii*	Federal - category 2 CNPS - list 1B	Sonoran desert scrub	Chocolate Mountains
Wiggins' cholla *Opuntia wigginsii*	Federal - category 2 CNPS - list 1B	Sonoran desert scrub	Palo Verde Mountains, northeast corner of Imperial/Riverside County line, San Felipe Creek (near Harper's Well)
giant Spanish-needle *Palafoxia arida* var. *gigantea*	Federal - category 2 CNPS - list 1B	Sonoran desert scrub	Algodones Sand Dunes, Pilot Knob Mesa, Ogilby Hills, Brawley, Winterhaven, Hedges, Grays Well off Highway 80
Thurber's sandpaperplant *Pilostyles thurberi*	Federal - category 3c CNPS - list 4	Sonoran desert scrub	San Felipe Creek (near Salton Sea), Yuha Desert (Pinto Wash), Superstition Mountains, Superstition Hills, Kane Spring off Highway 86, Tule Wash (near Imperial/San Diego County line), Tarantula Wash off Highway 78, Ocotillo Wells, Plaster City off Highway 80
Orocopia sage *Salvia greatae*	Federal - category 2 CNPS - list 1B	Sonoran desert scrub	Eastern edge of Salton Sea (south of Riverside County line), Orocopia Canyon in Chocolate Mountains
Orcutt's woody aster *Xylorhiza orcuttii*	CNPS - list 1B	Badlands, sparse desert scrub; gypsum soils, shales	Anza Borrego Desert State Park (Carrizo Impact Area), Imperial/San Diego County line (between Arroyo Salada and Tule Wash), San Felipe Creek, Palo Verde Wash, Red Rock Canyon, Ocotillo Wells

[1] This species is currently proposed for federal listing under the Endangered Species Act of 1973, as amended; therefore, its status may be changed to "Endangered" or "Threatened" prior to final approval of the Imperial County General Plan Update.

Sources: BLM 1980
CNPS 1988
Dice 1992
Imperial County Planning Department 1985
McLaughlin et al. 1987

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
bonytail chub *Gila elegans*	State - endangered Federal - endangered	Possibly extirpated	Freshwater springs, streams, rivers, agricultural drains, irrigation channels, ponds, lakes, reservoirs	Lower Colorado River
Colorado squawfish *Ptychocheilus lucius*	State - endangered Federal - endangered	Possibly extirpated	Freshwater springs, streams, rivers, agricultural drains, irrigation channels, ponds, lakes, reservoirs	Lower Colorado River
humpback (or razorback) sucker *Xyrauchen texanus*	State - endangered Federal - endangered	Extremely rare; adults may still persist in a few backwater areas	Freshwater springs, streams, rivers, agricultural drains, irrigation channels, ponds, lakes, reservoirs	Senator Wash, lower Colorado River
desert pupfish *Cyprinodon macularius*	State - endangered Federal - endangered	Stable; present in at least 57% of agricultural drains	Shoreline pools of Salton Sea, slow-moving streams with sand-silt substrate, refugium ponds, shallow waters, agricultural drains; abundant algae	San Felipe Creek, Salton Sea National Wildlife Refuge, various irrigation drains and shoreline pools around the Salton Sea
Colorado River toad *Bufo alvarius*	State - special concern	Declining	Springs, streams, reservoirs; ranging from arid mesquite-creosote bush lowlands to oak-sycamore mountain canyons	Lower Colorado River
couch's spadefoot toad *Scaphiopus couchii*	State - special concern	Unknown	Streams, temporary pools, lakes, reservoirs, marshes	Eastern edge of Algodones Sand Dunes
lowland leopard frog *Rana yavapaensis*	State - special concern	Very rare; possibly extirpated from San Felipe Creek	Desert streams and pools; may occur in agricultural drains throughout Imperial Valley	San Felipe Creek
Sonoran mud turtle *Kinosternan sonoriense*	State - special concern	Extremely rare	Streams, backwaters of Colorado River	Lower Colorado River (old records), near Palo Verde and Yuma Indian Reservation
desert tortoise *Gopherus agassizi*	State - threatened Federal - threatened	Fairly common, but declining in northeastern portion of County; extremely rare in remaining eastern Imperial County	Desert oases, riverbanks, washes, dunes; creosote scrub	Eastern Imperial County

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
Barrow's goldeneye *Bucephala islandica*	State - special concern	Accidental occurrence in winter	Mudflats, marshes, open water	Salton Sea
Cooper's hawk *Accipiter cooperi*	State - special concern Blue list	Uncommon migrant and visitor in winter	Woodlands, parks, residential areas; formerly bred along Colorado River	Salton Sea National Wildlife Refuge (Headquarters), Imperial Wildlife Area (Wister Unit)
Swainson's hawk *Buteo swainsoni*	State - threatened Federal - sensitive Blue list - special concern	Uncommon migrant in spring and fall, rare non-breeding resident in summer	Soars all over; nests in scattered trees or ranchyard groves near desert grasslands or agricultural areas	Borrego Valley, Brock Ranch, Bard
Harris' hawk *Parabuteo unicinctus*	State - special concern	Formerly localized resident at south end of Salton Sea and fairly common resident along Colorado River; now extirpated from the region due to destruction of riparian forests along Colorado River and illegal possession for falconry	Mesquite bosques and adjacent cottonwood galleries	No credible reports of wild birds since the mid-1960s
ferruginous hawk *Buteo regalis*	State - special concern Federal - category 2	Rare to uncommon migrant	Grasslands, open fields, agricultural areas	Imperial Valley agricultural fields
sharp-shinned hawk *Accipiter striatus*	State - special concern Blue list	Fairly common visitor in winter, common localized migrant in fall	Open deciduous woodlands, mixed or conifer forests, thickets, edges	All areas of Imperial County
northern goshawk *Accipiter gentilis*	State - special concern Federal - category 2	Accidental occurrence	Agricultural fields	Imperial Valley agricultural fields
northern harrier *Circus cyaneus*	State - special concern Blue list	Fairly common localized visitor in winter, common migrant in spring, summer and fall	Open grasslands and desert, brushlands, freshwater marshes, agricultural fields; nests in protected marshes or open grassy meadows	South end of Salton Sea National Wildlife Refuge, Imperial Wildlife Area (Wister Unit), lower Colorado River, Imperial Valley agricultural fields
black-shouldered kite *Elanus caeruleus*	State - fully protected	Occasional non-breeding visitor in spring and summer; has bred in the County in the past; suffered serious decline earlier this century	Grasslands, river valleys, marshes, open groves; nests in groves bordering grasslands or open fields	Salton Sea National Wildlife Refuge (Unit 1), Imperial Wildlife Area (Wister Unit)

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
bald eagle *Haliaeetus leucocephalus*	State - endangered Federal - endangered	Localized visitor in winter, casual migrant in summer; wintering sites are deep inland lakes and reservoirs	Forages in and near lakes; roosts in trees	Salton Sea shoreline, lower Colorado River
golden eagle *Aquila chrysaetos*	State - special concern	Casual visitor in winter along Colorado River; uncommon resident throughout the year elsewhere	Grasslands, broken chaparral or sage scrub; soars all over; nests in rugged mountains	Anza-Borrego Desert State Park
prairie falcon *falco mexicanus*	State - special concern	Uncommon; most often observed soaring over agricultural fields in Imperial Valley or perched on utility poles	Open desert scrub and grasslands, agricultural areas; nests in cliffs or rocky outcroppings	Imperial Valley agricultural fields
American peregrine falcon *Falco peregrinus anatum*	State - endangered Federal - endangered	Rare migrant and non-breeding visitor in summer at Salton Sea; rare migrant and casual visitor throughout the year elsewhere	Oases, mud flats, shores, or ponds with other water birds; nests in cliff faces near coastal estuaries	Salton Sea shoreline, New River delta, Morton Bay
osprey *Pandion haliaetus*	State - special concern Blue list - local concern	Uncommon to rare migrant throughout the year	Large inland lakes in foothills and mountain areas	Salton Sea, lower Colorado River
merlin *Falco columbarius*	State - special concern	Rare migrant in fall and winter	Most often seen soaring over agricultural areas in Imperial Valley	Imperial Valley agricultural fields
California black rail *Laterallus jamaicensis coturniculus*	State - threatened Federal - category 1	Uncommon to rare localized resident in summer; fairly common resident at Imperial Dam in spring and summer	Freshwater bulrush marshes	Salton Sea National Wildlife Refuge, Finney Lake, Seeley, Niland, Salt Creek, Imperial Dam, Carrizo Marsh in Anza-Borrego Desert State Park
Yuma clapper rail *Rallus longirostris yumanensis*	State - threatened Federal - endangered	Fairly common resident in summer, uncommon resident in winter at Salton Sea; fairly common to common resident in summer, rare in winter along Colorado River	Ephemeral freshwater marshes consisting of pure cattails and rushes to marginal stands of cane and flooded salt cedar	Salton Sea and Imperial National Wildlife Refuges, Imperial Wildlife Area (Wister Unit), New and Alamo Rivers, Whitewater River, Salt Creek, any freshwater marshes in Imperial Valley
greater sandhill crane *Grus canadensis tabida*	State - threatened Federal - sensitive	Common visitor in winter	Grasslands and agricultural fields	Between Brawley and El Centro, Cibola National Wildlife Refuge, lower Colorado River

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
willow flycatcher *Empidonax traillii extimus*	State - endangered Federal - category 1 Blue list - special concern	Fairly common to common migrant throughout the year; very rare resident in summer	Among any trees or large scrubs; nests in willow thickets in riparian woodland	Lower Colorado River
vermilion flycatcher *Pyrocephalus rubinus*	State - special concern	Rare visitor in fall and winter; rare and localized resident along Colorado River	Breeds near water in riparian groves and mesquite bordering irrigated fields	Imperial Wildlife Area (Wister Unit), Lower Colorado River
brown-crested flycatcher *Myiarchus tyrannulus*	State - special concern	Accidental occurrence		
purple martin *Progne subis*	State - special concern Federal - sensitive Blue list - special concern	Rare migrant in spring and fall; more common at Salton Sea	Breeds in coniferous woodlands	South end of Salton Sea National Wildlife Refuge
bank swallow *Riparia riparia*	State - threatened	Fairly common migrant in spring and fall, casual visitor in winter; occasional breeding resident in spring and fall, non-breeding migrant in summer at Salton Sea	Steep riverbanks and gravel pits	Salton Sea National Wildlife Refuge, Imperial Dam
Bendire's thrasher *Toxostoma bendirei*	State - special concern	Accidental occurrence in fall and winter	Desert brush	Anza-Borrego Desert State Park, eastern Imperial County
Crissal thrasher *Toxostoma dorsale*	State - special concern	Rare breeding migrant in spring and summer at Salton Sea; visitor in all other native areas elsewhere in the County	Densely vegetated canyons	Anza-Borrego Desert State Park, eastern Imperial County
Le Conte's thrasher *Toxostoma lecontei*	State - special concern	Accidental occurrence	Saltbush and open cactus deserts	Anza-Borrego Desert State Park, eastern Imperial County
black-tailed gnatcatcher *Polioptila melanura*	State - special concern Federal - category 2 Blue list - local concern	Common resident throughout the year	Desert wash scrub throughout Anza-Borrego desert; mesquite, creosote	Imperial Wildlife Area (Wister Unit), Salton Sea National Wildlife Refuge (Headquarters), Anza-Borrego Desert State Park, eastern Imperial County
Arizona Bell's vireo *vireo bellii arizonae*	State - endangered	Accidental occurrence	Riparian woodlands	Eastern Imperial County

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
least Bell's vireo *Vireo bellii pusillus*	State - endangered Federal - endangered	Uncommon and very localized resident in summer; rare migrant and visitor in winter	Diverse riparian woodlands	Anza-Borrego Desert State Park
tricolored blackbird *Agelaius tricolor*	Federal - category 2[1]	Accidental occurrence	Freshwater marshes, cattails, tules, willows, mulefat; forages in agricultural areas, lakeshores, damp lawns	Imperial Valley agricultural fields
northern cardinal *Cardinalis cardinalis superba*	State - special concern	Accidental occurrence	Hedgerows, wooded margins, desert washes, residential areas	Lower Colorado River
yellow warbler *Dendroica petechia brewsteri*	State - special concern	Fairly common migrant in spring, uncommon localized resident in summer, fairly common to common migrant in fall, rare visitor in winter	Breeds in riparian woodlands, esp. broad leaf trees	Lower Colorado River, Imperial National Wildlife Refuge
Virgina's warbler *Vermivora virginiae*	State - special concern	Accidental to occasional migrant in spring and fall	Mesquite thickets or brushy areas, riparian woodlands, tree rows	Lower Colorado River, Imperial National Wildlife Refuge
yellow-breasted chat *Icteria virens*	State - special concern	Uncommon to occasional migrant	Riparian woodlands	Lower Colorado River
summer tanager *Piranga rubra*	State - special concern	Accidental occurrence	Residential areas with larger trees	Imperial Valley
mountain plover *Charadrius montanus*	State - special concern Federal - category 2	Common to very common localized visitor in winter; reduction of grasslands is main cause for decline	Newly disked or burnt agricultural fields	Imperial Valley agricultural fields
western snowy plover *Charadrius alexandrinus nivosus*	State - special concern Federal - category 2 Blue list - special concern	Rare to uncommon breeding resident in spring	Shorelines, shallow water areas, flooded agricultural fields	Salton Sea shoreline (Unit 1), barnacle bars
long-billed curlew *Numenius americanus*	State - special concern Federal - category 2	Common migrant and visitor in winter, uncommon and local visitor in summer	Freshwater ponds, mudflats, salt marshes, irrigated agricultural fields	Imperial Valley agricultural fields and freshwater ponds
laughing gull *Larus atricilla*	State - special concern	Non-breeding visitor in summer and fall	Open water, shorelines, mudflats; formerly nested in the County, but no recent breeding recorded	Salton Sea shoreline

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
California gull *Larus californicus*	State - special concern	Common migrant in spring and fall	Open water, freshwater ponds, lakes, shorelines, mudflats, agricultural fields, garbage dumps	Salton Sea shoreline
gull-billed tern *Sterna nilotica*	State - special concern	Uncommon breeding resident in spring and summer	Shorelines; Salton Sea is only inland-occurring nesting colonies in western U.S.	Salton Sea shoreline near Red Hill, Mullet Island, and near Barth Road
California least tern *Sterna antillarum browni*	State - endangered Federal - endangered	Populations currently suffering serious declines	Shorelines; nests along the coast	Salton Sea shoreline
elegant tern *Sterna elegans*	State - special concern Federal - category 2	Accidental occurrence	Mudflats, shorelines	Salton Sea shoreline
black skimmer *Rynchops niger*	State - special concern	Uncommon breeding resident in spring and summer	Dikes, mudflats; Salton Sea is only inland-occurring nesting colonies in western U.S.	Salton Sea shoreline near Red Hill, Mullet Island, and near Barth Road
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	State - endangered Federal - sensitive	Accidental occurrence	Riparian corridors, cottonwood-willow habitat	Lower Colorado River
short-eared owl *Asio flammeus*	State - special concern Blue list	Rare to uncommon localized migrant in winter	Salt marshes, open grasslands, agricultural areas	Imperial Valley agricultural fields
long-eared owl *Asio otus*	State - special concern	Rare localized resident and visitor in winter	Wooded areas near open country	Anza-Borrego Desert State Park (Tamarisk Grove campground)
burrowing owl *Athene cunicularia*	State - special concern Blue list - special concern	Common resident throughout the year; Western Breeding Bird Surveys show localized declines	Grasslands, agricultural areas	Imperial Valley agricultural fields and drains
elf owl *Micrathene whitneyi*	State - endangered	Accidental occurrence	Native desert areas	Lower Colorado River
black swift *Cypseloides niger*	State - special concern	Accidental occurrence	Soaring over ponds	All areas of Imperial County
gila woodpecker *Melanerpes uropygialis*	State - endangered	Rare resident throughout the year	Trees	Brawley, Cattle Call Park
California leaf-nosed bat *Macrotus californicus*	State - special concern Federal - category 2	Uncommon localized breeding migrant throughout the year; declining due to habitat loss	Caves and mine shafts during the day; occasionally found in buildings at night; forages in washes	All areas of Imperial County; most common in mountains of eastern Imperial County

TABLE 14
SENSITIVE ANIMAL SPECIES IN IMPERIAL COUNTY

Species	Status & Authority	Status In Imperial County	Habitat Preference	Locale
pallid bat *Antrozous pallidus*	State - special concern	Uncommon migrant throughout the year; declining due to habitat loss	Caves, mines, cliff crevices, buildings; roosts in trees	All areas of Imperial County
spotted bat *Euderma maculatum*	State - special concern Federal - category 2	Rare migrant throughout the year	Dry desert areas, rocks crevices; occasionally found in buildings or caves	All areas of Imperial County
Townsend's western big-eared bat *Plecotus townsendii townsendii*	State - special concern Federal - category 2	Uncommon migrant throughout the year	Caves, mine shafts; roosts in buildings	All areas of Imperial County
California mastiff bat *Eumops perotis californicus*	State - special concern Federal - category 2	Rare migrant throughout the year	Cliff crevices, trees, on or in buildings	Western Imperial County
American badger *Taxidea taxus*	State - special concern and harvest species	Uncommon throughout the County	Open grasslands, desert scrub, unpopulated areas	Native habitats of Imperial County
Yuma mountain lion *Felis concolor browni*	State - special concern Federal - category 2	Uncommon in mountains of eastern and western Imperial County	Rugged mountains, associated valleys, desert areas	Lower Colorado River; eastern Imperial County
Peninsular bighorn sheep *Ovis canadensis cremnobates*	State - threatened Federal - sensitive; proposed for listing	Uncommon in western Imperial County	Rugged mountains, desert areas	Peninsular Range, Anza-Borrego Desert State Park, Jacumba and Sawtooth Mountains, Carrizo Gorge area, Imperial National Wildlife Refuge
Nelson's bighorn sheep *Ovis canadensis nelsoni*	State - fully protected and harvest species Federal - sensitive	Common along lower Colorado River	Rugged mountains, desert areas	Chocolate Mountains, Imperial National Wildlife Refuge, eastern Imperial County along lower Colorado River

[1] The species is currently proposed for federal listing under the Endangered Species Act of 1973, as amended; therefore, its status may be changed to "Endangered" or "Threatened" prior to final approval of the Imperial County General Plan Update.

Sources: CDFG 1990; Garrett and Dunn 1981; Nicol 1992; Peterson 1990; Radke 1992; Smith and Brodie 1982; Stebbins 1966; Watkins 1992

Fish

All four native fish species occurring within Imperial County are listed as "Endangered" by the CDFG and USFWS. As mentioned, the desert pupfish occurs within the Salton Sea, San Felipe Creek, Whitewater River, Salt Creek, and at least 72% of all agricultural drains feeding the sea.

The desert pupfish was formerly common in sloughs and backwaters of the Gila River in Arizona, and the lower Colorado River in the United States and Mexico, and in shoreline pools and irrigation drains of the Salton Sea in Imperial County. In spite of its high reproductive rate and remarkable tolerance for environmental extremes, this species has undergone a serious decline in numbers since the late 1800s. Fish have disappeared in association with human and agricultural activities such as vegetation removal, soil compaction, diversions of water, groundwater pumping, and pesticides; indirect effects from human activities resulting in changes in stream flows, temperature regimes, silt loads, and salinity levels; chemical spills from oil and gas development; encroachment of non-native vegetation such as aquatic weeds, cattails, bulrushes, and tamarisk; lethal pathogens, diseases and toxins such as fungus infections, tail rot, and parasites; and introduced fishes, through predation, aggression, hybridization, and various behavioral activities that interfere with pupfish reproduction. The latter is responsible for the most rapid decline in recent years, driving the pupfish population to the brink of extinction.

On March 31, 1986, a final rule was published in the *Federal Register* listing the desert pupfish as an endangered species. Designated critical habitat at San Sebastian Marsh and San Felipe Creek in Imperial County protects populations of desert pupfish which are generally increasing throughout the Salton Sea ecosystem. Detailed information on this species' life history, habitat requirements, historical and present distribution, current status, and factors leading to its continued demise can be found in *A Review of the Life History and Status of the Desert Pupfish, Cyprinodon macularius* (Schoenherr 1986).

Amphibians and Reptiles

Three amphibian species within Imperial County are listed as "Species of Special Concern" by the CDFG. Occurring within or near permanent sources of water, these species are the Colorado river toad, couch's spadefoot toad, and lowland leopard frog. Five reptilian species within Imperial County are considered sensitive. The Sonoran mud turtle is a CDFG "Species of Special Concern." The desert tortoise is listed as "Threatened" by both the USFWS and CDFG. The barefoot banded gecko is also a State-listed "Threatened" species, but is a Category 2 candidate for the federal "Endangered" species list. The flat-tailed horned lizard is listed as a "Species of Special Concern" by CDFG, and is a Category 1 candidate for the federal "Endangered" species list. The Colorado Desert fringe-toed lizard is listed as a "Species of Special Concern" by CDFG, and is a Category 2 candidate for the federal "Endangered" species list.

The status of the flat-tailed horned lizard was recently reviewed by both the USFWS and CDFG. In 1990, the federal status of this species was elevated from Category 2 to Category 1 after extensive monitoring by BLM between 1984-86 indicated severe population declines in three out

of four special habitat management areas, or Areas of Critical Environmental Concern (ACECs), in the California Desert Conservation Area. These continuing declines are primarily due to significant habitat modification and destruction from agriculture and other urban developments. Proposed listing of this species as "Endangered" or "Threatened" under the Endangered Species Act of 1973, as amended, is anticipated in the near future. The USFWS is currently preparing a listing package for the flat-tailed horned lizard which will be listed as a threatened or endangered species. Its listing would have a profound impact on future development proposals within or adjacent to designated habitat throughout the County.

In 1988, a petition was filed with the California Fish and Game Commission from Dr. Wilbur Mayhew and Ms. Barbara Carlson of the University of California at Riverside requesting State listing of the flat-tailed horned lizard as an endangered species. In response to this petition, *The Status of the Flat-Tailed Horned Lizard (Phrynosoma mcallii) in California* (CDFG 1989) presents findings in support of the revised listing based on the species' life history parameters and factors responsible for its declining status. Listing of this species as "Endangered", however, was denied by the California Fish and Game Commission, and it remains a "Species of Special Concern." Figures 12 and 13 show the historic and present range of the flat-tailed horned lizard in Imperial County.

Birds

Listings of sensitive birds are provided by the CDFG, USFWS, and Audubon Society's Blue List (Tate 1986). Ten bird species occurring or utilizing habitats within Imperial County are listed as "Endangered" and/or "Threatened" by the USFWS or CDFG. The southern bald eagle is listed as "Endangered" by the USFWS and CDFG; the American peregrine falcon is listed as "Endangered" by the USFWS and CDFG; the elf owl is listed as "Endangered" by the CDFG; the California brown pelican is listed as "Endangered" by the USFWS and CDFG; the Yuma clapper rail is listed as "Threatened" by the CDFG and "Endangered" by the USFWS; the California least tern is listed as "Endangered" by the USFWS and CDFG; the western yellow-billed cuckoo is listed as "Endangered" by the CDFG; the Arizona Bell's vireo is listed as "Endangered" by the CDFG; the least Bell's vireo is listed as "Endangered" by the USFWS and CDFG; and the gila woodpecker is listed as "Endangered" by the CDFG.

Several other bird species are listed as "Threatened" by the USFWS or CDFG, including Aleutian Canada goose, Swainson's hawk, greater sandhill crane, California black rail, and bank swallow. The California black rail is also a Category 1 candidate for the federal "Endangered" species list, and the tri-color blackbird is currently proposed for federal listing as either threatened or endangered. Agricultural areas in the County provide important habitat for species such as the sandhill crane, which utilizes wetland roosting areas between Brawley and Imperial (including portions of the Mesquite Lake SPA) and forages throughout the Valley. Several plans, including the City of Imperial Annexation and the Imperial County Enterprise Zone, have the potential to affect roosting by further development in these areas.

The following raptors seen soaring over various habitats throughout Imperial County are considered sensitive due to an overall regional loss of foraging and nesting areas within southern

California: golden eagle, prairie falcon, Cooper's hawk, sharp-shinned hawk, ferruginous hawk, Harris' hawk, osprey, northern harrier, American kestrel, black-shouldered kite, turkey vulture, long- and short-eared owl, and burrowing owl. Also, as primary carnivores, they are often more susceptible to changes in their environment. Twenty-four key raptor areas are managed by BLM on lands under its authority throughout the State. In 1987, an interdisciplinary Raptor Habitat Team was established within BLM for the purpose of developing strategies for achieving the raptor habitat goals and objectives identified in *Fish and Wildlife 2000*, a strategic plan for BLM's wildlife program. The goal of this plan is to provide suitable and crucial habitat conditions (including availability of nesting areas, shelter and food sources) for birds of prey on public lands. This is accomplished through conservation and management of essential habitats, both in areas where raptors concentrate either year-round or during some period of the year, as well as in important habitat areas where populations are suppressed.

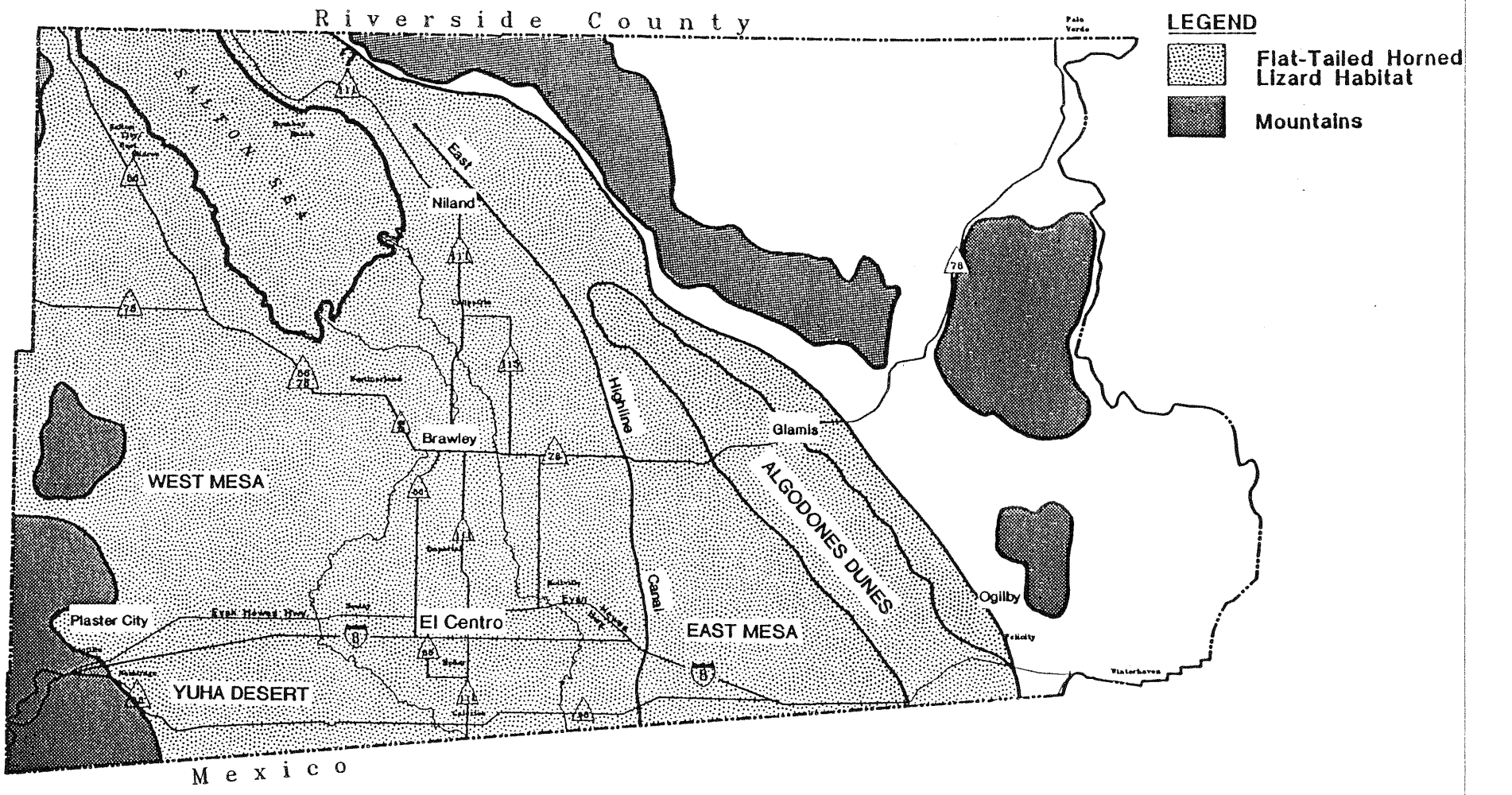
Mammals

Mammalian species of high interest occurring in Imperial County include the American badger, desert kit fox, Yuma mountain lion, and bighorn sheep. The peninsular bighorn sheep is listed as "Threatened" by the CDFG, and is currently proposed for federal listing by the USFWS as either "Endangered" or "Threatened." The remainder of these species are not listed as "Endangered" or "Threatened" by the USFWS and/or CDFG. Several species of bats are listed as "Species of Special Concern" by the CDFG, including the California leaf-nosed, Townsend's western big-eared, and California mastiff bats. These species and the pallid and spotted bats are also Category 2 candidates for the federal "Endangered" species list. Agricultural areas in the County provide foraging habitat for some bat species through the availability of water and flying insects. Agricultural pesticides, however, can have a negative impact on bat populations.

Habitats

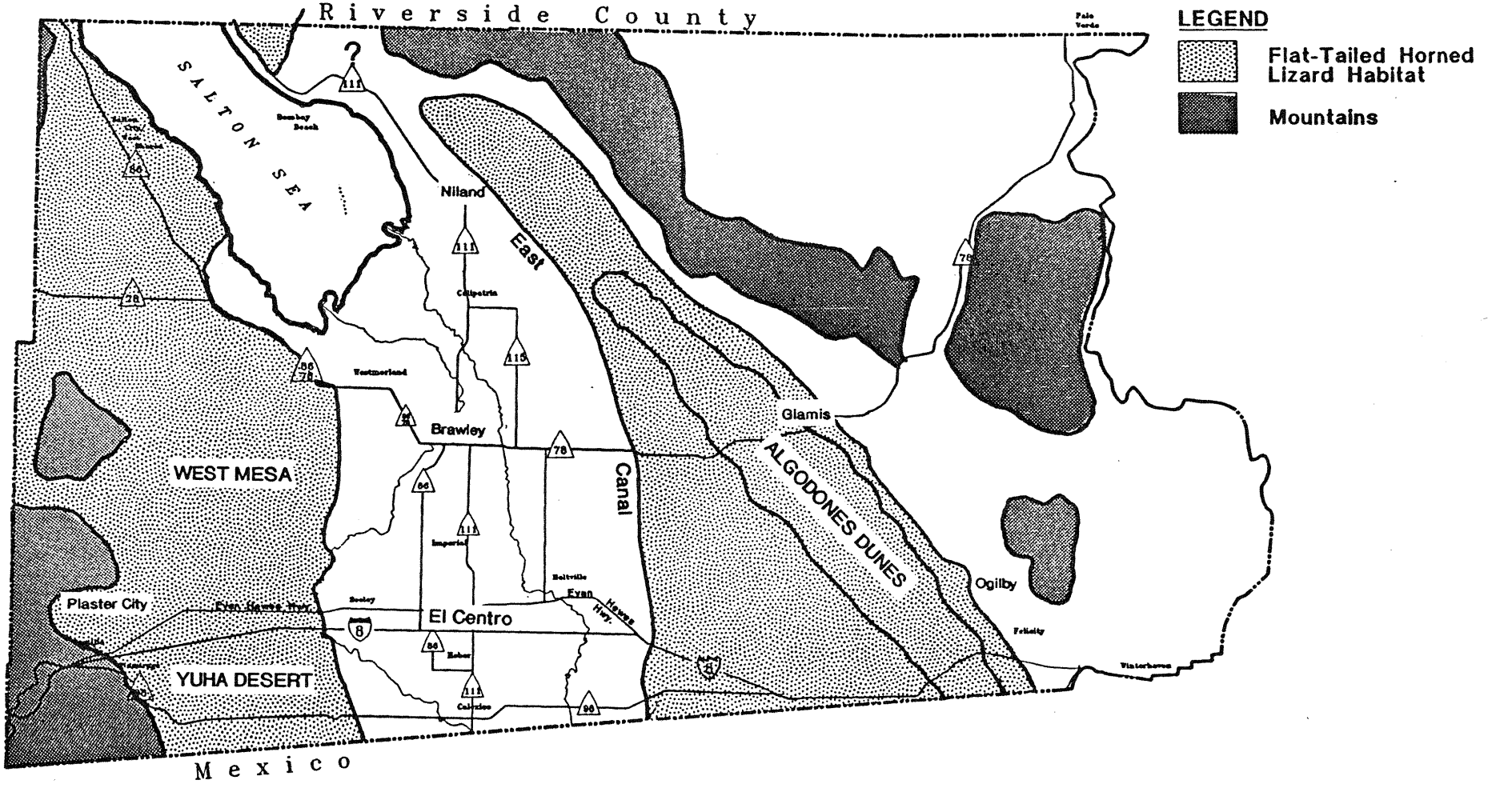
Sensitive habitats are those which are considered rare within the region; are listed by the Conservation and Open Space Element of the Imperial County General Plan; or support sensitive plants or animals. Past disturbances from agricultural and recreational activities are the primary sources for reduced habitat values. Although not considered sensitive, agricultural and other disturbed areas are often of significant value to certain animal species such as large mammals (e.g., foxes, coyotes and badgers), birds (e.g., sandhill crane), and raptors (e.g., burrowing owl) because they provide foraging opportunities. Sensitive habitats of the County include desert riparian, fresh emergent wetlands (freshwater marsh), palm oases, desert succulent shrub, and sand dunes (see Figure 10).

In southern California, wetlands by their nature are limited, and in Imperial County they are extremely limited. They are also one of the fastest disappearing habitats in the State. Proximity to water, interface between a variety of habitat types, and vertical stratification of foliage are factors which contribute to the richness and productivity of wetlands. While a few wildlife species are restricted entirely to wetlands for all of their life requirements, many more are dependent on them for necessities such as food, cover, or breeding. Numerous other species also make extensive use of these habitats even though they may not be entirely dependent upon



SOURCE: California Dept. of Fish & Game

Imperial County General Plan	Historic Range of the Flat-Tailed Horned Lizard in Imperial County	Figure 12



SOURCE: California Dept. of Fish & Game

Imperial County General Plan	Current Range of the Flat-Tailed Horned Lizard in Imperial County	Figure 13

them. Due to their limited area and diminishing acreages, the occurrence of sensitive plants, and the ability to support a diversity of wildlife species, desert riparian and freshwater marsh habitats are considered sensitive in Imperial County.

Palm oases are sensitive due to their limited distribution and high wildlife diversity. Because they rely on permanent sources of water, these habitats are restricted to areas of moist alkaline soils near seeps, springs and streams around the Salton Sea basin. Desert succulent shrub habitats are sensitive due to the predominance of sensitive cactus species, such as foxtail cactus, crucifixion thorns, Munz's cholla, Wiggins' cholla, and giant Spanish-needle.

As mentioned, the sand dunes of south-central Imperial County contain many examples of rare and/or endangered plants, insects and animals that have adapted to the extreme arid conditions. These species include the Peirson's milk-vetch, Wiggins' croton, Algodones Dunes sunflower, Andrews' dune scarab beetle, and flat-tailed horned lizard.

Other important habitat areas in Imperial County include the Salton Sea, Colorado River, agricultural-related canals and drains, mesquite hummocks, and desert washes. These diverse and occasionally highly specialized communities constitute important and valuable resources which will require protection if their long-term value is to be preserved.

d. Resource Areas

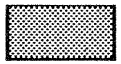
Resource areas should be considered during development and planning evaluations. The following discussion contains a brief description of the various State and federally administered resource areas throughout Imperial County. These areas should be taken into account when conducting site-specific environmental impact analyses. Where possible, impacts on these areas should be avoided; where impacts cannot be avoided, every effort should be made to achieve the least degree of impact and to mitigate for impacted areas through on- and/or off-site preservation, creation or restoration of habitat before, during or immediately following the proposed action. Figure 14 shows the geographic relationship between the several designated resource areas within the County.

Federally Administered Resource Areas

National Wildlife Refuges. Managed by the USFWS, the Salton Sea National Wildlife Refuge provides important feeding, nesting and resting habitat for thousands of waterfowl, shorebirds and other migrant bird species. Covering over 380 square miles, the Salton Sea ranges from 9 to 15 miles wide, 35 miles long, 40 feet deep, and contains 115 miles of shoreline. The surface elevation is currently about 227 feet below mean sea level. Established in 1930 by Presidential Proclamation, the Refuge originally consisted of approximately 35,000 acres. Due to past flooding by the Salton Sea, only about 2,200 manageable acres of marsh habitat remains along the southeastern shoreline. Dikes have been constructed to prevent further flooding of the Refuge. Agricultural crops are grown on the Refuge to feed wintering waterfowl. The primary purpose of the Refuge is to provide habitat for migrating and wintering waterfowl and endangered bird species along the Pacific Flyway Corridor.

Areas of Critical Environmental Concern (ACEC) and Wildlife Habitat Areas (WHA)

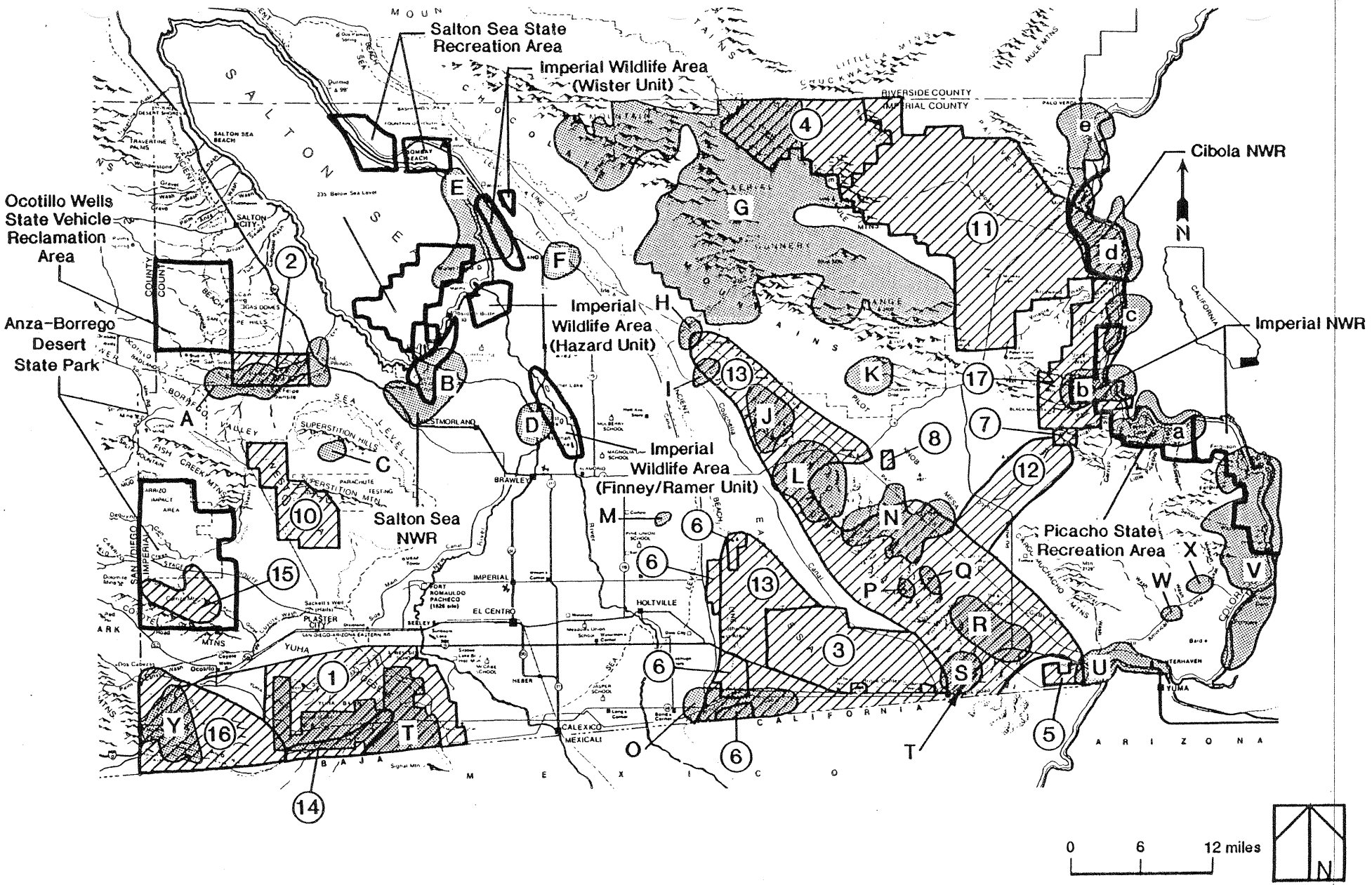
1. Yuha Basin ACEC
2. San Sebastian Marsh/San Felipe Creek (Desert Pupfish) ACEC
3. East Mesa (Flat-Tailed Horned Lizard) ACEC
4. Chuckwalla Bench (Desert Tortoise) ACEC
5. Pilot Knob ACEC
6. Lake Cahuilla ACEC's (4 Locations)
7. Indian Pass ACEC
8. Singer Geoglyphs ACEC
9. Plank Road ACEC (Linear)
10. West Mesa ACEC
11. Milpitas Wash WHA
12. Indian Wash WHA
13. Algodones Dunes WHA
14. Pinto Wash WHA (Located within Yuha Basin ACEC)
15. Coyote Mountains/Davies Valley (Barefoot Banded Gecko) WHA
16. Smuggler's Cave (Southern Mixed Chaparral) WHA
17. Picacho Special Attention Area



Significant Natural Areas (SNA)

- A San Sebastian Marsh SNA
- B New River SNA
- C Superstition Hills SNA
- D Ramer and Finney Lakes SNA
- E Mullet Island SNA
- F Camp Dunlop SNA
- G Chocolate Mountains SNA
- H Tortuga Sand Hills SNA
- I Amos Sand Hills SNA
- J Acolita Sand Hills SNA
- K Glamis Buttes SNA
- L East Mesa Imperial Sand Dunes SNA
- M Holtville Drain SNA
- N Central Imperial Sand Dunes SNA
- O All American Canal SNA
- P Cactus Southwest Dunes SNA
- Q Pilot Knob Mesa West SNA
- R Ogilby Dunes SNA
- S Plank Road SNA
- T Crucifixion Thorn SNA
- U Yuma Riverbend SNA
- V Ferguson Lake/Imperial Dam SNA
- W Ross Corner SNA
- X Bard Riverbend SNA
- Y In-Ko-Pah Gorge/Pinto Drainage SNA
- a Picacho/Taylor and Adobe Lakes SNA
- b Julian/Carrizo Washes SNA
- c Draper SNA
- d Cibola/Gilmore's Landing SNA
- e Palo Verde Valley SNA
- f 38th Street Park SNA

Imperial County General Plan	Resource Areas Legend	Figure 14 LEGEND



Imperial County General Plan	Resource Areas	Figure 14

There is no outlet from the Salton Sea, and water is removed only by evaporation. Consequently, the primary water quality problem facing the Sea continues to be increasing salinity. Currently at about 44,000 milligrams per liter (mg/L) of total dissolved solids (TDS), or 20% saltier than the Pacific Ocean, the salinity of the Salton Sea increases by 800 mg/L per year. Another problem facing the Salton Sea is that of selenium brought from the Colorado River. As this water is conveyed into Imperial Valley by various canals, selenium levels become concentrated due to evaporation and evapotranspiration that occurs during farming of agricultural fields. As a result, the New and Alamo Rivers entering the Sea contain approximately 7 to 8 parts per billion (ppb) of selenium.

Imperial County shares two national wildlife refuges with the State of Arizona along the lower Colorado River. They are the Cibola and Imperial National Wildlife Refuges. These refuges, also managed by the USFWS, encompass the nutrient-rich Colorado River flood plain. The riparian and marshland habitats along the River support a diversity of aquatic wildlife, including several species of game and non-game fish. They also provide critical wintering grounds for the greater sandhill crane and Aleutian Canada goose. The endangered Yuma clapper rail and threatened black rail also nest on the Refuges. Since 1989, hundreds of acres of invasive salt cedar have been eradicated in preparation for native revegetation sites. Efforts are also continuing to maintain flows through old river meanders (i.e., stretches of the Colorado River left undisturbed after channelization was completed in other sections) in order to increase their use by wildlife species. Old river meanders are important due to a large variety of wildlife species utilizing these backwater areas throughout the year. The USFWS actively promotes limited cropland development in the Refuges as a food source for migrating waterfowl. Other important Refuge habitats managed by the USFWS along the Colorado River include salt flats, which are used by foraging birds, and adjacent desert scrub, used by desert bighorn sheep.

Areas of Critical Environmental Concern (ACECs). Part of the BLM's mandate for the *California Desert Conservation Area Plan* (BLM 1980) is to identify ACECs using guidelines published in the *Federal Register*. The Federal Land Policy and Management Act, in Section 103(a), defines an ACEC as an area "... within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." The ACEC designation is a process for determining the special management needs for certain important environmental resources or hazards. Management prescriptions are developed for each area proposed for ACEC designation. The requirements are site-specific and may include actions which BLM has authority to carry out, including posting signs, patrolling and fencing, and recommendations for actions which BLM does not have direct authority to implement, such as cooperative agreements with other agencies and mineral withdrawals. They are designed to meet the following management goals for each area:

- To alleviate threats to critical resource values by communicating to visitors the existence of sensitive sites and the need for caution;

- To protect specific sites by constructing barriers to prevent surface damage; and

- To provide other measures that result in protection of the most environmentally important and fragile resources.

An activity plan prepared for each ACEC is the vehicle for translating the special management prescriptions into ongoing "on-the-ground" implementation actions. These plans identify the ongoing management objectives of the ACEC, and describe the types of existing and future uses, activities, or management practices considered compatible and incompatible with the purposes of the ACEC, as well as a schedule for implementation. They also detail special management requirements, such as patrol schedules and specifications for facilities. When wisely planned and properly managed, development is allowed to take place in an ACEC as long as the basic intent of protecting natural resources is assured. Figure 14 shows the four wildlife ACECs in Imperial County.

Wildlife Habitat Areas (WHAs). Habitat Management Plans (HMPs) are developed specifically by BLM for wildlife habitats or species which require intensive, active management programs. In addition to the four wildlife ACECs, six WHAs occur in Imperial County as shown on Figure 14. In terms of habitat preservation, WHAs are considered of lower priority than ACECs due to competing multiple-use activities which are allowed by the BLM under certain regulated guidelines. Sensitive, rare, threatened or endangered animal species for which HMPs are currently being prepared in Imperial County include the bonytail chub, barefoot banded gecko, least Bell's vireo, desert and peninsular bighorn sheep, desert tortoise, flat-tailed horned lizard, Andrew's dune scarab beetle, and golden eagle.

Special Area Designations. In addition to the ten ACECs and WHAs shown on Figure 14, the Picacho Land and Wildlife Management Area is designated by the BLM as a "Special Attention Area." The habitats and species known to be important for special consideration in the environmental assessment process for any kind of project proposed in this area include riparian, alkali desert scrub, mesquite thickets, desert bighorn sheep, and golden eagle.

Another biological resource area in Imperial County is the Colorado River Herd Management Area located in the northeastern portion of the County. The Colorado River Herd Management Area Plan is the result of the Wild Horse and Burro Act, passed by Congress in 1971, providing the basis for the management of wild horses and burros by the Bureau of Land Management. The Plan states that: "...the Secretary of the Interior shall manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on public lands." The Act also provides for the inventory, study, and removal (if necessary) of wild horses and burros.

Unusual Plant Assemblages (UPAs). These are extraordinary stands of vegetation recognized as such due to one or more factors such as unusual age, unusually high cover or density, or disjunction from main centers of distribution. Plant associations which are relatively rare in the desert due to their alliance with restricted and discontinuous habitats are also considered UPAs. Examples of these UPA types include wetlands and plants growing on unusual and restricted substrates, such as limestone outcroppings and sand dunes. As shown on Figure 11, there are eight unusual plant assemblages designated by the BLM within Imperial County; however, these

boundaries do not represent absolute limits on a stand in question, nor do they occupy the entire area delineated. In addition, not all of these UPAs represent climax stands of vegetation either climatically or edaphically.

Several basic management tools are employed to ensure the continued existence of unusual vegetation found within UPAs. Certain UPAs, such as Algodones Sand Dunes, receive special attention because they contain rare plant species. Although not shown on Figures 11 or 14, all wetland and riparian areas in the County are considered UPAs and fall under BLM guidelines for "Wetland/Riparian Area Protection and Management". They are also given "Special Attention Area" status wherever they occur on federal lands due to their high value, sensitivity, and rarity in the County.

Wildlife Corridors. As mentioned, the Salton Sea serves as a critical link for numerous migratory bird species along the Pacific Flyway Corridor. Additional biological significance is given to riparian drainages and desert scrub mountain areas in terms of their potential use as wildlife corridors. Drainageways with their characteristic vegetation cover serve as important corridors for the movement and survival success of many species of animals. Many of the riparian corridors traversing the County make up portions of major rivers and drainage basins that originate from undisturbed areas to the east (Arizona), south (Mexico), west (San Diego County), and north (Riverside County). Probable bighorn sheep corridors occur in the rugged, mountainous areas along the eastern portion of Imperial County, in the Chocolate, Picacho and Palo Verde Mountain Ranges, while known corridors exist in the southwestern portion of the County, adjacent to Anza-Borrego Desert State Park (see Figure 11).

State-Administered Resource Areas

Imperial Wildlife Management Areas. Three areas (Units) totalling 9,105 acres are operated by the CDFG within Imperial County (see Figure 14). These areas are characterized by developed marsh, riparian and upland habitats, and are located within northern Imperial Valley.

Between 200 and 230 feet below mean sea level, the Wister Unit is situated along the southeastern shore of the Salton Sea. This area consists of 5,243 acres of State lands and 1,320 acres of land leased from the Imperial Irrigation District. Established in 1954 for the development of waterfowl habitat, to alleviate crop depredations and to provide public sportfishing and shooting opportunities (waterfowl and doves), the Wister Unit today supports a variety of waterfowl and other wetland species including the endangered Yuma clapper rail. Other sensitive species include desert pupfish, California black rail, Cooper's hawk, red-tailed hawk, sharp-shinned hawk, marsh hawk, American kestrel, Colorado River cotton rat, badger, and possibly six species of bats. Approximately 4,380 acres are managed as marsh habitat on an annual cycle of contour and levee maintenance and planting. Plant species found in these wetlands include cattail, bulrush, watergrass, and swamp timothy in conjunction with cultivated grains such as barley, wheat and ryegrass. Developed areas consist of a series of manmade reservoirs and shallow field/pond areas separated by levees and canals. Examples of ruderal plant species along these peripheral areas include salt cedar, saltbush, arrowweed, carrizo cane, and mesquite. Concentrated in dense stands around agricultural drain outlets, the invasive salt

cedar is subject to an aggressive eradication program. The remainder of the Unit consists of reservoirs, fishing ponds and mudflats.

Just south of the Wister Unit, also straddling the southeastern shore of the Salton Sea, is the 615-acre Hazard Unit. This managed marsh habitat area has been leased to the USFWS as part of the Salton Sea National Wildlife Refuge for the last 15 to 20 years.

The Finney/Ramer Unit is located along the Alamo River, approximately three miles south of Calipatria, off Highway 111. It consists of approximately 2,047 acres of unique desert habitat in the heart of Imperial Valley. Both the Finney and Ramer Lakes, and associated marsh habitats, were created by overflow water from the Colorado River. Purchased by CDFG in 1931 from two professional baseball players who owned and operated adjoining gun clubs on the Alamo River, the Unit was subsequently added to the statewide refuge system. Four habitat types are found at this Unit: aquatic (marshes and lakes), delta (common cane, salt cedar and saltbush), riverbottom (salt cedar and arrowweed), and plateau (arrowweed, mesquite and saltbush). Wildlife includes 16 species of mammals and 115 bird species, including the endangered Yuma clapper rail and the rare California black rail. For management purposes, the area is divided into 23 sub-units ranging in size from 50 to 300 acres. The combination of climate, vegetation, and location along the Pacific Flyway Corridor contributes to the overall attractiveness of the area to wildlife.

State Parks. The CPS manages four State Parks/Recreation Areas within Imperial County. These are the Anza-Borrego Desert State Park and the Ocotillo Wells, Salton Sea and Picacho State Recreation Areas (see Figure 14).

Established as California's first desert state park in 1933, Anza-Borrego comprises over 600,000 acres of land in both San Diego and southwest Imperial Counties. Measuring 30 miles wide from east to west, it contains 12 wilderness areas, several oases, several year-round streams in verdant canyons, and cactus gardens throughout. Characteristic wildlife species include bighorn sheep, roadrunners, cactus wrens, chuckwallas, and kangaroo rats. Most of the Park acreage within Imperial County is located within the 28,000-acre Carrizo Impact Area, which is closed to the public due to the presence of buried ordnance from previous military bombing exercises (Jorgensen 1992). This area is no longer in active military use, but several deaths to hikers in recent years have been attributed to the buried ordnance, necessitating its closure to the public. Thus, the Carrizo Impact Area is dedicated to resource protection, and is home to sensitive species such as Orcutt's aster, flat-tailed horned lizard, Colorado Desert fringe-toed lizard, badger, and peninsular bighorn sheep. It is also targeted as a future release area for some of these species. It should be noted that a majority of the bighorn sheep population in this area occurs to the north, in the BLM-administered federal lands of Fish Creek Mountains.

In addition to Anza-Borrego Desert State Park, the CPS manages three recreational areas. Ocotillo Wells is an off-highway vehicle park located off Highway 78 in the western portion of the County. This 14,532-acre park shares many of the same natural and cultural features as Anza-Borrego Desert State Park, which is directly adjacent to the west. The wash and ridge terrain includes a butte with dunes and sand bowl, a blow-sand dune, and springs. Potential

wildlife use of these habitats is limited, however, due to the proximity of off-highway vehicle areas.

The Salton Sea State Recreational Area contains over 17,000 acres bordering 15 miles of shoreline along Highway 111 in both Riverside and northern Imperial Counties. It supports over 350 bird species; some considered rare or endangered. Characteristic plant and wildlife species include goldenbush, creosote bush, burrobush, desert holly, narrow-leaved wing scale, ocotillo, mesquite, Canada and snow geese, blue heron, egrets, a variety of ducks, desert iguana, sidewinder rattlesnake, kangaroo rats, round-tailed ground squirrels, blacktail jackrabbits, cottontails, kit foxes, and bobcats.

The Picacho State Recreational Area winds along eight miles of the lower Colorado River at the eastern County boundary line adjacent to the State of Arizona. Centered near the site of Picacho, a turn-of-the-century gold-mining town, it provides access to desert riparian habitat stretching along 55 miles of river between Parker and Imperial Dams. A variety of wildlife, including numerous transitory birds, bald and golden eagles, and bighorn sheep, utilize this area.

Significant Natural Areas (SNAs). Figure 14 shows 32 SNAs within Imperial County. Appendix E contains a detailed description of SNAs; Sections 1930-33 of the Fish and Game Code as relates to SNAs; and maps, sensitive species/habitat occurrences and ownership data for each listed SNA within the County. The following is a brief summary of this information.

A statewide natural areas program was established by CDFG via the passage of legislation (AB 1039) in 1981. This program was developed in response to the rapid rate of change in California's landscape as a result of man's activities, and due to lack of a statewide inventory of important biological resources and poor coordination between conservation organizations and programs. AB 1039 requires CDFG to meet five significant goals relating to biodiversity. To implement this legislation, CDFG has developed the Natural Diversity Data Base (NDDB) and the Lands and Natural Areas Program (LNAP). NDDB is the most comprehensive inventory of California's biological diversity. LNAP identifies and protects SNAs and coordinates the protection activities of other conservation organizations.

Information from NDDB is analyzed to identify sites which meet strict criteria for designation as SNAs. The SNA inventory (see Appendix E) currently identifies sites on the basis of biological values only. A SNA must meet one of the following four criteria: extremely rare, ensemble, best example, and high-diversity types. These elements are defined in Appendix E. The SNAs listed for Imperial County include well-protected as well as poorly protected, highly threatened sites. The approximate limits of each listed SNA shown on Figure 14 are based on the known distribution of elements on each site. These limits have been modified based on a cursory analysis of other important ecological factors such as local topography, extent of urbanization, or other human disturbance. Detailed site boundaries will require on-site evaluation by qualified biologists. It should be noted that the listed SNAs for Imperial County does not constitute an exhaustive inventory of all possible SNAs; newly identified sites may be added as this information becomes available. Finally, this list does not provide an inventory of

all officially listed rare, threatened, or endangered species, nor does it list all of the natural areas that CDFG is concerned with.

e. Plans/Policies

Imperial County General Plan

The Conservation and Open Space Element of the 1973 Imperial County General Plan showed approximately 611,514 acres designated for "Preservation" in the Land Use Plan. The revised Land Use Plan for the currently proposed General Plan Update incorporates the majority of this area within the new "Recreation/Open Space" land use classification. Consisting of approximately 1,568,507 acres, this designation also includes additional areas of biological sensitivity not shown on the 1973 Land Use Plan. As discussed in the "Project Description", a significant portion of this acreage would be dedicated to the preservation of natural resources. Recreational land uses within this category are limited to recreational vehicle parks and uses which consist primarily of outdoor facilities such as parks, athletic fields, golf courses, swim and tennis clubs, and off-road vehicle use areas. Light to medium agricultural uses, including row and field crops, orchards, aquaculture, grazing and apiaries, are also permitted in this category. In addition, residential development is allowed at a maximum density of one single-family dwelling per 20 acres.

On the surface, it may appear that the proposed Plan is less effective in its ability to protect sensitive biological resources than the 1973 General Plan because it would allow potentially impactive uses such as agriculture in areas that were previously designated for "Preservation". Because a significantly larger amount of open space is designated by the proposed Plan, however, there is greater potential to preserve more acreage of biological sensitivity in Imperial County than was available with the previous Plan. Through the creation of wildlife corridors (see Figure 11), better connectivity between habitat areas can also be achieved with the proposed Plan because many of the areas previously designated for "Preservation" are already highly fragmented. Furthermore, the proposed Plan will allow the County and appropriate resource agencies to exert greater land use controls over future projects in the "Recreation/Open Space" land use category for the purpose of protecting biological resources. For example, the design of open space easements could occur in a configuration which is sensitive to the natural vegetation and terrain, and therefore more conducive to wildlife movements. Thus, implementation of the proposed Land Use Plan, coupled with the requirement for site-specific biological studies in connection with future development in the "Recreation/Open Space" land use category (see Impact section below), can offer a greater degree of regional preservation for sensitive biological resources than did the previous Plan.

The Conservation and Open Space Element of the currently proposed Imperial County General Plan Update contains general goals and objectives which pertain to the preservation of biological resources. This Element identifies and describes the various Resource Areas within the County and sets forth goals and policies for the creation and maintenance of open spaces for the preservation of natural resources (please see Mitigation section below).

California Desert Conservation Area Plan

This Plan provides general, regional guidance for management of the California Desert Conservation Area, encompassing nearly 25 million acres through eight counties, over a 20-year time period. The Plan applies, however, only to the 12.1 million acres of federal lands administered by the BLM. The goal of the Plan is to provide for the use of these public lands and associated resources, including economic, educational, scientific and recreational uses, in a manner which enhances wherever possible the environmental, cultural and aesthetic values of the desert and its future productivity. This goal is to be achieved through the direction provided by management actions and guidelines in four multiple-use classes. Each class describes a different type and level or degree of use which is permitted within a particular geographic area. Thus, the Plan requires the protection of endangered and threatened species of plants and wildlife and cultural resources, as well as providing for the development of mineral resources and for livestock grazing and other consumptive uses. As such, it is an evolving process which permits analysis of actions and impacts on a broad basis, and provides a framework for ongoing analyses of subsequent specific plans, programs, actions and impacts.

Lower Colorado River Master Plan

The USFWS is currently preparing a Master Plan for four national wildlife refuge stations along the lower Colorado River. The stations include the Imperial, Cibola, Havasu, and Bill Williams Unit of the Havasu National Wildlife Refuges. When completed, the Master Plan document will provide long-term (20-plus years) direction for the management, administration and operational plans of these refuges. The overall goal of the Plan is to ensure that future management of the lower Colorado River accommodates the needs and desires of the public, to the extent that these needs are in agreement with the laws and policies that regulate refuges. Problematic to this endeavor is the absence of prescriptive water rights on the California side of the over-allocated Colorado River. The result is an inadequate wildlife inventory and minimal resource management for the California portion of each refuge, except for monitoring of hunting and unauthorized camping activities. Possible solutions to this problem are presented in the Plan, including the improvement of aquatic and marsh habitats through dredging and other methods to increase in-stream flow (Baca 1992).

Pacific Flyway Management Plan

This Plan was prepared for the USFWS and Pacific Flyway Council in 1983 by a Subcommittee of the Pacific Flyway Study Committee. Its purpose is to facilitate cooperative management of the greater sandhill crane population that winters along the lower Colorado and Gila Rivers in Arizona and Imperial Valley, California. This population is the least known and least numerous of four regional populations of this subspecies in the Pacific Northwest. Northeast Nevada is the principal nesting region for the 1,500-1,600 cranes that comprise this population. Their major wintering area is on the Colorado River Indian Reservation near Poston, Yuma County, Arizona. Smaller numbers winter in the Cibola and Imperial National Wildlife Refuges and in an area located about seven miles southeast of Brawley. Historically, cranes wintered further

south along the Colorado River, near its delta with the Gulf of California, and in the Salton Sea National Wildlife Refuge.

The primary objectives of this Plan are to increase the wintering population from an estimated 1,175 to an upper limit of 2,600 cranes by the year 2000; achieve occupancy by cranes of all suitable nesting habitat by the year 2000 without major changes in their geographic range, staging areas, or migration corridors; achieve greater dispersal of the wintering population by the year 2000 into areas currently devoid of cranes, such as the Havasu, Salton Sea and Imperial National Wildlife Refuges; retain, protect and occasionally develop habitats in sufficient quantity and quality to meet population and distribution goals; and increase opportunities for viewing and appreciation by the public.

Imperial Wildlife Area (Wister Unit) Management Plan

Developed by CDFG in 1988 to direct habitat and species management on over 6,500 acres, this Plan calls for habitat manipulation on wetlands, uplands and aquatic habitats. The Plan considers consumptive and nonconsumptive uses of these habitats and the species that use them, such as game and nongame waterfowl, fish and sensitive birds. With regard to threatened and endangered species, the Plan focuses on assessing population size, density and distribution, as well as habitat quantity and quality. For example, population assessments include annual surveys for Yuma clapper rail and California black rail, and quarterly surveys for desert pupfish. The existence of predatory fish species in available habitat, however, suggests that desert pupfish may have been extirpated from the Wister Unit since none have been observed since 1983.

In conjunction with population assessments, habitat assessments identified in the Plan include levee, contour and water structure maintenance, as well as water level and vegetation manipulation. These procedures are used to maintain wetlands, with a high priority placed on preservation of habitat for the endangered Yuma clapper rail and the threatened California black rail. The recovery of all wetlands immediately following the above maintenance procedures is closely monitored.

Flat-Tailed Horned Lizard Habitat Management Plan

The *Management Strategy for the Flat-Tailed Horned Lizard (Phrynosoma mcallii) on Bureau of Land Management Administered Lands within the California Desert Conservation Area* (BLM 1990) describes impacts to this sensitive reptile species in an Environmental Assessment, and provides overall management goals to maintain stable, viable populations in all crucial habitat areas and to promote species recovery. With this goal in mind, the document codifies a uniform approach to mitigation and compensation which will permit more effective management of habitat for the flat-tailed horned lizard, and more efficient processing of land use proposals within BLM's multiple-use, sustained yield mandate.

2. Environmental Impacts

Figure 15 shows the proposed Land Use Plan plotted onto a sensitive biological resources map of Imperial County. This Sensitivity Map consolidates the locations of sensitive plant species, sensitive wildlife areas, and resource areas (e.g., ACECs, WHAs, SNAs, UPAs, Wildlife Refuges and Management Areas, and State Parks) into areas of high biological sensitivity. Please note the locations on this map where designated land uses occur within or adjacent to areas of high biological sensitivity. It is in these areas that focused biological studies will be required as part of subsequent environmental review for future development projects, in accordance with General Plan implementation guidelines. The following analysis of potential impacts to biological resources resulting from build-out of the Imperial County General Plan Land Use Element is consistent with a "program-level" approach, as defined in Section 15168 of the CEQA Guidelines.

a. Plants and Vegetative Habitats

Full implementation of areas shown for development by the Imperial County General Plan would largely impact agricultural areas, where most of the native vegetation within the central Imperial Valley (under County jurisdiction) has previously been removed. Loss or disturbance of native vegetation would also result from scattered residential, agricultural, recreational, mining, public facility, and other uses in areas not presently in agricultural use.

b. Sensitive Species and Habitats

The following discussion provides a brief orientation to the major issues currently affecting, or projected to have an affect on, the sensitive species and habitats of Imperial County. These issues are not listed in order of importance, nor are they prioritized in terms of current habitat management goals.

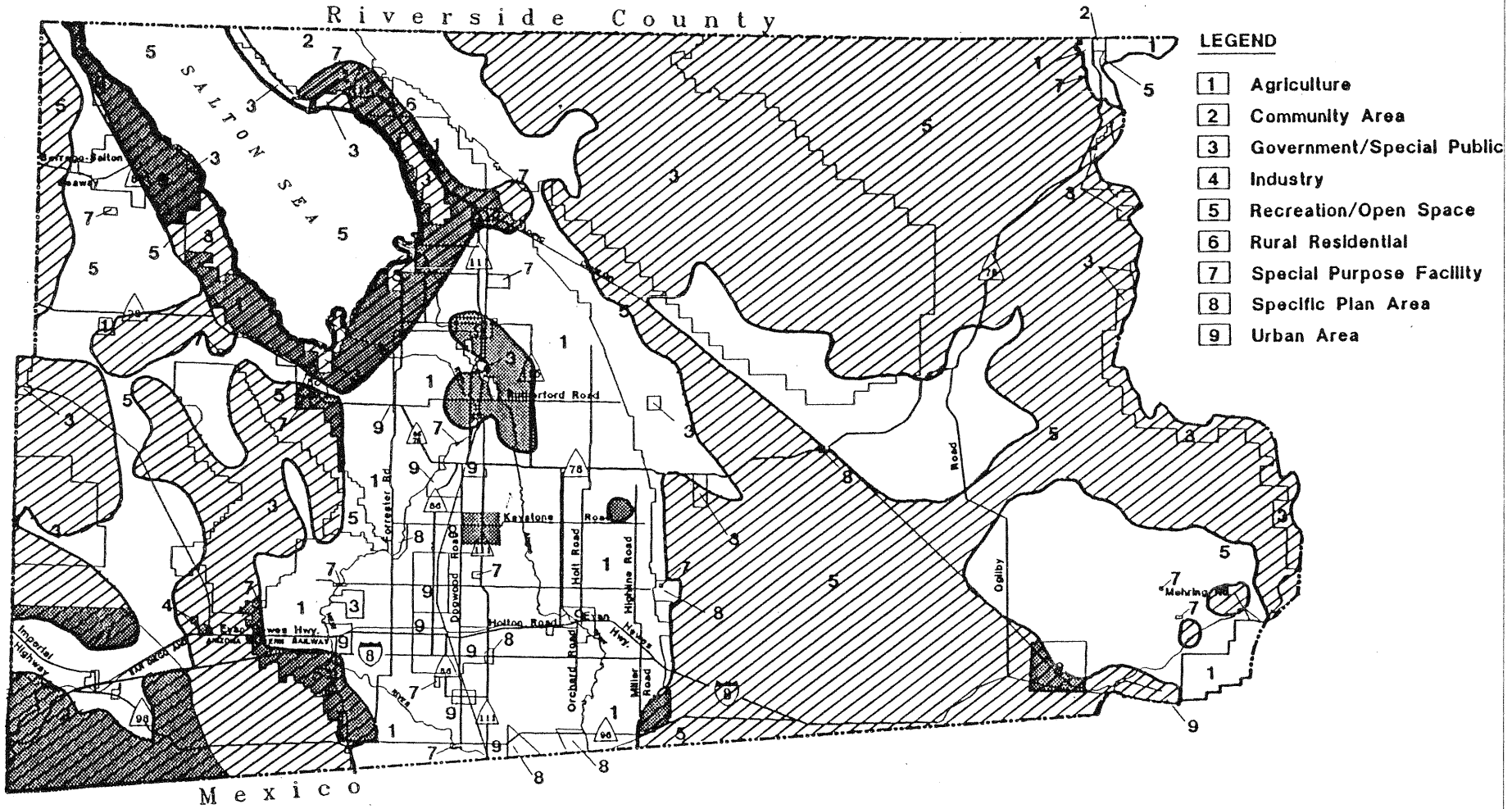
Agriculture/Pesticide Spraying. Past and/or present use of pesticides has been suggested as a factor in the observed declines of many sensitive animal species, especially the flat-tailed horned lizard. Since 1943, the California Department of Food and Agriculture (CDFA) has conducted a control program on BLM lands in Imperial County for the beet leafhopper. From 1956 to 1965, 73,603 pounds of DDT (mixed with diesel oil) was sprayed over 113,668 acres in the Imperial Valley, including East and West Mesas. Malathion, an organophosphorus insecticide, has been used from 1965 to the present. Treatment of areas with these chemicals generally occurs every three to five years. Pesticide drift from private agricultural operations also presents a potential impact to adjacent biological habitats. No conclusive studies have been conducted to determine the effects of pesticides on the flat-tailed horned lizard or other reptile species, although pesticide use in other areas of the State have shown deleterious effects on leopard lizard populations. Of perhaps greater concern than the direct effects of pesticides on native wildlife is the potential impact such use may have on their food sources, primarily insectivorous species. Although research is not yet available to demonstrate the effects of pesticide spraying on insectivorous species such as birds and bats, some wildlife species are no doubt affected. For example, burrowing owls are known to have died after consuming earwigs and other insects that had been sprayed with pesticides.

Water Quality. Changes in salinity in the waterways of Imperial County affects aquatic ecosystems and other beneficial uses of the surface waters. The salinity of the Salton Sea is expected to increase in the next few years if appropriate measures are not taken. The projections on the rate of increase depend upon changes to the salinity of Colorado River water, the effect of water conservation measures on salt loading, and other factors such as the development of industrial water users and salinity control projects. In addition to the problems of salinity, increasing selenium levels in the County's waterways are taken up and concentrated by small organisms, which in turn, are eaten by larger organisms. This process increases selenium concentrations in fish in the Salton Sea, which have an average of approximately 10 ppb of selenium. Birds which feed off these fish have tissue levels of up to 40 ppb of selenium, which has a potential to cause health problems in birds.

Intensive irrigation in the Imperial Valley also introduces agricultural chemicals, such as fertilizers, pesticides and herbicides, into downstream waters. Organochlorine pesticides affect local fish and wildlife populations in agricultural drains and in the New and Alamo Rivers of Imperial Valley. The concentration levels of these chemicals in the fish of the County's waterways are higher than the levels found in Salton Sea fish by a factor of ten or more. Birds also have high levels of these chemicals. The USFWS is currently studying this problem and has completed the Drainwater Study, which includes an analysis of levels of DDE (a DDT metabolite) and its effect on piscivorous birds, and the California Regional Water Quality Control Board is focusing on efforts to control toxic compounds detected in agricultural drains in the Valley. Field erosion and dredging activities also result in siltation in the New and Alamo Rivers and in the Salton Sea. The bacteriological quality of these waters is also a concern because these streams receive locally generated municipal waste discharges, in addition to the municipal and toxic industrial waste load entering the United States from Mexico.

Urban and Recreational Development. Potential impacts to native vegetation and sensitive species and habitats occur due to direct habitat loss from construction activities. Indirect noise impacts from construction equipment and vehicle noise along urban roadways have also been documented for bird species which use adjacent "noise-sensitive" biological habitats. Fuel management activities, such as vegetation clearing for the establishment of fire buffers between developed and natural areas, result in direct and indirect impacts to adjacent biological resources. In addition to the direct loss of vegetation, and possibly sensitive habitats, the continual maintenance of fuel management zones decreases the foraging potential for wildlife in these buffer areas. Once construction is completed, the potential indirect impacts from human activities associated with developed areas include unauthorized intrusions into adjacent native habitats; lighting and noise effects; disturbance from off-highway vehicle (OHV) users, hikers and equestrians; increased predation from feral pets; increased "road-kills" along urban roads; and habitat fragmentation.

The planned development and improvement of facilities within and adjacent to existing State recreational areas can be particularly impactive to biological resources because these areas most often occur near resource areas (see Figure 14). Except for the Ocotillo Wells State Vehicle Recreational Area, no major improvements are planned at this time for the remaining three State recreational areas in the County. In particular, the Picacho State Recreational Area, which is



Imperial County General Plan	Biological Sensitivity Map	Figure 15

an area of potential concern with respect to the wildlife protection goals of the Lower Colorado River Master Plan, is expected to remain as a primitive camping area (Horvitz 1992). The protection of adjacent wildlife values usually being a high priority among the various resource agencies, impacts occurring as a result of such activities are not expected to be significant; however, they should be closely monitored.

Roads and Power Transmission Lines. To meet increasing energy demands, an estimated twofold increase in electrical power transmission facilities across the California deserts is expected by the year 2000. Construction and maintenance of these facilities results in direct habitat loss, increased "road-kills" for native wildlife, increased public access and potential for illegal hunting and possession of sensitive species, potential impacts from significant noise sources and electromagnetic radiation, and an increase in predatory bird populations. In addition, powerlines contribute to bird mortality through electrocution and, particularly where constructed across wetland habitats, by birds striking the wires at night. It is estimated that between 62 to 99 acres of land are impacted for each 0.62-mile of transmission line due to construction activities (Robinette 1973). Studies conducted in the Mojave Desert indicate that the natural recovery time required for perennial vegetation disturbed by powerline construction ranges between 33 to 100 years. Long-term disturbance to habitat along roads and transmission line corridors occurs through continued use of access and service roads by maintenance personnel and OHVs, as well as the proliferation of unauthorized roads created by OHV users.

Off-Highway Vehicles. Off-highway vehicles are involved in competitive racing events, casual off-road use, camping, law enforcement activities, and maintenance of power transmission lines. The BLM and CPS currently administer approximately 148 square miles of land in Imperial County for OHV use. The CPS plans to extend the Ocotillo Wells State Vehicle Recreational Area eastward into 45 square miles of habitat currently used by the flat-tailed horned lizard, pending the transfer of land ownership from the BLM. Extension of the Ocotillo Wells State Vehicle Recreation Area into flat-tailed horned lizard habitat may require formal consultation with the USFWS Enhancement Field Office in Carlsbad pending listing of this species. Impacts of OHVs on desert ecosystems are complex and well-documented. One of the most important and persistent effects is soil compaction, which is a contributing factor to soil erosion and a cause of decreased plant growth. A single vehicle pass can destroy algal crusts, which play an important role in surface soil stability, annual plants in the process of germination, and even mature plants (Wilshire 1983). More often, native vegetation is impacted indirectly by erosion and sedimentation caused by vehicular denudation of adjacent land. Loss of vegetation due to OHVs reduces the amount of cover and forage material available to wildlife.

Direct evidence of injury or death to desert reptiles and other wildlife due to crushing and harassment by OHV activities has also been documented by researchers. Furthermore, the high-intensity noise from massed off-road motorcycles has been shown to severely damage the acoustical sensitivity of many reptile and bird species. The importance of hearing to desert fauna is related to prey acquisition and predator avoidance, since many animal sounds fall within the frequency range of hearing which is lost after exposure to significant OHV noise levels (Brattstrom and Bondello 1983).

Geothermal, Oil and Gas Development. Many geothermal resource areas and oil and gas leases occur near the Salton Sea National Wildlife Refuge. Although the area required for the development of such facilities is relatively small (e.g., on the order of 100 acres), associated noise impacts from cooling towers, drilling and power plant operation, as well as human disturbances, can affect a much larger area. Depending on the amount of oil or gas available, however, direct impacts to biological resources from the extraction of these materials could be more extensive than that of geothermal resources because they require comparatively more well pads, maintenance roads, and other facilities. In addition, toxic emissions of arsenic, boron, ammonium salts and hydrogen sulfide from cooling towers and spray ponds can be carried large distances by wind drifts. Accidental and controlled brine spills from geothermal fields also impact soil salinity. Finally, roads constructed for geothermal, oil and gas development may attract OHV users, resulting in additional habitat destruction in previously pristine areas.

Sand and Gravel Extraction. Sand and gravel extraction within Imperial County is expected to increase 10-15% annually. Extraction areas for existing permits in the County range in size from five to 640 acres, and average about 80 acres. Over 543 acres are permitted for extraction in the Yuha Desert ACEC. Direct habitat loss, road kill, and indirect noise impacts to wildlife occur from quarry operations and unauthorized intrusions by OHV users off of main access roads.

Mining. Numerous mining claims and associated assessment work, exploration and development occur within sensitive desert tortoise habitat in the northeastern portion of Imperial County. A much higher mineral potential exists in the eastern, rather than the western portion of the County. Mining impacts are also evident at the Gold Fields, Picacho, and Cargo Muchacho sites in southeastern Imperial County. The potentially significant effects to biological resources in these areas are difficult to quantify. However, impacts to the desert tortoise from mining include habitat loss and the direct loss of individuals. Each mining project is evaluated individually and requires a Section 7 consultation with the USFWS and habitat compensation for residual impacts due to habitat loss. Such compensation, negotiated with the BLM, typically involves off-site mitigation whereby one acre of good desert tortoise habitat is purchased by the project proponent and turned over for protection by the BLM for each acre of poor habitat that is lost, or three to four acres of good habitat are used as compensation for each acre of good or moderate habitat that is lost.

Numerous gold mining claims have recently been staked out on BLM land in the Arroyo Salada region, where CPS is proposing to expand its Ocotillo Wells State Vehicle Recreational Area. The presence of gold may preclude BLM's lease of this land to CPS. If gold is found, it would be extracted by excavating large areas of earth (i.e., strip mining) and extracting relatively small amounts of ore with cyanide. Cyanide leaching ponds represent potential threats to migratory birds. A variety of mitigation measures are designed and implemented on a project-specific level to minimize impacts to birds. These mitigation measures include hazing, the use of nets and covers over ponds, artificial raptor calls, and other means. Projects are monitored by the BLM and mitigation measures are redesigned or added as required.

Habitat Fragmentation. Fragmentation occurs when a large expanse of habitat is transformed into numerous patches of smaller total area. These fragments are then isolated from each other by a matrix of habitats or land uses unlike the original. When the area surrounding the patches is inhospitable to species of the original habitat, and when species dispersal is low, the fragments become habitat "islands" and the populations of animals within the islands become isolated. The probability for local extinctions increases within these fragments due to either a reduction in total habitat area or redistribution of the remaining area into disjunct habitats (Wilcove et al. 1986). Reduction in total habitat area reduces population size and commonly results in loss of habitat homogeneity. A seemingly uniform expanse of creosote bush scrub, for example, is actually a mosaic of different microhabitats. Individual fragments may lack the full range of habitat elements found in the original contiguous block; therefore, fragmentation increases the vulnerability of patchily, distributed species like the flat-tailed horned lizard to local extirpations. Habitat fragmentation due to urban development and roads also decreases the likelihood of successful immigration and emigration (i.e., blocking of wildlife corridors), thus affecting wildlife dispersal. Small, fragmented populations are also more susceptible to inbreeding and loss of genetic variation, due to a decrease in genetic drift (Lacy 1988).

3. Mitigation Measures

Site-specific measures may be required of future development proposals as mitigation for potential impacts to significant biological resources that could result from their implementation. The design of such measures shall be based on a field reconnaissance conducted by a qualified biologist, and documented in a report to be submitted to the County Planning Department and relevant resource agencies for review and approval. Such reports shall include, at a minimum, a map of the specific biological resources occurring on the subject property, a description of sensitive species and habitats, an evaluation of potential impacts to these resources based on the proposed development plan, and recommended mitigation measures, if necessary. The range of on-site and/or off-site mitigation measures includes proposed open space easements to preserve sensitive resources, revegetation plans to fully compensate for the direct loss of sensitive biological habitat, or other feasible options such as conversion fees or mitigation banking, to be determined by future biological studies.

All recommended mitigation measures from these future biological field surveys shall become conditions of approval on subsequent development projects, subject to approval by the County. In addition, the applicant shall submit the necessary permits, where applicable, to the relevant resource agencies for review and approval. All conditions specified by these approved permits shall also become conditions of approval.

In addition to the measures discussed above, the general mitigation measures listed below should be considered during subsequent environmental review of future development projects that implement the Imperial County General Plan. Some of these measures are also stated policies of the General Plan Conservation and Open Space Element:

- Preserve the native habitat of sensitive plants and animals through the dedication of open space easements, and by other means that will ensure their long-term protection and

survival. Appropriate areas containing significant biological resources, as determined by subsequent biological studies for future development proposals, shall be preserved in perpetuity.

- The environmental studies conducted for each SPA shall include a biological study conducted by a qualified biologist, and a Notice of Preparation shall be sent to the U.S. Fish and Wildlife Service and the Bureau of Land Management.

- All open space set aside for the protection of significant biological resources shall be placed in open space easements and dedicated to the County. Grading, erection of any structures (permanent or temporary), placement of utilities or any other facility, or vegetation addition or removal shall be prohibited within these future biological open space easements, except that vegetation may be selectively removed upon written order of the appropriate fire control authority for the express purpose of reducing an identified fire hazard. Fencing and signage may also need to be placed within these easements to discourage unauthorized intrusions and other indirect impacts from human activities associated with future developments.

- Areas designated for biological open space preservation shall include buffers, which provide important breeding and foraging habitats for native and migratory birds and animals. Such buffers shall serve to separate future development from adjacent native habitat areas to ensure the perpetual regeneration of these habitats.

- Protect riparian habitat and other types of wetlands from loss or modification by dedicating open space easements with adequate buffer zones, and by other means to avoid impacts from adjacent land uses. Road crossings or other disturbances of riparian habitat should be minimized and only allowed when alternatives have been considered and determined infeasible.

- Rock outcrops which serve as significant boulder habitat for sensitive biological resources shall be preserved and integrated into the design of dedicated biological open space easements.

- Preserve California fan palms and other individual specimen trees which contribute to the community character and provide wildlife habitat.

- Habitat restoration plans shall be submitted and approved by the Imperial County Planning Department and relevant resource agencies for the mitigation of sensitive habitat lost, and for disturbed areas created by roads or installation of facilities adjacent to native habitat. Such plans shall mitigate for the loss of sensitive habitat and habitat value based on a ratio consistent with accepted policy, with consideration given to recommendations by the State and federal resource agencies. See discussion below for more information relative to habitat restoration plans.

- Projects within or in the vicinity of a resource area, as shown on Figure 14, shall be designed to minimize adverse impacts on the biological resources it was created to protect.

- Preserve and encourage wildlife corridors, which are essential to the long-term viability of wildlife populations, through open space easements or other appropriate means.

- Integrate open space dedications in private developments with surrounding uses to maximize a functional open space/recreation and wildlife management system.

- Landscaping shall be required in all developments to prevent erosion on graded sites and, if the area is contiguous with undisturbed wildlife habitat, the plan shall include revegetation with native species that are compatible with the surrounding or pre-existing plant community.

- Clearing of shrubs, vines, and other native vegetation for purposes of fire control shall be coordinated with the local fire protection district, particularly in fire-prone areas. Where clearing is necessary, high-fuel plants shall be replaced with native, low-fuel plants. Where feasible, fire buffer clearing shall be done by hand so as to minimize disturbance to understory species. A list of important understory groundcover, shrubs, vines, ferns, and other vegetation shall be compiled by a qualified biologist, and included in all required landscape plans prior to final approval of individual projects.

Habitat Restoration Plans. Planting specifications for proposed habitat restoration sites shall be included in all required revegetation plans. These specifications shall include, at a minimum, the following:

- Locations of ecologically appropriate planting areas.

- Site preparation/remedial grading. Soils shall be recontoured to match surrounding natural topography and natural watersheds shall be maintained, to the extent possible.

- Amounts, sizes, and locations of appropriate overstory tree species to be planted.

- Hydroseed/container stock planting mixes and locations for appropriate understory shrub species and groundcovers.

- Timing of planting (for example, most plantings should be conducted during the rainy season).

- Protective measures during and after plant installation, such as temporary chainlink fencing to keep out construction equipment/personnel; caging to avoid potential herbivory (animal browsing); and permanent wood-rail fencing or signage to deter human intrusions. This would also reduce potential impacts caused by future active uses, or "edge effects," from adjacent residential areas.

- Irrigation schedule which specifies timing, frequency, length, and method of watering to ensure successful plant establishment. For example, temporary irrigation through the use of drip emitters should be installed around each tree to encourage deep tap rooting. Irrigation may only be necessary for the first one or two years, but could be extended throughout the monitoring period as determined necessary by the consulting biologist.

- The proposed habitat restoration sites shall be monitored for a period of three to five years to ensure long-term plant survivorship. Monitoring shall be conducted by a qualified biologist proficient at horticultural and botanical sampling methods. The biological monitor shall be present at the time of plant installation to ensure correct implementation. The monitoring program shall clearly specify success criteria (e.g., percent vegetative cover for shrub species, percent canopy cover for tree species, etc.) to be evaluated by the biological monitor. Annual reports detailing the progress of the revegetation effort in attaining these goals shall be submitted to the Imperial County Planning Department and relevant resource agencies.

- A maintenance program shall be implemented for the length of the monitoring period. Primary goals of the maintenance program shall include staking, weed control and replacement of planted material that is diseased or has died. If the proposed restoration sites are not meeting stated goals of the Plan, supplemental remedial measures, such as additional weed control or replacement plantings, shall be recommended during the monitoring and maintenance period. A bond or other security may be required to assure that necessary monitoring and management of the revegetation site is properly done.

F. Cultural Resources

1. Existing Conditions

A generally accepted outline of Imperial County culture history is recognized by the archaeological community, with the realization that many details are not yet well understood. This culture history is based on the pioneering work of Malcolm Rogers in the Colorado and Sonoran Deserts (Rogers 1939, 1945, 1966). Several overviews and syntheses have since contributed new data and interpretations (e.g., M. Weide 1976; Crabtree 1981; Warren 1984). Most culture history reconstructions derive from survey data and surface-collected artifacts with uncertain chronological controls. Site excavations to date (e.g., Gallegos 1980) confirm suspicions that the establishment of cultural affiliation of many sites may remain an impossible task. Only at Late Prehistoric ceramic-bearing sites will more precise cultural reconstructions be possible (Wilke 1976).

a. Culture History

Six successive cultural patterns may be defined for the Colorado Desert, including Imperial County, extending back over at least 12,000 years. They are: 1) Malpais, 2) San Dieguito, 3) Pinto and Amargosa, 4) Patayan, 5) Historic Yuman, and 6) Historic Euro-American. The cultural resources associated with these patterns may be summarized as follows.

Malpais (Early Man) Pattern. The Malpais Pattern is represented by archaeological material hypothesized to date back more than 12,000 years Before Present (BP) (Hayden 1976; von Werlhof et al. 1977; Davis, Brown and Nichols 1980). The term was originally used by Rogers (1939, 1966) for ancient-looking cleared circles, tools, and rock alignments that he later classified as San Dieguito I. The term continued to be applied to heavily varnished choppers and scrapers found on desert pavements of the Colorado, Mojave, or Sonoran deserts that were thought to predate the San Dieguito Culture. Although few refute that most of the artifacts are culturally derived, dating methods remain extremely subjective and have been assailed on numerous grounds (Taylor and Payen 1979; McGuire 1982:160-164). Arguments for Early Man in the Colorado Desert are further eroded by the redating of the "Yuha Man" found in the Yuha Desert in the early 1970s: originally dated to over 20,000 years BP, more reliable dates now place the burial at about 5,000 years BP.

San Dieguito Pattern. Most pre-ceramic lithic assemblages, rock features, and cleared circles in the Colorado Desert are assigned to the San Dieguito Complex (von Werlhof 1984), dating between 7,000 and 12,000 years BP. Rogers first defined this complex based on desert surveys, but later refined his constructs with excavated material from the C.W. Harris site in San Diego County (Rogers 1939, 1966). He recognized three San Dieguito phases, with each characterized by the accumulation of new, more sophisticated tool types.

San Dieguito lithic technology is based on primary and secondary percussion flaking of cores and flakes. San Dieguito I and II phase tools include bifacial and unifacially reduced choppers and chopping tools, concave-edged scrapers, bilateral-notched pebbles, and scraper planes.

Appearing in the San Dieguito II phase are finely-made blades, smaller bifacial points, and a larger variety of scraper and chopper types. The San Dieguito III phase tool kit is appreciably more diverse with the introduction of fine pressure flaking. Tools include pressure-flaked blades, leaf-shaped projectile points, scraper planes, plano-convex scrapers, crescentics, and elongated bifacial knives (Rogers 1939, 1966; Warren and True 1961; Warren 1967). Due to a lack of chronological indicators, Rogers' phase designations as chronologically successive changes of a long-lived culture have not been substantiated. Indeed, phase distinctions may be due to economic specialization at specific site loci or to sampling error.

The San Dieguito Complex is a hunter-gatherer adaptation based on small mobile bands exploiting game and seasonally available wild plants. The absence of ground stone is seen as reflecting a lack of hard nuts and seeds in the diet, and as a cultural marker separating the San Dieguito from later patterns. Portable manos and metates are now being recognized at coastal sites dated in excess of 8000 BP and in association with San Dieguito III adaptation, and arguments are being made for the presence of a developed grinding tool assemblage in earlier periods (Ezell 1984). Pendleton (1984:68-74) also remarks that most ethnographically documented pounding equipment for processing hard seeds and wild mesquite and screw beans were made out of wood and not preserved in the archaeological record.

San Dieguito sites are characteristically located on flat areas and the largest aggregations occur on mesas and terraces overlooking the larger washes or around lake edges. These are areas where water and various plant and animal resources were seasonally available. Pendleton (1984) has made a strong case, based on ethnographic analogy from Colorado River based tribes, that San Dieguito occupation in the eastern Colorado Desert was focused on the river floodplain. Surrounding desert areas were used only for special resource utilization within a restricted foraging radius.

Pinto and Amargosa Patterns. The Pinto Complex, dating between 7000 and 4000 BP, and the Amargosa Complex, dating between 4000 and 1000 BP, were regional manifestations of a diversified hunting and gathering Desert Culture that enveloped the Great Basin and California Deserts (Warren 1984). Most tool types are similar to the San Dieguito, but notched and large-stemmed projectile points and more frequently occurring manos and metates identify these later sites. These complexes are not well represented in the Colorado Desert due possibly to few diagnostic tool types, little use of the area, or site disturbance by fluctuations of Lake Cahuilla. Indian Hill Rockshelter, on the eastern periphery of the Peninsular Ranges, exhibits Amargosa and Late Prehistoric material in a multi-component context (Wallace et al. 1962; Wilke et al. 1986). This shelter is virtually the only 'in situ' evidence of this period in the Colorado Desert, and was apparently used sporadically by mobile hunter-gatherers in small groups (Wilke et al. 1986). Desert bighorn sheep, rabbits, and plant materials were exploited as early as 4000 B.P. By 2500 B.P., hunter-gatherers used the shelter more frequently and more intensively. Stone-lined storage pits, grinding implements, and cultural materials associated with residence suggest that the shelter served increasingly more as a sedentary residence and resource processing and storage base.

Patayan Pattern. The advent of the Patayan Culture in Imperial County coincides with the filling of Lake Cahuilla at about A.D. 1050. Rogers (1945:169) identified this culture as ancestral to the modern Yumans based on technological similarities and site distributions. Patayan village and temporary camp sites are characterized by pottery and lithic scatters, groundstone implements, cremation burials, fire hearths, house pits, and midden deposits containing shell, bone, charcoal and other organic remains. Site types range from trail systems and lithic quarry loci to extensive occupational complexes.

The Patayan sequence is divided into three periods distinguished by pottery types and regional site distributions. Patayan I sites are found on the Colorado River and east into Arizona. Dating between A.D. 500 and 1050, this period is marked by riverine-oriented hunter-gatherers. Patayan II is characterized by a spread into the California and Mojave Deserts between A.D. 1050 and 1500-1600. This is the period of major Lake Cahuilla infillings and the periodic occupation of the relic east and west shorelines. Extensive midden deposits, including preserved human coprolites retrieved from excavations at Myoma Dunes near Indio, provide the most detailed picture of subsistence and diet of people on the shoreline (Wilke 1976). Shellfish, fish, waterfowl, cattails, and mesquite beans were consumed along with various other resources. Current models for occupation on the west shoreline emphasize a seasonal occupation by groups whose main territory was in the eastern Peninsular Range (Graham 1981; Shackley 1984). The east shoreline was occupied by people from the Colorado River. A late spring-early summer occupation of the shoreline is suggested by the presence of fish and cattail and mesquite pollen in midden deposits at Dunaway Road (Schaefer 1986) and Myoma Dunes (Wilke 1978). Wilke proposed that the shoreline sites were intensively-used "villages" occupied much of the year by large populations, but Weide (1976) contends that shorelines were occupied by small groups staying only a short time. Current research, including low artifact densities along the southwest and east shorelines (Gallegos 1984a, 1984b), supports the Weide model (Graham 1981:148-150; Shackley 1984:30ff). If the Lake Cahuilla shores were occupied by short-term seasonal encampments, then many of the Patayan II base camps may exist at the eastern foot of the Peninsular Range near perennial streams and springs and in ecotones between the Upper and Lower Sonoran life zones, which were characterized by a wide variety of resources.

After numerous recession and infilling sequences, Lake Cahuilla receded for a final time after A.D. 1580. This marks the beginning of the Patayan III period, when the population made final use of the receding shoreline habitats. As the lake became too saline to maintain lacustrine life, probably below the 100-foot BMSL contour, the population abandoned the shoreline and instead focused on mesquite dunes, springs, wells, and arable lands along the New and Alamo Rivers and spread south to the Gulf of Baja, west to the Peninsular Range, and east to the Colorado River. Increased Patayan III site densities along the eastern Peninsular Range suggest that the final recession caused major population shifts by people whose primary subsistence had been the Lake Cahuilla lacustrine habitat, and there is evidence for increased exploitation of agave in the Upper Sonoran life zone (Shackley 1984). Weide, however, suggests that only minor shifts in scheduling were required to compensate for the lost seasonal resources. In any event, the East and West Mesa areas apparently became a marginal resource collection zone fit only for extractive temporary camps, or for trail connections to more favorable east and west environments (Weide 1976:89-90).

Ethnohistoric Yuman Pattern. The Bautista de Anza expedition traveled through the Imperial Valley in 1774-1775 and encountered groups calling themselves Kamia. Research has demonstrated that these people were a desert subgroup of the Kumeyaay (Diegueño), whose territory included coastal and inland regions of San Diego County. Few trips by Anglos through Imperial County up to the mid-1800s resulted in accurate observations on the lifeway of the Kamia as most early travelers were preoccupied with surviving the harsh desert environment. The 1849 Heintzelman expedition estimated that 254 people under the leadership of Chief Fernando were inhabiting the New River (Gifford 1931:16), but certainly many more people also resided along the Alamo River and other habitable areas (Barker 1976:23). In addition to the Kamia, Imperial County was also occupied by the Quechan along the lower Colorado River, and by the Desert Cahuilla in the northern Salton Trough and extending into Coachella Valley.

Recorded folk traditions and oral histories discuss aboriginal lifeways in the Imperial Valley after the desiccation of Lake Cahuilla, but make no direct cultural connection with the prehistoric Patayan culture. The version of the Kamia origin myth recorded by Gifford (1931:79) describes them as having come from the north and on the Colorado River, moving to the eastern shore of Lake Cahuilla. When the lake dried up they moved to such localities as Xachupa (Indian Wells), Saxnuwai (near Holtville), and other communities. Given linguistic affinities with the Kumeyaay, the Kamia origin story clearly deviates from the more likely proposition, given by Gifford's main informant that they descended from the Peninsular Range about three centuries before (Gifford 1931:82).

The Kamia built dams and ditch systems to irrigate land along the New and Alamo rivers. Annual flooding of the Colorado River made desert cultivation of corn, beans, squash, pumpkins, gourds, and watermelon possible. This practice may have been borrowed from the Quechan of the Colorado River, or as early as Patayan III times, as an adaptation to resources lost by the recession of Lake Cahuilla. The Kamia also relied on mesquite and screwbean, and on wild animal and plant foods in riverine, wash, and desert habitats. Vegetal foods were processed with ground stone manos and metates or wooden mortars and pestles. Fish were caught and small to medium sized game were hunted. The Kamia also exchanged vegetal foods, baskets, eagle feathers, and carrying nets with the Kumeyaay and the Quechan, and acted as trade intermediaries between these groups. All three groups maintained political alliances against other tribes to the north and south (Gifford 1931; Forbes 1965; Forde 1931).

Major base camps were located in the eastern Peninsular Range, such as the Jacumba area, and at the base of the Peninsular range in areas like San Sebastian Wash and San Felipe Wash (Spier 1923:301-302). Apparently the agricultural settlements in Imperial Valley were extremely marginal and not intensively occupied. To the extent that overflow from the Colorado River provided sufficient water for irrigation, the Kamia occupation of the New River and adjacent regions may have involved more permanent settlements at some locations. During wet years in the mid-1800s, the New River was normally occupied by the Kamia along its entire length; during drought periods they dispersed to other areas.

Disease, warfare, drought, white settlement, and assimilation into Anglo Imperial Valley or Indian Reservations brought an end to the Kamia as a cultural entity by the 20th Century. The

last recognized Kamia chief died in 1905. Direct descendants of some of the Kamia may be found on the Kumeyaay Reservations of Campo, Cuyapaipe, Viejas, Manzanita, and Sycuan. Descendants of those who married into other tribes may be found on the Quechan Reservation at Fort Yuma, the Cocopah Reservations near Somerton, and at the Colorado River Reservation at Parker.

Historic Euro-American Pattern. Hernando de Alarcon and his Spanish soldiers, in 1540, were the first non-Indians to discover Alta California, from near the present intersection of Interstate 8 and Highway 186 on the Colorado River. For most of the next 350 years, the early history of Imperial County centered around exploration, travel, and transportation. Thousands of early missionaries, travelers, explorers, and settlers traversed the arid desert after crossing the Colorado River on the way to coastal southern California. Most of the earliest use of the area was restricted to the West Mesa, or Yuha Desert; the inhospitable sand dunes of East Mesa discouraged early historic exploration and utilization of this area. Numerous Imperial County historic details are provided in recent reviews by Lawton (1974), Norris and Jacques (1980), and Anderholt (1987).

The first historic phase of Euro-American use of Imperial County may be identified as the Spanish Period, from 1769 to 1821. Upon establishing Mission San Diego in 1769 and a chain of missions up the Pacific Coast, a land route between Sonora and the coast became critical for establishment of the Spanish frontier. The first known Spaniard to see potential passes through the Peninsular Range was Father Francisco Garcés in 1771, although he did not venture north or west from near Calexico and Mount Signal. The first white man to actually enter the Yuha Desert was Pedro Fages, a captain commander at Mission San Diego who reached Imperial Valley from San Diego in 1772 when pursuing deserters. Captain Juan Bautista de Anza, of the presidio at Tubac on the Sonoran frontier, led an expedition of 33 members in 1774-1775 from Baja California across the present U.S.-Mexico border near the base of Mount Signal and through western Imperial County up to Borrego Valley.

Enthusiasm over Anza's opening of a land route was such that a second Anza expedition consisting of 240 persons and 1,000 animals crossed the Yuha Desert in December 1775. This trip doubled the colonist population of Alta California and pioneered a land route that was used extensively for several years. Two mission outposts were established on the Colorado River to ensure the viability of the Anza Trail in 1780, but cruelty towards the Indians led to a rebellion the following year. The Yuman Indians destroyed the missions and killed settlers, soldiers, and four priests including Father Garces who had participated in both Anza expeditions.

Lt. Col. Pedro Fages led a punitive force against the Yumans and then traveled along the Anza Trail to and from Mission San Gabriel in 1782. On a second trip to the mission later that year, Fages discovered the Carrizo Corridor, a route that eventually replaced the Anza Trail. Efforts to maintain overland connections between coastal California and Sonora ceased in August 1786 due to conflicts with the Yumans along the Colorado River and Apaches in Arizona.

The Mexican Period, from 1821 to 1848, was associated with a renewed interest to establish an overland route from Sonora to the California coast. Following a few expeditions that crossed

portions of Imperial County, the Sonora Road was established in late 1825 as the official mail route. From the Yuma crossing, the route followed the Anza Trail as far as Carrizo Creek, then turned westward through the Carrizo Corridor to Vallecito before splitting to San Diego or Temecula. Several Mexican and Indian skirmishes occurred in the late 1820s, resulting in numerous deaths in the desert. Following a few years of little use, travel along the route increased in 1835 and, toward the late 1830s, the southwestern portion of the route that had been south of the U.S.-Mexico boundary shifted north to near present-day Seeley. In 1846, General Stephen M. Kearny, leading a military march of 1,500 miles to San Diego, made a difficult trip across the Yuha Desert and up the Carrizo Corridor. Several weeks after Kearny's trip, Lt. Col. Philip St. George Cooke led the Mormon Battalion of about 350 members from Iowa to San Diego, with a primary objective of establishing a wagon road to California. Although an extremely difficult trip, this group was the first to make a passage across the desert by wagon.

The American Period, beginning in 1848, immediately resulted in the firm re-establishment of the old Sonora Road, which became known as the Southern Emigrant Trail. The route passed through Mexico from Yuma and crossed the U.S.-Mexico border near present-day Calexico. In Imperial County, the route passed through Indian Wells on the New River southwest of El Centro, and northwest to Carrizo Creek and up to Vallecito. The Southern Emigrant Trail was used extensively by military teams, Forty-niners, and Anglos moving to California. Also in 1848, a mail route was established between Yuma and San Diego. This route followed the Southern Emigrant Trail from Yuma to just east of Coyote Wells before ascending up past Mountain Springs. Mail service increased and from 1858 to 1861 the Butterfield Overland Mail, designed to carry mail and passengers between Missouri and San Francisco, traveled along the Southern Emigrant Trail. Approximately 50,000 travelers used the route during this period, and a short-lived camp named Camp Salvation was established near present-day Calexico and the New River to provide water. There was steady traffic along the trail until 1865 when the Smith-Groom County Road, a new road over Mountain Springs and up through Jacumba, was opened.

Irrigation water was first delivered to the Imperial Valley in June 1901, by the California Development Corporation. Water from the Colorado River was diverted through a channel cut in Mexico to the Alamo River. After crossing the International Border east of Calexico, water was diverted from the stream to irrigate crops. Until this time, although many people traveled through Imperial County, the area held little attraction for settlers. Irrigation by the Alamo Canal Project soon led to a substantial population base in the area and the establishment of several towns. More irrigation ditches were completed and rapid development occurred as settlers poured into the area. The townsites of Imperial, Brawley, Calexico, Heber and Silsbee were laid out and 15,000 people were attracted to the area. A branch line of the Southern Pacific Railroad was extended south through Imperial Valley to Calexico in 1903, and additional branch lines were constructed over the next few decades. El Centro and Holtville sprang up and a railway connecting them was built in 1904. A demand for new and better roads resulted in the construction of a seven-mile long plank road over the sand dunes between Imperial Valley and Yuma in 1914. Other portions of the road between Yuma and San Diego were surfaced by 1924, and a wider two-lane road was paved in the early 1930s.

In 1905 the Colorado River flooded and ran uncontrolled through Imperial Valley, creating the Salton Sea and inundating 488 square miles of farmland. Several decades were required to improve the water delivery system, culminating in the completion of the All American Canal, which replaced the Alamo Canal, in 1941.

b. Availability of Cultural Resources

Prehistoric Resources. Approximately 7,000 prehistoric archaeological sites have been recorded in Imperial County (Jay von Werlhof, personal communication). A wide variety of site types are represented including settlements, trails, rock art, geoglyphs, fish traps, resource procurement and manufacturing locations, etc. The current distribution and availability of such resources are a consequence of several environmental and historic factors. Environmental factors include the periodic flooding of ancient Lake Cahuilla and the existence of the New River and Alamo River, all of which encouraged prehistoric settlement and resource use in the vicinity of their shorelines and riverbanks. At the other extreme, an environmental feature that discourages the likelihood of finding prehistoric cultural resources is the Algodones Sand Dunes. From a historical standpoint, the intensive use of Imperial Valley for irrigation agriculture since the beginning of this century has impacted any resources that may have existed on land that is now farmland or under the Salton Sea.

A sensitivity map, prepared by Mr. Jay von Werlhof of Imperial Valley College for this EIR, illustrates general areas that are very sensitive, moderately sensitive, and not expected to contain prehistoric resources (Figure 16). As indicated in Figure 16, few highly sensitive resources exist within the major populated and developed portion of the County, and this is precisely the area that has been intensively farmed. The important exceptions in this area include the New River and the Alamo River which, as described above, were extensively utilized by the Kamia as late as the mid-1800s. Irrigation agriculture has also impacted sensitive resources that presumably existed near Palo Verde. The only non-agricultural areas that are expected not to contain resources are the immediate east and west sides of the Salton Sea, and the Algodones Sand Dunes.

Other areas that are highly sensitive include the vicinities of the west and east Lake Cahuilla shorelines, lower Borrego Valley extending east to Highway 86, the southwesternmost portion of the County centered around Ocotillo, a portion of the Pilot Knob Mesa area east of Glamis, and the entire easternmost portion of the County including the Palo Verde Mountains and the area between Ogilby Road and the Colorado River.

Areas that are moderately to lightly sensitive include most of the Chocolate Mountains and portions of East Mesa, West Mesa, the Fish Creek Mountains, and the Superstition Mountains. The lack of water and relative harsh terrain combined to discourage major use of these regions. However, significant resources have been found in these areas and additional archaeological research will no doubt lead to the discovery of others.

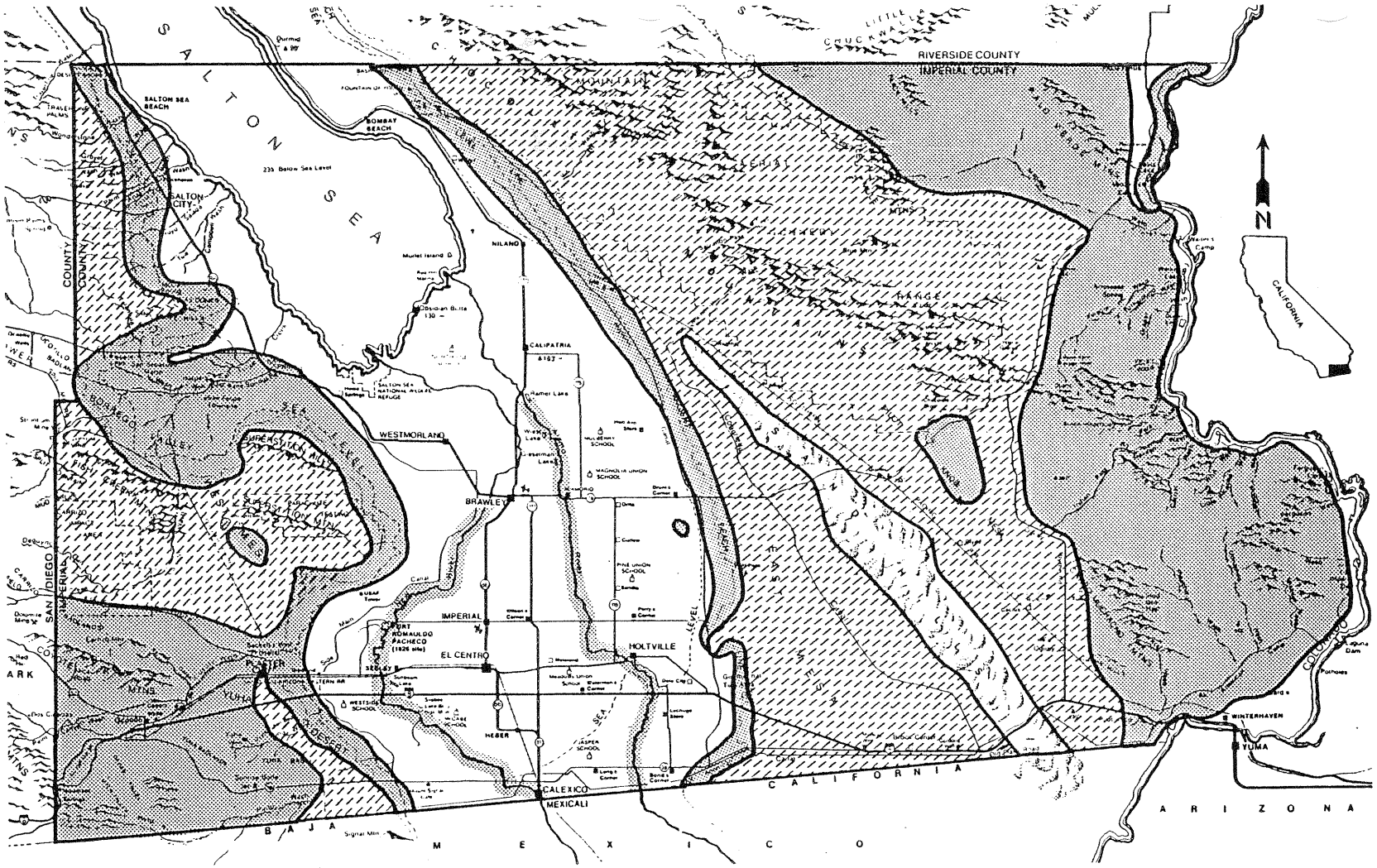
Historic Resources. Approximately 200 historic sites have been recorded in Imperial County (Jay von Werlhof, personal communication). Important historic resources date back to 1540,

when the Hernando de Alarcon Expedition discovered Alta California from near the intersection of Interstate 8 and Highway 186 on the Colorado River (California Registered Historical Landmark No. 568). The next major historical event occurred in 1775 when Juan Bautista de Anza first passed through the area. The Anza Trail itself constitutes a significant cultural resource in the Yuha Desert, as does the later Sonoran/Southern Emigrant Trail which, as summarized above, served as a major route to and from coastal California from 1825 to 1865. The general locations of these trails are illustrated in Figure 17. Although very few structures or artifacts may remain from the use of these trails, the routes themselves are of historical significance. As described in the *Current Land Use Element for Yuha Desert Planning Area, Imperial County, California, General Plan* (adopted March 20, 1973 by the Imperial County Board of Supervisors), the corridor of historic trails joining the Yuha Desert with, and passing through, the Anza-Borrego Desert State Park, represents an area and physical records "of such a nature as to be of State or National importance" (p. 4). The Anza Trail has since become formally recognized to be of national significance by an Act of Congress that dedicated the Juan Bautista de Anza National Historic Trail. Several historical markers have been established along the Anza Trail, including the monument of Los Puertecitos (California Registered Historical Landmark No. 635) near Highway 78 and Kane Springs Road.

Two additional significant resources that stem from the Spanish period are the La Purisima Concepcion Mission site (California Registered Historical Landmark No. 350), located at Mission St. Thomas on Indian Hill, and the San Pedro Y San Pablo de Bicuner Mission site (California Registered Historical Landmark No. 921), located near Laguna Dam. The former was constructed in 1780 at the request of the local Indians, and the latter in January 1781 as a strategic settlement for those crossing the Colorado River. Both were attacked and destroyed on July 17, 1781 by the Quechans.

One of the few known historic sites from the Mexican period is Fort Romualdo Pacheco (California Registered Historical Landmark No. 944). Located about seven miles west of Imperial near the New River, this fort was the only Mexican fort in Alta California, and was constructed to help maintain the Sonoran Trail. It was constructed in 1825 and attacked by the Kamia on April 26, 1826, resulting in the deaths of three soldiers and the fort's abandonment. Adobe walls about two and a half feet high remained in 1968 but were leveled for agricultural purposes shortly thereafter. The site was excavated by Jay von Werlhof of Imperial Valley College in 1978.

Few early American period sites remain, since little settlement and other use occurred until the availability of irrigation water in 1901; most sites have been impacted by agricultural activities and the construction of towns. One American period site has received a historical monument for being the location where the first irrigation water entered the County. This monument is located a few feet from the U.S.-Mexican border on Barbara Worth Road, between Calexico and the Alamo River.



Very Sensitive

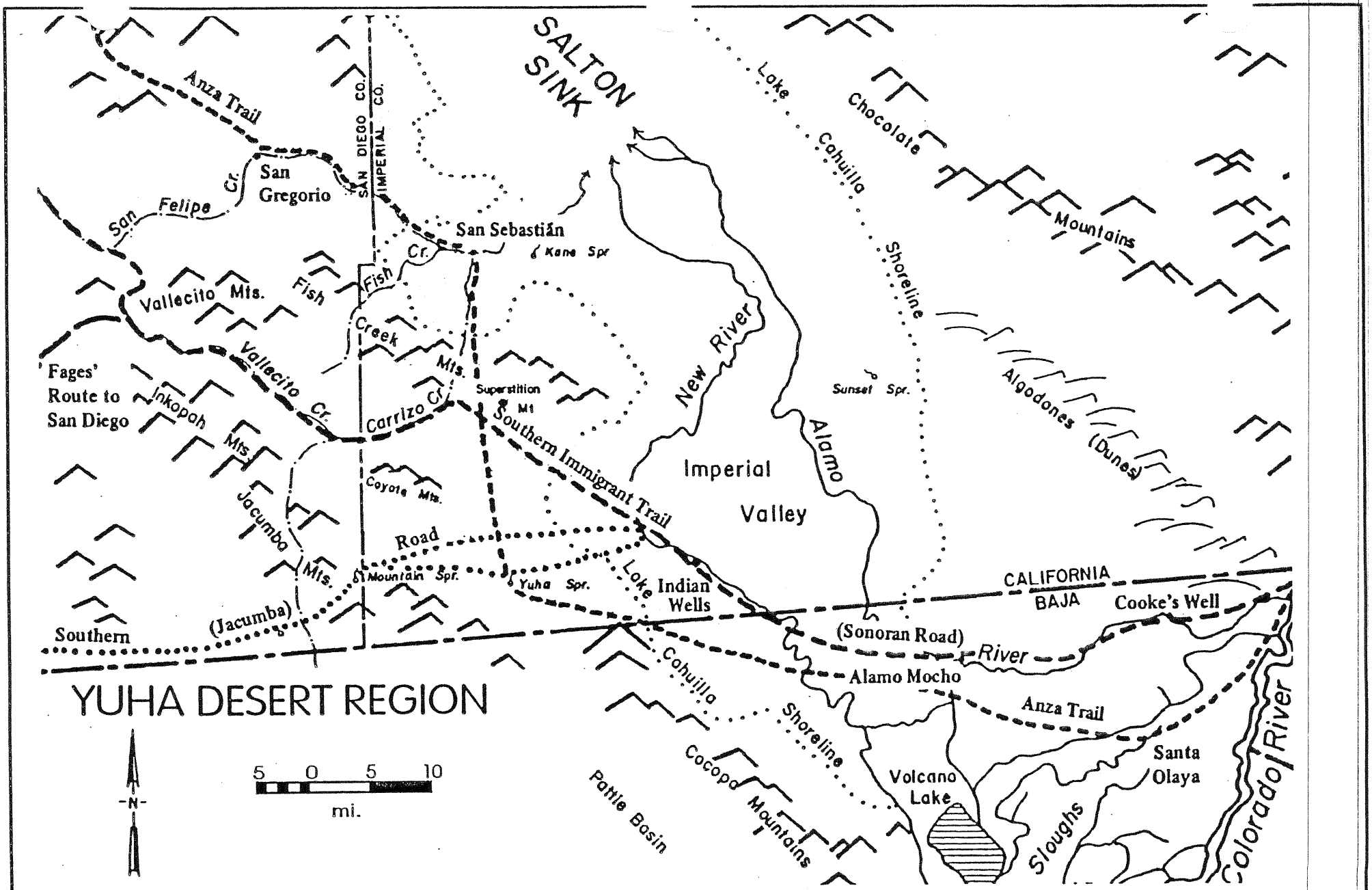
Moderate to Light

Zero to Rare

0 6 12 miles

N

Imperial County General Plan	Sensitivity Map for Cultural Resources	Figure 16



Imperial County General Plan	Major Historic Routes Across the Yuha Desert Region	Figure 17

Another significant historic site is the Plank Road near I-8 along the Algodones Sand Dunes. Utilized from 1914 to 1927, this seven-mile long road has been dedicated as California Registered Historical Landmark No. 845. Other sites of local historical importance are described in *Imperial Valley Historical Markers* (Little 1982). In addition, plant maps of the early 1900s indicate numerous structures throughout Imperial Valley. Although many of these structures are no longer standing, there is a potential for the existence of subsurface features such as house foundations, privies, and trash deposits at these locations. Information from these sites could contribute to an understanding of early settlement in the County.

Locations of contemporary Native American importance include the Quechan Reservation in southeastern Imperial County and a portion of the Torres-Martinez Reservation in northwestern Imperial County.

c. 1973 General Plan

The 1973 General Plan addresses the presence and management of cultural resources in only a minimal fashion. The Open Space Element, in a section titled "Ecological, Archeological, Other Scientific Sites," acknowledges that archeological sites exist in the desert region of the County and states that "It is essential that these sites or areas be determined and means of preservation adopted in order to guarantee their continued presence. Assistance by the academic and scientific communities may provide valuable input while assuring that the most fragile and significant sites receive priority" (15). This section then mentions the San Felipe Creek and Yuha Desert areas, and the Truckhaven Site west of Salton Sea Beach, as being prime areas for archeological resources including ancient man burial sites and intaglio figures. The Open Space Element also acknowledges the presence of significant historic sites in the San Felipe Creek and Yuha Desert areas, and calls for preservation of all significant historic sites including the Plank Road and Fort Yuma (31-32).

Brief reference to cultural resources is also made in the Conservation Element:

> "Mineral extraction, while often uncovering items of archeological significance, very often destroys the fragile setting and artifacts of the site. When considering applications for mineral extraction in areas of archeological or other scientific interest, an on-site evaluation of the site's historical or archeological value should be provided by the applicant. Such information must be prepared by a qualified archeologist" (43-44).

A similarly worded policy statement in the Conservation Element is as follows:

> "In areas of suspected archeological importance, professional evaluation of the archeological significance of a particular site is required prior to the approval or denial of an application to extract minerals" (45).

The Conservation and Open Space Element of the newly proposed General Plan provides a more comprehensive review of prehistoric, historic, and ethnographic resources in the County, and

provides several goal, policy and other statements that encourage the protection and conservation of these resources.

2. Environmental Impacts

Significant impacts to prehistoric cultural resources may result if development occurs on existing undeveloped land in Imperial County. Undeveloped land in the County largely consists of land which has not been intensively cultivated or urbanized. Significant impacts to cultural resources would be particularly likely to occur in areas indicated in Figure 16 as very sensitive, such as along the New River, the Alamo River, and the Lake Cahuilla shorelines, and also likely in those areas indicated as moderately to lightly sensitive. Should any development be proposed in these sensitive areas, cultural resource studies must be conducted to determine the existence of significant resources. Under the proposed General Plan, most future development activities would occur in existing farmland and residential areas; no significant impacts to prehistoric cultural resources are expected to occur at these locations.

Few known significant historic resources exist in Imperial County except for those located in the undeveloped desert areas, and most such resources have been designated as California Historical Landmarks or as places of local historical interest. As such, if development is restricted to existing farmland or residential areas, and away from documented historical sites, no significant impacts to historic resources are expected to occur. At the County-wide level, a potential exists for impacts to occur to undocumented historic sites, such as subsurface house foundations, privies, and trash deposits.

No impacts to the Quechan or Torres-Martinez Reservations are expected to occur under implementation of the proposed General Plan.

In comparison with the Conservation and Open Space Elements of the 1973 General Plan, the proposed General Plan offers a more comprehensive description of the status of cultural resources in Imperial County, including the general locations of highly and moderately sensitive prehistoric resources. The proposed General Plan also provides stronger language calling for the protection of cultural resources and for the scientific study and storage of these resources. As such, the new Plan represents an improvement over the 1973 Plan for the protection and management of cultural resources.

3. Mitigation Measures

Significant impacts to prehistoric cultural resources are not expected to occur in areas that have been or currently are utilized for agriculture, residential, or other types of intensive land use. No mitigation measures for prehistoric cultural resources are therefore required for projects that may be proposed in areas that have been entirely developed.

Significant impacts to prehistoric cultural resources would be expected to occur in areas that have been identified as very sensitive, moderately sensitive, or lightly sensitive (see Figure 16). These areas include especially the New and Alamo Rivers, areas around the ancient Lake

Cahuilla shoreline, the southwesternmost portion of the County around Ocotillo, and the easternmost portion of the County. Any project proposed in an area identified as very sensitive, moderately sensitive, or lightly sensitive shall require a cultural resource study for prehistoric resources by a qualified archaeologist.

Significant impacts to historic cultural resources could occur in both previously developed and undeveloped areas, although few historic resources are known to exist in intensively farmed areas. Project applicants should seek to identify any potentially significant historical resources that may exist in undeveloped areas proposed for development. The identification of any known resources can efficiently be achieved through consultation with the Imperial County Historical Society and the Southeast Information Center at Imperial Valley College Museum.

Developers of all Specific Plan areas shall be required, as part of the environmental review process, to have a cultural resource study conducted by a qualified archaeologist.

If prehistoric or historic resources are encountered during any development project, a qualified archaeologist shall be consulted to evaluate the resources.

G. Public Services/Safety

The purpose of this section is to determine the impact of the proposed project on local public services. This section provides an analysis of the project's effect on police protection, fire protection, solid waste, natural gas, electric and telephone, water service and availability, sewage treatment, schools, parks and recreation, and seismic safety.

1. Existing Conditions

a. Police Protection

Police protection is currently provided to the County of Imperial by the Sheriff's Department which is headquartered in El Centro. Substations are located in Bombay Beach, Brawley, Niland, Ocotillo, Palo Verde, Salton City, and Winterhaven. The Sheriff's Department is currently staffed with 125 sworn officers and 95 nonsworn personnel. This level of staffing results in an officer-to-resident ratio of about 1.5 sworn officers per 1,000 persons. The average response time for both priority and non-priority calls is approximately 10 to 14 minutes (Whitman 1992). Each of the cities within Imperial County also have police departments to serve their incorporated areas.

b. Fire Protection

Fire protection is currently provided to the County of Imperial by the Imperial County Fire Department. A total of three stations are staffed and operated by the County of Imperial. The headquarters is located in Imperial. Two substations are located in Heber and Seeley. The staff at these three stations includes a fire chief, an assistant fire chief, 13 fire fighters, three shift captains, one training officer, one fire prevention officer, and three fire engine mechanics. The average response time is 8 to 10 minutes.

Fire protection for the remainder of the incorporated area of the County is provided on a contract basis through the County of Imperial. Currently, the County has 10 contracts. These contracts are with Palo Verde, Winterhaven, Holtville, Brawley, Calipatria, Niland Westmorland, Salton City Community Services, Salton Sea Beach, and Ocotillo. The County provides the contractor with the vehicles and equipment. Each station has a chief; the chiefs at Holtville, Brawley, Calipatria, and Niland are paid and the others are volunteers, as is most of the remaining fire fighting force. Each of the cities within the Imperial County also have fire departments to serve their incorporated areas.

Additionally, the County Fire Department provides heavy rescue service. Emergency medical services are contracted to Gold Cross Ambulance. The Fire Department houses and staffs the hazardous materials van that is owned by the Imperial County Department of Health, Environmental Services Division (EHS).

The biggest fire hazards in the County are the fuel storage tank farms that exist within the Imperial Valley area (Buzo 1992). There are two different sites within the County where the

fuel storage tank farms are located. One is located south of the city of Imperial and the other is located east of Niland. In the event of a fire, assistance from various fire departments within the County would be required. The threat of fire spreading and causing major problems to other areas of the County is minimal due to the isolated locations of the fuel storage tanks.

c. Solid Waste

Three different types of landfills exist within the County. The three different types are classified as Class I, Class II, and Class III. A Class I landfill site is wholly for the dumping of hazardous wastes. A Class II landfill site is for dumping designated and/or special waste, and a Class III landfill site is for dumping non-hazardous wastes such as municipal waste.

There are currently eleven Class III landfills located within the County of Imperial. Figure 18 depicts the existing public and private landfills located in the County. Ten of the landfills are operated by the County Public Works Department and one landfill is operated by a private company, El Centro Sanitation. Three of the County landfills, near Brawley, Imperial, and Calexico, are under the ownership or control of the County. Six, near Holtville, Niland, Salton City, Hot Mineral Spa, Ocotillo, and Palo Verde, are on Bureau of Land Management property. The Picacho landfill serves the Winterhaven/Bard area and is located on land owned by the Quechan Indian Reservation. Since the Quechan Indians have the right to terminate the County's use of the site on short notice, a nearby alternate site, on Bureau of Land Management land, has been reserved on a contingency basis. The capacities of the landfills vary. Within the next ten years, the landfills at Brawley, Calexico, Imperial and Holtville will be approaching their capacities. The landfills that will be closed within the next ten years will become transfer stations.

The County currently does not have any plans for construction of additional public landfills. Pursuant to the schedule established by the State, the County is required to prepare and submit a County Integrated Waste Management Plan (COIWMP) to the State Integrated Waste Management Board by January 1994.

There are currently two proposed large-scale privately-owned landfill projects in the County. These projects are the Mesquite Regional Landfill and the Chocolate Mountain Regional Landfill. The County of Imperial has requested that these projects be designed to accommodate local solid waste as well as out-of-area solid waste. Additionally, the Bureau of Land Management (BLM) has requested that the existing landfills in Imperial County that are located on BLM land be closed.

d. Natural Gas

The Southern California Gas Company provides gas service to the County of Imperial. The availability of gas service is based upon present conditions of gas supply and regulatory policies. As a public utility, the Southern California Gas Company is under the jurisdiction of the California Public Utilities Commission. The gas company can also be affected by actions of federal regulatory agencies.

Typical demand use for residential units on a yearly basis is 799 therms/year for a single family dwelling unit, 482 therms/year for a multi-family dwelling unit with 4 or less units, and 483 therms/year for a multi-family unit with 5 or more units. These averages are based on total gas consumption in residential units served by the Southern California Gas Company.

Due to the fact that commercial construction varies so widely and that there is such a wide variation in types of materials and equipment used, a typical demand figure is not available for this type of construction. Calculations would need to be made after the building has been designed.

The Southern California Gas Company has several conservation programs. The Low Income Weatherization Program offers several weatherization services to low income families. The gas company will add insulation, apply weather-stripping and caulk to doors, add insulation to the hot water heater, and install a low-flow shower head free of charge to those who qualify for the program.

The Low Income Appliance Repair and Replacement Program is available to low income families who own their own home. There are three appliances that the program is particularly concerned with. They are the water heater, the furnace, and the kitchen range. The gas company will repair these appliances at no charge to those who qualify for the program. Additionally, if the appliances are beyond repair, the gas company will replace them at no charge.

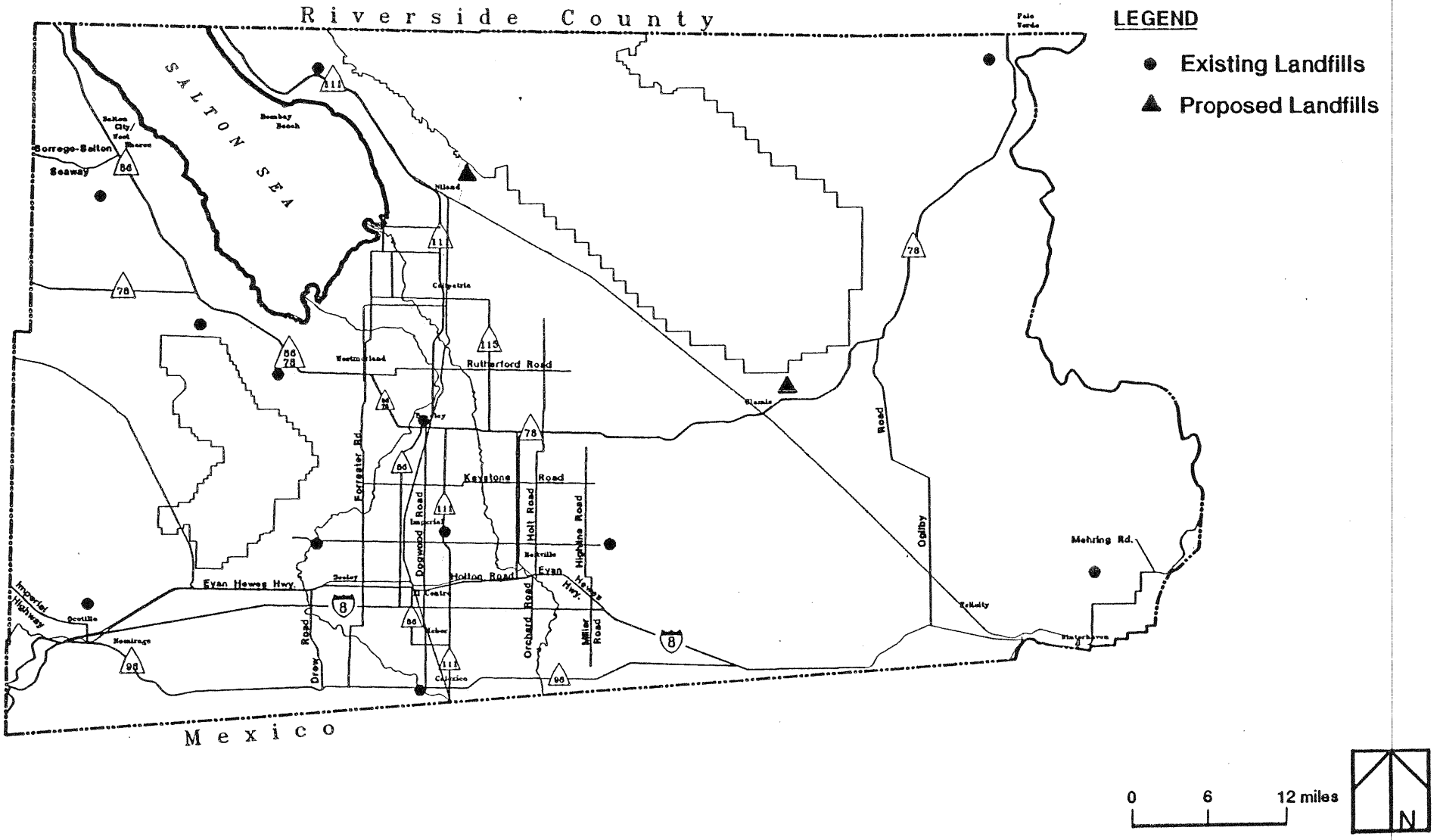
The Residential Rebate Program was initiated on January 1, 1992. This program offers a cash rebate to all residential customers, regardless of income, who replace their water heaters, add insulation, add caulking and/or weather-stripping, or wrap their ducts.

The Southern California Gas Company also conducts home energy audits. The audits help to identify ways that the residential customer could conserve energy.

e. Electric and Telephone

Power Generation

The Imperial Irrigation District (IID) provides electricity to the County of Imperial and parts of Riverside and San Diego Counties. The District serves more than 70,000 customers. The average power consumption by customers in the District's service area is one of the highest in the nation. Virtually all homes are equipped with temperature-controlled air conditioning. The average District customer uses 13,000 kilowatt-hours annually. The nationwide average is about 9,000 kilowatt-hours. Because of the extremely hot summers and mild winters that characterize the area, the District's power system must accommodate a wide variance between the summer and winter coincident peak demands. Electric service for the Palo Verde area is provided by Southern California Edison.



Imperial County General Plan	Existing/Proposed Solid Waste Disposal Facilities	Figure 18

IID operates nine hydroelectric generation plants, a 260-megawatt steam plant, eight gas turbines and an eight-unit diesel plant. As the need for more electrical energy has increased, IID has expanded the sources available for meeting this demand. In 1981, the Board of Directors of the IID joined with the Southern California Public Power Authority to purchase an ownership interest of 14.6 megawatts in the Palo Verde Nuclear Generation Station in Arizona. IID is also a one-third participant with Southern California Edison and the Arizona Public Service Company in a 75-megawatt steam plant, and the District also purchased an interest in the Palo Verde-San Diego 500-kilowatt transmission line, which allows IID access to cheaper imported energy. The District also has an energy supply contract with the El Paso Electric Company for 100 megawatts, which will increase to 150 megawatts from 1992 to 2002. In 1990, IID officials sold bonds to finance the 1990 Electric Systems Project, which is designed to further meet the increasing demand for electric service in the District's service area. Included in the project is a $62.5 million repowering of the El Centro Steam Plant, which will increase its generating capacity by 82 megawatts. In 1991, the IID authorized the asset purchase of 104 megawatts from the San Juan Generating Station (coal fired) in New Mexico.

In order to ensure delivery of power to its customers, IID is including six new substations along with upgrades to transmission lines in the 1990 Electric Systems Project. The Coachella Valley Substation, placed in service in late June 1986, is the key link between the District and Southern California Edison. A 230-kV transmission line constructed in 1988 serves two important roles. First, it allows the District to strengthen its access to the rest of the southwestern power grid. In the case of a disruption of power from the Imperial Valley, the District could use this route to service Coachella Valley customers. Second, it establishes a firm path to export geothermal and other alternative energy from Imperial Valley. In 1992, the IID initiated permitting for a 500-kV transmission line from the Palo Verde switchyard (Arizona) to the IID service area extending north to the Southern California Edison Devers Substation.

A major step to protect the District from major power outages was accomplished in 1987 when IID and the Commission Federal de Electricidad signed an emergency service agreement in Mexico City. The agreement allows the two utilities to buy low-cost energy from each other when available and provide energy in the event of an emergency in either system.

Energy Conservation

The finite nature of fossil fuels both to fire power plants and for on-site use has prompted the state legislature to mandate stringent energy conservation measures for all new construction or remodeling projects. Title 24 of the California Administrative Code requires buildings to meet an acceptable energy conservation level through a combination of siting, glazing, and insulation factors.

IID customers are offered rebates for the installation of new energy saving heat pumps or evaporative coolers. The program was initiated in 1990 and is expected to contribute toward reducing the District's energy load. To further encourage energy conservation, the District routinely conducts residential and commercial energy surveys. The District is also studying consumer energy consumption habits. Further conservation tools and incentives are planned.

Telephone

The County of Imperial is provided with telephone service by the Pacific Bell Telephone Company. Pacific Bell provides telephone service to other areas of the state, as well. Telephone service for the Palo Verde area of the County is provided by Contel.

f. Water Service and Availability

The majority of water supplied within Imperial County is used for agricultural purposes. Domestic water uses account for approximately two percent of the total water use in the County. Water is supplied to the residents and farmers of Imperial County by several different water agencies: the IID, the Palo Verde Irrigation District, the Palo Verde County Water District, the Winterhaven Water District, the Southern California Water Company, the Coachella Valley Water District, and the Bard Water District. Private or mutual water companies also serve areas such as the communities of Ocotillo and Nomirage; and in rural areas as well as many communities, large water trucks deliver bulk water for domestic use which is stored in 100-gallon or larger tanks.

The water of the Colorado River is used by both the Upper Basin States (Colorado, New Mexico, Utah, Wyoming) and the Lower Basin States (Arizona, California, and Nevada), as well as by Mexico. In accordance with the Colorado River Compact of 1922, the Upper and Lower Basin States are each apportioned to the exclusive beneficial consumptive use of 7.5 million acre-feet (MAF) of Colorado River System water each year, in perpetuity. In addition, an option is granted to the Lower Basin States for the use of an additional 1.0 MAF of such waters each year for beneficial consumptive use. The 1929 California Limitation Act limits California's annual consumptive usage to 4.4 MAF of the Lower Basin's 7.5 MAF per year basic apportionment, plus not more than one-half of any excess or surplus water unapportioned by the Colorado River Compact.

By treaty signed on February 3, 1944, Mexico is entitled to 1.5 MAF of Colorado River water each year. The Colorado River Compact anticipated the recognition of Mexico's rights to Colorado River water by the United States and specified that such water shall be first supplied from waters unapportioned by the Colorado River Compact. If unapportioned amounts should be insufficient, any shortfall shall be borne equally by the Upper and Lower Basin States. In years of extraordinary drought or other disaster causing extreme low flow conditions, Mexico's entitlement would be reduced in the same proportion as consumptive uses in the United States.

In 1928, the Boulder Canyon Project Act was passed by Congress which authorized the construction of Hoover Dam and Power Plant and the All-American Canal to Imperial and Coachella Valleys. The Act also required that the District and other Colorado River water users enter into water delivery contracts with the Secretary of Interior; and authorized lower basin states to enter into a water apportionment agreement as follows: of the 7.5 MAF of Colorado River water annually apportioned to the states, Nevada would receive 0.3 MAF, Arizona would receive 2.8 MAF, plus one-half of any excess water unapportioned by the Colorado River

Compact, and California would receive 4.4 MAF, plus one-half of any excess water unapportioned by the Colorado River Compact.

The proposed apportionment was never settled upon by the Lower Basin States. On August 18, 1931, the California Seven Party Agreement was signed by all the water users and went into effect. The first four California priorities, which include the 1) Palo Verde Irrigation District, 2) Yuma Project (Reservation Division), 3a) Imperial Irrigation District and Coachella Valley Water District, 3b) Palo Verde Irrigation District, and 4) Metropolitan Water District, total 4.4 MAF annually, of which the agricultural agencies are entitled to 3.85 MAF.

After execution of the California Seven Party Agreement, a draft contract for water delivery was submitted to the District by the Secretary of Interior. The draft contract called for extension of boundaries of the Imperial Irrigation District to include the Coachella Valley. The Coachella Valley desired to maintain its own organization. The District and the Secretary of Interior negotiated another contract which was approved by the district and the voters. Following approval, the district filed an action in the Supreme Court to validate the contract. The Coachella Valley objected to the validation. Following judgment in favor of the District and during Coachella Valley's period of appeals, Imperial Valley and Coachella Valley negotiated what came to be the Compromise Agreement of 1934. The result of this Agreement was that the District would have priority over Coachella in times of water shortage.

In 1964, the United States Supreme Court Case of Arizona v. California (373 U.S. at 546) concluded than an agreement was not necessary because the Project Act authorized the Secretary of Interior to deliver water in accordance with the apportionment. To complete the apportionment in California, the Secretary of Interior requested the State of California to prioritize water rights among the seven major water users: the Palo Verde Irrigation district, the Yuma Project, the Imperial Irrigation District, the Coachella Valley Irrigation District, the Metropolitan Water District, the City of San Diego, and the County of San Diego.

As a result of the Colorado River Basin Project Act of September 30, 1968, the 4.4 MAF are also the quantities accorded priority over the Central Arizona Project.

Water Delivery and Supply

Water diverted by IID under its Colorado River Water Delivery Contract may be used for potable/domestic and irrigation purposes. Section 17 of the Contract provides that water shall be delivered as ordered by the District "and as reasonably required for potable and irrigation purposes." This section further provides that the Contract is for permanent service and that the dam and reservoir shall be used "for irrigation and domestic uses in satisfaction of present perfected rights." Article 29 of the Contract specifically provides that "all rights based upon this Contract shall be subject to and controlled by the Colorado River compact." The 1964 Decree in *Arizona v. California* provides that the United States is enjoined from operating the dam other than "(1) for river regulation, improvement or navigation, and flood control; (2) for irrigation and domestic uses, including the satisfaction of present perfected rights; and (3) for power." The term "domestic use" is defined in the Colorado River Compact, the foundational document

for "the Law of the River," as follows: "The term 'domestic use' shall include the use of water for household, stock, municipal, mining, milling, industrial, or other life purposes...."

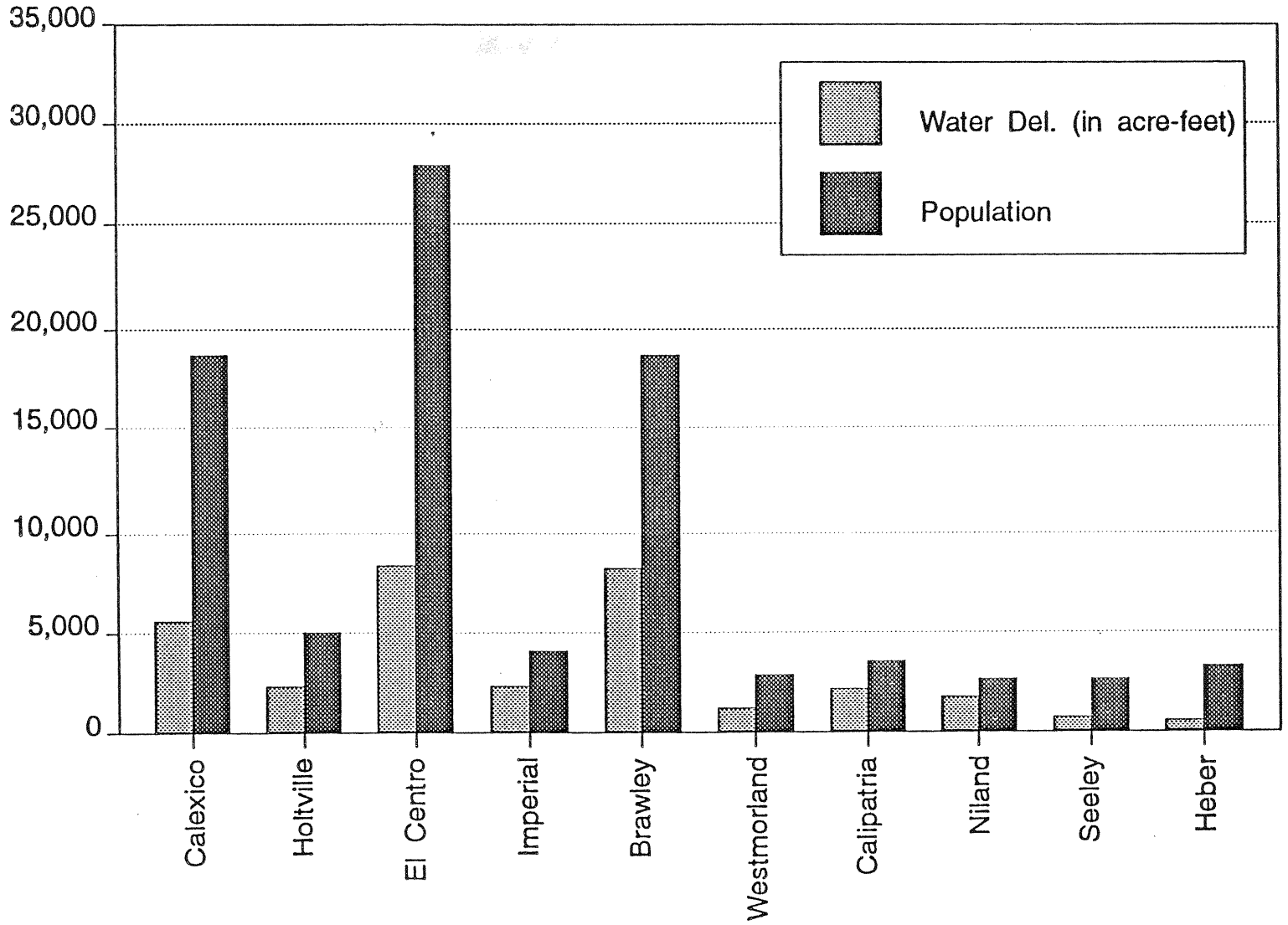
Imperial Irrigation District. IID provides water to residents and farmers of a large portion of Imperial County. IID diverts and distributes approximately 2.9 million acre-feet of water to ten communities and over 500,000 acres of agricultural lands in Imperial County. The communities that receive irrigation water from the IID for subsequent domestic and drinking water treatment are: Calexico, Holtville, El Centro, Imperial, Brawley, Westmorland, Calipatria, Niland, Seeley, and Heber (Figure 19). Each city has its own water treatment facilities for treating and distributing water to users in its jurisdiction.

IID also supplies irrigation water to approximately 3,800 homes, offices, and shops in rural areas in the Imperial Valley via its extensive canal system. On December 22, 1992, the U.S. Environmental Protection Agency (EPA) issued an Administrative Order pursuant to the Safe Drinking Water Act, which requires IID to undertake specified tasks according to a detailed compliance schedule. The Order cites the facts that the system is open and unprotected, and subject to numerous sources of contamination; and that IID does not filter, disinfect, or otherwise treat water supplied to these rural water customers. The County Planning/Building Department has stopped issuing building permits for homes which depend on untreated IID water.

The IID obtains all of its water from the Colorado River. Imperial Dam is the diversion point on the Colorado River from which water is delivered to Imperial County. Water is conveyed from this point to the Imperial County area via the 82-mile-long All-American Canal, which was built by the U.S. Bureau of Reclamation in the 1930s. Through this gravity flow canal, the Colorado River water is conveyed to the head of the District system at Drop No. 1. These main canals branch off the All-American: the East Highline, Central Main, and Westside Main Canals. Service to the Imperial Valley is provided from these three main canals and from the tributary lateral canals that they supply. In total, 1,675 miles of irrigation canals are within the District. Six regulating reservoirs with total storage capacity of 2,300 acre feet are included within the distribution system.

As a part of its operating system, IID maintains an extensive gravity flow drainage system. The lateral drain system is laid out to provide a drainage outlet for each quarter-section of approximately 160 acres and, as such, the drains usually parallel the canals. These drains are used to collect excess surface flow from agricultural fields, subsurface drainage from 32,222 miles of tile drains, and operational discharge from canals and laterals. There are over 1,457 miles of surface drains that can be divided into three main areas: Alamo River System, New River System and drains that flow directly into the Salton Sea. Approximately 430 control structures are installed along the drainage system.

The East Mesa Unit and the West Mesa Unit lie within the IID boundaries. These areas use wells to extract water from the ground water basin. The East Mesa Unit has four wells that are approximately 600 feet deep. Scattered residential development occurs in the East Mesa Unit.



Imperial County General Plan	Water Delivery per Average Yearly Population 1984-1990 by Community	Figure 19

Much of the West Mesa Unit land has been historically classified as "withdrawn lands" and is under the jurisdiction of the Bureau of Reclamation. Currently, much of this land is in the process of being revoked and jurisdiction transferred to the Bureau of Land Management. A portion of the land in the West Mesa Unit is used by a Naval Air Facility for bombing practices and exercises. Water delivered to the Naval Air Facility comes from the Elder Lateral Canal. From June 1, 1986 to October 23, 1991, the facility has used approximately 3,714 acre-feet of water, with a daily average water use of 2.0 acre-feet.

The Imperial District has a "present perfected right" to 2.6 million acre-feet of water annually. The significance of the District's present perfected right is that in times of shortage, present perfected rights must be satisfied first. Although there is no explicit contractual prohibition against transfer of conserved or surplus water, which is a portion of water delivered to the District pursuant to federal contract, it would be appropriate to obtain the prior consent of the Secretary of Interior. Conserved or surplus water, which is a portion of District water appropriated pursuant to state law, may be used outside of the District boundaries if the District's Board of Directors finds it to be in the best interest of the District.

Palo Verde Irrigation District. The Palo Verde Irrigation District provides water service to the Palo Verde Valley, the southern portion of which is located in the northeast corner of Imperial County. The Palo Verde Irrigation District supplies irrigation water to an overall area of about 8,400 acres in the Palo Verde region of Imperial County. This water is directly applied to 7,462 acres of farmland. The water is strictly for irrigation purposes and is taken from the Colorado River. Groundwater and very little surface runoff from these agricultural fields drains back into the Colorado River. PVID drains are used to maintain groundwater at an acceptable depth. Currently, the Palo Verde Irrigation District holds an entitlement to use of Colorado River water as reasonably required for potable and irrigation purposes for beneficial use on 104,500 acres of valley lands and 16,000 acres of mesa lands.

Palo Verde County Water District. The Palo Verde County Water District is responsible for supplying water to approximately 162 customers for domestic purposes. The PVCWD has a deep water well in the community of Palo Verde which extracts Colorado River water from the groundwater basin which is then treated at a plant before it is distributed to its customers. The well extracts approximately 45,000 gallons per day. PVCWD lies within PVID boundaries.

Winterhaven Water District. The Winterhaven Water District supplies water to approximately 1,000 people in Winterhaven. The WWD uses two wells, one of which is a standby well, to extract approximately 150,000 gallons of water per day from the ground water basin for domestic purposes. The ground water basin is recharged by the Colorado River, which passes just south of Winterhaven. The community of Winterhaven has two 100,000 gallon storage tanks for storing domestic water.

The community of Winterhaven holds a present perfected right to divert 780 acre-feet per year from the Colorado River. The present perfected right was granted by the United States Supreme Court supplemental decree in *Arizona v. California* dated January 9, 1979.

Coachella Valley Water District. The Coachella Valley Water District (CVWD) serves communities of Imperial County that exist along both sides of the Salton Sea. The communities of Salton City, Bombay Beach, and Hot Mineral Spa are served by the CVWD. The water supplied to these areas of the County is strictly for domestic uses. Each community has a high pressure 16-inch diameter water main providing water to its users. The source of water for the CVWD main are deep wells in Riverside County from which ground water is pumped into the mains. There is a balancing reservoir located 47 feet above mean sea level at Travertine Rock in Riverside County. Several storage reservoirs are located along the pipeline. There are approximately 2,500 water meters in these communities.

Southern California Water Company. The Southern California Water Company provides domestic water service to the unincorporated community of Niland and to the City of Calipatria. The raw water capacity of the system is 7.7 million gallons. The present rate of water usage is .7 million gallons per day (mgd). The water company has 13 days of raw water storage. The capacity of the water treatment facility is 1.0 mgd. Future plans include the construction of a new 1.0 million gallon treated water storage facility which will, along with additional filtering capacity, increase the daily treated water capacity to over 5.0 mgd.

Bard Water District. The Bard Water District serves approximately 175 landowners and supplies approximately 90,000 acre-feet of water per year for some 15,000 acres of agricultural land located in Bard Valley at the southeastern corner of Imperial County. The water is used for irrigation purposes only and is taken from the Colorado River, via the All-American Canal. All drainage from the irrigation fields in the Bard Water District service area is drained back into the Colorado River, and down into Mexico.

In the community of Bard, wells are used to extract ground water for certain domestic purposes such as watering landscapes and taking baths. Drinking water sources are supplied by 100 gallon tanks which are stored outside the residences and are filled periodically by private water companies.

Conservation

The IID has initiated many conservation programs in Imperial County. Conservation programs in general can be grouped into six different categories. The categories are: structural programs, operational programs, administrative programs, educational programs, cooperative programs, and on-farm irrigation programs. Structural programs to conserve water include physical changes to the water conveyance and usage system that will bring about benefits independently of user practices. Operational programs refer to changes in operational procedures that have been initiated to promote water conservation. Administrative programs are options that are available to public distributors of water. An example of this would be the establishment of incremental water rates to encourage water conservation. Educational programs have been implemented to encourage water conservation within the Imperial Valley. The District has been involved in various cooperative studies and programs to research innovative water conservation methods.

After extended negotiations, a Water Conservation Agreement between the Imperial Irrigation District and the Metropolitan Water District was reached on December 22, 1988, and both parties entered a subsequent Approval Agreement along with CVWD and the PVID in December of 1989, providing for conservation projects in Imperial Valley to save an estimated 106,110 acre-feet of water annually. MWD agreed to finance the construction, operation and maintenance of the projects selected at a total cost of $222 million (1988 dollars). In exchange, and subject to conditions contained in the Approval Agreement, the MWD would be able to divert additional water from the Colorado River, equivalent to the amount conserved, for delivery to its service area through the Colorado River Aqueduct.

The agreement calls for 18 structural and non-structural conservation measures which can be grouped into seven categories: canal concrete lining, regulatory reservoirs, 12-hour deliveries, non-leak gates, system automation, lateral interceptors and on-farm irrigation water management. The landmark agreement also established a Program Coordinating Committee and a Water Conservation Measurement Committee to direct and oversee the implementation of the water conservation program and the verification program, respectively. Project construction began in February of 1990 and is expected to be completed within a five-year construction period.

g. Sewage Treatment

The County of Imperial does not provide any sewer service. Sewer service is provided by cities and by several districts serving unincorporated communities. These districts include the Salton Community Service District, the Heber Public Utilities District, the Niland Service District, the Coachella Valley Water District and the Seeley Community Service District.

The Salton Community Service District (SCSD) jurisdiction generally extends from Salton City to Desert Shores. SCSD has two separate independent sewage systems: one for Desert Shores and the other for Salton City. Sewage in both cases is collected and transported by gravity sewers and force mains pressurized by several intermediate lift stations. The carrying and treating capacity of the existing system is limited to its own development. The existing system would have to be upgraded to accommodate any additional outside load.

A sewage system serves Winterhaven and also a few developments within the Indian Reservation lands adjacent to the community of Winterhaven. A water treatment facility in Winterhaven treats sewage which is then discharged and piped to the City of Yuma, Arizona. This is a joint venture between the community of Winterhaven and the Indian Reservation lands adjacent to Winterhaven under a grant from the Federal government. The pipeline is approximately 16 inches in size and decreases to a ten-inch line at the bridge crossing to Yuma. The average annual daily flow is 42,825 gallons per day.

The Niland Service District provides sewer service to the community of Niland. The design capacity of the wastewater treatment facility is .250 million gallons per day (mgd). The average annual daily flow is .220 mgd. The system is currently operating at 88% capacity.

The Heber Public Utility District provides water and sewer service to the community of Heber. Ever since the moratorium on new service hookups was lifted in November of 1981, considerable capacity has been added to both systems. The wastewater treatment plant is operating well within its designed capacity. The design capacity of the wastewater treatment plant is .38 mgd and it is currently operating at .22 mgd. The District anticipates that 350 connections are available to the sewer plant.

The IID has been evaluating the feasibility of building regional water and wastewater treatment plants. The proposed locations are in the Imperial-El Centro area and near a new Calexico area Port of Entry. These plants are proposed to accommodate future growth in the south end of the Valley. The IID Board of Directors has not yet approved the proposal.

h. Schools

Imperial County has 16 school districts and a community college, most of which are experiencing rapid enrollment increases.

The El Centro School District serves the City of El Centro as well as unincorporated portions of the County. Ten elementary schools are located within this district. The District is currently exceeding its capacity of 5,200 students by 1200 students. Recently, several bond issues have been passed to build new schools. The District is currently unable to raise additional bond funds because it is bonded to capacity. If a major project was to be developed in the region, the School District would not be able to bond to build schools. An approved increase in school fees will bring charges to $3.65 per square foot for El Centro residential projects.

The Calexico Unified School District serves the City of Calexico as well as unincorporated areas of the county. Six elementary schools, one junior high school, one high school, and one continuation high school are located within this district.

Westmorland Union School District serves the community of Westmorland. The District has one elementary school (K-8). The school is presently at its capacity of 520 students. A bond measure was placed on the November 1992 ballot that would provide the District with six more classrooms and a recreation area. If the initiative passes, the District would separate the school into an elementary and junior high school. The District currently assesses developer fees on construction of residential housing at $1.14/sq.ft.

The Seeley Union School District serves the community of Seeley, the Naval Air Facility, the Rio Bend RV Park, and other unincorporated areas. One elementary school (K-8) is located within the District. The current enrollment at the school is 470 students. The school has a capacity of 560 students. The District plans to construct another school when a large tract housing development goes in. The District assesses developer fees for construction of residential housing at $1.14/sq.ft.

The San Pasqual Valley Unified School District serves the communities of Winterhaven, Ft. Yuma, and Bard. Palo Verde is also within the district but, through an inter-district agreement,

is served by schools in Riverside County. One elementary school (K-5), one middle school (6-8), one high school, and one alternative high school are located within the District. The elementary school is nearing its capacity with a current enrollment of 410 students. The middle and high school are also near capacity with a current combined enrollment of 300 students. The alternative high school enrolls approximately 25 students. The District does not have any current plans for construction of additional schools due to lack of funding. The District assesses developer fees at $1.65/sq.ft. for residential housing and $0.26/sq.ft. for commercial development.

The Mulberry Union School District serves a rural, unincorporated portion of the County located northeast of Brawley and southeast of Calipatria. One elementary school (K-8) is located within the District. The current enrollment of the elementary school is 78 students. The school has a capacity of 100 students. The District has no plans to construct any additional schools. The District does not assess developer fees.

The Meadows Union School District serves the unincorporated area of the County just outside of Holtville. One elementary school (K-8) is located within the District. The school is currently operating over its capacity of 480 students. The District plans on adding more classrooms if a planned residential subdivision is built in the area. The school assesses a developer fee of $1.14/sq.ft. for residential development.

The McCabe Union School District serves the southwestern portion of the County and portions of the City of El Centro. One elementary school (K-8) is located within the District. The current enrollment of the school is 517 students. The capacity of the school is 326, and therefore, the school is operating well over its capacity. The District has leased portable classrooms to accommodate the excess number of students. The District has plans to construct two new classrooms and new restrooms. Three subdivisions are planned within the District's jurisdiction. Developer impact fees are collected by the school from residential and commercial developments in the area.

The Magnolia Union School District serves the City of Brawley and the areas outlying Brawley. One elementary school (K-8) is located within the District. The current enrollment of the school is 105 students. The capacity of the school is 110 students. The District currently has no plans to construct additional schools. The District assesses developer fees of $1.65/sq.ft. of residential development and $.26/sq.ft. for commercial development.

The Imperial Unified School District serves the City of Imperial and the outlying unincorporated areas. Five schools are located within the District. These schools include two elementary schools, one junior high school, one high school, and one continuation high school. All of the schools are operating at capacity. The District has plans to construct a new school on land that was donated by a developer. The District assesses developer fees on new residential and commercial development.

The Holtville Unified School District serves the City of Holtville and the surrounding outlying areas. The District has four schools within its jurisdiction including two elementary schools,

one junior high school, and one high school. The District has no plans to construct any additional schools at the present time. The school assesses developer fees of $1.65/sq.ft. of residential development and $.26/sq.ft. of commercial development.

The Heber School District serves the community of Heber and the outlying areas. One elementary school (K-8) is located within the District. The current enrollment of the school is 535 students. The school is operating under capacity and has empty classrooms available. The District has no plans to construct additional schools at the present time. The District collects fees on new residential and commercial development.

The Central Union High School District serves the communities of Heber, Seeley and El Centro. The District operates one high school and one continuation high school. The current enrollment of the schools is 3,100 students. The schools are operating over their capacity. The District has plans to add portable classrooms. A new continuation high school is approved and has been funded. A second comprehensive high school has been approved and funded as well. Construction of the new continuation high school will commence first. The District collects fees on new residential and commercial development.

The Calipatria Unified School District serves the communities of Calipatria, Niland, Bombay Beach, and Slab City. The District operates five schools including three elementary schools, one high school and one continuation school. The total current enrollment for all five schools is 1,400 students. The capacity of the school district is 1,600 students. The District currently has plans to add six classrooms to one of the elementary schools. These classrooms should be completed by September of 1993. The new classrooms will replace portable ones. The District assesses developer fees of $1.65/sq.ft. of residential development and $.26/sq.ft. of commercial development. Recently, the District decided to implement the developer fee $1.00 rate hike that was approved by voters in the November 1992 election.

The Brawley Union High School District serves the City of Brawley as well as the unincorporated area. The District operates one high school and one continuation high school. The current enrollment of the two schools is 665 and 100 students, respectively. The high school is operating at capacity and the continuation high school is operating just under capacity. The District has no plans to construct any additional schools at the present time. The District collects impact fees on new residential and commercial development.

The Brawley School District serves the City of Brawley as well as the unincorporated area. Five schools are located within the district. Two elementary schools teach kindergarten, first, second, and third grades. Two elementary schools teach kindergarten, fourth, fifth, and sixth grades. One middle school teaches seventh and eighth graders. The current total enrollment of the schools is 3,905. The schools are currently operating at capacity.

Imperial Valley College, located at 380 E. Aten Road in Imperial, is the only junior college in Imperial County. The school is currently operating over its capacity and is very crowded. Approximately 5,434 students attend classes on campus. Approximately 1,500 additional

students attend classes that are offered through the college at various locations throughout the community. The State of California currently has a cap on funding to the school.

Also located in Imperial County is a satellite campus of San Diego State University (SDSU). The Imperial Valley campus is a two-year, upper-division campus of San Diego State University located in Calexico. Offering only the last two years of undergraduate education as well as a fifth year credential program for teacher preparation and occasional M.A. programs, the campus accepts transfer students from community colleges or other colleges who have at least 56 units. Additionally, there is an exchange program for students between the Imperial Valley campus and the Universidad Autonoma de Baja California which allows students to take classes at either of the participating universities and receive credit at their home institution.

i. Parks and Recreation

Imperial County possesses a wealth of natural recreational open space, including Federal, State, County and private facilities.

The County of Imperial operates six parks within the county. Sunbeam Lake Park is located on approximately 145 acres along Drew Road. This park features two small lakes. One is popular for fishing; the other is used for swimming, boating and jet skiing. A boat launch and a two-mile hiking trail are also offered. There are picnic facilities, a snack bar and a 120-site RV park with hookups and showers.

Red Hill Marina is located on the southeastern shore of the Salton Sea. This 240-acre recreation area is popular for fishing, duck hunting, boating and camping. The park offers 64 developed campsites, two primitive camping areas and a boat launch. Picnic areas with shelters are available.

Wiest Lake Park covers a 150-acre area. Popular activities at this park include boating, camping, fishing, picnicking and swimming. Lake facilities include a boat launch, about 70 campsites (40 with RV hookups), three picnic areas with barbecues and tables, and flush toilets and showers. Wiest Lake is stocked with trout, catfish, bass and bluegill.

Three additional County operated parks, Palo Verde Park, Heber Dunes, and Walker Park, offer rough campsites. Portions of the Anza-Borrego Desert State Park, most of which is within San Diego County, also offer hiking and equestrian trails and rough campsites.

The Salton Sea State Recreation Area occupies approximately 18,000 acres and 18 miles of shoreline. The Salton Sea, at 35 miles long and 15 miles wide, is North America's largest inland sea. The park provides a boat ramp, boat access areas and several miles of sandy beaches. Fishing is popular for ocean transplants, including Gulf croaker, sargo, corvina and tilapia. The shoreline is also ideal for bird-watching. There are plenty of hiking trails, including a one-mile, self-guided nature trail. The recreation area features two campgrounds with 150 developed sites, in addition to 800 primitive campsites and a large picnic area. Of its approximately 230,000 visitors per year, 40 percent come from the Los Angeles County area.

The Picacho State Recreation Area is a 6,800 acre park that borders eight miles of the scenic Colorado River near jagged Picacho Peak. The river basin is populated with waterfowl, bighorn sheep and wild burros, which live among wildflowers, cacti, tule reeds, cottonwood and mesquite trees. Adobe, Taylor and Island Lakes are stocked with black bass, catfish, crappie and bluegill. A boat ramp is located along the river near the 50-site Headquarters Campground, which has chemical toilets and showers. Near park headquarters, the Picacho Mills Historic Trail leads visitors through the ruins of turn-of-the-century Picacho, once a prosperous town with a gold mine and stamp mill. The park offers three group campgrounds, two of which are designed for boat-in use.

The Imperial Sand Dunes Recreation Area is located 27 miles east of Brawley. The Imperial Sand Dunes are also known as the Algodones Sand Dunes or "the Sahara of America" and are California's largest dunes. About two-thirds of the area is open to off-highway vehicles. Vehicle camping is allowed throughout the area, with parking pads and pit toilets provided at the Bureau of Land Management's Gecko and Roadrunner campgrounds on Gecko Road south of Highway 78. The Bureau of Land Management also provides parking pads, pit toilets, and trash dumpsters along Grays Well Road at the Buttercup Camping Area, the Midway Camping area, and adjacent to the Plank Road, and provides dry camping primitive sites in the Yuha Desert and other locations in Imperial County.

The Imperial Wildlife Area Wister Unit is a 7,000 acre refuge. Visitors can view up to 250 species of birds. Once an arid desert, this stretch of land along the east shore of the Salton Sea was upgraded to a waterfowl habitat when the state built an intricate web of levees here in the 1950s. Visitors may also come upon curious mudpots: murky, oozing bubbles that form when carbon dioxide gas is released from movements along a branch of the San Andreas fault. Camping, fishing and boating are popular activities here.

The Imperial National Wildlife Refuge is a 25,000 acre wildlife refuge encompassing 30 miles of Colorado River shoreline in both Arizona and California. These wetlands provide thousands of migratory waterfowl with an important source of winter feed. Visitor facilities are located on the Arizona side. The reader is referred to the Biological Resources section for a discussion on the types of species present in these wildlife refuges.

The County does not presently collect "park fees" from new residential development pursuant to the State "Quimby Act".

j. Health Care

The El Centro Regional Medical Center is located at 1415 Ross Avenue in El Centro. The facility is licensed for 107 beds. The hospital has 48 full-time physicians on staff. A 24-hour emergency room is staffed by at least one physician at all times. The El Centro Regional Medical Center is the County Base Station and it manages all emergency ambulance calls. Complete ancillary services are available at the Center.

Pioneer Memorial Hospital is located at 207 West Legion Road in Brawley. The hospital is licensed for 80 beds. A 24-hour emergency room is staffed by at least one physician at all times. The hospital employs 44 full-time physicians.

Calexico Hospital is located at 450 East Birch in the City of Calexico. As a hospital district, it receives state sales tax funds. It is presently facing state licensing problems and may be forced to close temporarily in order to construct improvements.

In addition to the three hospitals serving the region, there are three urgent care centers in the Imperial County area. The Valley Urgent Care Centers are located at 608 G in Brawley and 820 North Imperial Avenue in El Centro. The Immediate Care Center is located at 865 South Imperial Avenue in El Centro.

Clinicas de Salud del Pueblo offers three comprehensive health care centers to the residents of Imperial County: the main facility in Brawley, and two satellite centers in Calexico and Blythe (the Blythe Family Health Clinic). The Clinicas are funded through state and federal resources. The Brawley facility is equipped with 14 exam rooms, the Calexico facility with 11 exam rooms, and the Blythe clinic with 9 exam rooms. Currently there are nine clinic physicians, each holding full staff privileges at most community hospitals in the region.

The Imperial County Department of Health Services also offers health programs and clinic services to County residents. Programs range from Well Baby and Immunization clinics to Emergency Medical Services. The main facility is located at 935 Broadway in El Centro. Satellite clinics include the Brawley Lion's Center at 225 A Street, and the Calexico Community Center at 707 Dool Avenue. Information on various programs offered throughout the County can be obtained by contacting the Department of Health Services.

First response medical aid with emergency medical technicians is provided by the Imperial County Fire Department. The Fire Department's emergency medical services is supported by concurrent dispatch of Gold Cross Ambulance. Gold Cross is contracted by Imperial County and is activated by the 911 system. The average response time for emergency transport is less than 15 minutes.

k. Seismic Safety

Historically, the Imperial Valley is one of the most, if not the most, seismically active regions in California. Twelve significant seismic events have occurred in the Imperial Valley since April 1906 (Table 15). A significant seismic event is classified as one with an intensity exceeding VIII on the modified Mercalli scale. These events were located in or near the communities of Brawley, Imperial, Holtville, El Centro, and Mexicali. Therefore, earthquakes represent one of the major threats to life and property in Imperial County.

TABLE 15 SIGNIFICANT SEISMIC EVENTS IN IMPERIAL VALLEY SINCE 1900	
April 19, 1906	6.0+
June 23, 1915	6.3
June 23, 1915	6.3
May 28, 1917	5.5
January 1, 1927	5.8
January 1, 1927	5.5
May 19, 1940	7.1
May 19, 1940	5.5
October 15, 1979	6.6
October 15, 1979	5.8
November 24, 1987	6.6
November 25, 1987	6.0

Nine fault zones are located in Imperial County. These are: San Andreas, Imperial, Algodones Sand Dunes, Calipatria, Boundary, Superstition Hills, Superstition Mountain, Laguna Salada, and Elsinore. The most noteworthy fault is the San Andreas extending from Mexico north through northern California. Since 1900, over sixty earthquakes measuring a magnitude of 5.0 or greater have been recorded in the Salton Trough. The San Andreas Fault Zone is considered capable of generating a maximum credible earthquake of magnitude 8.5, but this consideration does not include a time-factor. The maximum probable earthquake expected for the San Andreas Fault is a magnitude of 8.3, indicating that this magnitude earthquake could be generated along the fault during the next 100 years.

The largest earthquake was recorded along the Imperial Fault in May of 1940 which registered a magnitude of 7.1 on the Richter Scale. The epicenter was located on the international border east of Calexico. The fault could be traced for approximately 50 miles from the Volcano Lake in Mexico north to Imperial Valley just north of Brawley. The newly completed All-American Canal showed a horizontal movement of approximately 14 feet.

A major earthquake with a magnitude of 6.6 occurred along the Imperial Fault in October of 1979. The epicenter was located approximately seven miles east of Calexico. No lives were lost but several structures and canals were damaged. The quake resulted in a settlement of the All-American Canal of up to four feet in the embankment. Water flows had to be reduced to avoid flooding and to rebuild the embankments. However, water demand was low at the time and reduced flows were still sufficient to accommodate the cities and towns in the County.

Currently, some portion of the County is affected by a minor earthquake with a magnitude of 4.5 or less every few months. The County may experience an earthquake with a magnitude of

5.5 or greater every five years and dozens of micro-seismic events with magnitudes of 2.0 or less on a daily basis.

The "Imperial County Emergency Plan" addresses Imperial County's planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and nuclear defense operations. The operational concepts in the Emergency Plan focus on potential large-scale disasters that can generate unique situations requiring unusual responses. The Emergency Plan also identifies the sources of outside support which might be provided by other jurisdictions, state and federal agencies, and the private sector through mutual aid and specific statutory authorities.

l. 1973 General Plan

The 1973 General Plan included a much higher planned acreage of residential, industrial, and other types of urban development. The General Plan Update calls for less development than the 1973 General Plan and therefore, could result in less potential impact on public services. The 1973 General Plan did not adequately address the issue of public services at that time.

2. Environmental Impacts

a. Police Protection

An increase in calls for Sheriff services would result in the future, due to increased traffic on developed roadways, as well as future residential, commercial, and industrial development. The Imperial County Sheriff's Department states that the County's service goal is 1.5 deputies per 1,000 population. Currently, the Sheriff's Department is meeting this goal. However, future increases in population would necessitate the addition of staff to the Sheriff's Department in order to meet service goals.

b. Fire Protection

Future development in the County would significantly impact upon the service ability of the Imperial County Fire Department. This would require additional staff, equipment, and buildings, particularly to serve proposed Specific Plan Areas (SPAs) which are not near an existing station.

c. Solid Waste

The implementation of the General Plan would result in new residential, commercial, and industrial development. This would result in the generation of additional solid waste. Adequate landfill sites presently exist within the County, however, many are at locations, such as within the New River and on BLM land, which may not continue to be available to the County, due to environmental or other considerations. New or expanded facilities may be needed to serve projected growth. This is a significant impact, particularly due to the difficulty of establishing new landfill sites.

d. Natural Gas

The full development of the General Plan Area will create a demand for additional natural gas resources. The impacts are not anticipated to be significant and the Southern California Gas Company is expected to be able to serve the community and improve facilities as needed.

e. Electric and Telephone

Electric

The implementation of the General Plan will result in the construction of additional residential, industrial, and commercial units. These new developments will result in a significant demand for electrical energy. IIDs interstate network of power sources is expected to be adequate to meet local demand from new development.

Telephone

The exact number of new telephone lines that will be generated by the implementation of the General Plan Update cannot be determined at the present time. Residential development would be expected to generate approximately two lines per unit. The number of new lines attributed to new commercial and industrial development cannot be determined at this time because the exact nature of the new commercial and industrial development is presently unknown. The full development of the General Plan area is anticipated to have a significant impact on the telephone company facilities in the County. The projected new development will require that additional cables be run and that the switching capability be increased.

f. Water Service and Availability

Adequate water supply to the Imperial County area exists and no significant impacts are expected. Local district treatment capacity for domestic water is adequate for short-term growth, but new facilities will be needed in many areas. For large residential, industrial, and other new development, service impacts could result.

Based on the EPA Order to IID regarding untreated domestic water service, further development in reliance on the existing canal system may have significant adverse health impacts.

g. Sewage Treatment

Implementation of the General Plan would result in a significant impact to sewer services in portions of the County. Expansion of existing urban development around cities and in unincorporated communities may tax the ability of local sewer districts to keep pace with growth. Development of proposed SPAs outside of existing sewer service areas may require new treatment plants or extension of sewer lines to existing plants. Extension of sewer lines, construction of new treatment plants, and/or expansion of treatment capacity at existing plants may create growth inducing and other environmental impacts. This potential impact is significant.

h. Schools

The implementation of the General Plan would result in new residential development. This would result in impacts to most school districts which are already operating over their capacity. The districts that would be impacted include the El Centro School District, the San Pasqual Valley Unified School District, the Meadows Union School District, the McCabe Union School District, the Central Union High School District, and the Brawley Union High School District. The impacts to these districts would be significant.

i. Parks and Recreation

Impacts to parks and recreation are not anticipated as a direct result of the implementation of the General Plan Update. However, demand for parks and recreation facilities may rise upon future development. In many of the unincorporated communities, improved neighborhood parks are limited or non-existent. This impact due to the lack of local park facilities could become significant as development occurs.

j. Health Care

In general, implementation of the General Plan would result in additional development in the Imperial County. The increase in the amount of development in the area would result in an increased demand for health care services. Growth that can be accommodated under the General Plan would ultimately impact the El Centro Regional Medical Center. However, the growth identified in the General Plan is only minimally located within the jurisdiction of the County; most growth will be within existing incorporated cities.

k. Seismic Safety

A moderate to severe incident resulting in intense ground shaking of populated or built up areas could reasonably be expected to cause numerous casualties, extensive property damage, fire, road closures, disruption of rail systems, communication systems (particularly telephone systems), the County's extensive canal system, and utilities. Additionally, health hazards would be posed by contamination of the County's potable water supply. Medical treatment facilities would most likely be overtaxed. Theft and looting may also be a problem. The resultant disruption of the agricultural community bodes ill for the local economy.

There are several specific geologic/seismic hazards associated with moderate to severe earthquakes. These hazards are surface rupture, ground shaking, liquefaction and inundation from dam failure. The primary determinant of the hazardous potential due to surface rupture is the activity of the fault. Active faults bisecting or contiguous to populated centers represent the most significant hazards as regards surface rupture. Within this context, the proximity of manmade structures to the fault and the structural integrity of those structures are critical factors in assessing damage potential.

Ground shaking represents a major hazard to population centers. The soil characteristics of the Imperial Valley indicate a susceptibility to damage from this hazard. Multi-story buildings of unreinforced masonry are particularly at risk.

Inundation from dam failure due to earthquake is considered an unlikely scenario for this event. In order for this to occur, the subject dam would have to be at or near full storage capacity due to heavy precipitation or other factors, concurrent with a severe seismic event along a fault in close proximity to the dam. Should these conditions manifest themselves, spillover is another threat that must be considered.

Although provisions have been made for local mutual aid, as well as state and federal assistance, both government and private sector planners agree that such assistance would not be available for days, or perhaps weeks, after the incident. In the event that more than one community is affected, competing requests for aid will result in each affected community receiving proportionately less assistance.

Another hazard is that of liquefaction. Liquefaction is the loss of strength of sandy soils resulting in a temporary transition of soil to a fluid mass, having a semblance of quicksand. This phenomena may be expected to occur if dynamic forces of ground shaking take place. The unconsolidated sediments of the Salton Trough, especially in saturated areas such as irrigated lands, are subject to failure during earthquakes, thus causing the potential for liquefaction.

These potential public safety impacts are considered significant.

3. Mitigation Measures

a. Police Protection

The following recommendations shall be implemented, as is feasible, to minimize impacts on sheriff services. .

- Future developers shall install security alarm systems on all commercial buildings.
- Security lighting on all parking lots, pathways and trails through commercial/industrial areas shall be provided by future developers.
- Clearly marked street names and numbers shall be provided to enhance police and fire identification.
- Sheriff personnel shall be routinely involved in the review of new development applications as they relate to street access and safety. In particular, the County should review development applications with an intent to incorporate concepts of defensible space into the project. These concepts stress the importance of physical design and surveillance as techniques to deter crime. The structure's size, number of entrances, orientation of parking, and the physical features of the project such as landscaping and

lighting, can have an immense effect on people's perceptions about the use, access, and safety of their environments. Guidelines including, but not limited to the following should be used to evaluate the security of proposed development:

a. All common and private spaces shall be well-defined, utilizing physical design features, such as building enclosures, landscaping, screens and walls, vegetation, pairing, grade separation, lighting, fencing, gates, and doors.

b. Entrances to a site and to buildings shall be clearly identified. Conversely, where access is not desirable a formal or symbolic barrier should exist and ample opportunities for informal surveillance should be available.

c. Common spaces, such as parking lots or plazas, shall be open, visually unobstructed, and well-lit.

- The County shall remain active in crime prevention by working with human care agencies, recreational agencies, educational services and community groups to:

  a. reduce victimization;

  b. encourage recreational programs to provide off-school hour activities for youth;

  c. maintain awareness of potential problem areas; and

  d. encourage the organization of Neighborhood Watch Programs in residential areas as well as crime prevention programs in industrial and commercial areas.

- The County shall maintain a high standard for the delivery of law enforcement services, including a commitment to the use of state-of-the-art equipment and management techniques.

b. Fire Protection

Payment of development fees to the County Fire Department would mitigate most impacts to County fire protection services. Large new developments, such as SPAs, shall require more detailed evaluation of fire protection and other public service impacts, and mitigation beyond payment of development fees, such as construction of new stations, may be necessary.

c. Solid Waste

The continued availability of adequate solid waste disposal sites to accommodate planned development will need to be addressed by the County Integrated Waste Management Plan to be prepared by January 1994.

The ability of existing local landfills to serve planned development will also need to be evaluated on a project by project basis, particularly for large new developments such as SPAs. Such

projects shall require that a "Public Facilities Financing Plan" be prepared, and that the capacity of solid waste disposal sites be evaluated as part of the project environmental review.

d. Natural Gas

No mitigation measures are necessary.

e. Electric and Telephone

Electric

The impacts to electricity supply would be significant and would probably require the Imperial Irrigation District to construct new distribution and sub-station facilities. The construction of new facilities will mitigate the impacts caused by the project. The costs for construction of new generation, distribution and sub-station facilities will be absorbed by all IID customers and by developers of new projects.

Telephone

The telephone company, being a publicly regulated utility, is obligated to serve the community and improve facilities as needed to serve increased demand for telephone services. The addition of more cables and the upgrade of switching capability should mitigate the impacts caused by new development within the General Plan Area.

f. Water Service and Availability

Significant impacts to local water treatment districts may result from planned development and require improvement of treatment and storage facilities. Evaluation of adequacy of domestic water delivery systems shall be required for all new development. For large new developments such as SPAs, a "Public Facilities Financing Plan" shall be prepared and the capacity of water service facilities shall be evaluated as part of the project environmental review.

Potential impacts from use of IID canal water for domestic purposes in rural areas will be addressed pursuant to the EPA Order. No further mitigation is required.

g. Sewage Treatment

Significant impacts to local sewage treatment districts may result from planned development and require improvement of treatment facilities. Evaluation of adequacy of treatment capacity shall be required for all new development. For large new developments such as SPAs, a "Public Facilities Financing Plan" shall be prepared and the capacity of treatment facilities shall be evaluated as part of the project environmental review. If extension of sewer lines, expansion of treatment plant capacity, or construction of a new treatment plant is required for a proposed project, the impacts of such extension, expansion, or construction shall be addressed by the project EIR.

h. Schools

Due to the current overcrowding of most of the school districts in the area, significant impacts may result from planned development. If adequate funding mechanisms are not available to accommodate new development, funding for additional schools shall be provided by the developer to the school district in which a project is located. For large new developments such as SPAs, a "Public Facilities Financing Plan" shall be prepared and the capacity of school facilities shall be evaluated as part of the project environmental review.

i. Parks and Recreation

As new development occurs, the need for expanded neighborhood park facilities, particularly in many of the unincorporated communities, is expected to increase. The County should evaluate the need to establish a park fee program based on the State Quimby Act. For large new developments such as SPAs, a "Public Facilities Financing Plan" shall be prepared and the adequacy of neighborhood park facilities shall be evaluated as part of the project environmental review. For SPAs proposing residential development, the need to develop internal neighborhood parks shall be considered during the specific plan process.

j. Health Care

Mitigation measures for increased health care demands are beyond the scope of this EIR and fall within Economic and Social Effects as defined by CEQA Guidelines Section 15131. However, the County will forward notice of all residential applications to the Regional Medical Center to assist in their long-term solution of these issues.

k. Seismic Safety

Future projects should be evaluated for their seismic safety on a project by project basis under the CEQA process in order to ensure that seismic safety issues are resolved. Construction in accordance with the Uniform Building Code and local regulations will insure that damage from seismic activity will be limited.

l. Public Facility Fee

The County shall consider adopting a comprehensive impact fee program for the provision of services not provided by local districts. This program involves the payment of a fee by the developer to the County that would cover the cost of the provision of a number of public services, including fire and police protection, neighborhood parks, libraries, and administrative services.

H. Air Quality

Clean air is a valuable and essential resource which affects many aspects of our daily lives. It is vital to our health and welfare, to the local agricultural economy, and to the quality of life enjoyed by Imperial County residents. The capacity of the air to absorb environmental contaminants is limited however, and must be managed wisely to avoid significant deterioration of the resource. Considerable information about Imperial County air quality, and plans for management of the air quality is contained in the *1991 Air Quality Attainment Plan* (APCD 1991). This report is the source of most of the information in this section describing the existing conditions and air quality planning efforts.

1. Existing Conditions

a. Climatology

The climate of Imperial County is a desert climate, characterized by low precipitation, hot summers, mild winters, low humidities and strong inversions. The hottest month, July, has an average maximum temperature of 113.8°F, an average minimum temperature of 67.5°F, and an average mean temperature of 91.5°F. The coldest months, December and January, have an average maximum temperature of 79.5°F, an average minimum temperature of 30.6°F, and an average mean temperature of 54.7°F. Annual average rainfall is 2.89 inches. The wettest month is December, averaging 0.5 inches; the driest is June, with measurable rainfall recorded only twice since 1914. Rainfall is highly variable with precipitation from a single heavy storm one year exceeding the entire annual total during following a drought year. Average humidities range from 28 percent in summer to 52 percent in winter. A large daily oscillation of temperature produces a corresponding large variation in the relative humidity. Nocturnal humidities rise to 50-60 percent, but drop to about 10 percent during the day.

These climatic conditions are strongly influenced by the large-scale sinking and warming of air in the semi-permanent subtropical high pressure center of the Pacific Ocean. The high pressure ridge blocks out most mid-latitude storms, except in winter when the high is weakest and farthest south. The coastal mountains also have a major influence on climatic conditions by blocking the cool, damp marine air found in the California coastal environs. The flat terrain of the Imperial Valley and the strong temperature differentials created by intense solar heating produce moderate winds and deep thermal convection. The combination of subsiding air, protective mountains, and distance from the ocean all combine to severely limit precipitation.

High winds are occasionally experienced in the Imperial Valley. Wind speeds in excess of 31 miles per hour occur most frequently in April and May. On an annual basis, strong winds (greater than 31 miles per hour) are observed 0.6 percent of the time; speeds of less than 6.8 miles per hour account for more than one-half of the observed winds. The prevailing winds are from the west-northwest through southwest. Secondary flow is observed from the southeast.

Air pollutant concentrations are primarily determined by the amount of pollutant emissions in an area and the degree to which these pollutants are dispersed in the atmosphere. Dispersion can be limited by the presence of a temperature inversion, a condition defined by a layer of

warm air above a layer of cooler air. Inversions may be broken by winds or solar heating. Imperial County experiences surface inversions almost every day of the year. These inversions are usually broken by solar heating. Strong, persistent subsidence inversions, caused by the presence of a Pacific high pressure cell, can persist for one or more days, causing air stagnation and the buildup of pollutants. Highest ozone levels are often associated with subsidence inversions. In Imperial County, subsidence inversions are common from November through June and less likely to occur the remainder of the year.

b. Air Quality Standards

The federal government and the State of California set ambient air quality standards for pollutants that are of greatest public health concern. Air quality standards are typically set at levels which provide a reasonable margin of safety and protect the health of the most sensitive individuals in the population.

Pollutants for which federal ambient standards have been established are known as 'criteria pollutants'. Criteria pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10} (airborne particles 10 microns or less in diameter), and lead, a specific particulate pollutant. For some criteria pollutants, California has set additional standards, generally more restrictive than the national standards. California has also set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. National and California ambient air quality standards are shown in Table 16.

c. Regulatory Structure

Federal authority for air quality issues is governed by the Clean Air Act, originally passed in 1963 and most recently amended in 1990. The Clean Air Act is administered by the EPA which, among many other requirements, requires each state to prepare, submit for approval, and maintain a State Implementation Plan, or SIP. The SIP includes plans for attaining ambient air quality standards.

California authority for air quality issues is contained in the California Clean Air Act (CCAA) of 1988 and a number of related pieces of legislation. The CCAA requires all areas of the State to achieve and maintain the California ambient air quality standards by the earliest practicable date. The state agency for the administration of the CCAA is the Air Resources Board (ARB). In general, ARB is responsible for the establishment and direction of local air quality districts to implement state air quality requirements. One responsibility retained by the State is the control of emissions from vehicular sources.

The Imperial County Air Pollution Control District (APCD) shares responsibility with ARB for ensuring that state and federal ambient air quality standards are achieved and maintained within the County. The District is also responsible for the inspection of stationary sources, monitoring of ambient air quality, and planning activities such as modeling and maintenance of the emission inventory. Districts in state nonattainment areas are also responsible for developing and implementing transportation control measures necessary to achieve the state ambient air quality standards.

TABLE 16
FEDERAL AND STATE AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration	Method	Primary[3]	Secondary[4]	Method
Ozone	1 hour	0.09 ppm	----	0.12 ppm (235 μg/m3)	0.12 ppm (235 μg/m3)	Ethylene Chemiluminescence
Carbon Monoxide	8 hour	9.0 ppm (10 mg/m3)	Non-dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m3)	----	Non-dispersive Infrared Spectroscopy (NDIR)
	1 hour	20 ppm (23 mg/m3)	Non-dispersive Infrared Spectroscopy (NDIR)	35 ppm (40 mg/m3)	----	Non-dispersive Infrared Spectroscopy (NDIR)
Nitrogen Dioxide	Annual Average	----	Gas Phase Chemiluminescence	0.05 ppm (100 μg/m3)	0.05 ppm (100 μg/m3)	Gas Phase Chemiluminescence
	1 hour	0.25 ppm (470 μg/m3)	Gas Phase Chemiluminescence	----	----	Gas Phase Chemiluminescence
Sulfur Dioxide	Annual Average	----	----	0.03 ppm (80 μg/m3)		Pararosaniline
	24 hour	0.05 ppm (131 μg/m3)	Ultraviolet Fluorescence	0.14 ppm (365 μg/m3)		Pararosaniline
	3 hour	----	Ultraviolet Fluorescence	----	0.5 ppm (1300 μg/m3)	Pararosaniline
	1 hour	0.25 ppm (655 μg/m3)	----	----	----	Pararosaniline
Suspended Particulate Matter (PM_{10})	Annual Mean[5]	30 μg/m3	Size Selective Inlet High Volume Sampler	50 μg/m3	----	High Volume Sampling
	24 hour	50 μg/m3	Size Selective Inlet High Volume Sampler	150 μg/m3	----	High Volume Sampling
Sulfates	24 hour	25 μg/m3	Turbidimetric Barium Sulfate	----	----	----
Lead	30 day Average	1.5 μg/m3	Atomic Absorption	----	----	----
	Calendar Quarter	----	----	1.5 μg/m3	1.5 μg/m3	Atomic Absorption
Hydrogen Sulfide	1 hour	0.03 ppm (42 μg/m3)	Cadmium Hydroxide Stractan	----	----	----
Vinyl Chloride (chloroethane)	24 hour	0.010 ppm (26 μg/m3)	Tedlar Bag Collection, Gas Chromatography	----	----	----
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70 percent.		----	----	----

1 California Standards: Other than ozone, carbon monoxide, sulfur dioxide (1 hour), nitrogen dioxide and particulate matter (PM_{10}), are values that are not to be equaled or exceeded. The ozone, carbon monoxide, sulfur dioxide (i hour), nitrogen dioxide and particulate matter (PM_{10}) standards are not to be exceeded.

2 National Standards: Other than ozone and those based on annual averages or annual geometric means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above standard is equal to or less than one.

3 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards not later than three years after that state's implementation plan is approved by the Environmental Protection Agency.

4 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the EPA.

5 The annual PM_{10} state standard is based on the geometric mean of all reported values taken during the year. The annual PM_{10} national standard is based on averaging the quarterly arithmetic means.

d. Air Quality in Imperial County

Ambient Air Quality Data. Monitoring of ambient air quality in Imperial County began in 1976. Most air monitoring in the County has occurred in the urban areas and areas where industrial activities are located. As of March, 1991, nine public agency and private sector monitoring stations were in active service in the County, as shown in Figure 20. Long-term monitoring has been performed at El Centro, Brawley and Calexico. Criteria pollutants monitored are ozone, and PM_{10}. Total suspended particulates (TSP) is also monitored; TSP was a criteria pollutant until the summer of 1977, when PM_{10} replaced TSP as a criteria pollutant. Monitoring data for the five year period 1987-1991 and for the first quarter of 1992 are shown in Table 17.

TABLE 17
OZONE AND PARTICULATE CONCENTRATIONS
IN IMPERIAL COUNTY 1987-1991 AND JAN-MAR 1992

		1987	1988	1989	1990	1991	1992 (Jan-Mar.)
OZONE							
El Centro	1 hour maximum	0.10	0.11	0.11	0.10	0.11	0.07
	Days exceeding the State ozone standard	1	19	5	6	3	0
Calexico	1 hour maximum	Ozone monitoring started 10/91					0.12
	Days exceeding the State ozone standard	Ozone monitoring started 10/91					5
TSP							
El Centro	24 hour maximum	——	——	TSP monitoring discontinued			
	Annual Average	120	122	TSP monitoring discontinued			
Brawley	24 hour maximum	——	——	TSP monitoring discontinued			
	Annual Average	124	139	TSP monitoring discontinued			
Calexico	24 hour maximum	——	——	——	637	467	——
	Annual Average	199	194	238	168	150	——
PM_{10}							
El Centro	24 hour maximum	——	368	209	100	243	60
	Annual Average	——	55	87	41	50	——
Brawley	24 hour maximum	——	126	280	258	229	103
	Annual Average	——	61	48	50	57	——
Calexico	24 hour maximum	379	212	405	No current PM_{10} monitoring		
	Annual Average	136	112	136	No current PM_{10} monitoring		

Sources: Imperial County 1991 Air Quality Attainment Plan
California Air Resources Board, Air Quality Data 1990, 1991, 1992

Description of Pollutants. Ozone is the primary constituent of photochemical smog, which is formed in the atmosphere through the reaction of reactive organic gases (ROG) and oxides of nitrogen (NO_x) in the presence of sunlight. At higher concentrations smog, or ozone, can affect public health by directly affecting the lungs. Asthma, bronchitis, other respiratory ailments and

cardiovascular disease are aggravated by exposure to ozone. Ozone is also a serious threat to California agriculture and native vegetation. Many sensitive plant species are known to suffer damage at concentrations below human health standards. A number of crops grown within Imperial County, including orchard crops, lettuce and several grape varieties, are particularly sensitive to ozone injury. Ozone stunts growth, reduces yield and causes aesthetic damage which reduces market value.

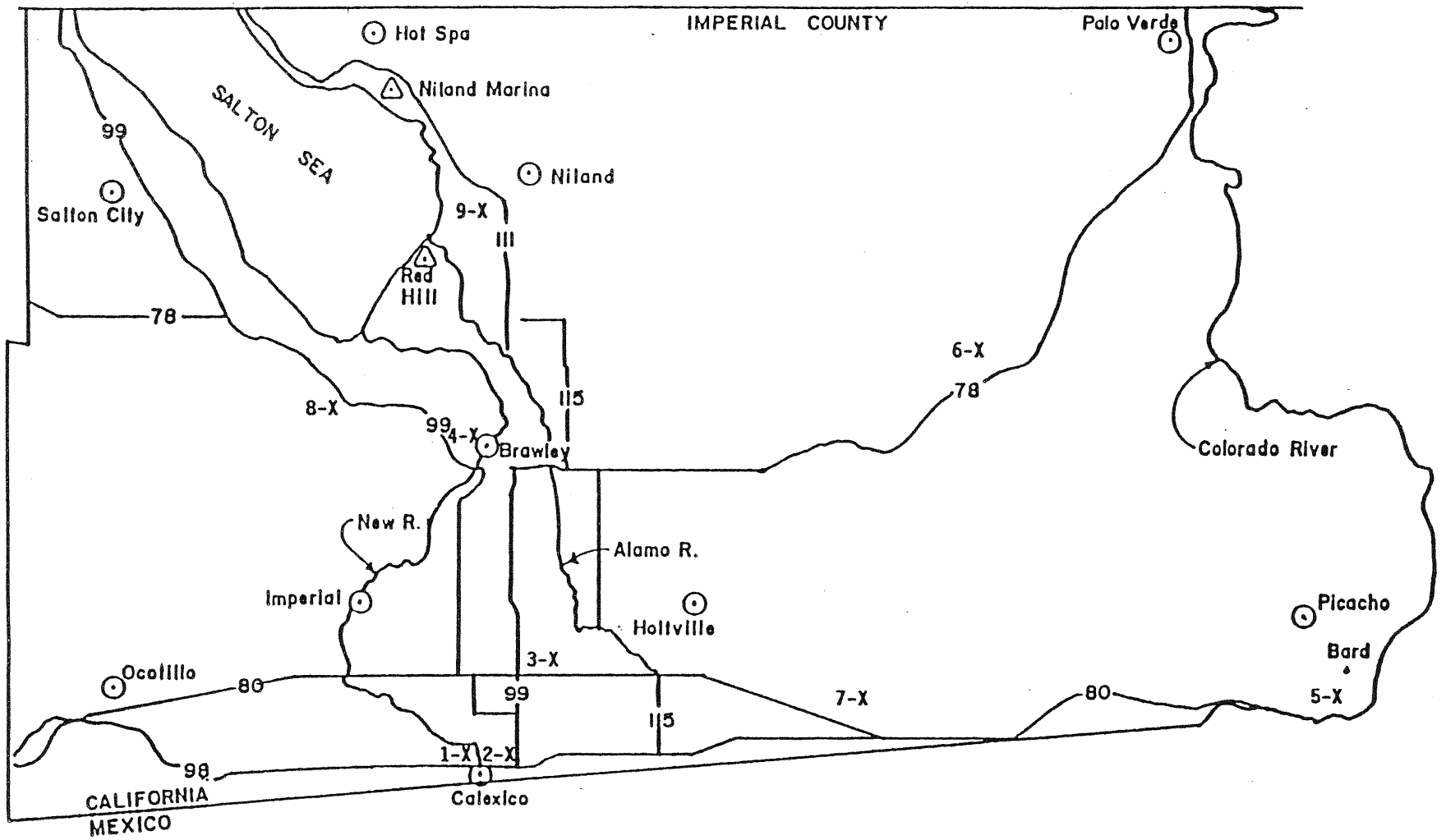
Suspended particulates include particles of dust, smoke, fumes and small droplets of liquid as aerosols and mists. The particles of concern, from a health aspect, are those particles with a diameter less than 10 microns (10 millionths of a meter), which are classified as PM_{10}. These particles have the greatest likelihood of being inhaled into the human lungs, the larger particles being stopped in the nose and throat. Inhaled particles can irritate the respiratory tract, reduce lung capacity and carry toxic materials into the body, where they may be absorbed into the blood stream.

Attainment Designation. The County of Imperial has been designated a nonattainment area for the state ozone standard. The County has also been designated a nonattainment area for the PM_{10} standard. A nonattainment designation for ozone requires the jurisdiction to prepare and implement plans which would bring the area into attainment by a prescribed date. The date and the degree of attainment are governed by the severity and the sources of the pollutants.

Sources of Pollutants. Ozone is formed in the atmosphere, and is often transported in the atmosphere from the area where the constituent compounds were emitted to a downwind area where the effects of the pollution are felt. Atmospheric transport of ozone is likely the case in Imperial County, where ozone levels have occasionally been traced to sources in the Los Angeles Basin and in Mexicali, Mexico. The present availability of data does not allow quantification of the transport effect. A monitoring plan to study the transport from Mexico has been implemented.

The sources of pollution within the County have been quantified in the form of an emissions inventory. Emissions may be quantified by measurement at a source; by calculation from the engineering parameters of a source, such as fuel consumption and stack diameter; and by estimation, using emission factors developed by the EPA and other agencies. The first two methods are often used for large point sources, such as utilities and manufacturing operations. Estimation is commonly used for multiple sources and area sources, such as motor vehicles, agricultural operations and natural sources. For particulate matter, an additional tool for estimation of source is the analysis of the material collected in the sampling process.

The year 1987 was designated as the baseline year for estimation of emissions data to be used in measuring progress towards attainment of air quality standards. The 1987 emissions inventory for Imperial County is shown in Table 18. A refinement of this inventory is the ozone attainment planning inventory shown in Table 19. This inventory includes only ROG and NO_x, the constituents of ozone, and only those emissions for the months May through October, the "ozone season." The planning inventory also omits natural sources, which are beyond APCD control. This planning inventory allows focus upon those emissions principally contributing to locally formed ozone.



Monitoring Site Location

1. Grant Street
2. Calexico Fire Station
3. El Centro
4. Brawley
5. Winterhaven
6. Gold Fields
7. Ormesa
8. Laidlaw
9. Niland

0 5 10 miles

N

SOURCE: Imperial County, 1991 Air Quality Attainment Plan

Imperial County General Plan	Air Quality Monitoring Locations	Figure 20

TABLE 18
1987 ANNUAL EMISSIONS INVENTORY (TONS/DAY)

Mobile Source Categories	TOG	ROG	CO	NO_x	SO_x	PM	PM-10
Fuel Combustion							
Agricultural							
Petroleum Refining							
Other Manufacturing/Industrial			.40	3.30		.20	.20
Electric Utilities			.30	2.30	.20	.10	.10
Other Services and Commerce			.10	.40			
Residential			.10	.10			
Subtotal	**.00**	**.00**	**.90**	**6.10**	**.20**	**.30**	**.30**
Waste Burning							
Agricultural - Debris	4.80	3.50	31.00			3.30	2.80
Range Management							
Other	.90	.40	3.40	.20		.50	.50
Subtotal	**5.70**	**3.90**	**34.40**	**.20**	**.00**	**3.80**	**3.30**
Solvent Use							
Dry Cleaning	.10	.10					
Degreasing	.40	.10					
Architectural Coating	.70	.70					
Other Surface Coating	.50	.50					
Asphalt Paving	1.10	1.10					
Consumer Products	.90	.90					
Industrial Solvent Use	.10	.10					
Subtotal	**3.80**	**3.50**					
Petroleum Process, Storage, and Transfer							
Petroleum Refining		1.20				.10	
Petroleum Marketing	1.20	1.20					
Subtotal	**1.20**	**2.40**	**.00**	**.00**	**.00**	**.10**	**.00**
Industrial Processes							
Food and Agricultural						.80	.30
Mineral Processes						.60	.40
Metal Processes						1.60	1.10
Subtotal	**.00**	**.00**	**.00**	**.00**	**.00**	**3.00**	**1.80**
Miscellaneous Processes							
Pesticide Application	5.50	5.50					
Farm Operations						63.00	29.00
Construction and Demolition						8.00	5.10
Entrained Road Dust - Paved						21.00	9.50
Entrained Road Dust - Unpaved						53.00	32.00
Unplanned Fires							
Natural Sources						1,700.00	860.00
Subtotal	**5.50**	**5.50**	**.00**	**.00**	**.00**	**1,845.00**	**935.60**
Total Stationary Sources	**16.20**	**15.30**	**35.30**	**6.30**	**.20**	**1,852.20**	**941.00**

TABLE 18
1987 ANNUAL EMISSIONS INVENTORY (TONS/DAY)

Mobile Source Categories	TOG	ROG	CO	NO_x	SO_x	PM	PM-10
On Road Vehicles							
Light Duty Passenger	3.80	3.50	27.00	3.40	.10	.40	.20
Light and Medium Duty Trucks	2.50	2.30	19.00	2.30	.10	.20	.10
Heavy Duty Gas Trucks	.40	.40	9.10	.90			
Heavy Duty Diesel Trucks	.80	.80	2.60	6.40	.30	1.30	1.10
Motorcycles			.10				
Heavy Duty Diesel Urban Buses							
Subtotal	**7.50**	**7.00**	**57.80**	**13.00**	**.50**	**1.90**	**1.40**
Other Mobile							
Off Road Vehicles	1.50	1.40	5.50	.10			
Trains	1.50	1.40	1.80	5.10	.50	.30	.30
Government Aircraft	2.20	1.90	5.20	1.40	.20	.10	.10
Other Aircraft	.20	.20	4.50	.20			
Mobile Equipment	1.40	1.40	16.00	4.70	.40	.60	.60
Utility Equipment	.10	.10	1.20				
Subtotal	**6.90**	**6.40**	**34.20**	**11.50**		**1.00**	**1.00**
Total Mobile Sources	**14.40**	**13.40**	**92.00**	**24.50**		**2.90**	**2.90**
Total 1987 Emission Inventory	**30.60**	**28.70**		**30.80**		**1,855.10**	**943.90**

Source: Imperial County 1991 Air Quality Attainment Plan.

TABLE 19
1987 PLANNING EMISSION INVENTORY (TONS/DAY)

Mobile Source Categories	ROG	NO_x
Fuel Combustion		
Agricultural		
Petroleum Refining		.01
Other Manufacturing/Industrial		
Electric Utilities	.03	4.92
Other Services and Commerce		2.34
Residential	.01	.25
Other		.04
Subtotal	**.04**	**7.56**
Waste Burning		
Agricultural - Debris	3.43	
Range Management		
Other	.36	.16
Subtotal	**3.79**	**.16**
Solvent Use		
Dry Cleaning	.14	
Degreasing	.18	
Architectural Coating	.82	
Other Surface Coating	.61	
Asphalt Paving	1.84	
Domestic	.93	
Industrial Solvent Use	.13	
Subtotal	**4.65**	
Petroleum Process, Storage, and Transfer		
Petroleum Marketing	1.2	
Subtotal	**1.2**	**.00**
Industrial Processes		
Food and Agricultural	.02	
Subtotal	**.02**	**.00**
Miscellaneous Processes		
Pesticide Application	5.56	
Unplanned Fires		
Subtotal	**5.56**	**.00**
Total Stationary Sources	**15.26**	**7.72**

TABLE 19
1987 PLANNING EMISSION INVENTORY (TONS/DAY)

Mobile Source Categories	ROG	NO_x
On Road Vehicles		
Light Duty Passenger	5.25	3.32
Light and Medium Duty Trucks	3.29	2.17
Heavy Duty Gas Trucks	.57	1.26
Heavy Duty Diesel Trucks	.79	6.22
Motorcycles	.07	.01
Heavy Duty Diesel Urban Buses		.01
Subtotal	**9.97**	**12.99**
Other Mobile		
Off Road Vehicles	1.65	.18
Trains	1.4	5.07
Government Aircraft	1.91	1.39
Other Aircraft	.22	.23
Mobile Equipment	.82	4.19
Utility Equipment	.14	.01
Subtotal	**6.14**	**11.07**
Total Mobile Sources	16.11	24.06
Total 1987 Emission Inventory	**31.37**	**31.78**

Source: Imperial County 1991 Air Quality Attainment Plan.

The major sources of ozone constituents, as shown in the baseline inventory, are on-road vehicles, other mobile sources, such as government aircraft, trains and off-road vehicles, the burning of agricultural debris, and manufacturing/industrial processes. The principal source of PM_{10}, constituting more than 90 percent of the emissions, is natural sources, which is wind-blown dust and sand.

With respect to mobile sources, it is apparent that non-local travel is a major factor in Imperial County. It is estimated that commuting for work or school accounts for about 1/3 of all trips and vehicle miles traveled. While total tourist and through travel has not been quantified, some figures are available. For the period October 1, 1989 - September 30, 1990, more than 2.2 million vehicles with Mexican license plates entered Imperial County at the Calexico Port of Entry, and about 1.75 million vehicles entered from Arizona. Imperial County is also a popular vacation destination, with a dual impact on air quality. First is the impact of the tourist travel to and from Imperial County; second is the use of off-road vehicles (i.e., dune buggies and dirt bikes) as a popular tourist activity.

Odor and Pesticide Impacts. The predominant land use in Imperial County is agriculture. Agricultural operations contribute to ROG, PM_{10}, and the other criteria pollutants, as shown in the emissions tables. Additionally, the air quality of some agricultural areas and downwind

properties may be subjected to unpleasant odors and to airborne pesticides, particularly from aerial spraying of crops.

In recognition of the role of agriculture in the County, the Board of Supervisors has adopted a Right to Farm Ordinance (No. 1031). This ordinance requires a disclosure to owners and purchasers of property near agricultural lands or operations, or areas zoned for agricultural purposes. The disclosure advises persons that discomfort and inconvenience from odors, fumes, dust, smoke and chemicals resulting from conforming and accepted agricultural operations are a normal and necessary aspect of living in the agricultural areas of the County. The complete disclosure notice is contained in Appendix B.

e. Plans to Control and Improve Air Quality

Under the CCAA, the ARB and the air pollution control districts share primary responsibility for improving air quality. The extent of the planning effort to control air pollution within a district depends upon the severity of the district's air pollution problems. Although formal severity classifications have not yet been made, Imperial County is expected to fall within the "moderate" attainment category for ozone, and is required to implement the following:

- A permitting program designed to achieve no net increase in emissions of nonattainment pollutants or their precursors from new or modified stationary sources which emit or have the potential to emit 25 tons per year or more of nonattainment pollutants or their precursors;
- A permitting program requiring the use of best available control technology for any new or modified stationary source that has the potential to emit 25 pounds per day or more of any nonattainment pollutant or its precursors.
- Reasonably available control technology for all existing stationary sources;
- Reasonably available transportation control measures;
- Provisions to develop area source and indirect source control programs;
- Provisions to develop and maintain an emissions inventory system to enable analysis and progress reporting and a commitment to develop other analytical techniques to carry out its responsibilities;
- Provisions for public education programs to promote actions to reduce emissions from transportation and areawide sources.

The Imperial County APCD has prepared a plan for reduction of ozone-forming emissions and attainment of ozone standards entitled the *1991 Air Quality Attainment Plan* (APCD 1991). The ARB conditionally approved the 1991 AQAP in February 1993. For the control of stationary source emissions, the Plan contains 19 measures proposed for adoption, and an additional four

measures proposed for further study. The measures proposed for adoption include reducing the ROG content of paints, controlling landfill gases, and changing commercial dry-cleaning machines. The reduction of agricultural burning is one of the measures proposed for further study.

With respect to mobile sources, the reduction of emissions from individual vehicles is the province of the ARB. APCDs are concerned with the reduction of vehicle use and increased use of transportation modes which reduce emissions. The Imperial County Attainment Plan contains four transportation control measures and four land use strategies proposed for adoption. An additional six measures are proposed for further study. The transportation control measures focus on reducing the number of short trips.

The 1991 Attainment Plan addresses reductions in ozone levels, and does not specifically address the nonattainment of the PM_{10} standard. Many of the measures designed to reduce ozone-forming emissions will also reduce PM_{10} emissions. The effect on reducing PM_{10} is expected to be minimal, considering that the preponderance of PM_{10} is from wind and natural sources, which are not readily controlled by APCD or ARB measures.

It is noted that, since 1989, Imperial County has put two resource recovery plants into operation. These plants use agricultural wastes to generate power, and should have an effect on reducing ROG emissions.

f. Existing General Plan

The existing General Plan recognizes the need for air quality concerns in the Geothermal Element and the Conservation and Open Space Element. The need for reduction of motor vehicle emissions was described in the 1991 draft *Amended Circulation and Scenic Highways Plan.*

2. Environmental Impacts

a. Methodology

The implementation of the Noise Element, Seismic and Public Safety Element, Conservation and Open Space Element, and Water Element will not have an adverse impact on air quality. Accordingly, this analysis focuses solely on impacts arising out of implementation of the Land Use, Traffic and Circulation, Agricultural, and Geothermal and Transmission Elements.

Ozone. Because Imperial County is not in attainment with State ambient air quality standards for ozone, any increase in ozone emissions is considered significant.

As noted above, under the California Clean Air Act the Imperial County APCD is required to develop an attainment plan that will reduce ozone-precursor emissions (ROG and NOx) by five percent per year from 1987 levels until ambient air quality standards are met. The 1991 Air Quality Attainment Plan (AQAP) prepared by the Imperial County APCD does not meet this

target. The 1991 AQAP would, however, result in a yearly decline in local ozone-precursor emissions, and thus would result in an improvement in air quality, assuming long-range transport of ozone from other regions does not overwhelm such improvement.

The 1991 AQAP, in projecting this improvement in ozone concentrations, allowed for the degree of population growth and development anticipated with the 1973 General Plan in place. The proposed General Plan, when compared with the 1973 General Plan, significantly scales back on permissible urban and residential development in the County. For example, the 1973 General Plan designates 122,026 acres for urban land uses. By contrast, the proposed General Plan designates 78,240 acres for urban land uses and places 22,520 acres in Specific Plan Areas. Similarly, the proposed General Plan lessens the acreage devoted to lesser intensity residential development. As a result, anticipated, actual growth expected under the proposed General Plan will be less than that anticipated under the existing 1973 General Plan. Accordingly, the growth projections assumed for purposes of the 1991 AQAP (which in turn were developed in light of the 1973 General Plan) remain valid. Indeed, if anything, these growth projections can be expected to overstate growth, in that the proposed General Plan scales back on permissible growth. Thus, as the 1991 AQAP is implemented, the yearly decline in ozone-precursor emissions in Imperial County should also be expected to occur (and may even accelerate) under the proposed General Plan, assuming there is no significant increase in long-range transport of imported ozone from other regions.

In summary, the 1991 AQAP projected steady, real-world reductions in ozone concentrations, even allowing for a degree of growth greater than or equal to the growth anticipated in the proposed General Plan. In short, air quality in Imperial County is expected to improve. The question is whether the proposed General Plan will disrupt those expectations. To the extent the goals, objectives and policies set forth in the proposed General Plan are consistent with the strategies outlined in the 1991 AQAP, adopting the General Plan will not derail the real-world improvement in ozone pollution anticipated under the 1991 AQAP. Accordingly, to the extent the policies in the proposed General Plan are consistent with the strategies in the 1991 AQAP, adopting the proposed General Plan will not result in a significant impact on ozone pollution. As discussed below, the policies in the proposed General Plan are largely consistent with, and indeed compliment, the strategies in the 1991 AQAP.

PM_{10}. Because Imperial County is not in attainment with State and Federal ambient air quality standards for PM_{10}, any increase in the emission of PM_{10} or its precursors associated with adoption of the proposed General Plan is considered significant. The 1991 AQAP does not specifically address attainment of ambient air quality standards for PM_{10}. Many of the ozone control strategies identified in the 1991 AQAP, however, will result in decrease PM_{10} emissions.

It is anticipated that the Imperial County APCD will issue a separate attainment plant designed to reduce PM_{10} concentrations in the County. Because the Imperial County APCD has not prepared this program, at this time there is no way to compare the strategies set forth in the program with the policies in the General Plan.

It should be noted, however, that the Imperial County APCD will shortly adopt a New Source Review permit program that will require new or modified sources that emit 80 pounds per day or more of PM_{10} or its precursors to provide emissions offsets, such that the new or modified source will result in no net increase in the emission of PM_{10} or its precursors. As discussed below, nothing in the proposed General Plan is inconsistent with this requirement.

Other Criteria Air Pollutants. An increase in emissions or carbon monoxide (CO), the only criteria air pollutant other than ozone, PM_{10}, or their precursors, is considered significant only if CO emissions would cause a violation of natural or state ambient air quality standards.

b. Impacts

Land Use. The Land Use Element defines land use categories, delineates boundaries for various land use areas, and establishes development standards for each category. Implementation of the Land Use Element is accomplished through amendments to the County Zoning Ordinance and Zoning Maps, and through discretionary review of proposed development plans and land use permit applications.

The Imperial County APCD has proposed and will shortly adopt a revised "New Source Review" permit program designed to reduce non-attainment emissions in the County. Under this revised rule, new or modified stationary sources that emit 137 pounds per day or more of ROG, NOx or SOx or 80 pounds per day or more of PM_{10} will be required to provide "emission offsets" before the air district will issue them a permit. These stationary sources will not cause a net increase in non-attainment pollutant emissions, and thus will not result in a significant impact on ozone and PM_{10} pollution in the County. This revised New Source Review rule will also result in reduced agricultural emissions by allowing the use of such reductions as offsets. In addition, the Imperial County APCD will adopt a number of stationary source controls that will apply to existing equipment. In light of these and other regulations described in the 1991 AQAP, any future increase in ozone-precursor emissions will be virtually entirely attributable to increased emissions from mobile sources.

In light of the approach taken by the 1991 AQAP, the proposed General Plan's impact on air quality will be the product of the growth it induces, if any, and the resulting increase in vehicle trips and vehicle miles travelled. The 1991 AQAP identifies the following land use strategies to reduce emissions from mobile sources:

- **Planning Compact Communities.** This strategy calls upon cities and the County to develop at densities that reduce trips and travel distances and encourage the use of alternative forms of transportation, to focus growth within urban areas, and to maintain rural areas as open space and agricultural lands.

- **Mixed Land Use.** This strategy is designed to reduce reliance on the automobile. Locating residential, commercial and retail uses close to one another encourages forms of transportation other than automobiles, such as walking and cycling. The strategy recognizes that some forms of land use are functionally compatible, and need not be

separated. An example of compatible, mixed-use development would be street-level commercial uses, with residential uses on upper floors.

- **Jobs/Housing Balance.** This strategy is designed to ensure that developments address both employment and housing needs. Such a balance reduces home-to-work travel distances, cuts down on vehicle miles travelled, and encourages the development of commuter transit alternatives.

- **Communication, Coordination and Monitoring.** This strategy ensures that the Air Pollution Control District is included in the review and implementation of land use policies.

Although the Land Use Element of the proposed General Plan may appear to conflict with certain strategies due to limiting mixed uses in commercial or industrial areas, in actuality it promotes them with the underlying theme of directing balanced growth into existing urban areas. The following examples illustrate that balance.

- **Urban Areas.** The General Plan identifies 12 urban areas which currently support urban level public services such as sewer, domestic water and schools, and contain the majority of the residential, commercial and employment oriented land uses. The Land Use Element promotes development within these areas by allowing the most intensive residential and commercial densities and limiting development outside the urban areas to predominantly agriculture.

- **Specific Plans.** The Land Use Element considers eight Specific Plan Areas (SPA) within the County. These SPAs represent either new specialized or unique land use areas within the County. They are in overall conformance with the AQAP because they promote mixed use or compact communities. Examples of this conformance include Felicity SPA, a new town focusing on mixed uses with a principal policy to develop a broad range of uses clustered into nodes or neighborhoods over a designated 10,000 acre area; or the Mesquite Lake SPA, focusing on job producing industrial development adjacent to the predominately residential cities of Brawley and Imperial. These cities are currently experiencing significant additional residential growth.

- **Agriculture/Recreation/Open Space.** The Land Use Element contains specific policies and low density development standards of one unit per 40 acres and one unit per 20 acres within the Agriculture and Recreation/Open Space designations to assure the maintenance of both natural open space and agricultural land uses.

The proposed General Plan contains additional land use policies that directly implement strategies set forth in the 1991 AQAP. These policies are described below as "mitigation measures."

As noted above, the Imperial County APCD will shortly adopt a New Source Review permit program that will require new or modified sources that emit 137 pounds per day or more of

ROG, NOx or SOx, or 80 pounds per day or more of PM_{10}, to provide emissions offsets, such that the new or modified source will result in no net increase in non-attainment pollutant emissions. None of the policies in the proposed General Plan are inconsistent with this requirement.

Traffic and Circulation. The Imperial County APCD's 1991 AQAP is designed to bring the County into attainment with ambient air quality standards for ozone. Indeed, implementation of the 1991 AQAP will result in annual reductions in the emission of ozone precursors (ROG and NOx), and will thus result in progress towards attaining these standards, assuming any such progress is not overwhelmed by a significant increase in imported, long-range transport of ozone pollution from other regions.

The Circulation and Scenic Highways Element contains data projecting considerable growth in vehicle traffic volumes through the year 2015. This increase in vehicle trips and vehicle miles travelled would cause increased ROG and NOx emissions from mobile sources, and thus exacerbate the existing regional ozone problem. This, in turn, would make it increasingly difficult to assure that the decline in ozone-precursor emissions envisioned in the 1991 AQAP would be realized.

As noted above, however, the 1991 AQAP allowed for population growth and development consistent with the 1973 General Plan, and still projected declining ozone concentrations. The proposed General Plan scales back on the level of permissible growth (e.g., 122,026 acres designated for urban land uses in the 1973 General Plan, versus 78,240 acres designated for urban land uses and 22,520 acres placed in Specific Plan Areas under the proposed General Plan). Accordingly, adoption of the proposed General Plan will not disrupt the declining ozone concentrations projected in the 1991 AQAP.

Moreover, the Circulation and Scenic Highways Element contains programs and policies designed to maintain levels of service. According to the 1991 AQAP, slow speeds and congestion tend to increase air pollutant emissions from automobiles. The AQAP contains a strategy calling for maintaining a level of service of "C" or better. This is identical to the standard set forth in the proposed General Plan. By establishing and maintaining the levels of service set forth in the proposed General Plan, vehicular emission swill be reduced.

Additional policies in the proposed General Plan encourage the use of non-motorized transportation and provide guidelines for a Transportation Demand Management program. These policies are consistent with, and indeed compliment, strategies set forth in the 1991 AQAP.

Because implementation of the Element is consistent with (and, indeed, compliments) the strategy set forth in the 1991 AQAP, it would not result in a significant air quality impact.

Agriculture. The proposed General Plan's Agricultural Element assumes and promotes the continued prominence of the agriculture industry in the life and economy of the County. Agricultural operations emit air pollutants. In particular, the burning of agricultural debris emits

ROG, NOx and PM_{10}, and pesticide use emits ROG. These practices can be expected to continue under the proposed General Plan. These impacts are potentially significant.

The 1991 AQAP does not contain measures specifically addressing PM_{10} emissions in the County, although such a program is anticipated in the future. Over 90 percent of PM_{10} emissions are attributable to natural sources. Much of the remaining PM_{10} emissions from non-natural sources are attributable to farming operations. Although the Agricultural Element seeks to promote agricultural uses, in light of development pressures such uses are not expected to increase under the proposed General Plan.

The Imperial County APCD has proposed and will shortly adopt an "emissions offset" rule that would permit the use of reductions in agricultural emissions (such as burning debris) as emission reduction credits. This rule will likely result in a reduction in ROG, NOx, and PM_{10} emissions from agricultural operations. Nothing in the proposed General Plan is inconsistent with this strategy.

For these reasons, the impact of the proposed General Plan on attainment with ambient air quality standards for PM_{10} and ozone is insignificant.

Agricultural operations may also create unpleasant odors, fumes, dust, smoke, airborne pesticides or other emissions that are regarded as nuisances by nearby residents. This impact is potentially significant.

Geothermal and Energy Production. The Geothermal and Transmission Element recognizes the potential for adverse air quality impacts from the construction and operation of geothermal plants. The Element also recognizes potential air quality benefits where geothermal generation replaces, or is built instead of, fossil fuel generation. The development of new plants is subject to environmental review and air quality permitting rules. No significant air quality impact would occur from implementation of the Geothermal and Transmission Element.

3. Mitigation Measures

The following mitigation measures are recommended to minimize the potential for, and magnitude of, significant air quality impacts.

- Establish formal procedures in land use planning which provide air quality-sensitive inputs to the planning process as well as the review process. Consideration only in the review process, subsequent to planning and conceptual design, often results in the "no-win" choice of minimal change to a proposal with marginal improvement in air quality, or major change to a proposal to reach a desired goal, with great loss in time and expense, and possible abandonment of the original objective. The following procedures should be included, as a minimum:

  a. The Air Pollution Control Officer or his designated representative shall be included in reviews of the County Zoning Ordinance. This shall include cases

considering the prohibition of residential use in commercial and industrial zones and cases considering zoning adjacent to industrial areas.

b. Developers of Specific Plans shall be instructed to include the concepts of Mixed Land Use and Balanced Jobs and Housing in the development of their plans. The Air Pollution Control Officer or his designated representative shall be included in any task force or committee established by the County to participate in Specific Plan preparation and in reviews of Specific Plans submitted to the County for comment or approval.

- Consider the addition of an Air Quality Element to the General Plan. Alternatively, or in the interim, until an Air Quality Element is appropriate, add the concepts of Mixed Use Zoning, Balanced Jobs and Housing, and Planning Compact Communities to the Goals and Objectives of the Land Use Element. These are strategies L-2, L-3 and L-1 of the *1991 Air Quality Attainment Plan* (APCD 1991).

- Purchasers or owners of property near agricultural lands or operations or included within an area zoned for agricultural purposes shall be provided with the disclosure statement from the Right to Farm Ordinance (No. 1031).

- Support the Air Pollution Control Officer with resources as required to implement the strategies of the *1991 Air Quality Attainment Plan* (APCD 1991), when approved by ARB. Similarly, support study efforts to develop technically and economically feasible alternatives to the burning of agricultural waste.

With incorporation of these mitigation measures, the implementation of the General Plan will not have a significant impact on air quality.

I. Visual Resources

1. Existing Conditions

a. Scenic Visual Resources

Imperial County contains a wealth of scenic visual resources. The visual resources of Imperial County include desert areas, sand hills, mountains, the Salton Sea, agricultural areas, and urban areas. The general locations of these areas are identified in Figure 2.

Desert Areas

The desert areas generally include the West Mesa, lower Borrego Valley, East Mesa, and Pilot Knob Mesa. The desert of the West Mesa area is bordered on the east by the Superstition Mountains and on the west by the Fish Creek Mountains. The Yuha Desert is located in the southwest portion of the County within the West Mesa area and is bisected east/west by I-8. The most visually prominent plant of the Yuha Desert is the ocotillo, which can stand up to 15 feet in height. The seemingly barren landscape contrasts starkly against the backdrop of mountains. Several features within the Yuha Desert add to the scenic quality of this desert. These features include sand chimneys and painted gorge formations. These unique geologic features are valuable for scientific knowledge and add beauty to the natural landscape. Cultural features in the Yuha Desert include large earth sculptures, or geoglyphs that were constructed by pre-historic Indians. Geoglyphs are rare and are one of the most fragile archeological features known.

The lower Borrego Valley desert area is located in the northwestern area of the County, bordered on the north by the Santa Rosa mountains and on the south by the Vallecito Mountains, and on the east by the Salton Sea. The East Mesa area lies to the west of the Imperial Sand Dunes and to the east of the agricultural areas of the Imperial Valley. The Pilot Knob Mesa area is located just east of the Imperial Sand Dunes and west of the Cargo Muchacho Mountains.

The vegetation of these desert areas consists of the Creosote scrub community. Dominant in this community is the creosote bush. Other plants include ocotillo, mesquite, paloverde, saltbush, and encelia. Also contributing to the scenic quality of the desert areas are the springtime blooms of desert wildflowers. In springtime, up to 60 species of annuals may be viewed. A typical scene would include large white evening primroses gleaming over variegated carpets of sand verbena, sunny desert dandelion and desert sunflower, which are often joined by desert marigold, coreopsis and daisy family species.

Algodones Sand Dunes

The Imperial Sand Dunes, also called the Algodones Sand Dunes, are the largest mass of sand dunes in California. This dune system extends for more than 40 miles along the eastern edge of the Imperial Valley agricultural region in a band averaging five miles in width. They extend lengthwise in a northwest by southeast direction, and are situated between the East Mesa and

Pilot Knob Mesa areas. Consisting of shifting sands, the dunes attain a thickness of at least 200 feet in their central parts. Rising to heights of over 300 feet above the surrounding desert floor, the dunes are a well-known landmark to local residents and the thousands of highway travelers who pass by them every year. The dunes are currently bisected east/west by Highway 78 between Brawley and Glamis, and by I-8 between El Centro and Yuma.

Tremendous earth upheavals that elevated the area above the ocean some 200 million years ago and the constant action of erosional forces over the ancient Salton Sea shoreline have all had a part in sculpturing this vast region of dunes. For millions of years, the climate of California's desert area was tropical. But as the earth's crust shifted along the San Andreas fault, the coastal mountains were pushed up, cutting off the moisture laden air coming from the ocean. At the same time, the interior plains of Southern California began to drop, forming a basin known as the Salton Sink. The Colorado River meandered over a wide area, being periodically diverted by silt deposits remaining after floods. Sometimes, the river flowed into the Gulf of California as it does today, while at other times, it turned westward into the Salton Sink. Each time the Salton Sink received the river flow, a large freshwater lake formed. Scientists refer to this ancient body of water as Lake Cahuilla. The last Lake Cahuilla covered much of the Imperial, Coachella and Mexicali Valleys as late as 1450.

The most popular theory holds that the Imperial Sand Dunes were formed from windblown beach sands of Lake Cahuilla. The prevailing westerly and northwesterly winds blew the sands eastward from the old lakeshore to their present location. This process continues to this day. Prevailing winds cause the dunes to migrate toward the southeast at the rate of approximately one foot per year.

The sand dunes played a major role in early exploration, travel, and development in Imperial County, and have long been an obstacle to travelers moving east and west. Though a few pioneers did manage to cross with horse and mule pack trains, this natural barrier continued to hinder California's southern commerce until the first road across the dunes was built in 1911.

The first road, built by volunteers from Yuma, the Imperial Valley and San Diego, was known as the "auto railroad." In 1916, the California Highway Commission, which assumed responsibility for the trans dunes highway in June 1915, built an improved plank road. The Plank Road lasted until 1926 when it was replaced by a new two-lane asphalt road. The Imperial Sand Dunes are considered a significant visual resource in the County due to their unique scenic qualities, historic features and prominent visibility to a large number of people.

Mountains

Mountains make up another significant visual resource of Imperial County. On the west side of the County are the eastern foothills of the Peninsular Range. These foothills include the In-Ko-Pah or Jacumba Mountains, the Coyote Mountains, the Fish Creek Mountains, and, in the northwesternmost corner, the Santa Rosa Mountains.

The Chocolate Mountains, so named because of their dark color, are located in the northeastern portion of the County, stretching northwest by southeast between Riverside County and the Colorado River. They are bisected by Highway 78 between Glamis and the Palo Verde area. These mountains reach an elevation of 2,700 feet, and are highly visible from throughout the County. They are extremely rugged, virtually undeveloped, and used as a Naval Gunnery Range.

Prominent landmarks visible from much of Imperial County are the Superstition Mountains and Superstition Hills located in the West Mesa area, southeast of lower Borrego Valley, and west of Westmorland and Brawley. These are clearly visible looking north from I-8, west of El Centro, and from Highway 86 between El Centro and the Salton Sea. Perhaps the most significant landmark in the County is Mount Signal, located along the International Border on the eastern edge of the Yuha Desert, west of Calexico. This feature is visible from the entire Imperial Valley.

The Picacho State Recreation Area contains some prominent visual resources as well. Unique scenic values are created by volcanic formations rising several hundred feet from the valley floor.

Salton Sea

The Salton Sea is located in the northwestern portion of the County and extends into Riverside County. The Salton Sea extends for 35 miles in length and covers approximately 245,000 acres. The Salton Sea has been sustained by agricultural drainage from the Imperial, Coachella and Mexicali Valleys, rainfall, storm runoff from the surrounding mountains, and groundwater inflow. Because the Sea exists in a closed basin, the only outflow is evaporation. This results in a rising level of salinity in the Salton Sea. Despite the salinity problems in the Salton Sea, the area represents an important wildlife habitat area and provides migrating and wintering habitat for thousands of waterfowl and other birds. Masses of these birds are visible from the shores of the Salton Sea. The Salton Sea represents a unique visual resource because of its massive size, its location in a desert area, and its value to wildlife.

Agricultural Areas

Irrigated agricultural areas comprise approximately 20 percent of the County's area. The majority of the agricultural activity is concentrated in the Imperial Valley area. Additional agricultural areas include the Bard Valley and the Palo Verde Valley. These areas are characterized by square or rectangular fields, typically 40 to 80 acres in area, and are sometimes interspersed with scattered farmhouses and related agricultural structures. These agricultural regions are crossed by irrigation canals and drainages that are paralleled by dirt farm roads. Several cattle feedyards, other animal ranches, and aquaculture farms are located throughout the Imperial Valley, as are a few agricultural processing/packaging plants including Holly Sugar, Calcot, cotton gins, fertilizer/chemical plants and other agricultural-related operations. Agricultural areas dominate the visual scenes along I-8, and sections of Routes 78, 86, 111, and 115.

Urban Areas

The urbanized areas of Imperial County are characterized by low-rise mixed-use development. The principal urban areas include El Centro, Imperial, Brawley, and Calexico. Other smaller urban areas include Calipatria, Heber, Holtville, Niland, Seeley, Westmorland, Winterhaven and Salton City.

The urban area of El Centro is characterized by strip commercial development along Route 86, Imperial Avenue, and Main Street. Industrial and residential development is located on the fringes of the strip commercial areas. The Imperial urban layout is similar to that of El Centro, but includes the Imperial Valley Airport on Route 86. The Brawley urban area is characterized by commercial development along Route 78, with residential development existing in the outlying areas. Calexico is characterized by strip commercial development along Highway 111 and residential uses to the east and west. Urban development is not usually considered a visual resource, but it makes up an important segment of the existing visual environment of the County.

b. 1973 General Plan

The 1973 General Plan does not identify any visual resources within Imperial County. Policies for the preservation of visual resources are not detailed.

2. Environmental Impacts

Implementation of the General Plan Update is not anticipated to impact the highly sensitive visual resources of the deserts, mountains, sand dunes and the Salton Sea. These areas are primarily designated Recreation/Open Space and intended to remain largely as they appear today. Further development of Felicity in the East Mesa desert area and Glamis in the dunes area will impact these visual resources as viewed from I-8 and SR-78, respectively. Both are proposed SPAs and include objectives and policies in the Land Use Element recognizing their scenic values and requiring design guidelines for development.

Implementation of the General Plan Update will result in some impacts to agricultural areas and the incremental expansion of existing urban areas. The impacts will be due to the implementation of Specific Plan Areas (SPAs) and Urban Area land use designations over existing agricultural areas. Since agriculture will remain by far the dominant visual feature of the central Imperial Valley, proposed SPAs and expanded Urban Areas are not expected to create significant impacts to visual resources.

3. Mitigation Measures

With inclusion of objectives and policies to preserve the visual resources of the Felicity and Glamis SPAs, significant impacts are not expected in these areas and therefore no mitigation measures are proposed.

J. Water Quality

1. Existing Conditions

a. Water Resources

Surface Water

There are three general categories which describe the surface water in Imperial County. These are freshwater, brackish water, and saline water. The freshwaters include the All-American Canal and other canals and laterals which deliver irrigation water to the agricultural fields within the county. The freshwaters generally have a total dissolved solids (TDS) concentration ranging from 600 to 1,000 parts per million. The brackish waters (with TDS in the range 2,000 to 4,000 ppm) include the Alamo River, New River and the agricultural drains that flow into these rivers or directly into the Salton Sea. The Salton Sea is the only saline water body in Imperial County.

Colorado River. The Colorado River flows along the eastern boundary of the County. The Colorado River begins high in the Rocky Mountains and terminates in the Gulf of California.

Excessive salinity concentrations have long been recognized as one of the major quality problems of the Colorado River, which provides municipal and industrial water to nearly 18 million people, and irrigates approximately 700,000 acres of farmland. The Colorado River's heavy salt load is derived from both natural and human activities, each contributing about half the total amount. An estimated nine million tons of dissolved salts pass Hoover Dam each year. These dissolved salts cost California water users an estimated $290 million in annual damages. As the water flows through the Colorado system it is used for agriculture and other beneficial uses, resulting in this salt buildup. Without measures to control it, salinity in the lower reaches of the river will continue to cause major water quality problems. In addition, the erosion of the Colorado and its tributaries results in a large sediment load. Although Colorado River water still has a relatively high total of dissolved solids when compared to its headwaters, the water quality of the Imperial Valley is fairly good.

In 1975, the seven Colorado River Basin States (California, Arizona, Nevada, Utah, Wyoming, Colorado and New Mexico), with the Environmental Protection Agency's approval, adopted water quality standards for Colorado river salinity at three stations: 723 milligrams per liter (mg/L) below Hoover Dam; 747mg/L below Parker Dam; and 879 mg/L at Imperial Dam. Current studies show that, without control measures, salinity could reach 1,000 mg/L at Imperial Dam by the year 2010.

All-American Canal. At Imperial Dam, water is diverted to the All-American Canal, which conveys water in California to the Bard Valley, and to the agricultural areas of the Imperial and Coachella valleys. The salinity of the water in the All-American Canal would be expected to follow fairly closely that of the Colorado River. Without salinity control projects in the

Colorado basin, the salt concentration of this water would be expected to increase. This increase is partly a result of increased diversion and use of the Colorado River water in other parts of its reach.

Water moving through the All-American Canal is of relatively good quality. No significant difference in water quality parameters would be expected between the All-American Canal and smaller trunk and delivery lines, such as the East Highline and Westside Main Canals and the irrigation laterals. During the process of irrigation this water accumulates additional salts and nutrients associated with agricultural processes. The result is a reduction in water quality for agricultural runoff. This runoff flows through the Imperial Irrigation District (IID) drainage canals into the New and Alamo Rivers, and eventually enters the Salton Sea.

The canal system of Imperial County consists of approximately 1,675 miles of canals and laterals. The canals and laterals are open and unprotected and transport water throughout the urban, suburban and agricultural portions of Imperial Valley. The surrounding area contains numerous potential sources of contamination including storm water runoff, septic tanks, aerial pesticide applications, wild and domestic animals, and hundreds of miles of roads. The water flowing in these canals is used by people in rural locations for a variety of domestic purposes including bathing, cooking, dishwashing, and oral hygiene. In the course of these activities, canal water may be ingested by people. The water is not filtered, disinfected, or otherwise treated before its use.

The Environmental Protection Agency issued an administrative order to the Imperial Irrigation District on December 22, 1992 demanding that the District take immediate action towards providing treated water to the residents who use the canal water. The EPA's order prohibits IID from connecting any more homes to the raw canal water; mandates it monitor and reduce the amount of contaminants in the canal system; and orders the district to send letters of warning to water customers, detailing steps they should take to make their water safer for use. Prior to issuing this order, the EPA found that some of the canals were contaminated with coliform bacteria. The presence of coliform bacteria is usually associated with sewage or animal wastes and indicates that the water may be contaminated with organisms that can cause disease such as dysentery, hepatitis, typhoid fever, and cholera.

New River, Alamo River and Drains. The New River flows into the Imperial Valley from Mexico with a significantly high waste load. The New River at the International Border has a sizable flow. Seasonal variations in contaminant loads correspond to a late winter planting and irrigation, and a fallow fall season. As this drainage flows through the County, the flow increases dramatically as a result of drainage from the agricultural lands in the Imperial Valley.

Table 20 provides a summary of the water quality of the New River at the International Boundary. This total indicates the intensive use of this water for irrigation in Mexico and the presence of municipal waste water from Mexicali. To be safe for use as potable water, a source should be free of fecal coliforms. The New River is highly polluted with sewage and industrial waste which originates in Mexicali, Mexico.

TABLE 20
WATER QUALITY OF THE NEW RIVER
AT THE INTERNATIONAL BOUNDARY

Factors	1/22/92
Flow cfs[1]	157
Temperature °C[2]	13
Field pH[2]	7.4
Dissolved Oxygen mg/l[2]	3.9
Turbidity NTU	34
Specific Cond. umhos/cm[2]	4,599
Total Diss. Solids mg/l[3]	2,913
Suspended Solids mg/l[3]	24
Phosphate PO_4-P mg/l	2.8
Nitrate NO_3-N mg/l	0.6
Nitrite NO_2-N mg/l	ND
Ammonia NH_3/NH_4-N mg/l	4.2
MBAS mg/l	4.1
20°C BOD_5 mg/l[3]	23
Fecal Coliform MPN/100 ml	130,000

(1) Reported by Imperial Irrigation District.
(2) Data collected in field.
(3) Analyzed by the Regional Board.

The Alamo River is less polluted than the New River, however, water from either river is unsuitable for domestic use or for irrigation. Table 21 provides a summary of the Alamo River water quality at the International Boundary. Agricultural runoff, community waste water runoff and other contributions to the Alamo River in Imperial County act to dilute the total suspended solids and other contaminants. This results in a less concentrated pollutant load being discharged into the Salton Sea than that entering the County from Mexico.

As the New and Alamo Rivers flow downstream toward the Salton Sea, the water quality does not degrade significantly. About 46 percent of the inflow comes from the Alamo River and 38 percent comes from the New River. The remainder of the inflow comes from smaller creeks, washes, agricultural drains and groundwater seepage. Approximately 12 percent of the total inflow comes from Mexico and is carried primarily by the New River. The flows, however, increase dramatically as they receive drainage from irrigated fields. This increase results in high TDS concentrations due to the leaching of salts from this land. Other fecal coliform concentrations are reduced, probably due to the dilution effect of these drainage waters which are also contaminated.

TABLE 21
WATER QUALITY OF THE ALAMO RIVER AT THE INTERNATIONAL BOUNDARY

Factors	Dates			
	10/2/90	3/5/91	7/29/91	1/28/92
Flow cfs	2.1	2.9	3.3	3.1
Temperature °C	23	18	27	11
Field pH	7.9	7.7	7.7	8.2
Dissolved Oxygen mg/l	8.7	6.5	4.3	7.3
Turbidity NTU	29	17	29	21
Specific Cond. umhos/cm	5,110	4,140	3,610	3,810
Total Diss. Solids mg/l	3,726	3,024	2,393	2,710
Suspended Solids mg/l	81	37.4	55.6	67.0
Phosphate PO_4-P mg/l	0.16	0.72	0.35	0.82
Nitrate NO_3-N mg/l	0.8	0.6	0.78	2.4
Nitrite NO_2-N mg/l	ND	0.05	0.04	0.03
Ammonia NH_3/NH_4-N mg/l	0.8	2.9	0.92	2.3
MBAS mg/l	0.06	0.055	0.01	0.034
COD mg/l	33	22	37	51
20°C BOD_5 mg/l	5	6	7	6
Fecal Coliform MPN/100 ml	1,700	<200	1,800	<200

Salton Sea. The 35-mile long Salton Sea is located in the lowest portion of a desert valley in Imperial and Riverside Counties. For the past several decades, the concerns about increasing elevations at the Salton Sea have been linked to increased agricultural runoff, above-average rainfall from 1976 through 1983, and increasing wastewater flows from Mexico. The volume of water has damaged some agricultural, recreational and residential properties along the Sea's shores. The salinity of water is becoming a problem and has recently gained the attention of local, state and federal officials. The salinity level of the Salton Sea is more than 43,000 ppm, which exceeds the salinity of ocean water (approximately 35,000 ppm). Water quality parameters for the Salton Sea are listed on Table 22. The current salinity of the Salton Sea is approximately 44,000 mg/L of total dissolved solids and increases by about 550 mg/L per year. Most of the important species of fish inhabiting the sea were originally from the Gulf of California, where the salinity level is approximately 35,000 mg/L. Previous tests have indicated that spawning of these fish is adversely affected at salinity levels above 40,000 mg/L. When salinity increases to about 45,000 mg/L it is very questionable if a viable fishery can continue to exist. The Salton Sea's sport fishing industry is threatened by rising salinity levels. Because the Sea is a terminal sea, all the salts which drain from the surrounding agricultural lands of the lower Colorado River and Mexico are deposited there. The high evaporation rate of the desert climate removes water from the Sea each year, but leaves the salt behind to become more and more concentrated. Therefore, any reduction in the water flowing to the Sea causes a rise in the salinity of the water in the sea.

TABLE 22
WATER QUALITY OF THE SALTON SEA

Factors	Dates							
	10/23/89	2/1/90	4/27/90	6/22/90	10/4/90	3/8/91	8/1/91	1/27/92
Temperature °C	25	13	22	30	27	16	31	14
Field pH	7.6	8.6	8.4	8.9	8.6	8.5	8.7	8.2
Dissolved Oxygen mg/l	IR[1]	11.2	6.9	18.8	19.9	6.5	10.6	16.7
Turbidity NTU	7	6	14	9	12	10	17	8
Specific Cond. umhos/cm	37,200	44,800	41,300	39,800	41,000	40,900	42,500	41,000
Total Diss. Solids mg/l	43,214	43,236	42,236	40,065	44,147	39,093	41,839	44,060
Suspended Solids mg/l	19	4	7.4	10	80	53.8	82.8	55
Phosphate PO_4-P mg/l	0.07	0.04	ND	0.08	0.12	0.11	0.08	0.12
Nitrate NO_3-N mg/l	ND	ND	0.3	ND	0.2	0.2	0.01	ND
Nitrite NO_2-N mg/l	ND	0.13	ND	ND	ND	ND	0.01	0.07
Ammonia NH_3/NH_4-N mg/l	1.7	1.5	1.6	1.4	1.7	1.5	3.0	ND
MBAS mg/l	0.2	0.19	0.184	0.174	0.325	0.22	0.01	0.229
COD mg/l	98	284	161	557	400	690	650	430
20°C BOD_5 mg/l	4.4	4	10	12	19	5	23	23
Fecal Coliform MPN/100 ml	<2	<2	<2	<2	<2	<2	<2	<2

[1] Inaccurate Reading

Selenium, the element blamed for waterfowl deformities at the Kesterson Reservoir in Merced County, California, has been detected in Salton Sea fish in concentrations that sometimes exceed state advisory levels. Although toxic effects of selenium, such as abnormalities in wildlife, have not been detected at the Salton Sea, studies of this issue have not, to date, been completed. High levels of selenium have been found in agricultural drain water and in the sediments at the bottom of the Sea, although water in the Sea itself has normal levels of this trace element. Studies on the sources and impacts of selenium at the Salton Sea are continuing to be a focus of state and federal agencies.

The Sea is also impacted by the effects of other pollutants flowing in through the New River. As an open conduit for untreated sewage, heavy metals contamination, and pesticide residue from northern Mexico, the New River is a major problem which affects the Salton Sea. Tables 23 and 24 provide a summary of the water quality of the Alamo River and New River at the outlet into the Salton Sea. The flow of the New and Alamo Rivers is significantly higher at the outlet into the Salton Sea than it is at the International Boundary. This is because of the drainage from the agricultural lands in the Imperial Valley. At the outlet into the Salton Sea, the turbidity, amount of suspended solids, and level of nitrates have all increased substantially compared to their levels at the International Boundary. The level of fecal coliforms is lower at the outlet into the Salton Sea than at the International Boundary, but is still at an unacceptable level.

TABLE 23
WATER QUALITY OF THE ALAMO RIVER AT THE OUTLET INTO THE SALTON SEA

Factors	Dates							
	10/25/89	1/29/90	4/25/90	6/27/90	10/3/90	3/7/91	7/30/91	1/29/92
Flow cfs	924	668	1,054	825	1,150	592	787	----
Temperature °C	20	9	19	29	25	16	29	12
Dissolved Oxygen mg/l	IR[1]	IR	7.7	5.2	6.9	9.0	5.3	10.0
Turbidity NTU	84	105	130	136	200	65	106	120
Specific Cond. umhos/cm	3,620	3,070	2,950	2,870	3,260	3,860	2,820	2,930
Total Diss. Solids mg/l	2,109	2,156	2,096	1,885	2,437	2,974	2,054	2,069
Suspended Solids mg/l	371	439	374	362	468	104	282.8	329
Phosphate PO_4-P mg/l	0.26	0.13	ND	0.5	0.39	0.46	0.26	0.35
Nitrate NO_3-N mg/l	10.6	5.9	6.2	4.6	7.0	9.6	5.37	7.0
Nitrite NO_2-N mg/l	0.18	0.38	0.5	0.6	0.37	0.14	0.51	0.03
Ammonia NH_3/NH_4-N mg/l	0.7	0.5	1.7	1.6	1.2	1.0	0.9	2.86
MBAS mg/l	0.1	0.07	0.023	0.099	ND	0.160	ND	0.054
COD mg/l	47	31	22	23	42	10	20	23
20°C BOD_5 mg/l	4	3	5	3	4	3	4	4
Fecal Coliform MPN/100 ml	3,100	3,300	3,300	>240,000	7,900	<200	500	1,700

[1] Inaccurate Reading

TABLE 24
WATER QUALITY OF THE NEW RIVER AT THE OUTLET INTO THE SALTON SEA

Factors	Dates							
	10/25/89	1/29/90	4/25/90	6/27/90	10/3/90	3/7/91	7/30/91	1/29/92
Flow cfs	621	540	740	585	687	525	648	—
Temperature °C	20	11	19	29	24	17	30	13
Field pH	7.1	7.4	7.8	7.6	7.5	7.4	7.6	7.6
Dissolved Oxygen mg/l	IR[1]	IR	5.5	3.6	4.8	6.9	4.4	9.3
Turbidity NTU	54	78	105	110	122	75	115	74
Specific Cond. umhos/cm	4,040	4,400	3,600	3,820	3,770	4,270	3,430	4,070
Total Diss. Solids mg/l	2,689	3,035	2,554	2,422	2,251	2,994	2,394	2,763
Suspended Solids mg/l	244	325	327	274	407	149	352.8	202
Vol. Suspended Solids mg/l	40	21	41	28	32	11.4	44	16
Phosphate PO_4-P mg/l	0.5	1.01	ND	0.76	0.63	1.5	0.52	1.07
Nitrate NO_3-N mg/l	7.4	4.3	4.1	2.8	4.4	5.0	3.83	2.55
Nitrite NO_2-N mg/l	0.22	0.57	0.9	0.5	0.54	0.3	0.94	0.03
Ammonia NH_3/NH_4-N mg/l	0.7	2.6	3.5	3.4	3.4	2.5	1.2	3.32
MBAS mg/l	0.78	1.09	0.868	0.706	0.429	1.38	0.14	0.908
COD mg/l	54	43	30	27	19	26	26	52
20°C BOD_5 mg/l	8	11	8	8	8	12	13	4
Fecal Coliform MPN/100 ml	4,900	7,900	4,900	7,900	4,900	800	2,300	800

[1] Inaccurate Reading

Groundwater

Groundwater quality in the Imperial Valley region is generally poor, although isolated aquifers of good quality groundwater do occur. Known TDS levels in the Imperial hydrographic subunit vary from approximately 800 to 15,000 mg/l. High TDS levels plus locally high fluoride concentrations have generally limited the domestic or agricultural application of groundwater in the Imperial hydrographic subunit, and render groundwater resources in the area generally unsuitable for domestic consumption under Federal and State drinking water standards. Poor groundwater quality is attributable to the infiltration of agricultural runoff and the presence of subsurface salt deposits associated with periods of flooding, evaporation and subsequent deposition.

Information on existing conditions in the Ocotillo area is based on a 1977 USGS Report by James Skrivan. The County of Imperial is currently in the process of preparing an updated report which will not be completed until 1993. Groundwater is the only source of industrial and domestic water supply in the Ocotillo-Coyote Wells area. Natural recharge through infiltration of precipitation is estimated to be 2,600 acre-feet per year, and estimated groundwater in storage

is 640,000 acre-feet. This is a conservative estimate but serves to indicate that the quantity of water in storage is great compared to the 1975 annual pumpage of about 880 acre-feet.

The projected water-level decline from 1976 to 1995 with annual pumpage of 1,000 acre-feet is 6 feet in Ocotillo. In this projection, flow is eastward across the Elsinore fault which separates potable groundwater in and around Ocotillo from saline water several miles east. Analyses of samples east of the fault often have dissolved-solids concentrations of over 2,000 mg/L. These samples are primarily sodium-chloride-sulfate type water. When a maximum of 2,000 acre-feet of pumpage is used for the projection, the 20-year decline is 17 feet in Ocotillo, and water levels on either side of the fault are about the same.

b. 1973 General Plan

The existing General Plan contains a non-mandated Water Plan. The Water Plan is a comprehensive document containing information on general goals, objectives and policies to help Imperial County conserve and utilize their water resources. The Plan provides a summary of the existing water quality at the time and also details policies designed to maintain and improve water quality.

2. Environmental Impacts

The implementation of the General Plan Update would result in development of new residential, commercial, and industrial uses. This is not anticipated to cause significant impacts to water quality. The development of urban uses would result in less fertilizer or pesticide residue being discharged to the drainage systems than is currently the case with the agricultural uses, although discharge of total petroleum hydrocarbons (storm discharge) will increase. The development of urban uses would also result in lower salt and selenium concentrations being deposited into drainage systems than is currently the case with the agricultural runoff.

Overall drainage quantity is not expected to change with increased urban development. Although annual urban land water use is one to three acre-feet per acre, and water use on agricultural land in the Imperial Valley averages five to six acre-feet per acre, a high proportion of the water used on agricultural land is absorbed by the soil and evaporates, rather than draining as runoff. Furthermore, although the water discharged from urban uses would be of a higher quality in terms of discharges of salt, selenium, fertilizer, and pesticide residues than that discharged from agricultural uses, overall discharge characteristics would change little since the amount of urban area that may be developed under the General Plan Update would remain relatively minor in comparison with the area used for agriculture.

The General Plan Update encourages the continued expansion and use of geothermal resources. The potential for contamination of surface waters or nearby non-geothermal groundwaters exists in the vicinity of geothermal power plants if proper precautions are not taken. This is due to the presence of potential pollutants such as antimony, arsenic, boron, copper, lithium, mercury, selenium, strontium, manganese, and zinc in geothermal fluids. Policies that are designed to minimize the potential for this problem are detailed in the Geothermal and Transmission

Element. The re-use of treated wastewater may increase nitrate and TDS levels in ground water and surface water drainage. No other impacts to groundwater quality are anticipated as a result of the implementation of the General Plan.

Potential impacts to the quantity of groundwater in the Ocotillo area are possible if pumping of 2,000 acre-feet per year is continued. If this rate is continued after 1995, it may result in saline water flowing toward the potable ground water in Ocotillo.

Implementation of the General Plan Update would result in less water quality impacts than would the 1973 General Plan. This is due primarily to the fact that the General Plan Update proposes less acres for agricultural use than does the 1973 General Plan.

3. Mitigation Measures

The following mitigation measures shall be implemented in order to improve the water quality of Imperial County's bodies of surface water.

- Require new development to utilize measures designed to conserve water in their construction.
- Encourage farmers to use irrigation methods that conserve water.
- Participate with cities and districts to establish programs for the agricultural re-use of treated wastewater in manners that would be economically beneficial to agriculture.
- Participate with other agencies in developing strategies to reduce the use of pesticides and other chemicals without negatively impacting agricultural production; and thereby reduce the drainage of toxic elements into downstream drains and into the Salton Sea.
- Promote the use of water efficient sprinkling and gardening systems to include ordinances and technology to encourage drought tolerant plants.
- Allow development within unsewered areas only after testing proves that septic systems would not create potential pollution.
- Phase out the use of water softeners which utilize salt in the water-softening process to prevent continued degradation of the water.
- The County shall require that appropriate and necessary permits be obtained from all responsible agencies before any new industrial use is established.
- Continue the program of monitoring groundwater conditions in the Ocotillo-Coyote Wells basin in order to help extend the life of the groundwater resource.

- In order to avoid incremental water pollution impacts to Imperial County's aquatic microbiota from oil and gas residuals runoff from widened roadway surfaces, a permanent oil catchment basin or native grass-lined drainage swale/retention basin shall be installed on one side of all future County road improvement projects that are located adjacent to canals or rivers.

- All discretionary development projects located within limited groundwater basins require a groundwater availability/quality study, conducted by a licensed professional as part of the environmental review process to ensure an adequate water supply to both the proposed project and existing users. This analysis will include potential effects to watersheds and recharge areas to ensure that no long-term impacts to groundwater basins will occur.

- All new development and public works projects shall comply with all requirements of the Regional Water Quality Control Board, the Environmental Protection Agency, and other responsible agencies that have jurisdiction in the County pertaining to water quality.

K. Geology/Soils

The following section provides general geologic substructure and soils information for Imperial County, and is based on the *Soil Survey of Imperial County* (SCS 1981); *California Desert Conservation Area Plan* (BLM 1980); and communication with resource agency staff from the U.S. Department of Agriculture, Soil Conservation Service (SCS).

1. Existing Conditions

a. Geology

Imperial County can generally be divided into three geomorphic provinces: the Peninsular Range, the Salton Trough, and the Mojave Desert. The Salton Trough is the most significant of the three provinces, as it underlays a majority of Imperial County. Variously described as the Salton Sink, Cahuilla Basin and Salton Basin, it is basically a northwestern landward continuation of the Gulf of California rift, which was formed by gradual settling in association with uplift of the surrounding mountains during the Miocene, Pliocene and Pleistocene epochs. Much of the land surface within this province is below sea level, and the Trough trends from the southeast to the northwest. It is bounded on the northeast and east by the Chocolate and Cargo Muchacho Mountains, and on the southwest and west by the Jacumba, Coyote, Fish Creek and Santa Rosa Mountains.

A conspicuous ancient shoreline nearly surrounds the Salton Trough. The shoreline has a major break at the southeast end which is roughly 14 miles wide. This breach has been the entrance point for immense amounts of Colorado River water and for upstream sedimentary materials that were occasionally diverted from their historically normal flows south into the Gulf of California. An unexposed succession of Tertiary- and Quaternary-age sedimentary rocks lies below the alluvial and lake bottom sediment. These sediments have basement depths ranging from 15,400 to 11,000 feet at the east and west margins to over 20,000 feet in the central portions of the Salton Trough province.

The Salton Trough has experienced continual in-filling with both marine and non-marine sediments since its formation in the Miocene epoch (30 million years before present). The specific stratigraphy incorporates Middle and/or Lower Pliocene marine, undivided Pliocene non-marine, and Quaternary non-marine terrace deposits. The Middle and/or Lower Pliocene marine deposits consist of light-gray claystone containing some arkosic sandstones, calcareous oyster-shell reefs, and fossilferous calcareous sandstone. The undivided Pliocene non-marine formations consist of interbedded arkosic sandstones and reddish clays. The Quaternary non-marine terrace deposits are believed to be Pleistocene in age.

The mountains of Imperial County consist mainly of metamorphic and igneous rocks of pre-Cambrian to Tertiary age, and sediments in the intervening valleys are generally weakly consolidated to unconsolidated sediments of late Cenozoic age.

Physiography and Drainage

The Salton Trough basin encompasses the structural trough of the Imperial and Coachella Valleys and the Salton Sea. This broad basin has a total area of approximately 8,000 square miles, of which approximately 2,000 square miles lie below sea level. The Imperial Valley is separated from the Gulf of California by the ridge of the Colorado River delta, which is about 30 feet above mean sea level (AMSL) at its lowest point. The lowest part of the basin is the bed of the prehistoric Lake Cahuilla, where the ancient beach line is about 35 feet AMSL. The deepest part of the lakebed, now filled by the Salton Sea, is about 277 feet below mean sea level (BMSL).

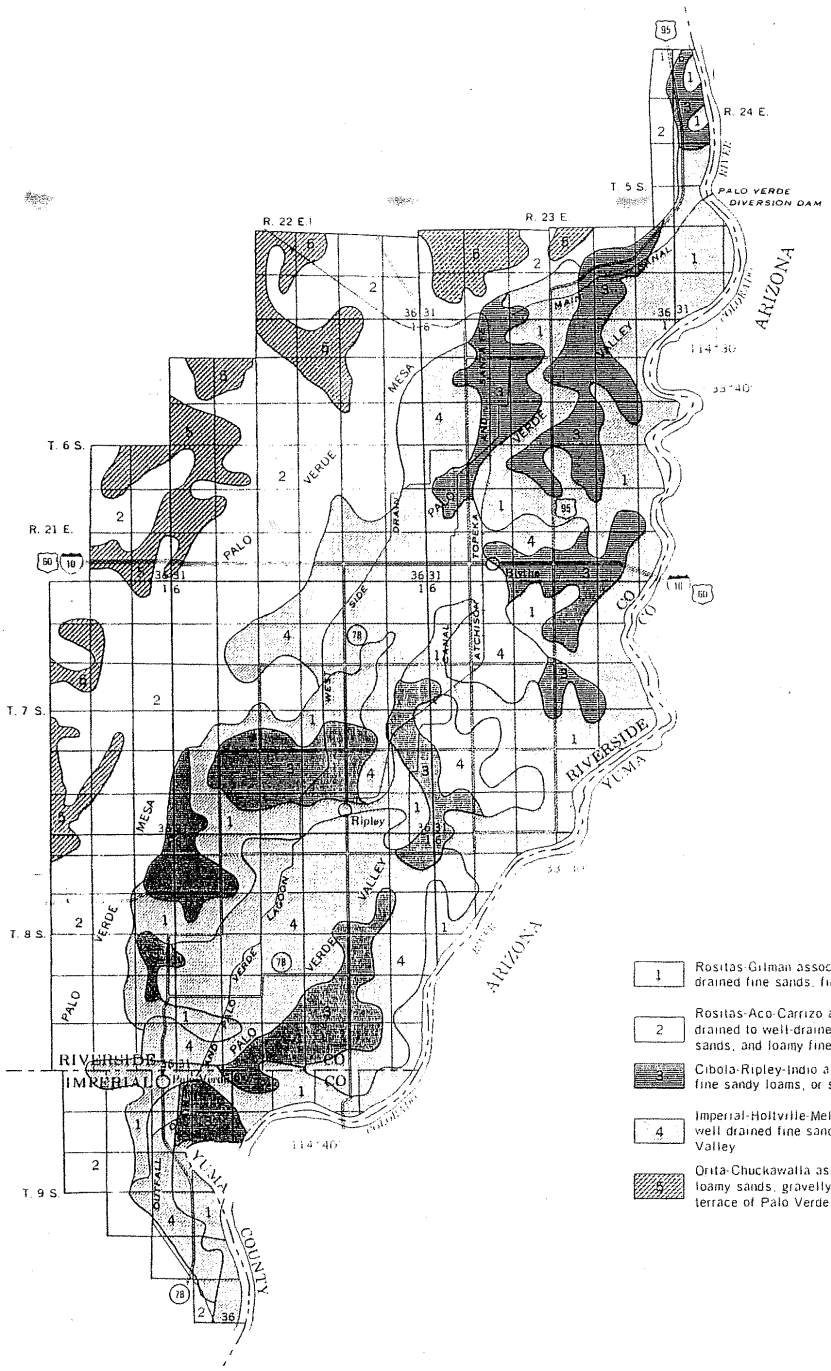
Surface drainage in the Salton Trough is primarily toward the center and into the Salton Sea. Southerly drainage into the Gulf of California does not occur in the Salton Trough north of the Mexican border.

b. Soils

A discussion of soils relative to their agricultural importance is included in the "Agriculture" Section of this EIR. The following is a general discussion of the overall soils regime for Imperial County, based on the above geologic setting. For a detailed description of the characteristics of each soil type, the reader is referred to the *Soil Survey of Imperial County* (SCS 1981).

The soils of Imperial County are variable and complex, and are found several thousand feet deep. The upper soil layers have been worked through the hydrologic action from periodic flooding of the New and Alamo Rivers and other various washes from the East and West Mesas. Wind erosion has also helped work the surface soils. Table 25 lists each soil type found within the County, and Figures 21 and 22 are general soils maps for the Imperial and Palo Verde Valleys. Six major soil associations are identified in the central Imperial Valley: Imperial, Imperial-Holtville-Glenbar, Meloland-Vint-Indio, Niland-Imperial, Glenbar-Imperial, and Fluvaquents. Palo Verde Valley in the northeastern corner of the County consists of five major soil associations: Rositas-Gilman, Rositas-Aco-Carrizo, Cibola-Ripley-Indio, Imperial-Holtville-Meloland, and Orita-Chuckawalla.

On the surface, the Salton Trough province exhibits at least three geomorphic areas: ancient lakebed sediments, alluvial channels and dune sands. The central portion of this province, consisting of the Imperial and Coachella Valleys (or the Salton Sink), is covered by clay and silt deposits from prehistoric lakestands. Shoreline deposits circumscribe the central lakebed deposits and consist predominantly of unconsolidated sand and gravel, grading into the previously mentioned silts and clays. Lake Cahuilla beds are generally believed to be less than 100 feet thick, and may have received their heaviest rate of deposition during the Wisconsin or early postglacial age.



SOIL ASSOCIATIONS

1 Rositas-Gilman association: Nearly level, somewhat excessively drained and well-drained fine sands, fine sandy loams, and silty clay loams, in Palo Verde Valley

2 Rositas-Aco-Carrizo association: Nearly level to moderately sloping, excessively drained to well-drained fine sands, gravelly sands, sandy loams, gravelly loamy sands, and loamy fine sands, on higher terraces of Colorado River

3 Cibola-Ripley-Indio association: Nearly level, well-drained fine sandy loams, very fine sandy loams, or silty clay loams, in Palo Verde Valley

4 Imperial-Holtville-Meloland association: Nearly level, well-drained and moderately well drained fine sandy loams, silty clay loams, and silty clays, in Palo Verde Valley

5 Orita-Chuckawalla association: Nearly level, well-drained fine sands, gravelly loamy sands, gravelly fine sandy loams, and very gravelly silt loams, on upper terrace of Palo Verde Mesa

Compiled 1972

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

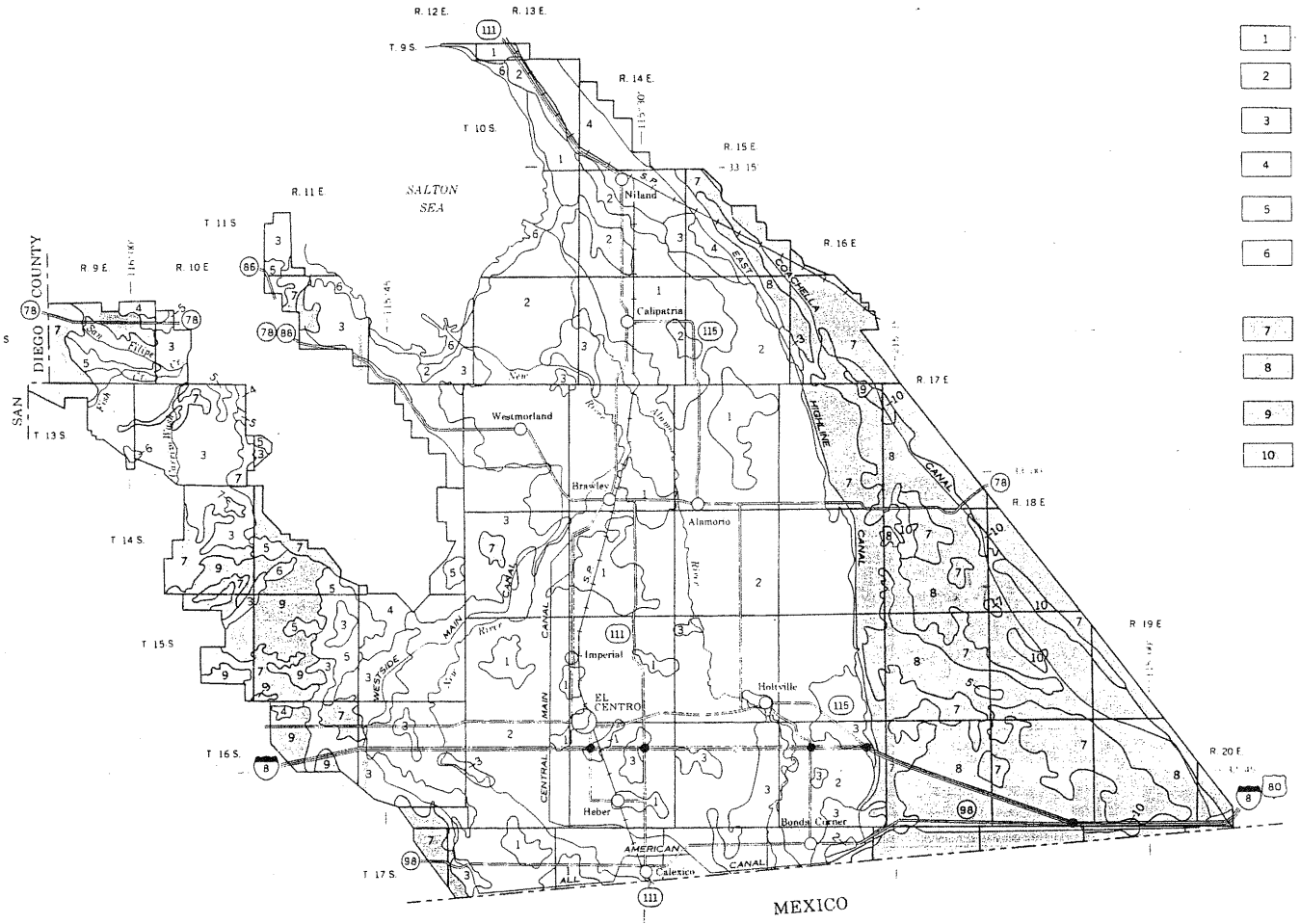
PALO VERDE AREA, CALIFORNIA

Scale 1:190,080
1 0 1 2 3 4 Miles

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

N

Imperial County General Plan	General Soils Map for Palo Verde Valley	Figure 22



MAP UNITS*

WELL DRAINED TO POORLY DRAINED SOILS DOMINANTLY IN THE LACUSTRINE BASIN

1. Imperial: Nearly level, moderately well drained silty clay in the lacustrine basin
2. Imperial-Holtville-Glenbar: Nearly level, moderately well drained and well drained silty clay, silty clay loam, and clay loam in the lacustrine basin
3. Meloland-Vint-Indio: Nearly level, well drained fine sand, loamy very fine sand, fine sandy loam, very fine sandy loam, loam, and silt loam in the lacustrine basin and on low alluvial fans
4. Niland-Imperial: Nearly level, moderately well drained gravelly sand, fine sand, silty clay, and silty clay loam at the edges of the lacustrine basin
5. Glenbar-Imperial: Nearly level, well drained and moderately well drained silt loam, clay loam, silty clay loam, sand, fine sand, and silty clay dominantly in basins on West Mesa
6. Fluvaquents: Nearly level, poorly drained soils of undifferentiated texture in the lacustrine basin

WELL DRAINED AND SOMEWHAT EXCESSIVELY DRAINED SOILS DOMINANTLY ON EAST MESA AND ON WEST MESA

7. Rositas: Nearly level to moderately steep, somewhat excessively drained sand, fine sand, and silt loam in alluvial basins and on fans and sandhills
8. Rositas-Superstition: Nearly level, somewhat excessively drained loamy fine sand or fine sand on alluvial terraces and fans
9. Antho-Superstition-Rositas: Nearly level, well drained and somewhat excessively drained fine sand and loamy fine sand in alluvial basins and on alluvial fans and terraces
10. Holtville-Antho: Nearly level, well drained loamy fine sand, loam, silty clay loam, and silty clay on alluvial terraces

*Texture refers to surface layer

Compiled 1979

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

IMPERIAL COUNTY, CALIFORNIA,
IMPERIAL VALLEY AREA

Scale 1: 443,520

1 0 1 2 3 4 5 6 7 MILES

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

N

Imperial County General Plan

General Soils Map for Imperial County

Figure 21

TABLE 25
ACREAGE AND PROPORTIONATE EXTENT OF SOILS IN IMPERIAL COUNTY

Soil Name	Acres	Percent
Antho loamy fine sand	4,134	0.4
Antho-Superstition Complex	8,416	0.9
Bad Land	4,390	0.4
Carsitas gravelly sand, 0 to 5 percent slopes	7,011	0.7
Fluvaquents, saline	12,262	1.2
Glenbar clay loam	2,951	0.3
Glenbar clay loam, wet	4,239	0.4
Glenbar complex	12,894	1.3
Holtville loam	2,804	0.3
Holtville silty clay	3,628	0.4
Holtville silty clay, wet	70,547	7.1
Holtville-Imperial silty clay loams	2,242	0.2
Imperial silty clay	1,405	0.1
Imperial silty clay, saline	5,679	0.6
Imperial silty clay, wet	123,401	12.5
Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes	203,659	20.6
Imperial-Glenbar silty clay loams, 2 to 5 percent slopes	2,162	0.2
Indio loam	9,169	0.9
Indio loam, wet	13,625	1.4
Indio-Vint complex	29,643	3.0
Laveen loam	2,322	0.2
Meloland fine sand	10,748	1.1
Meloland very fine sandy loam, wet	41,734	4.2
Meloland and Holtville loams, wet	11,483	1.2
Niland gravelly sand	7,884	0.8
Niland gravelly sand, wet	9,820	1.0
Niland fine sand	2,846	0.3
Niland loamy fine sand	2,088	0.2
Niland-Imperial complex, wet	6,974	0.7
Pits	1,400	0.1
Rositas sand, 0 to 2 percent slopes	22,608	2.3
Rositas sand, 2 to 5 percent slopes	1,590	0.2
Rositas fine sand, 0 to 2 percent slopes	77,301	7.8

TABLE 25
ACREAGE AND PROPORTIONATE EXTENT OF SOILS IN IMPERIAL COUNTY

Soil Name	Acres	Percent
Rositas fine sand, 2 to 9 percent slopes	40,748	4.1
Rositas fine sand, 9 to 30 percent slopes	19,401	2.0
Rositas fine sand, wet, 0 to 2 percent slopes	22,626	2.3
Rositas loamy fine sand, 0 to 2 percent slopes	90,896	9.2
Rositas silt loam, 0 to 2 percent slopes	3,737	0.4
Rositas-Superstition loamy fine sands	11,373	1.2
Superstition loamy fine sand	12,887	1.3
Torriorhents-Rock outcrop complex, 5 to 6 percent slopes	462	*
Torriorhents and Orhtids, 5 to 30 percent slopes	900	0.1
Vint loamy very fine sand, wet	31,545	3.2
Vint fine sandy sand, wet	13,066	1.3
Vint and Indio very fine sandy loams, wet Vint and Indio very fine sandy loams, water	15,462 3,288	1.6 0.3

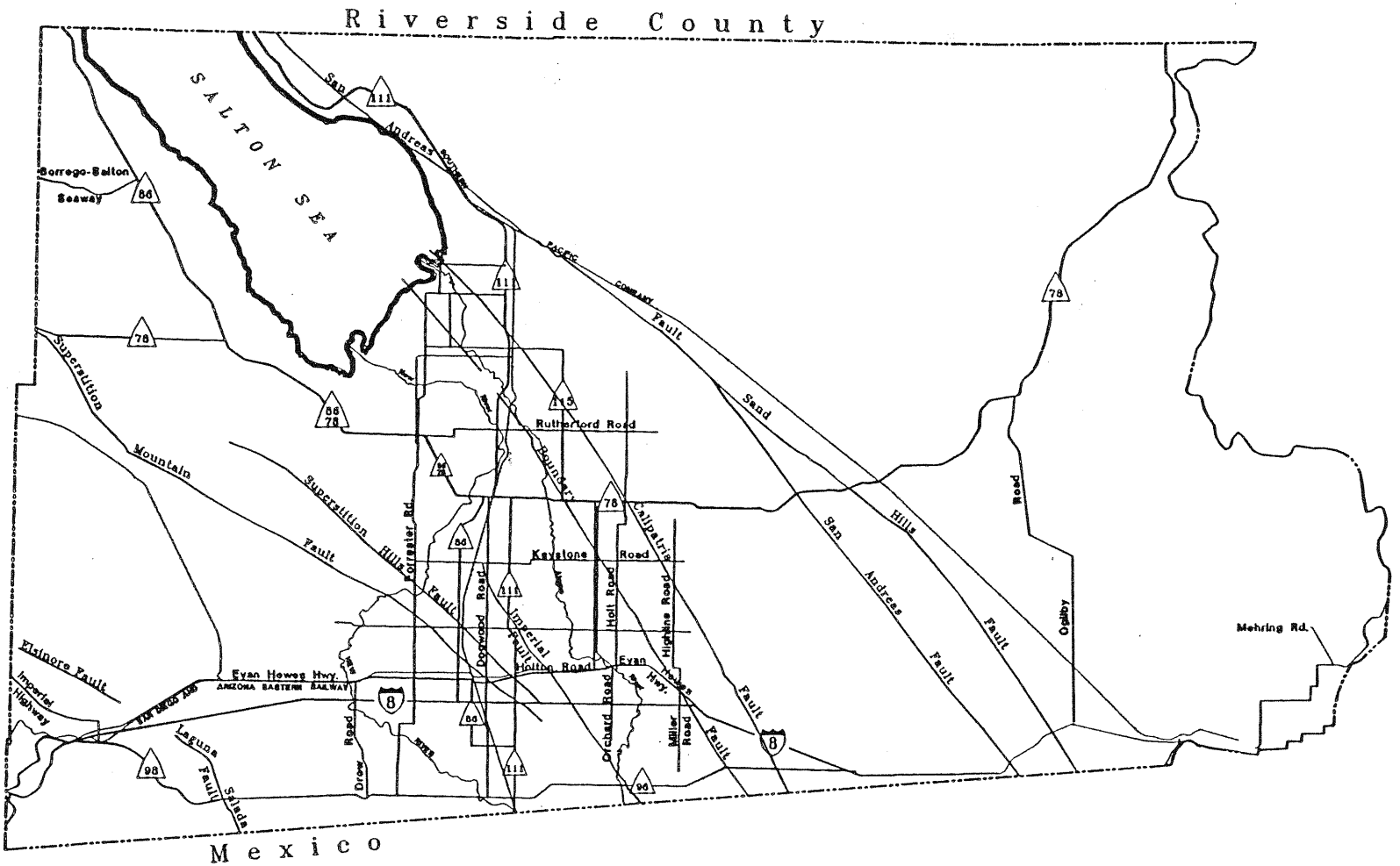
* Less than 0.1%
Source: Soil Survey of Imperial County, California, Imperial Valley Area (SCS 1981).

Dissected, flat-lying alluvium is present on both mesa-like areas east and west of the central portion of the Salton Trough province. Consisting of poorly consolidated silts, sands and gravels, these more recent alluviums typically form thin veneers of desert pavement between dry washes. Also, there are no topsoils, nor well-defined horizons in these areas.

An extensive, thick accumulation of dune sand comprising the northwest-trending Algodones Sand Dunes occurs over the previously described alluvial area. These sand dunes attain a thickness of at least 200 feet in their central parts. Additionally, dune sands of Holocene age are common on both the East and West Mesa areas of Imperial Valley, ranging from thin veneers to broad dunes at least 20 feet thick.

c. Seismicity

Similar to all areas of southern California, Imperial County is seismically active. Numerous active faults traverse the Salton Trough and the County. Figure 23 shows the known active and potentially active faults in the region. The most noteworthy is the San Andreas, extending northward from Mexico through the Imperial Valley and on into northern California. The three major fault zones which bound the Salton Trough and Imperial Valley are the San Andreas on the northeast, the San Jacinto on the northwest, and the Elsinore on the southwest. These northwest-trending fault zones are extensive and are a major factor in determining the configurations of the land. Further information on local seismic conditions is contained within the Public Services/Safety section of this EIR.



Imperial County General Plan	Seismic Activity in Imperial County	Figure 23

d. Existing General Plan

The proposed General Plan Update is consistent with the 1973 Imperial County General Plan with respect to the goals and policies relating to soils and seismicity. In terms of soils, both the existing and proposed General Plans defer to the *Soil Survey of Imperial County* (SCS 1981) for future planning in the use and management of soils for crops and pastures, as sites for buildings, highways and other transportation systems, sanitary facilities, parks and other recreational facilities, and for wildlife habitats. Using this information, the potential of each soil type for specified land uses can be determined; the soil limitations to these land uses can be identified; and costly failures in houses and other structures due to unfavorable soil conditions can be avoided.

As stated in the Seismic Safety Element of the existing General Plan, the primary goal of this Element in the proposed Plan is to "minimize injury, loss of life, destruction of property, and disruption of services which might result from earthquakes. In pursuit of this goal, Imperial County will:

- Require, where possessing the authority, that high, avoidable seismic risks, be taken to reduce injury, loss of life, destruction of property, and disruption of services.
- Encourage other governmental agencies and the private sector to pursue a similar goal.
- Support and assist in informing the public and other agencies of the hazards and risks of earthquakes and of techniques to employ to reduce those hazards."

2. Environmental Impacts

The following impacts analysis is generalized; further geotechnical investigations should be conducted for any specific parcel proposed for development within Imperial County, prior to approval of an implementing tentative map or permit.

a. Geology

Because known landslides and landforms suggestive of ancient landslides exist within the western and southwestern portions of Imperial County, adjacent to the San Diego County line, future development plans in these areas shall require additional geotechnical subsurface investigation.

b. Soils

Grading

Future development within Imperial County would result in grading associated with the construction of buildings, roads, and other infrastructure. The amount of grading required for future development is unknown at this stage of the planning process, but should be minimized as much as is feasible to reduce or avoid the need to import or export soil.

Soils that possess potentially compressible qualities (e.g., alluvium) are not considered suitable for structural loads or support of fill in their present natural condition. Remedial grading measures such as removal and recompaction of these soils will be necessary in some areas to mitigate this situation. Any expansive soils should also be evaluated by a registered geotechnical engineer and recommended mitigation followed.

Erosion

Some of the soils found in the County are highly susceptible to erosion. Erosion of exposed slopes due to natural means or grading could have a significant public safety impact on existing and future land uses in terms of increased erosion hazard, landslides, or flooding. Mitigation measures should be implemented at the earliest possible planning stages to reduce the potential for erosion of exposed slopes.

Soil erosion is not a serious concern in the Imperial Valley area due to low rainfall and nearly level soils, although limited areas adjacent to river bluffs and deep drains are especially subject to erosion. Irrigation water escaping from agricultural fields adjacent to deep channels can cause rapid piping or gulley erosion, trenching fields and cutting into roads and ditches. Some fields along the desert edge are subject to damage by runoff from adjacent desert areas. Many of these areas are protected by storm dikes that divert the runoff to storm channels. The SCS also expressed concern during the Notice of Preparation (NOP) review period that the increased development expected to occur within the irrigated areas of Imperial County, under implementation of the proposed General Plan, would result in significant erosion of agricultural soils (Cameron 1992).

Subsidence

Subsidence due to groundwater withdrawal can occur in unconsolidated to semi-consolidated sediments containing confined or semi-confined sand and gravel aquifers inter-bedded with clay sediments. The potential for subsidence is dependent on the depths of and amount of water likely to be extracted from the aquifer. On the valley floor where these conditions exist, the potential for subsidence is considered to be moderate to low based on the current hydrological conditions. Despite annual seasonal fluctuations of groundwater levels, no major subsidence has occurred. A dramatic lowering of the water table beyond the normal range of fluctuations, however, could strongly increase the potential for subsidence in the Imperial Valley.

c. Seismicity

The principal hazards related to seismic episodes are ground shaking, including differential ground settlement, soil liquefaction, rock and mudslides, ground lurching, and avalanches; ground displacement along the fault; floods from dam and levee failures; fires; and disruption of essential facilities and systems, including water, sewer, gas, electricity, transportation, communication, and irrigation and drainage. The following is a general analysis of the seismic hazards most likely to affect Imperial County.

Ground Shaking

Surface fault rupture anywhere within Imperial County is a very real possibility due to the presence of known active or potentially active faults. The most potentially significant active faults are in the San Andreas Fault Zone, which bisects the County in a northwest to southeast direction (see Figure 23). Other regionally known, active faults are in the San Jacinto and Elsinore Fault Zones in the southwest and northwest portions of the County. In addition to these major active Fault Zones, minor inactive faults could be encountered during future geotechnical evaluations. If so, appropriate mitigation measures shall be identified.

The San Andreas Fault Zone is considered capable of generating a maximum credible earthquake of 8.5 magnitude. Accounting for time delay, the maximum probable earthquake expected for the Imperial County region from this Fault Zone is a magnitude of 8.3. This indicates that such a magnitude earthquake could be generated along the fault during the next 100 years. Under implementation of the proposed General Plan, which allows for increased urbanization and other development, such an earthquake could damage more property and inflict more casualties than would be experienced currently. Public safety and health impacts from earthquakes are addressed in the "Public Services/Safety" Section of this EIR.

Liquefaction

Liquefaction and landslides are two seismically-related concerns. Liquefaction is where loose, saturated sands and silts lose their shear strength due to an increase in pore pressure between grains or particles. Granular soils are more prone to this phenomenon than are silty clays. Clays are not affected by seismic motion. This loss of shear strength causes the affected soil to temporarily flow as a liquid, having the semblance of quicksand, and may cause excessive settlements and sand boils at the ground surface. This phenomenon may be expected to occur if dynamic forces of ground shaking take place.

The unconsolidated sediments of the Salton Trough, especially in saturated areas such as irrigated lands, are subject to failure during earthquakes, thus, causing the potential for liquefaction. The majority of soil types within Imperial Valley (see Figure 21) are generally considered liquefiable due to their physical characteristics and saturated conditions. The Glenbar clay loam and the Torriorthents-Rock outcrop soil complexes, usually found in the eastern and western portions of the County, are not subject to liquefaction primarily due to the density of underlying sediments and volcanic base. As indicated above, impacts to local inhabitants and property due to liquefaction could increase with increased development, as allowed by the proposed General Plan.

Avalanches, Landslides, Rock and Mudslides

Seismically-induced rock/landslides and avalanches would also be considered a potentially significant hazard, particularly in the western portions of Imperial County. Areas of moderate landslide activity include the Jacumba, Coyote, Fish Creek and Santa Rosa Mountains. Slopes and embankments of rivers and canals are also subject to bluff failure and mudslides during an

earthquake. Since these areas currently experience little development, and future development plans for these areas are nonexistent, significant impacts from such hazards are not expected to occur.

Floods

Floods from dam failure are a notable secondary effect of earthquakes. Unfortunately, the geologic forces generating faults also often produce the topographic features desirable for the location of dams; earth-filled dams being the most susceptible to seismic-induced failure. Two major dams occur within Imperial County along the lower Colorado River: Imperial and Laguna. The Colorado River is not a seismically-active zone, and no cases of earthquake damage to these dams have been recorded. The potential does exist, however, that significant damage could occur to one or both of these dams in the event of a major earthquake. However, as the eastern portion of the County is very lightly settled, and no new significant development is proposed in these areas by the Plan Update, this potential impact is not considered significant.

In addition, several large, earth-filled impoundment reservoirs; miles of above-ground, earth-leveed canals; and hundreds of earthen check dams, drops and gates occur within the irrigated areas of the County. Within these areas, a number of instances of levee failure and resultant flooding from earthquakes have been reported. Because of the comparatively small volumes of water involved; the variety of options to check or divert canal flows; and the ubiquitous drainage network in the County, such seismically-induced flooding hazards are not considered to be significant. Even minor flooding, however, could incrementally contribute to the other disruptions caused by an earthquake.

3. Mitigation Measures

Prior to the approval of a tentative map, implementing permit, or grading plan for any phase or unit of development, a geotechnical investigation shall be conducted by a registered geotechnical engineer identifying appropriate mitigation, if required. Common mitigation measures associated with minimizing potential impacts of geology and soil conditions include adherence to basic construction procedures pursuant to the Uniform Building Code, which includes the incorporation of seismic safety-related construction standards; removal and recompaction of soils susceptible to settlement; and reduction or control of erosion by retaining as much vegetation in place as possible throughout the development process. All geotechnical studies shall be submitted to the Imperial County Planning and Public Works Departments for review and approval. Mitigation measures recommended by these studies that would reduce identified impacts to below a level of significance shall be included as conditions of future project approvals.

L. Flood Control/Hydrology

This section provides general hydrologic information for Imperial County, and evaluates the proposed General Plan in terms of the following environmental issues: surface drainage, groundwater, and flooding. Information for this section was derived from the Imperial County Overview Plan (Imperial County Planning Department 1985); *Soil Survey of Imperial County* (SCS 1981); and communication with agency staff from the Imperial Irrigation District (IID).

1. Existing Conditions

Extensive studies have been conducted by various federal and State agencies, universities, and private consultants on the hydrological aspects of Imperial County. The following is a generalized discussion of the distribution, characteristics, and effects of the County's water resources in relation to human activities.

a. Annual Precipitation

Annual precipitation in the County is very low, averaging approximately 2.89 inches per year. Individual storm events are often intense, however, and combine with low soil infiltration (percolation) rates in adjacent highlands to produce rapid surface runoff flows into low-lying drainages.

b. Surface Waters

The source of virtually all surface waters in Imperial County is the Colorado River. Primarily used for irrigation, Colorado River water is first diverted by the Palo Verde Irrigation District at the Palo Verde Diversion Dam north of Blythe, California. The second diversion point is at the Imperial Dam through the All-American Canal headworks and desilting basins operated by the Imperial Irrigation District (IID). Final diversions are made from the All-American Canal for use in the Yuma, Imperial and Coachella Valleys.

In the Imperial Valley, approximately 2.9 million acre-feet of irrigation water is delivered annually to some 500,000 acres of agricultural lands via an elaborate gravity-flow system. This water distribution system consists of about 5,600 delivery points, 1,675 miles of canals and laterals (more than 1,000 miles of which are concrete-lined), and six regulatory reservoirs. Distribution facilities include the All-American Canal, which has been diverting Colorado River water directly to Imperial Valley since 1940; the East Highline, Central Main and Western Main canals; and a series of smaller supply and drainage canals that crisscross the Valley. For more information on the County's irrigation water supply system, please refer to the General Plan Water Element.

The IID also maintains a 1,457-mile drainage system, which collects surface runoff and subsurface drainage from 32,222 miles of tile drains. These agricultural drains channel runoff directly into the New and Alamo Rivers and, eventually, the Salton Sea. Discharge from agricultural drains is restricted to IID outfall structures. These structures generally consist of

a single, 12-inch diameter concrete pipeline per 160-acre parcel, and have a flow capacity that ranges from one to six cubic feet per second (cfs) depending on the hydraulic conditions of the site. This limited outfall capacity for combined agricultural and storm runoff is designed to restrict flows into IID drains and, thereby, reduce downstream flooding potential.

Much of the County's drainage flows into the Salton Sea. The Salton Sea watershed includes all of Imperial Valley, where natural drainage is confined largely to the New and Alamo Rivers. These permanent streams carry irrigation drainage and storm runoff from Imperial Valley and northern Mexico. The New River drains the western portion of the Valley, and the Alamo River drains the eastern portion. Local drainage patterns within much of the Valley have been substantially altered through agricultural activities.

The surface elevation of the Salton Sea fluctuates by several feet annually, depending upon the rate of evaporation, precipitation and drainage from the New and Alamo Rivers and from the Coachella Valley. The water levels at the Sea are also influenced by occasional above-average upstream flows from heavy rainfall or snowfall within its watershed. The surface water level at the time the Sea was formed in 1907 was about 195 feet below mean sea level (BMSL). The lowest recorded level of 250 feet BMSL occurred in 1925. The Sea steadily rose to its level of 226 feet BMSL in April of 1984, where it remains today. The continued rise in surface elevation of the Salton Sea is causing serious drainage problems in adjacent cultivated areas.

c. Groundwater

The groundwaters within the shallow aquifers of the Salton Trough generally flow at right angles to the contour lines and towards the Salton Sea. Generally, the shallow aquifers beneath the Imperial Valley are affected by inflow from the Colorado River, the evaporation rate of surface waters, the depth of agricultural tile drains beneath farmlands, and seepage from drains and rivers. The Colorado River is probably the most important source of recharge into these shallow groundwater basins; approximately 10% percolates to underlying aquifers. Canals, such as the All-American and East Highline, contribute to groundwater recharge in the following ways: They are unlined; are sometimes up to 200 feet wide; flow across many miles of sandy terrain; and have a higher total surface water level than the average groundwater level for Imperial County.

Groundwater recharge by underflow from tributary areas is small compared to that which percolates through the soils from the Colorado River. Direct recharge from rainfall is very minor. On higher alluvial slopes of the southwestern mountains of Imperial County, however, a heavy rainfall may be sufficient for recharge via direct infiltration. This also occurs from surface runoff, mainly in washes and drainageways that discharge to the central part of the Valley and the Salton Sea.

Annual groundwater recharge in the Valley is estimated at about 400,000 acre-feet, although most of the recharge may be to shallow aquifers and subsequently lost to the Valley's extensive drainage system. The total volume of the deep-water reservoir underlying Imperial Valley has

been estimated at 1.1 to 3 billion acre-feet, with the total recoverable amount estimated to be about 20% of the water in storage (County of Imperial 1985).

Based on pumping data and water studies of various wells, groundwater levels range from six to eight feet below the ground surface level throughout most of the Imperial Valley. The deepest groundwater is, in some cases, believed to be moderately altered ocean water. Above this level, it may consist of residuals from prehistoric freshwater lakes that filled the Salton Trough. Groundwaters at this level vary from low to moderate salinity. The uppermost groundwater levels are higher in temperature and, in places, highly saline. The quality of these shallow groundwaters is better on the eastern and western sides of the Valley. A significant amount of groundwater of good quality can also be found in the Ocotillo-Coyote Wells Water Basin (please refer to the "Water Quality" Section of this EIR for more discussion on this groundwater basin).

Well Water

In addition to mutual water companies in the Ocotillo-Coyote Wells area, three other water districts supply well water to other areas in Imperial County: Palo Verde County Water District (PVCWD), Winterhaven Water District (WWD), and Bard Water District. Responsible for supplying domestic water to approximately 162 customers, the PVCWD has a deep well in the community of Palo Verde. This well extracts approximately 45,000 gallons of water per day, the quality of which is fairly good, from the groundwater basin and treats it before distribution.

The WWD supplies water to approximately 1,000 people in Winterhaven. The WWD uses two wells, one of which is a standby well, to extract approximately 150,000 gallons of water per day from the groundwater basin for domestic purposes. In the community of Bard, wells are used to extract groundwater for certain domestic purposes, including landscape irrigation. Other areas that use wells to extract water from the groundwater basin are the East and West Mesa Units within IID boundaries. The East Mesa Unit has four wells that are approximately six hundred feet deep. The lining of the first 49 miles of the Coachella Canal from its turnout from the All American Canal has reduced water loss due to seepage, but has not affected the wells in the area. Consideration is currently being given to line the All-American Canal from Pilot Knob to Drop 3 and a portion of the remaining unlined Coachella Canal.

The Supreme Court in its 1964 decree in *Arizona v. California* has set forth with respect to the Colorado River that "Consumptive use from the mainstream within a state shall include all consumptive uses of water within the mainstream, including water drawn from the mainstream by underground pumping...". Any such withdrawal of groundwater along the river is considered to be pumping mainstream water and requires a contract with the Secretary of the Interior. Those using Colorado River water without a contract or whose contract entitlement is insufficient may currently be eligible to participate in the Lower Colorado Water Supply Project and thereby have an opportunity to receive exchange water.

Subsidence

Natural subsidence has been occurring within the Salton Trough at an average rate of nearly two inches per year, as measured at the center of the Salton Sea. The rate of subsidence decreases to zero near the International Border. Despite the generally uniform rate of subsidence within the Imperial Valley, local depressions have formed, such as the Mesquite Sink south of Brawley.

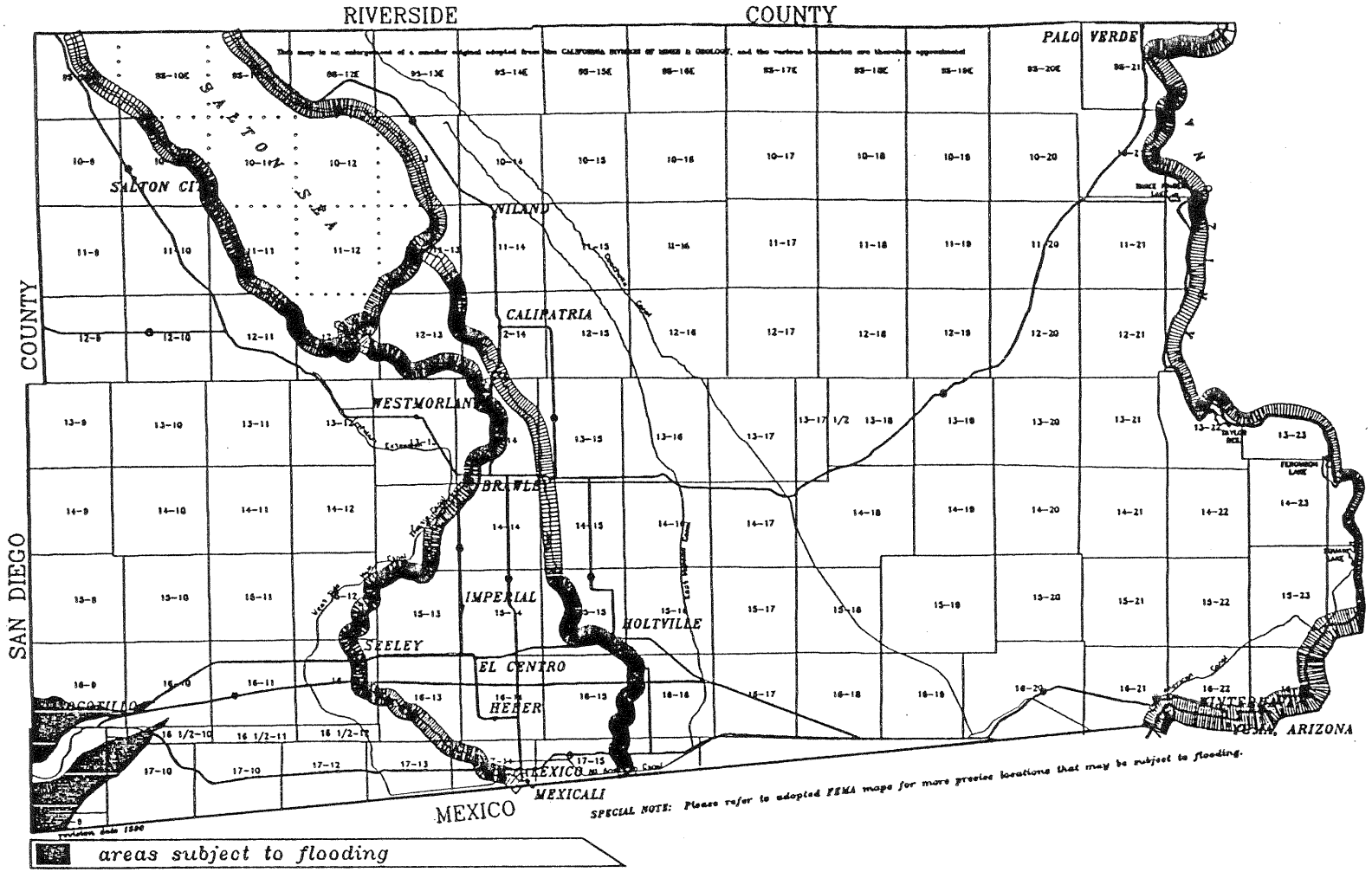
Subsidence due to groundwater withdrawal can occur in unconsolidated to semi-consolidated sediments containing confined or semi-confined sand and gravel aquifers inter-bedded with clay sediments. The potential for subsidence is dependent on the depths and amount of water likely to be extracted from the aquifer. On the Valley floor where these conditions exist, the potential for subsidence is considered to be moderate to low, based on current hydrological conditions. Despite annual seasonal fluctuations in groundwater levels, no major subsidence has occurred. However, a dramatic lowering of the water table beyond the normal range of fluctuations could strongly increase the potential for subsidence in the Imperial Valley.

d. Flooding

Areas adjacent to floodplains and floodways are most subject to flooding. Floodplains are generally located adjacent to rivers and other bodies of water, and in low-lying areas near a water source. Within Imperial County, agricultural and urban areas abut the floodplains of the New and Alamo Rivers, which flow in a northerly direction through the center of the Imperial Valley from the International Border to the Salton Sea. These are areas that are predicted to experience inundation from a 100-year storm event.

Floodways are more hazardous due to the anticipated velocities of floodwaters and expected damage to life and property. As shown on Figure 24, potential flood hazard areas within Imperial County occur along Myer Creek, which flows into an alluvial fan in the Ocotillo area; along levees of the Colorado River; along San Felipe Creek in the western central portion of the County; and along numerous (mostly unnamed) desert washes that drain the Peninsular Range, Chocolate Mountains, Cargo Muchacho Mountains, and other high elevation topographic features.

Regarding the Colorado River, the Colorado River Floodway Protection Act, Public Law 99-450, provided for the establishment of a federally-declared Floodway along the Colorado River from Davis Dam to the Southerly International Boundary between the U.S. and Mexico. It is to accommodate either a one-in-one hundred year river flow consisting of controlled releases and tributary inflow, or a flow of forty thousand cubic feet per second, whichever is greater. The forty thousand cubic feet per second flow corresponds to the long-standing target maximum flood control release objective of Hoover Dam which was established with the closure of the dam in 1935. The one-in-one hundred year frequency flow is the standard level of protection that has been adopted in the administration of the National Flood Insurance Act.



SOURCE: Imperial County Planning Department

Imperial County General Plan	Flood Areas	Figure 24

Much of the Imperial Valley region has been mapped for flooding potential by the Federal Emergency Management Agency (FEMA). As previously mentioned, identified local floodplains include those associated with the New and Alamo Rivers, the Salton Sea, and a number of playas and intermittent drainage courses. Further information regarding specific flood hazard areas of the County can be obtained by consulting Flood Insurance Rate Maps (FIRMs) prepared by FEMA, and by referring to the General Plan Conservation and Open Space Element.

Imperial Valley is also subject to some degree of shallow flooding due to the lack of local topographic reliefs; the low regional precipitation rate; occasionally intense storm events; and low soil infiltration (percolation) rates in adjacent highlands that produce rapid surface runoff flows into low-lying drainages.

e. 1973 General Plan

The proposed General Plan Update significantly improves upon the 1973 Imperial County General Plan with respect to the goals and policies relating to hydrology, drainage, groundwater and flood control. The existing General Plan Water Element developed broad based statements reflecting the County's values, aims, and aspirations for management of water resources. The goals and objectives of the Water Element of the proposed General Plan are designed to assure that water resources are conserved and utilized in a way that will enhance long-term availability, while providing for current supplies and demands; to improve the use and distribution of water throughout the County, including the extension of current water conservation programs; and to provide information and advisory services to help users increase efficiencies in their water consumption within the County.

Furthermore, the Water Element of the proposed General Plan addresses the physical development, as well as the wise use and preservation, of the County's important water resources, and sets forth specific performance requirements for the various elements which relate to water issues in Imperial County.

2. Environmental Impacts

Full implementation of the proposed General Plan would allow for continued intensive agricultural uses, as well as increased urbanization and other development within Imperial County. Resultant impacts could include:

- Alteration of existing surface drainage patterns;
- Increase in impervious surfaces, runoff volumes, and water levels of rivers, reservoirs and the Salton Sea;
- Increase in downstream erosion, sedimentation and siltation due to inadequate erosion control measures;
- Depletion of groundwater resources due to well water extraction and subsidence;

- Increased flooding potential, which could damage more property and inflict more casualties than would be experienced currently.

Future residential development could also result in discontinued use of adjacent agricultural properties if existing infrastructure (e.g., utilities, underground pipelines, access roads) is disrupted, without providing or maintaining temporary service connections during construction.

3. Mitigation Measures

a. Surface Drainage and Erosion Control

Prior to the approval of a final subdivision map, implementing development permit, or grading plan, a drainage study shall be conducted by a registered civil engineer experienced in performing drainage studies, and submitted to the County Planning and Public Works Departments for review and approval. At a minimum, such a study shall include specific recommendations on the locations, design and construction easements for all temporary and permanent drainage and erosion control facilities (e.g., stormdrains, pipelines, culverts, retention ponds, desiltation basins, and energy dissipators) required to handle surface drainage flows based on peak build-out runoff volumes. The locations of all permanent maintenance structures and access roads required to service these facilities shall also be delineated in this study.

b. Groundwater

All future development projects shall be required to comply with the goals, objectives and policies of the Imperial County General Plan Water Element, as they relate to water conservation.

Reclaimed water and/or urban runoff diversion facilities shall be considered as part of future development plans, to the extent feasible. The re-use of treated wastewater and stormdrain runoff for limited agricultural production and landscape irrigation would benefit groundwater supplies. Areas potentially adequate for reclaimed water use include landscaped road medians, open space and roadway setback zones, roadway slope plantings, and habitat restoration areas. At such time that reclaimed water becomes commercially available, and meets the federal, State, and local health standards and permitting requirements for re-use in agricultural and landscape applications, such facilities could come "on-line" after testing.

c. Flood Control

All future development projects proposed within the potential flood hazard areas indicated on Figure 24 shall be required to install appropriate flood control facilities and structures, in compliance with County and other responsible agencies' standards.

d. Infrastructure

Prior to the approval of a tentative map, implementing permit, or grading plan affecting agricultural canals and drains, an infrastructure improvement plan shall be submitted to the County Planning and Public Works Departments for review and approval. This plan shall show the temporary water utility connections that will be required to maintain continued agricultural use of adjacent properties that could be impacted by future grading operations.