# IV. RIPARIAN REVEGETATION PROGRAM

Appendix C of the Levi-Cushman Specific Plan Environmental Impact Report

# RIPARIAN REVEGETATION PROGRAM FOR THE LEVI-CUSHMAN SPECIFIC PLAN

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# I. INTRODUCTION

## A. PURPOSE

### 1. The San Diego River Wetlands Management Plan

The San Diego River Wetlands Management Plan was developed by the City of San Diego in cooperation with the resource agencies. The plan is intended to provide flood-control facilities along the increasingly urbanized corridor of the San Diego River through Mission Valley, while at the same time preserving and reestablishing a measure of the natural biological quality that once existed in this area.

This project, the Riparian Revegetation Program for the Levi-Cushman Specific Plan area (Figures 1 and 2), incorporates the principal goals of the San Diego River Wetlands Management Plan. The primary policy orientation of the city's plan is

> . . . to define a means of maintaining and improving the overall quality of the wetlands associated with the San Diego River while allowing for development in Mission Valley. The intent of the plan is to establish a framework for accomplishing this goal by incorporating biological considerations into planning for development and flood management on the river (p. G-3).

The stated objectives of the Wetlands Management Plan are to establish a guide for natural and revegetated wetlands preservation and improvement in the valley, to clarify common goals for agencies and the private sector to allow incorporation of biological requirements within the scope of new development, and, therefore, to facilitate compliance with the processing requirements of state and federal agencies for projects which affect wetlands.

Reestablishment and management of wetlands within the existing floodway (FW) of the San Diego River is mandated by the Wetlands Management Plan:

> The established FW zone boundary encompasses a sensitive resource area wherein no modifications shall be permitted unless mitigation is accomplished in agreement with the [San Diego River Wetland Management] plan (p. G-15).

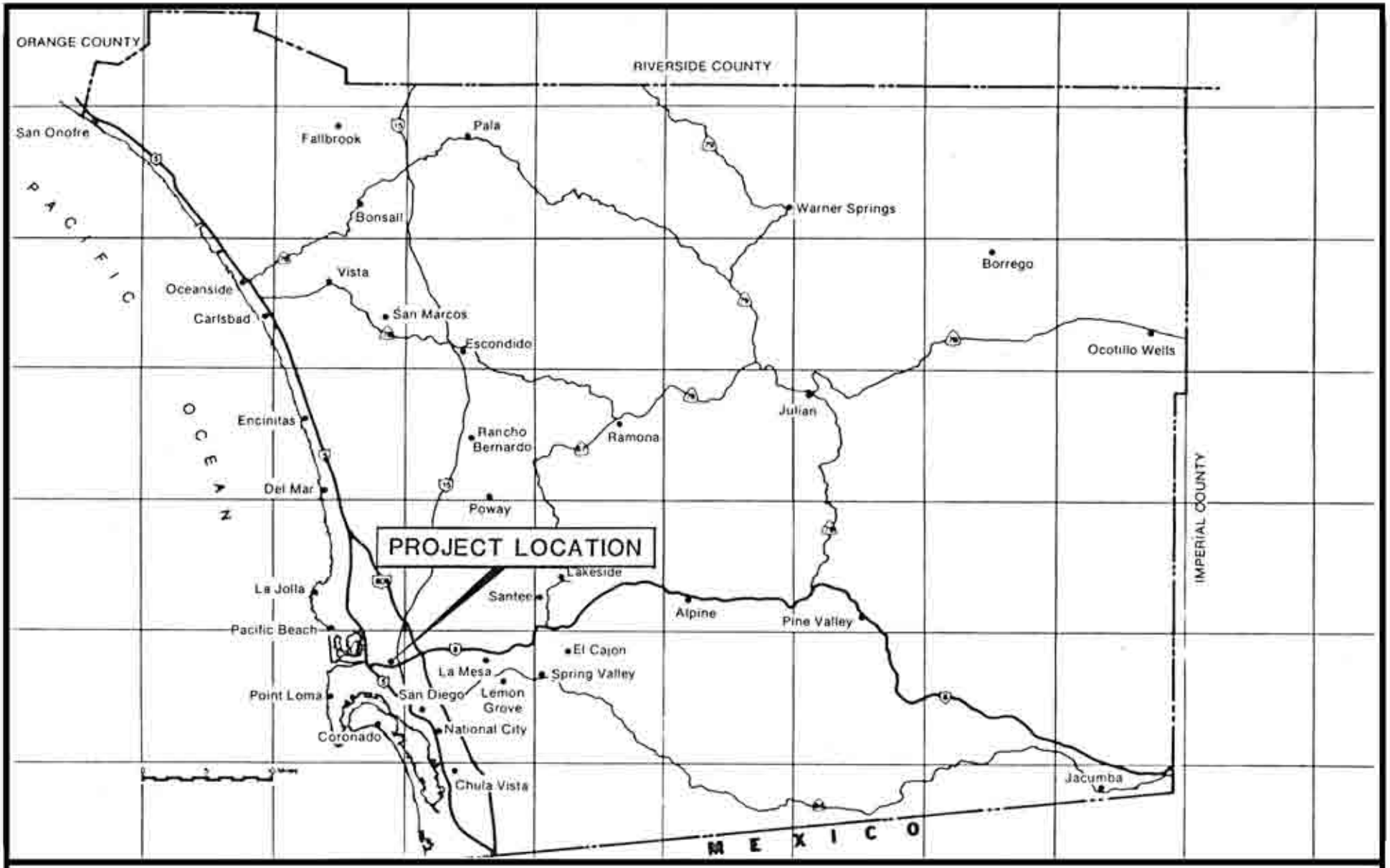


FIGURE 1. THE LOCATION OF THE PROPOSED PROJECT RELATIVE TO THE COUNTY OF SAN DIEGO.

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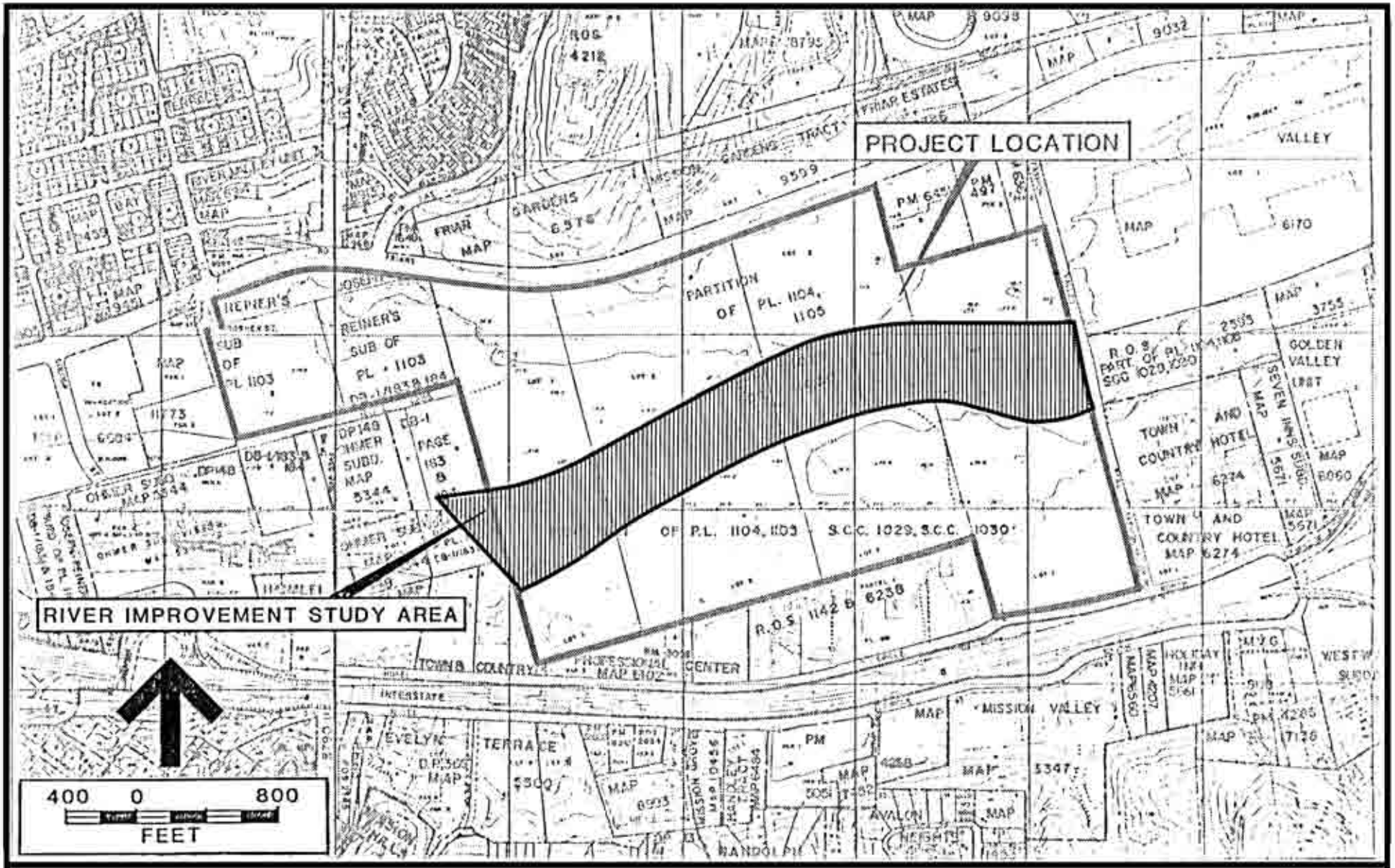


FIGURE 2. LOCATION OF THE RIPARIAN REVEGETATION STUDY AREA

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The purpose of wetlands revegetation is defined and qualified as to intent and limitations:

> The primary purpose of the [plan] is to protect, preserve and enhance wetlands . . . . it is recognized that the floodway is within an urban setting and must serve multiple uses, [not] solely serve as wildlife habitat (p. G-13).

Specific habitat reestablishment guidelines in the Wetlands Management Plan call for creation of a distribution of habitat types within the wetlands corridor of 35 to 45 percent riparian woodlands, 25 to 35 percent freshwater marsh, and 20 to 40 percent open water. Islands should also extend along 5 to 15 percent of the length of any river segment.

The Wetlands Management Plan also discusses specifically the segment of the river that includes the Levi-Cushman Specific Plan area (p. G-27). Some land that is presently within the floodway could be recovered for development if a flood-control channel capable of containing a 100-year flood and supporting a viable wetlands corridor is developed. Wetlands restoration must be incorporated into channel design. The revegetated channel could be considered compensation for loss of the small areas of existing riparian woodland and degraded wetlands (golf course), and the creation of a biologically valuable corridor would eliminate the need for compensating loss of floodway on an acre-for-acre basis.

### 2. The Levi-Cushman Riparian Revegetation Program

The primary purpose of the Riparian Revegetation Program for the Levi-Cushman property is threefold. First, implementation of the project will reduce the flood risk to both existing and proposed development, through channelizing the floodway of the San Diego River between Fashion Valley Road and the proposed crossing of Via las Cumbres. Second, the creation of a corridor of riparian habitat approximately 400 feet wide along the existing channel of the San Diego River through the property will mitigate the decrease in the width of the floodway resulting from project implementation and create new wildlife habitat. Third, the newly created habitat area will also serve to mitigate the loss of the visual open space currently provided by the green area of the golf courses.

The flood-control channel is designed to convey peak flood flows of 49,000 cfs (cubic feet per second), the peak flow during a 100-year flood event as estimated by the Army Corps of Engineers (COE), without raising the calculated surface of the existing 100-year flood level.

In accordance with the appropriate federal, state, and local policies, the proposed Riparian Revegetation Program includes provision for the establishment of a continuous riparian habitat corridor through the Levi-Cushman property. The riparian habitat has been designed to include riparian woodland, freshwater marsh, and open water habitats within the proposed flood-control channel, as delineated in the Wetlands Management Plan.

Although the reestablished riparian habitat will provide critical wildlife habitat in the valley, it will also be an important visual resource to the community, replacing the green open space of the golf course. Several provisions have been incorporated into the program design to enhance the value of the new floodway habitat as an aesthetic resource without significantly decreasing its biological value.

The specific goals of the Riparian Revegetation Program for the restructured floodway on the Levi-Cushman property are:

a. Design and revegetation of both sides of the channel to provide 36.2 acres of continuous wetlands habitat on both sides of the river distributed as follows: 19.5 acres of open water habitat (±53.8 percent), 3.7 acres of freshwater marsh (±10.1 percent), and 13.1 acres of riparian vegetation (±36.1 percent). Riparian is subdivided into 8.1 acres of willow-dominated riparian habitat cover (±21.8 percent) and 4.9 acres of cottonwood/sycamore-dominated riparian (±13.3 percent).

b. Maintenance of biological resources in accordance with the goals of the revegetation program, including development of riparian woodland, freshwater marsh, and open water habitats in the reconstructed floodway.

c. Maintenance of the hydraulic characteristics of the channel to ensure adequate flood control (conveyance of 100-year flows of 49,000 cfs).

d. Maintenance and management of the aesthetic and passive recreational resource represented by the revegetated river channel.

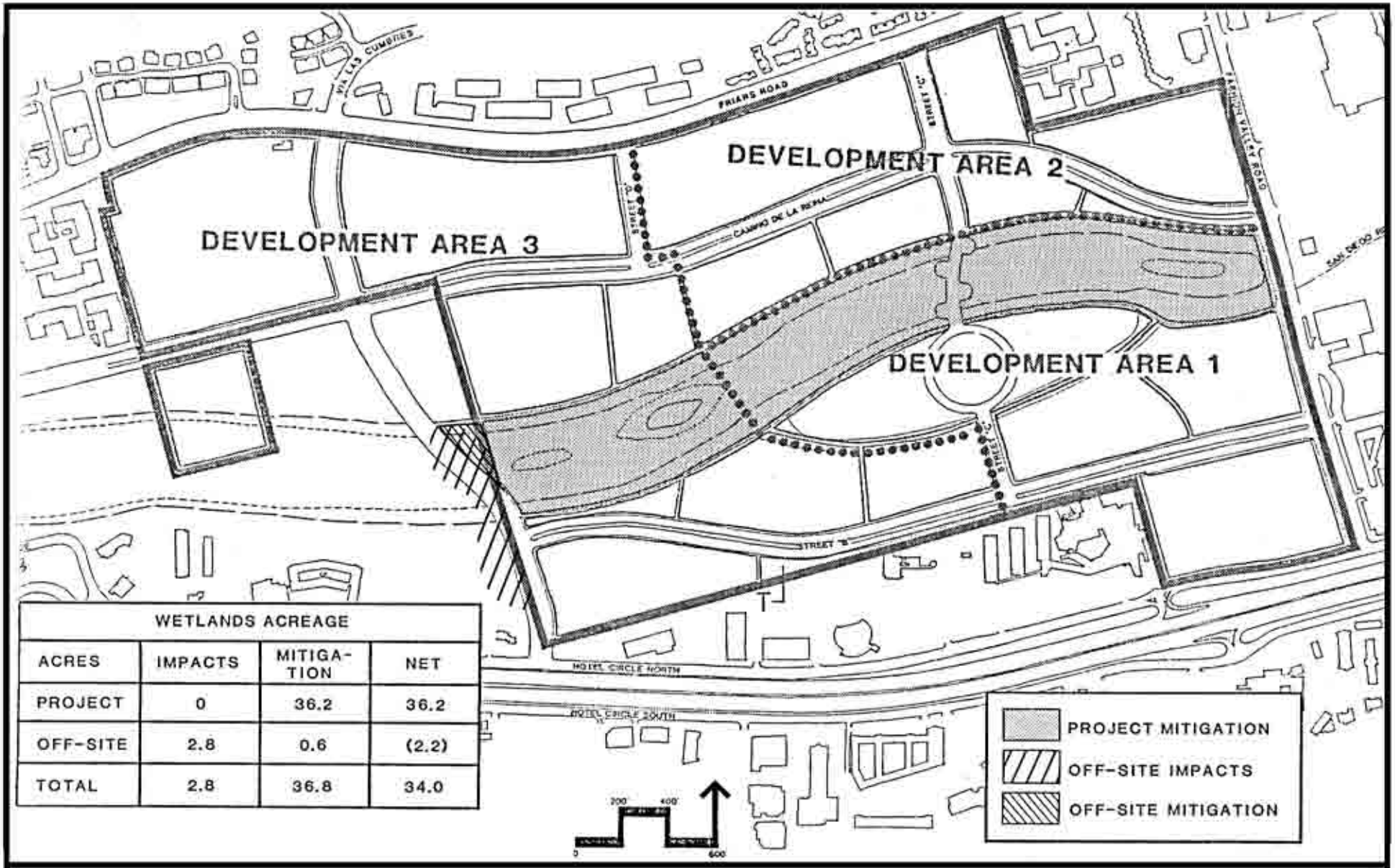
e. Monitoring of the establishment and subsequent development of vegetation and habitat quality to serve as a basis for maintenance activities.

This document will also detail phasing of channel construction, the structure and function of buffers along the revegetated floodway, uses permitted in the buffers adjacent to wetlands, and land uses allowed in developed parcels adjacent to the channel in accordance with the Wetlands Management Plan and with the requirements for maintaining the biological and aesthetic quality of important habitat areas.

One off-site improvement to be implemented by the project, the extension of Street "A" would affect 2.8 acres of riparian habitat. Included in the program described below are measures recommended to mitigate this off-site wetlands habitat loss in accordance with the guidelines of the Wetlands Management Plan. The location and area of project and off-site impacts and mitigation measures are shown in Figure 3.

### 3. State and Federal Agency Concerns

Applicants for projects along the San Diego River must obtain a U.S. Army Corps of Engineers Section 404 permit. The concerns of the COE are mandated by the Clean Water Act of 1972 and the River and Harbors Act of 1899 to minimize the loss of wetlands and degradation of water quality. This has been broadly interpreted to include all actions that result in the filling or dredging of wetlands. Section 404(b)(1) of the Clean Water Act proscribes development which will have an unacceptable adverse effect on wildlife and other values. The COE, in consultation with the U.S. Fish and Wildlife Service (USFWS), and following appropriate guidelines, must make a determination that a project (including mitigation measures) subject to a 404 permit will have no adverse impacts and that there is no feasible alternative to the proposed action. Furthermore, any impacts that result from project implementation must provide appropriate mitigation, as outlined in the USFWS Mitigation Policy (Appendix C of the Wetlands Management Plan). Other applicable federal authority is summarized in Appendix B of the Wetlands Management Plan.




| WETLANDS ACREAGE | | | |
|---|---|---|---|
| ACRES | IMPACTS | MITIGA-TION | NET |
| PROJECT | 0 | 36.2 | 36.2 |
| OFF-SITE | 2.8 | 0.6 | (2.2) |
| TOTAL | 2.8 | 36.8 | 34.0 |

FIGURE 3. IMPACTS AND MITIGATIONS ASSOCIATED WITH THE PROPOSED PROJECT

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Applicants must also process a California Department of Fish and Game (DFG) Section 1601/1603 Agreement for any alteration of the streambed of the San Diego River and meet the standards of the Regional Water Quality Control Board.

## B. EXISTING HABITATS ON THE SAN DIEGO RIVER

As described in the Biological Resources Survey of the Levi-Cushman Properties, the project area supports wetlands habitat (primarily emergent aquatic vegetation) within the banks of the existing pilot channel of the San Diego River. The remainder of the property is currently the golf course and driving range of the Stardust Country Club.

Included in the existing landscaping of the golf course are a number of mature trees (approximately 500). Transplantable individuals of native riparian species will be used in the revegetation of the river channel. Nonnative trees that are transplantable will be incorporated into the landscaping of the specific plan area.

Approximately 4.43 acres of disturbed riparian woodland exists on the border between the Stardust Country Club Golf Course (Levi-Cushman property) and the River West Golf Course to the west. The valley to the west to the Morena Boulevard crossing is a mix of habitat types, predominantly transitional wetlands, shrub-dominated uplands, riparian woodlands, and disturbed open areas. From the Morena Boulevard crossing to the railroad crossing and Interstate 5 (I-5), the habitat is primarily shrub-dominated uplands and riparian woodland with areas of transition and emergent wetlands. To the west of I-5, the flood-control channel contains primarily wetlands which make a transition to salt water and tidal influence increases.

To the east of the specific plan between State Route 163 (SR 163) and Fashion Valley Road, the normal river flow volume is contained by a narrow, disturbed, soft-bottomed channel. The channel varies from approximately 300 feet across at SR 163 to 100 feet at Fashion Valley Road. The channel is disturbed but contains areas of riparian woodland and emergent wetlands on the eastern end. The majority of the channel is disturbed wetlands or open disturbed land. Immediately to the north of this segment of the channel is the parking lot of Fashion Valley Center, which is within the 100-year floodway. To the south of the channel are various office buildings, hotels, and their associated parking lots.

## II. DESIGN CRITERIA

### A. THE WETLANDS RESTORATION PLAN

#### 1. Riparian Vegetation Ecology

Riparian vegetation along southern California coastal plain rivers such as the San Diego River is characterized by an overstory of trees such as willow, sycamore, cottonwood, and live oak. Understory species include shade-tolerant shrubs, herbs, and woody vines, ranging from chaparral shrubs such as holly-leaved cherry to riparian woodland taxa such as wild grape and California wild rose. The riparian vegetation community structure is determined by three principal factors: (a) vertical distance of the soil surface above the average dry-season groundwater elevation; (b) maximum flood-stage water velocity; and (c) random disturbance factors such as variations in weather patterns or channel erosion patterns. For any point on a transect across the river, the natural vegetation structure consists of plant populations adapted to associated drought-stress and flood-energy conditions. Random disturbance factors superimpose a patchwork pattern consisting of discrete areas in various stages of development following disturbance.

Prior to agricultural and urban development of much of Mission Valley, the natural vegetation consisted of three generalized zones: a channel area consisting of scoured sand and scattered pools formed by current irregularities, vegetated with sedges, bulrushes, and cattails; a zone of willows and cottonwoods increasing in age and size with distance from the channel; and further from the channel, a floodplain riparian woodland grading from mature black willows and cottonwoods to sycamores and live oaks on the edges of the valley floor. On the south-facing northern valley wall, native coastal sage scrub and perennial grasslands intergraded into the riparian forest. On the south wall, chaparral and live oaks formed the transition.

Current vegetation patterns along the river reflect both historical land use changes and disturbance/response abilities intrinsic to the vegetation. Along much of the present-day river, only the willow zone is present immediately adjacent to the channel. The channel itself has been straightened, deepened, and narrowed for flood control in many areas, and many bordering areas have been elevated above the natural floodplain. The prevalent willow zone vegetation is adapted to frequent

disturbance from scouring by high-energy floodwaters by its rapid growth and invasive abilities, explaining its presence in the absence of deliberate revegetation efforts.

### 2. Wetlands Restoration Goals

As described above, current vegetation on the project area is primarily turf grasses associated with the golf course, with no existing native riparian habitat. The primary goal of the wetlands restoration portion of the Riparian Revegetation Program is to reestablish native riparian habitat within the flood-control channel proposed for the project area. To the maximum extent possible within constraints imposed by the physical characteristics of the proposed flood-control channel, the goal of the restoration plan is to provide a level of habitat diversity and continuity within the restored area comparable to that of undisturbed systems.

The wetlands restoration plan will also implement mitigation for disturbance of riparian vegetation caused by the construction of one off-site road required as a condition of the project. Riparian vegetation will be planted along currently disturbed floodway areas in compensation for the paved floodplain areas created by the off-site roadways.

The wetlands restoration effort will result in the establishment of 3.67 acres of emergent aquatic vegetation, 8.11 acres of willow fringe thicket/woodland, and 4.94 acres of mixed riparian forest along the on-site portion of the river channel (see Figures 6 and 7). Approximately 0.6 acre within the floodway to the west of the project site will be restored to riparian vegetation in connection with the construction of Street "A."

The intention of the Riparian Revegetation Program is the creation of wetlands habitat through the reach of the San Diego River that crosses the specific plan area. This wetlands will be a natural lake during the dry season providing habitat for a variety of water-dependent wildlife species and a free-flowing river during the wet portion of the year. The shallow water of the dry season lake (depths of five to six feet) should be deep enough to inhibit filling in with vegetation yet shallow enough to allow adequate mixing to prevent degraded water quality.

### 3. Revegetation Habitat Categories

As shown on Figures 4 and 5, the riparian revegetation area has been divided into five generalized habitat types according to distance from and elevation above the river channel. The final design may require slight alterations to adjust for the grading design. These include open water, emergent aquatic, willow fringe, mixed riparian forest, and buffer plants. Each of these habitats is composed of one or more plant associations.

The open water category has been indicated for those areas of the channel which will be excavated to a depth exceeding 2 feet below the minimum groundwater elevation. The water level will be maintained (except during storm runoff conditions) at approximately 11 feet above mean sea level (MSL) along the entire on-site length of the river by a weir structure at the western boundary of the site.

Elevations for planting were determined by measuring elevations of established habitat along the San Diego River. Emergent aquatic vegetation is indicated for areas between 9 and 13 feet above MSL, these areas being characterized by shallow water and saturated soils with periodic high-energy flood velocities. Between about 13 and 21 feet MSL (up to 10 feet above the dry-season water level), willow fringe vegetation has been indicated. This vegetation is composed primarily of relatively small willow species adapted to annual flooding and rapid regeneration following disturbance by floodwaters. Channel areas higher than 21 feet above MSL will be established as a mixed riparian forest zone, to be planted with a variety of larger riparian tree species and native understory species.

A buffer area at least 25 feet in width will be implemented along the outer edge of the riparian restoration area. This area will be vegetated with native riparian tree species, with a 5-foot dense planting barrier of understory species such as blackberry and wild rose to discourage encroachment into the adjacent riparian habitat (see below).

Within each generalized habitat type, plantings will be implemented in plant associations of varying quantity and arrangement of the component species. These associations are intended to mimic the kinds of random aggregations of habitat stands which result from the natural development of riparian vegetation over time in unchannelized systems, and at the same time provide an interface to the project's aesthetic design by providing views to open water.

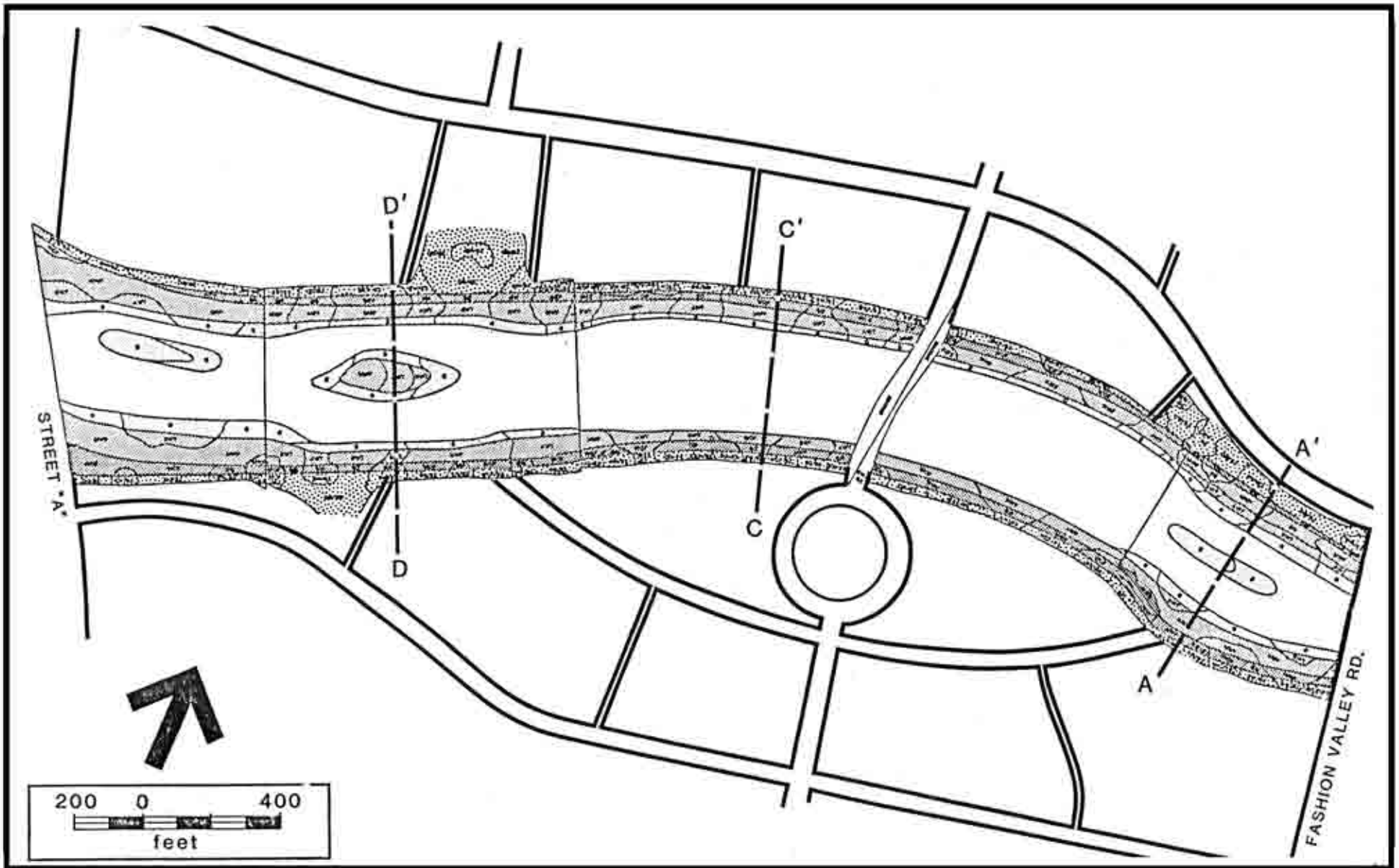


FIGURE 4. REVEGETATION PLAN FOR THE LEVI-CUSHMAN SPECIFIC PLAN RIPARIAN REVEGETATION PLAN

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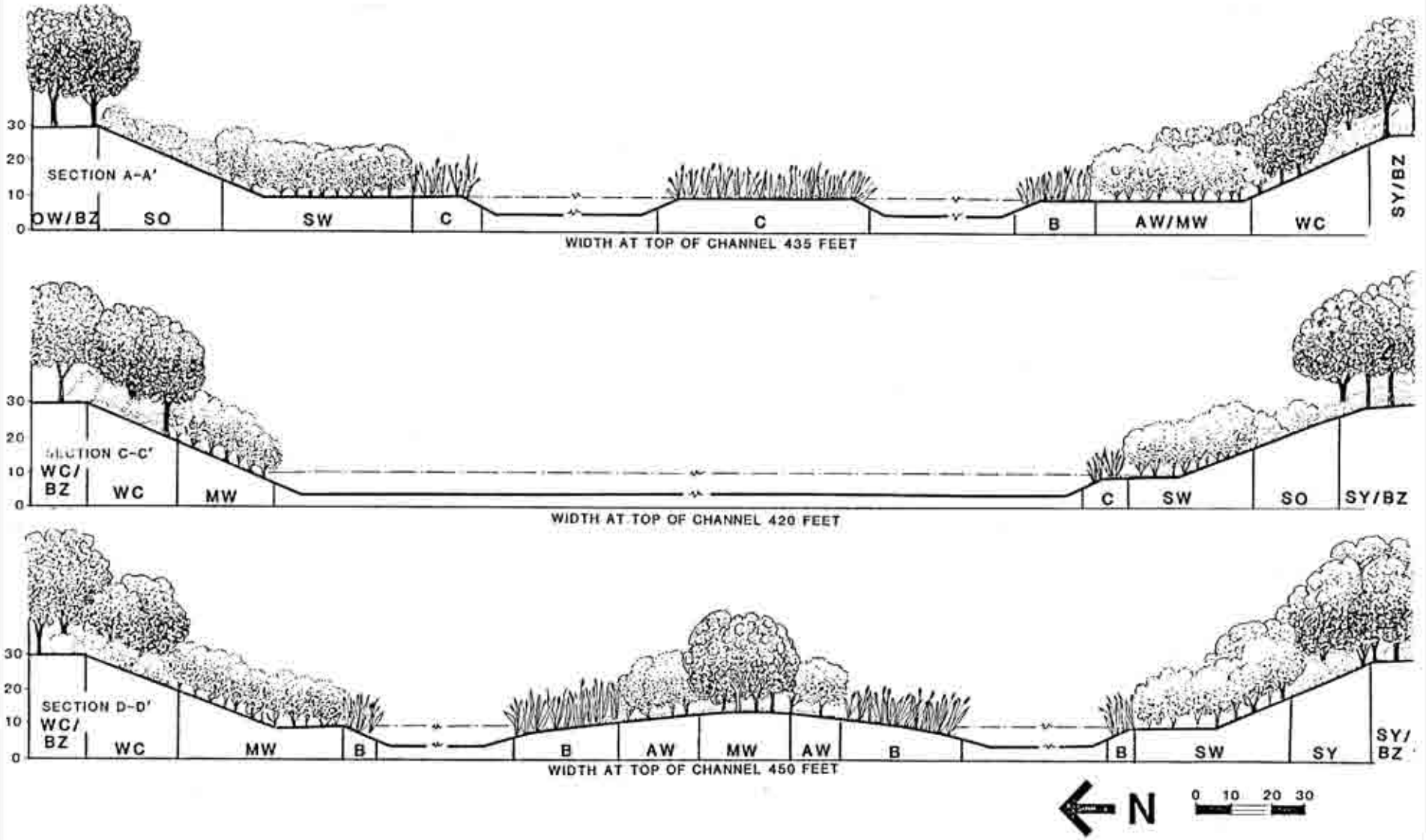


FIGURE 5. TOPOGRAPHIC CROSS SECTIONS SHOWING REVEGETATION

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While natural riparian vegetation normally grows on virtually level substrate, much of the woodland to be implemented with the revegetation plan will be on the 2.5:1 channel containment slopes. This difference will create a need for an initial irrigation and maintenance program period to assure reasonable survival of the planted materials.

## 4. Plant Association Descriptions

Table 1 lists the plant species to be used for each plant association within the generalized categories. Also shown is how these vegetation units correspond to environmental gradients of groundwater availability and flood energy. Each plant association is given a map symbol (see key) which may be used to interpret the revegetation designs illustrated in Figures 5, 6, and 7. Table 2 lists species composition and planting densities for each plant association.

As described in Tables 1 and 2, the emergent aquatic zone will consist of two plant associations, Cattail (C) and Bulrush (B). Both of these associations will depend primarily upon natural successional processes to establish the emergent aquatic vegetation initiated by planting rhizomes of locally obtained Typha (cattail) and Scirpus (bulrush) species. Because these plants spread rapidly by vegetative reproduction when established on appropriate habitat, planting will be at low densities sufficient to establish species diversity.

Three plant associations are included in the willow fringe zone. Sandbar Willow Woodland (SW) will consist primarily of low-growing (to 15 feet) shrubby species. Arroyo Willow Woodland (AW) and Mixed Willow Woodland (MW) are progressively taller, ranging to 40 feet at maturity. These plant associations will be planted at densities specified in Table 2.

The four plant associations specified for the mixed riparian woodland zone include Willow-Cottonwood Woodland (WC), Sycamore Woodland (SY), Oak Woodland (OW), Mixed Willow Woodland (MW), and Shrub Openings (SO). These patches will be taller at maturity (to 80 feet), with gaps and openings of low shrubby growth providing structure diversity and visual access to the river. Three plantings will be aggregated into groves at an overall density of 150 trees per acre (average spacing of 17 feet) according to the definitions given in Table 2.

TABLE 1
WETLAND RESTORATION PLAN:
VEGETATION CATEGORIES, STAND TYPES, AND ENVIRONMENTAL GRADIENTS

| Environmental Gradients | | Generalized Vegetation Category | Plant Association Species Composition | | | Plant Association Name | Map Symbol |
|---|---|---|---|---|---|---|---|
| Soil Water | Disturbance/ Flow Energy | | Tree Species | Understory/Shrub Layer | Seed Mix/ Ground Cover | | |
| Saturated | High | Emergent Aquatic | --- | Scirpus californica<br>Scirpus acutus | --- | Bulrush | B |
| | | | --- | Typha angustifolia<br>Typha latifolia | --- | Cattail | C |
| Mesic | Low | Willow Fringe | --- | Salix hindsiana<br>Baccharis glutinosa | Lowland Mix | Sandbar Willow Woodland | SW |
| | | | Salix lasiolepsis | Salix hindsiana<br>Baccharis glutinosa | Lowland Mix | Arroyo Willow Woodland | AW |
| | | | Salix gooddingii<br>Salix lasiandra<br>Salix laevigata | --- | Lowland Mix | Mixed Willow Woodland | MW |
| | Occasional Inundation | Mixed Riparian Woodland | --- | Baccharis glutinosa<br>Cercocarpus minutiflorus<br>Prunus ilicifolia<br>Iva hayesiana<br>Sambucus mexicanum<br>Heteromeles arbutifolia<br>Hymenoclea monogyra | Lowland or Upland | Shrub Opening | SO |
| | | | Populus fremontii<br>Salix gooddingii<br>Alnus rhombifolia | Rubus ursinus<br>Rosa californica | Upland | Willow/Cotton-wood Woodland | WC |
| | | | Platanus racemosa<br>Alnus rhombifolia | Sambucus mexicanum<br>Prunus ilicifolia<br>Vitis girdiana<br>Rosa californica | Upland | Sycamore Woodland | SY |
| | | | Quercus agrifolia | Prunus ilicifolia<br>Rosa californica<br>Rubus ursinus<br>Vitis girdiana<br>Rhus integrifolia | Upland | Oak Woodland | OW |
| Seasonally Dry | No Inundation | Buffer | Use tree cover from patch type indicated | Cercocarpus minutiflorus<br>Heteromeles arbutifolia<br>Prunus ilicifolia<br>Rhus integrifolia<br>Rubus ursinus | Upland | Buffer Zone | BZ |

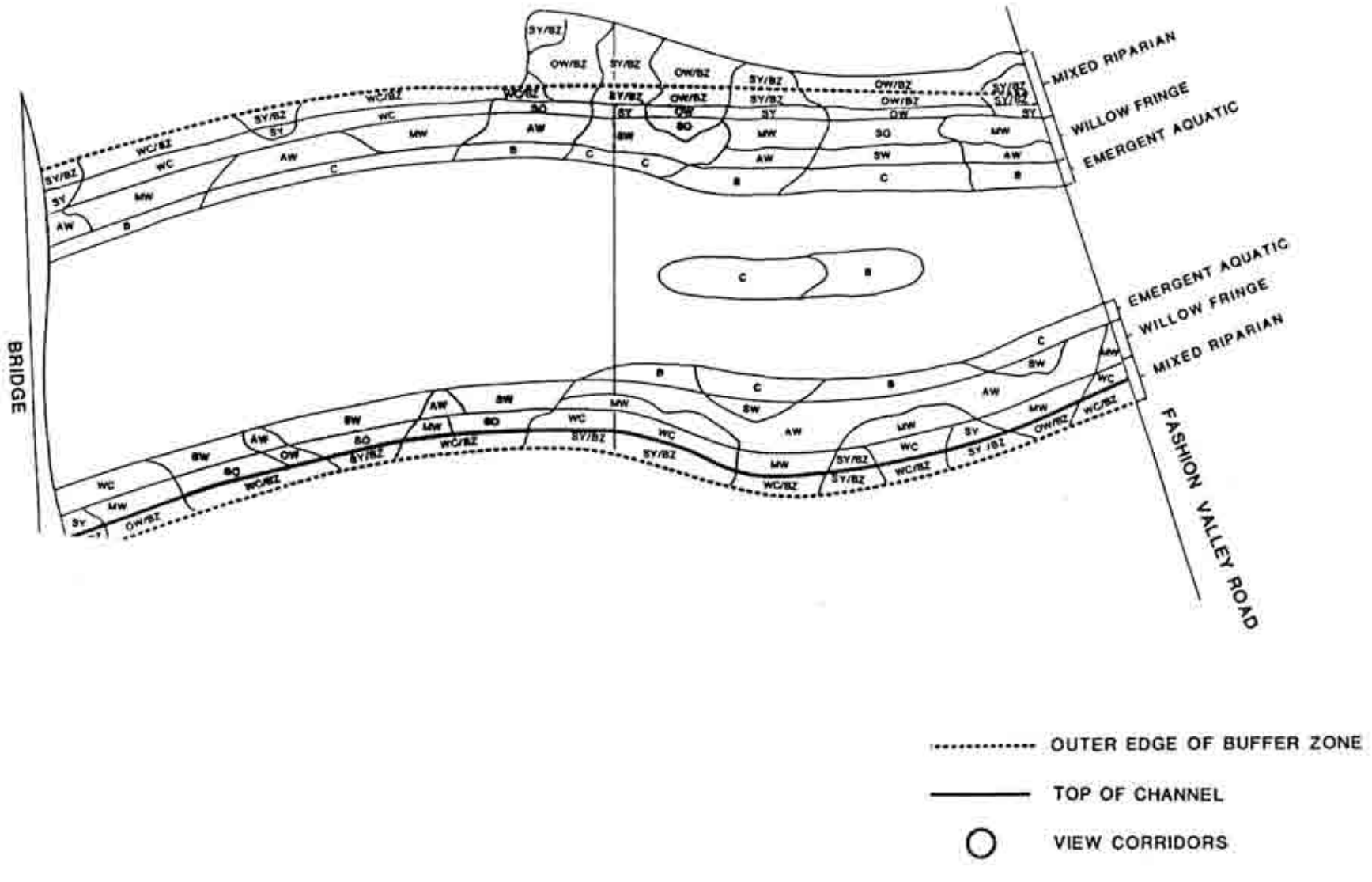


FIGURE 6. RIPARIAN REVEGETATION PLAN

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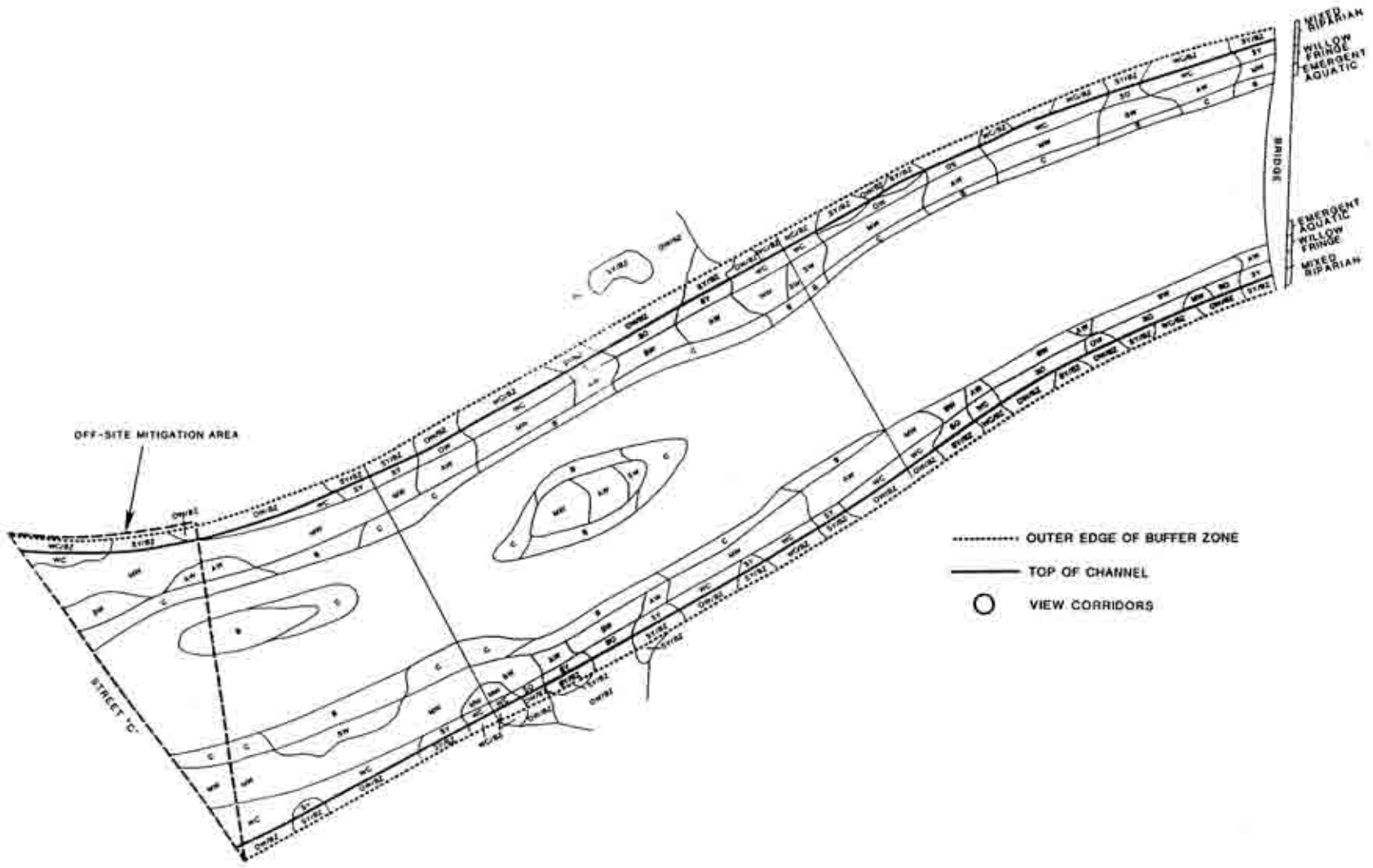


FIGURE 7. RIPARIAN REVEGETATION PLAN

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TABLE 2
STAND-TYPE DEFINITIONS

| Species | Quantity | Planting Layout |
|---|---|---|
| **Bulrush (B)** | | |
| Scirpus californica<br>Scirpus acutus | 100 rhizomes per acre of either or both species | Scattered planting near shoreline in late spring following last rains (no irrigation). |
| **Cattail (C)** | | |
| Typha angustifolia<br>Typha latifolia<br>Typha domingensis | 100 rhizomes per acre total; mixed species | Scattered planting near shoreline in late spring following last rains (no irrigation). |
| **Sandbar Willow Woodland (SW)** | | |
| Salix hindsiana | 300 plants/acre | Concentrate in 4,000-sq.ft. subunits within patch (6 per acre with 50 plants each). |
| Baccharis glutinosa | 150 plants/acre | Distribute evenly over remainder of patch. |
| Lowland seed mix | --- | Hydroseed entire patch (spray irrigate). |

**TABLE 2**
**STAND-TYPE DEFINITIONS**
**(continued)**

| Species | Quantity | Planting Layout |
|---|---|---|
| **Arroyo Willow Woodland (AW)** | | |
| Salix lasiolepsis | 200 plants/acre | Distribute evenly at 15-foot intervals over entire patch. |
| Salix hindsiana | 100 plants/acre | Plant adjacent to (C) or (B) patches. Concentrate in 1,000-sq.ft. subunits. Use 4 subunits per acre with 25 plants each. |
| Baccharis glutinosa | 100 plants/acre | Distribute evenly at 21-foot intervals over entire patch. |
| Lowland seed mix | --- | Hydroseed entire patch (spray irrigate). |
| **Mixed Willow Woodland (MW)** | | |
| Salix gooddingii | 100 plants/acre | Plant random mix of 3 species at ±15-foot intervals over entire patch (spray irrigate). |
| Salix lasiandra | 50 plants/acre | |
| Salix laevigata | 50 plants/acre | |
| Lowland seed mix | --- | Hydroseed entire patch. |

**TABLE 2**
**STAND-TYPE DEFINITIONS**
**(continued)**

| Species | Quantity | Planting Layout |
|---|---|---|
| **Shrub Openings (SO)** | | |
| Iva hayesiana | 100 plants/acre | Plant in 25-50-plant patches, with 2-5-foot intervals between plants (spray irrigate). |
| Baccharis glutinosa | 50 plants/acre | These six shrub species are listed in general order of increasing drought-tolerance. Plant at approx. 12-foot intervals over the (SO) patch, with the most drought-tolerant species in higher areas (spray irrigate or drip irrigate). |
| Hymenoclea monogyra | 50 plants/acre | |
| Sambucus mexicana | 50 plants/acre | |
| Prunus ilicifolia | 50 plants/acre | |
| Heteromeles arbutifolia | 50 plants/acre | |
| Cercocarpus minutiflorus | 50 plants/acre | |
| Upland or lowland seed mix | --- | Hydroseed entire patch. Use upland mix on higher slope areas. |
| **Willow/Cottonwood Woodland (WC)** | | |
| Populus freemontii | 100 plants/acre; 20% 5-gal. size | Plant in 10-15-tree groves with 10-foot intervals (drip irrigate). |
| Salix gooddingii | 75 plants/acre | Plant spaced over remainder of patch (drip irrigate). |
| Alnus rhombifolia | 25 plants/acre | Plant in 5-tree groves with 10-foot spacing (drip irrigate). |

**TABLE 2**
**STAND-TYPE DEFINITIONS**
**(continued)**

| Species | Quantity | Planting Layout |
|---|---|---|
| Rubus ursinus<br>Rosa californica | 100 plants/acre<br>50 plants/acre | Mixed at 17-foot spacing (no irrigation). |
| Upland seed mix | --- | Hydroseed entire patch. |
| **Sycamore Woodland (SW)** | | |
| Platanus racemosa | 100 plants/acre;<br>20% 5-gal. size | Plant in 5-tree groups with 10-foot spacing (drip irrigate). |
| Alnus rhombifolia | 50 plants/acre;<br>20% 5-gal. size | Plant in 5-tree groups with 10-foot spacing (drip irrigate). |
| Sambucus mexicana<br>Vitis girdiana<br>Prunus ilicifolia<br>Rosa californica | 50 plants/acre<br>50 plants/acre<br>50 plants/acre<br>50 plants/acre | Distribute over entire patch with Vitus and Rosa in the tree groups and the others outside (drip irrigate). |
| Upland seed mix | --- | Hydroseed entire patch. |
| **Oak Woodland (OW)** | | |
| Quercus agrifolia | 100 plants/acre;<br>20% 5-gal. size | Plant evenly at 21-foot intervals. |
| Platanus racemosa | 50 plants/acre;<br>20% 5-gal. size | Plant in 5-tree groups with 10-foot spacing (drip irrigate). |

**TABLE 2**
**STAND-TYPE DEFINITIONS**
**(continued)**

| Species | Quantity | Planting Layout |
|---|---|---|
| Prunus ilicifolia | 50 plants/acre | Distribute over entire patch at 15-foot intervals, with Rosa, Vitus, and Rubus nearest to the trees (drip irrigate). |
| Vitis girdiana | 25 plants/acre | |
| Rosa californica | 50 plants/acre | |
| Rubus ursinus | 50 plants/acre | |
| Rhus integrifolia | 25 plants/acre | |
| Upland seed mix | --- | Hydroseed entire patch. |
| **Buffer Zone (BZ)** | | |
| Trees | Use species and density from indicated patch-type | Plant according to layout given for indicated patch-type. |
| Cercocarpus minutiflorus | 50 plants/acre | Distribute evenly at about 15-foot intervals. |
| Heteromeles arbutifolia | 50 plants/acre | |
| Prunus ilicifolia | 50 plants/acre | |
| Rhus integrifolia | 50 plants/acre | |
| Rosa californica | 100 plants/acre | Plant in tree groups at about 10-foot intervals. |
| Rubus ursinus | 100 plants/acre | |
| Upland seed mix | --- | Hydroseed entire buffer zone. |

### 5. Buffers

To create and maintain a viable wildlife corridor within the floodway, habitat areas must be protected from excessive human disturbance--the same factors that also degrade aesthetic values on the river corridor. For these reasons, buffers will restrict activities within and adjacent to the floodway. Buffers will consist of a vegetated habitat area of variable width within the 100-year floodplain and adjacent native species oriented landscaping that extends the habitat area and provides opportunities for passive recreation. The width of the proposed buffer (see Figures 4 and 5) is a minimum of 25 feet, including a 5-foot planting barrier. Project passive open space is incorporated in the design to effectively increase the vegetated scope of the buffer.

The buffer design forms a restricted area adjacent to the floodway 25 feet in width in which limited uses are permitted. A 5-foot barrier planting of thorny shrubs (e.g., wild rose and blackberry), signs, berms, low walls, and fencing will discourage entry into the buffer. Some passive uses will be permitted within the buffer. These activities will include hiking trails, bicycle trails, and picnic tables in specified locations.

### 6. Design Interface of Biological and Aesthetic Goals

In accordance with the San Diego River Wetlands Management Plan, no uses will be permitted within the floodway of the river across the property. Entry into the habitats will be inhibited by a combination of appropriate plantings in the habitat buffer area, signage, view opportunities, and focusing of activities through placement of trails and passive use areas. One of the major features of the Levi-Cushman Specific Plan is the creation of an artificial waterway--the Riverwalk--to the south of the developed "island." This feature will direct human activity away from the habitat areas, while satisfying the planning goal of using the river as the thematic and aesthetic focus of the project. Also incorporated into the specific plan are three public open space areas adjacent to the river and a narrow pedestrian-oriented bridge across the river that are designed to focus attention toward the river without allowing direct access to the riparian habitat in the floodway.

To meet the aesthetic goals of the Riparian Revegetation Program, planting adjacent to the river will be carried out in a manner which preserves important

view corridors. Shading in Figures 6 and 7 illustrate the location of view corridors into the river area which will be created and maintained by design and selective pruning. Much effort has been expended to create a river environment which will be unique in scope and character in Mission Valley. Therefore, the revegetated habitat along the upper slopes of certain portions of the floodway and buffer have been designated for habitat types that are relatively low growing (e.g., Shrub Openings) or open groves of taller trees (e.g., Sycamore Woodland) allowing views under the canopy, in order to preserve view corridors onto open water from strategic locations within the project.

Habitat patches have been located in the revegetation plan so that maintenance activities for preserving view corridors to open water (pruning shrub and thicket growth to specified height limits) will enhance biological values through the maintenance of structural diversity.

### 7. Permitted Land Uses Adjacent to the Floodway Area

The Levi-Cushman Specific Plan presents general guidelines for development adjacent to the revegetated floodway which emphasize the intention that buildings be designed to maintain a comfortable scale relationship with adjacent open space area and to terrace down to the river, with building heights lower adjacent to the river corridor. In addition, the plan proposes that public recreation facilities be located adjacent to the floodway buffer and include picnic tables, benches, viewing areas, pathways, and jogging trails.

Specific development criteria for the areas adjacent to the river channel are proposed to ensure that the intent of these guidelines is met. These criteria include the following:

a. No buildings shall be located less than 20 feet from the floodway. The majority of buildings along the river should be 50 feet or more from the floodway.

b. Reflective glass will not be used on the facades of buildings that face the wetlands area and area adjacent to it. This will reduce the incidence of bird mortality that reflective glass can cause (the glass can disorient flying birds and result in collisions with structures).

c. Buildings located adjacent to the river corridor should not have direct pedestrian access to the adjacent buffer, although visual access should be encouraged.

### 8. Phasing

Appropriate construction phasing and revegetation under the Riparian Revegetation Program are critical to attaining the objectives of the Levi-Cushman Specific Plan. To this end, the flood-control channel will be developed in two phases (Figure 8). In addition to conforming with overall development phasing, channel construction phasing will allow for refining the revegetation strategy for the entire channel area based on success of the initial revegetation phase. The project biologist will be an independent consultant charged with the responsibility for implementing a monitoring program to assure satisfactory completion of various tasks and phases and to provide data to the technical management committee. Construction and revegetation of the first phase of the channel will be incorporated into the first development phase. Implementation of channel construction and revegetation through the remainder of the project area will be triggered by any development to the west of the first-phase channel.

## B. PLANT MATERIALS AND INSTALLATION SPECIFICATIONS

### 1. Implementation

Implementation of the revegetation plan will require close coordination of the project engineer, landscape architect, grading contractor, landscape contractor, and plant material contractor. The basic mechanism for implementation of the revegetation plan will be via the landscape plans for the overall project. Landscape drawings must be prepared by a licensed landscape architect which implement the guidelines and specifications of this document. The contracting nursery will require at least one year's lead time prior to initiation of the project for proper preparation of plant materials.

### 2. Plant Materials

Table 3 lists all plant species specified by the revegetation plan, showing container sizes, material sources, and seed mixes. The Salix hindsiana, S. lasiolepis, S. laevigata var. araquipa, and S. lasiandra (sandbar, arroyo, red,

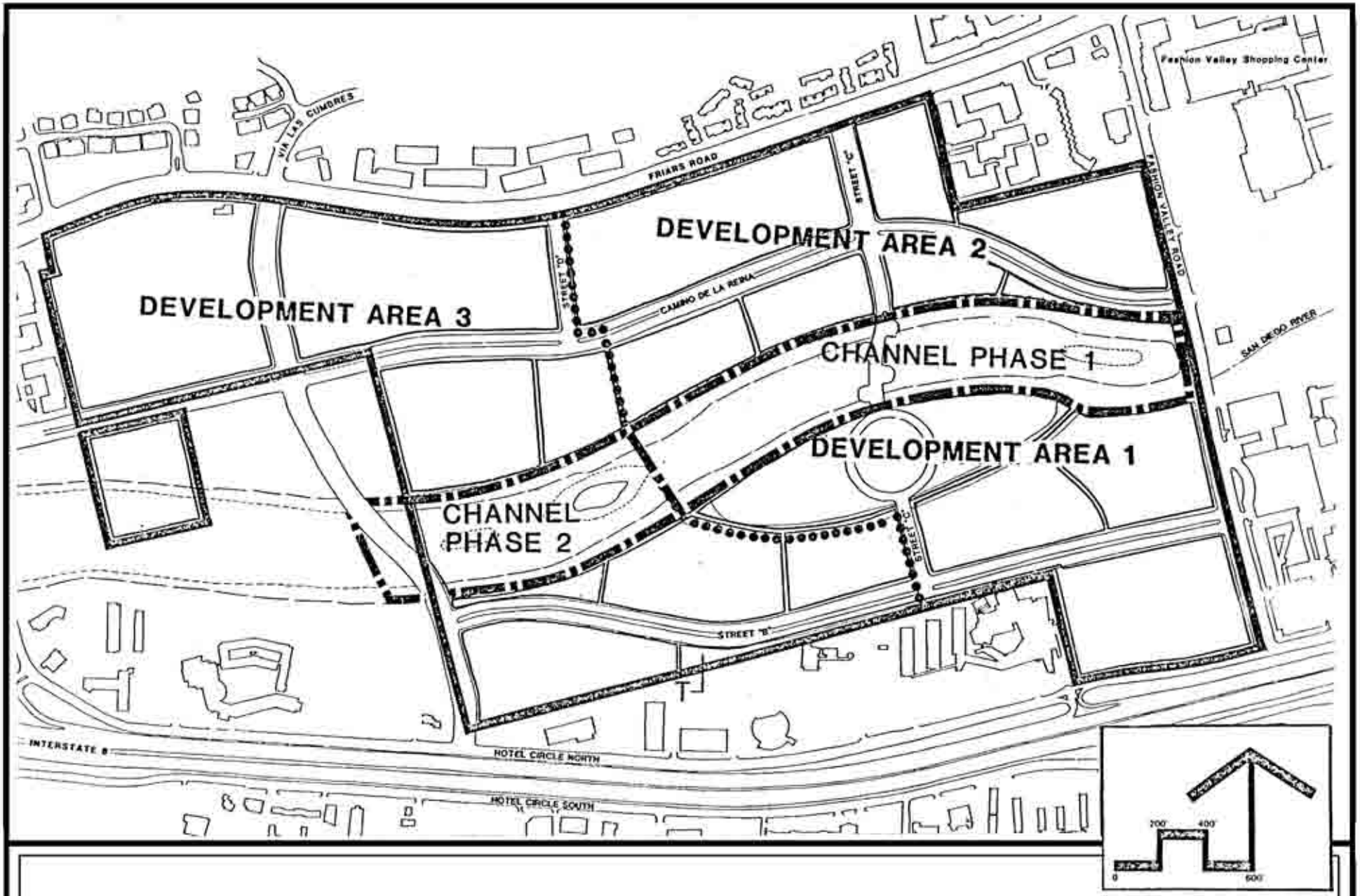


FIGURE 8. PROPOSED CHANNEL CONSTRUCTION AND REVEGETATION PHASE ON THE LEVI-CUSHMAN SPECIFIC PLAN

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**TABLE 3**
**PLANT MATERIAL LIST**

| Category | Container Size | Source |
|---|---|---|
| **Trees** | | |
| Alnus rhombifolia white alder | 1g, 5g | 2 |
| Platanus racemosa western sycamore | 1g, 5g | 2 |
| Populus freemontii Freemont cottonwood | 1g, 5g | 1,2 |
| Quercus agrifolia coast live oak | 1g, 5g | 2 |
| Salix gooddingii var. variabilis black willow | 1g | 1 |
| Salix laevigata var. araquipa red willow | 1g | 1 |
| Salix lasiandra lance-leaf pacific willow | 1g | 1 |
| Salix lasiolepis arroyo willow | 1g | 1 |
| **Shrubs** | | |
| Baccharis glutinosa mule fat | 1g | 1 |
| Cercocarpus minutiflorus mountain mahogany | 1g | 2 |
| Heteromeles arbutifolia toyon | 1g | 2 |
| Hymenoclea monogyra burrow bush | 1g | 1 |
| Iva hayesiana San Diego poverty weed | 1g | 2 |
| Prunus ilicifolia holly-leaved cherry | 1g | 2 |
| Rhus integrifolia lemonade berry | 1g | 2 |
| Rosa californica California wild rose | 1g | 2 |
| Rubus ursinus California blackberry | 1g | 2 |
| Sambucus mexicana Mexican elderberry | 1g | 2 |
| Vitis girdiana wild grape | 1g | 2 |
| **Emergent Aquatics** | | |
| Scirpus acutus hard-stem bulrush | T | 3 |
| Scirpus californicus California bulrush | T | 3 |
| Typha angustifolia narrow-leaved cattail | T | 3 |
| Typha latifolia cattail | T | 3 |

**TABLE 3**
**PLANT MATERIAL LIST**
**(continued)**

| KEY: | | SOURCE: | |
|---|---|---|---|
| 1g | one-gallon size | 1: | contract grown from local cuttings |
| 5g | five-gallon size | 2: | contract grown from nursery stock or seed |
| T | transplant | 3: | locally collected rootstock |

**LOWLAND SEED MIX**

Artemisia douglasiana western mugwort
Cotula coronopifolia brass buttons
Mimulus cardinalis scarlet monkeyflower
Oenothera hookeri tall yellow evening primrose
Salix hindsiana sandbar willow
Scirpus sp. bulrush
Typha sp. cattail
Zaucheneria californica California fuchsia

**UPLAND SEED MIX**

Artemisia californica California sagebrush
Artemisia palmeri Palmer's sagebrush
Clematis pauciflora southern California clematis
Eschscholzia californica California poppy
Keckiella cordifolia heartleaf penstemon
Lonicera subspicata southern honeysuckle
Solanum douglasii nightshade
Zaucheneria californica California fuchsia

and yellow willows) and the Baccharis glutinosa (mulefat) should be planted as rooted cuttings. These willows can be planted unrooted if done during the winter after leaves have fallen and the buds have begun to swell. The Salix gooddingii (black willow) should be planted from one-gallon pots and be initially larger than the other willow species. Container plants will be primarily contract-grown from local stock, but several species such as Quercus agrifolia (coast live oak), Alnus rhombifolia (white alder), and some native shrubs may be available "off the shelf."

To increase the size diversity of the upper area woodlands, a variety of sizes of trees (one-gallon, five-gallon, and transplanted mature trees) will be used. Currently, native cottonwoods and sycamores are growing on the on-site golf course. Many of these could be transplanted into the revegetation site or possibly used in place with other species planted around them. This would depend on the final contouring and design.

Willow cuttings should be at least 18 inches long and at least 0.25 inch in diameter. Larger-diameter cuttings increase survival rates. Cuttings should be cut flat across the top end to reduce water loss and diagonally at the bottom to increase water uptake. The cuttings should be inserted at least five inches into the rooting medium. Rooting hormone may or may not be used. Rooted cuttings should be inspected by the project biologist prior to installation. Other specifications as required would be available from the project biologist.

Plant materials should be as listed unless changes are approved by the project biologist. The project biologist should also approve the condition of all the plants prior to installation, especially the rooted cuttings.

Contract supervision for the supply of plant materials for the project will be the responsibility of the project landscape architect. Tree of Life Nursery in San Juan Capistrano is currently the only nursery (known to the authors of this report) with sufficient experience and ability with local native riparian species to assure successful delivery of the proper materials for a project of this magnitude.

### 3. Site Preparation

Grading plans for the project will specify a low degree of soil compaction for the channel slopes to allow proper root growth of planted trees and avoid a requirement for augering planting holes. Pre-planting soils testing should be

conducted by the project landscape architect to assess requirements for planting specifications. High-quality topsoil present on the site will be stockpiled prior to grading and used for landscape and riparian revegetation plantings.

Following initial grading and construction of the channel and just prior to planting and seeding, the site should be treated to reduce the chances of invasion by weeds. The channel slopes should be spray irrigated for a period of two weeks to initiate weed seed germination, then treated with Roundup (a herbicide) to kill the young weeds. If time permits, a second sequence of watering and Roundup application would assure even greater weed suppression. Planting of revegetation species should be done two weeks later, after the Roundup has broken down. This procedure should be done only during non-flooding seasons.

### 4. Rock Erosion Protection

Rock erosion protection will be used at the leading edge of islands, on the downstream side of bridge abutment, and below weir-drop structure where necessary for hydraulics. The rock erosion protection along the sides of the channel will be vegetated using a method based on live staking described by Gray and Leiser in Biotechnical Slope Protection (1982). Rooted cuttings will be planted prior to applying the rock erosion protection. On the higher areas, species of the Mixed Willow Woodland (MW) will be used, and on the lower areas, species of the Arroyo Willow Woodland (AW). Planting before rock is applied assures the roots will be in the soil below the rock. This also avoids the need to remove small areas of rock in which to plant. As rock is applied, plants may be bent or slightly damaged, but the species used (Salix and Baccharis) are resilient and will readily resprout shoots and roots.

Topsoil should be applied over the rock erosion protection if done at a time of year so that plants can become established, especially root systems, before winter rains and floods. Plantings on the rock erosion protection should be irrigated by the method used on adjacent plantings. Seeds can be applied to the topsoil on the rock erosion protection as on other areas.

Plastic erosion-control netting will be used in some locations on the channel slopes where water velocities approach seven feet per second. Vegetation can be planted through the netting; the combination of roots and enmeshed netting buried below the soil surface will enhance both soil and vegetation erosion resistance.

## 5. Timing of Plant and Seed Installation

Hydroseed application and container stock installation on the channel slopes should be installed during the period between October 1 and December 30. Hydroseed application and container planting in the channel bed and on lower slopes affected by flooding during the rainy season should be deferred until April 1 and accomplished prior to May 15 to minimize the probability of flood damage prior to establishment. Temporary spray irrigation may be required on the channel slopes to initiate and maintain growth of the hydroseed application if significant drought conditions occur in the period following application.

## 6. Irrigation Requirements

A temporary irrigation system for the revegetation area will be required. A drip irrigation system is required on the higher areas of the revegetation area in order to prevent the weed problem which would result from year-round spray irrigation. The higher areas with drip irrigation will be Willow-Cottonwood Woodland (WC), Sycamore Woodland (SY), Oak Woodland (OW), and Shrub Openings (SO). Spray irrigation will be required on lower areas of Sandbar Willow Woodland (SW), Arroyo Willow Woodland (AW), and Mixed Willow Woodland (MW). Spray irrigation on the higher areas may be required the first spring and summer if the winter is abnormally dry or if the seeded plants have not become well enough established to survive the summer drought. The buffer zone shrubs not designated to be irrigated would be more likely to survive if they are deep-watered (1 to 1.5 gallons per plant) one time each month during the first spring and summer.

Irrigation is expected to be required for the first one or two dry seasons on lower areas and longer on upper areas. To some extent, permanent landscape irrigation associated with adjacent project landscaping will provide water to the riparian plantings. The temporary irrigation systems will be turned off as soon as the associated plantings are capable of independent growth, in order to assure adequate growth of root systems. Prior to shutting down irrigation systems, testing will be conducted on representative subsections to determine ability to survive without irrigation.

## C. FLOOD-CONTROL DESIGN

The fundamental purpose of the proposed channel is to provide flood control for the surrounding property which will be developed to commercial and residential uses. The proposed facility has been designed to meet the hydraulic requirements and design guidelines specified by the Mission Valley Community Plan in that it will contain the projected peak discharge for a 100-year (probability of 0.01 for any particular year) flood event of 49,000 cfs without raising the water surface elevation more than one foot (Figure 9). The channel design has been configured to maintain the designed hydraulic performance in a low-maintenance system where riparian vegetation is allowed to develop. Modeling studies of channel performance utilizing conservation resistance factors for vegetated islands and banks were used to create a channel design which optimized flood-control performance within the constraints imposed by revegetation requirements (Bowling, Rick Engineering, 4/3/86).

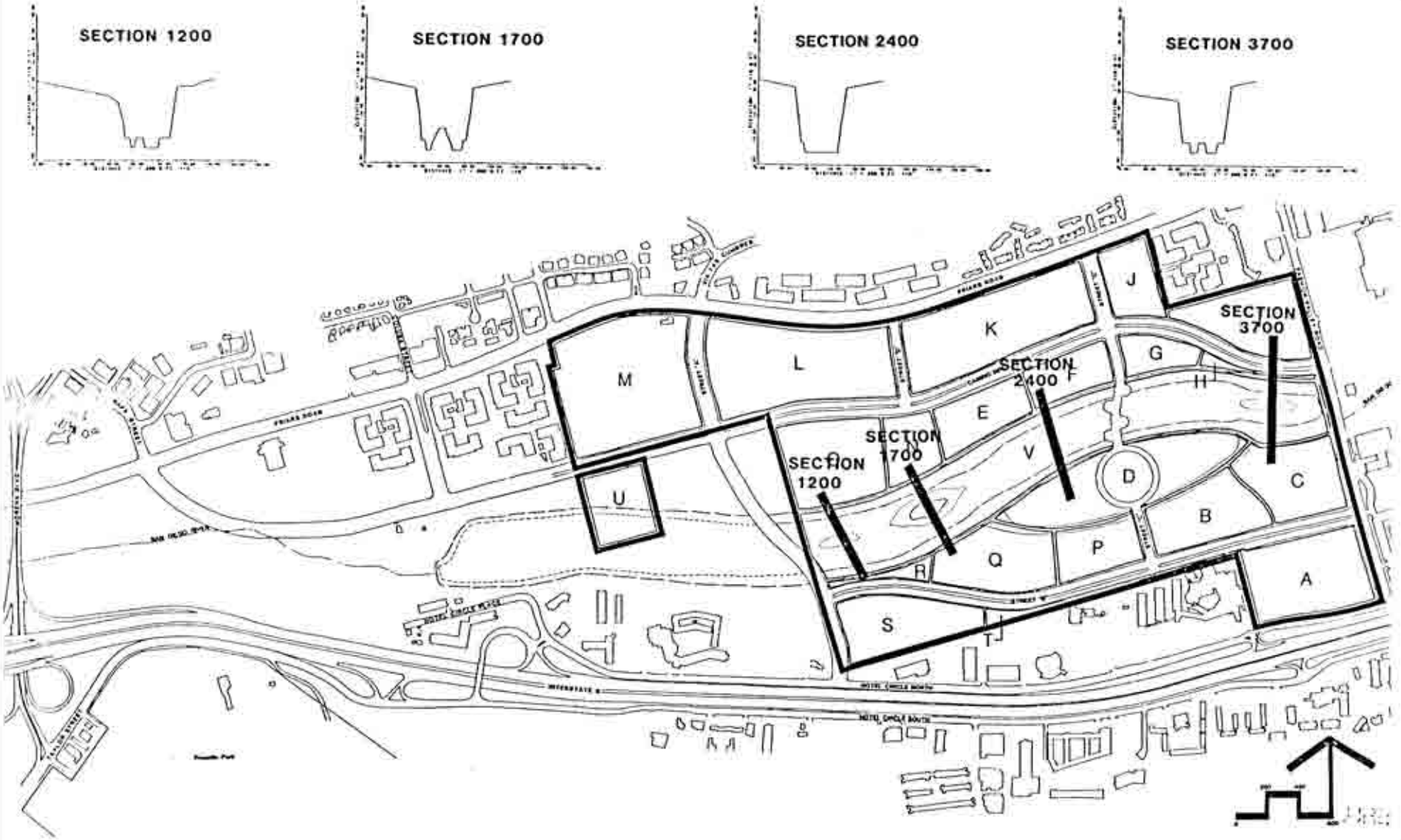


FIGURE 9. CHANNEL DESIGN CROSS SECTIONS

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## III. MANAGEMENT PLAN

### A. PURPOSE

The purpose of this management plan is to ensure that the goals of the Riparian Revegetation Program are met, resulting in the creation and maintenance of riparian habitat, maintenance of adequate flood control, and maintenance of the river as an aesthetic amenity to the community. The success of the program in achieving these goals depends upon adequate monitoring or the progress and status of these aspects of the river channel and correct maintenance responses to remedy any problems which may occur. In addition, monitoring and maintenance activities must integrate these goals in a consistent manner and in accordance with the guidelines agreed upon by the developer, the City of San Diego, COE, DFG, and USFWS.

The success of the revegetation effort will be primarily a function of the survival of initial and replacement plant materials and subsequent maturation of the created habitats through natural processes. It is to be expected that natural factors will remold the initial design to some extent, but the reestablished vegetation will be similar to that which is proposed. The primary measure of success of the revegetation effort will be the survival of individual plants after initial planting, during the first rainy season, and then in competition with adventitious species that will inevitably populate the site. A secondary, but immediate, goal will be the establishment of an adequate cover to minimize the extent of erosion after the new channel has been graded. After initial establishment of the vegetation, successional processes in response to ecological conditions will influence the ultimate composition and structure of habitat in the channel.

Management decisions may have to be made if successional processes lead toward habitat structure or composition in conflict with either flood-control or aesthetic goals of the channel. As a general policy, flood control should have priority where public safety is involved. Biological productivity should be maintained to the extent possible, without jeopardizing public safety. Aesthetic quality of the wetland habitat should also be maintained while not degrading biological productivity and values. Vegetation that is lost during the first three years after establishment will be replaced.

## B. TECHNICAL ASSESSMENT

The degree to which the actual implementation of the project satisfies the stated goals of the Riparian Revegetation Program will be determined by periodic inspection by the project hydraulic engineer, landscape architect, and biologist, as described in Section C below. These inspections will assess the attainment of the performance criteria listed below.

### 1. Hydraulic Performance

Evaluation by the project hydraulic engineer will consist of periodic inspection of the channel to determine whether topographic changes (such as sediment deposits causing a decrease in channel depth) or biotic changes (such as growth of woody vegetation in channel areas planned for soft vegetation) have occurred which require remedial action.

Corrective action will be recommended in accordance with the implementation procedures discussed below if the evaluation indicates existence of conditions which might result in a failure of the flood-control system to perform as designed.

### 2. Aesthetic Performance

Evaluation by the project landscape architect will consist of periodic inspection of the channel plantings to assess whether vegetation development, particularly in the buffer areas and view corridors, is consistent with the visual aesthetic goals of the Riparian Revegetation Program. The proper function of the irrigation system will be assessed, and landscape maintenance procedures will be reviewed during each periodic inspection.

Corrective action will be recommended if the evaluation indicates that maintenance activities within the buffer or channel plantings (such as pruning or weeding) are required in order to maintain view corridors or visual aesthetic standards specified by the Riparian Revegetation Program and the Specific Plan.

### 3. Biological Performance

Evaluation by the project biologist will consist of periodic surveys in the channel area to assess survival and development of the revegetation plantings

and to assess change in quality of wildlife habitat. Vegetation and habitat mapping will be produced during each inspection that documents mortality in tree and shrub plantings, immigration of native riparian plant species, invasion by nonnative weedy plant species, general distribution of wildlife species, and habitat quality. The level of disturbance (if any) originating from adjacent development will be assessed, and a comparison of actual versus planned physical-environmental conditions (e.g., water surface elevation, soil moisture) will be made.

The creation of high-quality wildlife habitat is one of the major goals of the revegetation program. While assessment of the success of vegetative reestablishment is the most easily quantifiable measure of the success of the project, it is only an indirect measure of wildlife use. Breeding bird surveys and wintering bird surveys will be conducted during the first five years after project implementation, in order to estimate habitat utilization as a measure of wildlife habitat quality. For comparison with later data, breeding and wintering bird surveys will also be conducted prior to project implementation and during the construction phase.

Corrective action will be recommended in accordance with the implementation procedures described below if the assessment indicates that one or more of the following conditions exist:

a. Mortality occurs in the tree and shrub plantings of any particular segment of the revegetation area, indicating a need to assess the cause of the mortality. Make corrections and replant where necessary. All trees and shrubs which are lost during the first five years due to disease, overwatering, irrigation failure, or vandalism will be replaced. Vegetation will be replaced during the first three years of the program if lost due to flooding.

b. Invasion by nonnative nuisance species which reduce habitat quality (such as castor bean or giant reed grass) has occurred, indicating a need for weeding and physical removal. Invasive nonnative species will be removed biannually during the five-year maintenance period.

c. Disturbance associated with human activity in the surrounding development is occurring, indicating a need to assess buffer function and formulate recommendations to reduce disturbance.

d. Actual physical-environmental conditions are significantly different from predicted conditions in some portion of the revegetation area, indicating a need for corrective action.

e. Conditions related to development or maintenance activities on areas surrounding the channel are having a detrimental effect on the habitat quality, indicating a need for corrective action.

## C. IMPLEMENTATION

It is anticipated that with financing through an LCSP maintenance district, the City of San Diego will be responsible for implementation of the Riparian Revegetation Program. Actual terms of the implementation arrangement will be defined in a Development Agreement negotiated between the City and the project developer.

Basic components of the Development Agreement will include the following:

1. Ownership of the improved flood-control facility will be maintained by the developer.

2. A flood-control easement to ensure conveyance of floodwaters and an open space easement will be established on the property within the floodway.

3. The developer will be responsible for maintenance of the flood conveyance capacity, the biological quality, and the aesthetic quality of the revegetated channel and buffer areas for a period of five years after the initial establishment of the vegetation.

4. The developer will contract the assistance of a management team consisting of a hydraulic engineer, a biologist, and a landscape architect to direct activities related to monitoring and maintenance of the Riparian Revegetation Program.

5. Monitoring will continue for five years after completion of the revegetation plan implementation.

The scope of work for the management team will include preparation of periodic reports addressing the performance criteria described in the previous section. The biological assessment should be semiannual for the first three years after implementation and annual for the next two years. The final biological assessment should review the results of the implementation program and describe modifications and remedial actions implemented during the monitoring period, to make these data available for use in the design of other such projects. The hydraulic and landscape reports are to be prepared annually over the five-year monitoring period. All three final reports will contain management recommendations to the City of San Diego concerning long-term resource and engineering management of the facility.

These reports, and periodic field visits by representatives of the City of San Diego, DFG, and USFWS, will allow adequate assessment of the project success. Reports will be sent to DFG and USFWS for review and comment. The city may require remedial action within the scope of the Development Agreement between the city and the developer.

Routine maintenance activities on the project site that could affect the biological structure or function of the revegetated wetlands in the flood-control channel must be made so that they balance the three principal goals of the Riparian Revegetation Program. To ensure this, all such activities (other than emergency measures) should be reviewed by a competent ecologist or conservation biologist who is familiar with the restoration program, prior to initiation. The biologist should determine that the proposed actions are either (1) minor in nature (minor in their effects or in the area affected) and require no further review before implementation or (2) of large enough significance to warrant modification to decrease impacts to biological resources. If recommended modifications to the proposed action are not acceptable to the responsible party, the proposed action and recommended modification will be reviewed by the City of San Diego for determination and DFG, COE, and USFWS for comment.

ATTACHMENT 1

RICK ENGINEERING COMPANY | PLANNING CONSULTANTS AND CIVIL ENGINEERS
5620 FRIARS ROAD • SAN DIEGO, CALIF. 92110-2596
TELEPHONE • AREA CODE 619 • 291-0707
S3/FVEX

3 APRIL 1986

TO: PLANNING DEPARTMENT, CITY OF SAN DIEGO

FROM: DENNIS BOWLING, HEAD, WATER RESOURCES DIVISION, RICK ENGINEERING

RE: HEC-2 RUN, WEST OF FASHION VALLEY ROAD

METHODOLOGY

A U. S. Army Corps of Engineers HEC-2 computer output has been prepared as part of the Levi-Cushman Specific Plan. Staff of the Water Resources Division are available to review the detailed computer output with City engineering personnel on request.

This HEC II computer run covers the portion of the San Diego River west of Fashion Valley Road, and includes both the 10-year storm (4,600 c.f.s.) and the 100-year storm (49,000 c.f.s.) events. The output results from combining three different HEC-2 input decks:

For sections 19008 through 21618, the City of San Diego's latest input deck (6/22/83) was used. This area, from approximately Colusa Street to the ocean, is west of proposed improvements within the Levi-Cushman property and covers land owned by Warner Ranch and the City of San Diego.

For sections 30 through 3900, a new input deck was digitized incorporating the channel improvements proposed within the project boundary of the Levi-Cushman Specific Plan dated March 1986. The area covered by sections 30 through 3900 runs from approximately Colusa Street to Fashion Valley Road.

For section 276.7 through 30483, input was from the latest Boyle Engineering run dated 9/05/85 which models a portion of the San Diego River upstream of Fashion Valley Road. This area adjoins the proposed LCSP improvements to the east and is owned by Fashion Valley Associates, which is comprised of Atlas Hotels and the Fashion Valley Shopping Center.

Two 100-year crossings and two weir sections have been included in this run. The 100-year crossings are incorporated at sections 800.1 through 800.4 (Street "A"), and sections 2701 through 2704 (Street "C"). The weirs were placed at sections 30 (Colusa Street) and 800.4 (Street "A"). The weir at Colusa Street has a minimum elevation of 11.0 feet while the weir at Street "A" has a minimum elevation of 13.0 feet and a maximum elevation of 17.5 feet. These two weir sections will provide a minimum water surface elevation upstream of each weir of 11.0 feet and 13.0 feet respectively. This constant water surface elevation provides natural habitat for plants and animals indigenous to the region.

Three islands are also included in the reach of the San Diego River between Street "A" and Fashion Valley Road and were included in the computer analysis. Two of these islands lie between Street "A" and Street "C", and the third is located between Street "C" and Fashion Valley Road.

The attached chart compares channel velocities ("Vel.") and calculated water surface elevations ("CWSEL") for the 100-year storm between the existing City of San Diego HEC-2 computer run and the LCSP proposed channel HEC-2 computer run. Along the bottom of the chart is a comparison of the water surface elevation at Fashion Valley Road for the proposed improvements and those of the Boyle Engineering run.

FINDINGS

1. Hydraulics necessary to establish channel geometry to accommodate Corps of Engineers flow requirements have been developed.

2. Channel design works for phased development of channel.

3. Area west of Street A river crossing is not protected in a 100 year storm, but it's a simple matter to do so. Preliminary assessment shows that protection can be made available at the time the parcels adjoining the channel are developed if pad elevation is raised. For example, a road constructed on the south side of the channel could serve as a dike.

4. A pilot channel is assumed in the area west of the project, at the point where Colusa Street, if extended, would cut across the River. The pilot channel is necessary only because of the construction of Camino de la Reina. If Camino de la Reina is not built west of Colusa, the pilot channel would not be necessary.

## COMPARISON OF EXISTING AND PROPOSED WATER SURFACE ELEVATIONS
## SAN DIEGO RIVER, WEST OF FASHION VALLEY ROAD
## 100-YEAR STORM

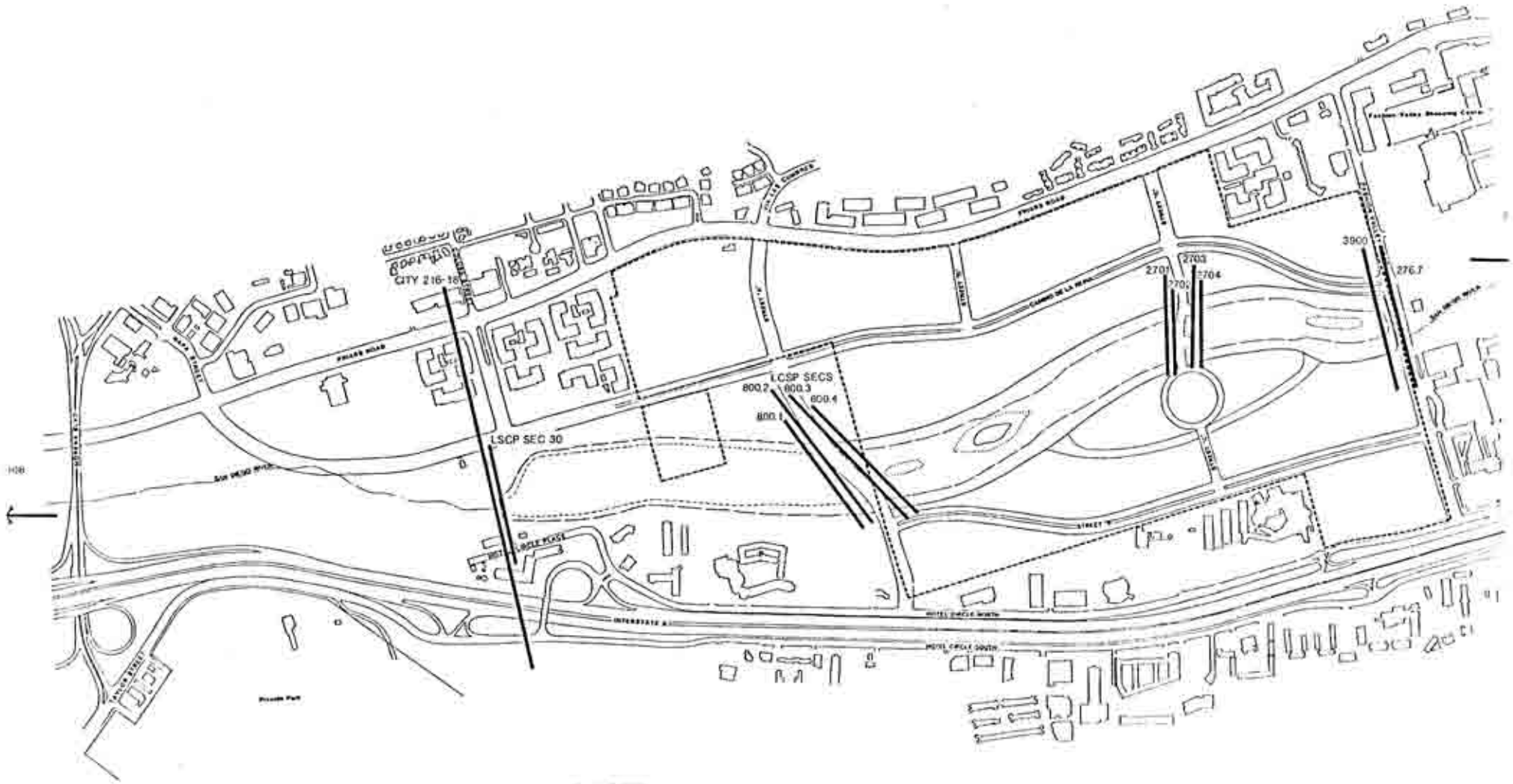
| 1) EXISTING CITY OF SAN DIEGO HEC-2 COMPUTER RUN DATED 6/22/83 | | | PROPOSED CONDITION 3/20/86 | | |
|---|---|---|---|---|---|
| SECTION | VELOCITY | CWSEL | SECTION | VELOCITY | CWSEL |
| (Colusa Street) | | | | | |
| 216+18 | 14.10 | 19.37 | 216+18 | 15.09 | 18.81 |
| WEIR AT SECTION 30 SET AT ELEVATION 11.0 (Colusa Street) | | | 30 | 14.76 | 20.10 |
| | | | 40 | 7.11 | 21.53 |
| | | | 50 | 6.43 | 21.73 |
| 223+03 | 12.61 | 21.57 | -- | ---- | ----- |
| | | | 60 | 6.41 | 21.78 |
| | | | 70 | 6.55 | 21.80 |
| | | | 80 | 6.76 | 21.83 |
| 227+03 | 8.74 | 23.25 | -- | ---- | ----- |
| | | | 90 | 7.13 | 21.83 |
| | | | 100 | 7.11 | 21.91 |
| | | | 200 | 6.93 | 22.01 |
| 230+93 | 8.77 | 23.80 | --- | ---- | ----- |
| | | | 300 | 6.94 | 22.08 |
| | | | 400 | 6.90 | 22.15 |
| 234+03 | 7.07 | 24.62 | 500 | 7.20 | 22.16 |
| | | | 600 | 7.07 | 22.26 |
| | | | 700 | 7.04 | 22.32 |
| 100 YEAR CROSSING SECTIONS 800.1-800.4 (Street "A" Bridge) | | | | | |
| | | | 800.1 | 7.00 | 22.38 |
| | | | 800.2 | 10.71 | 21.87 |
| | | | 800.3 | 10.61 | 22.00 |
| WEIR AT ELEVATION 17.5 WITH NOTCH TO ELEV 13.0 | | | 800.4 | 15.90 | 24.89 |

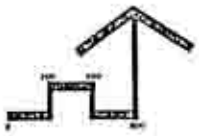
2) FASHION VALLEY ROAD

| EXISTING CITY RUN JUNE 22, 1983 | | | EXISTING BOYLE RUN SEPTEMBER 5, 1985 | | | PROPOSED RUN MARCH 20, 1986 | | |
|---|---|---|---|---|---|---|---|---|
| SEC. | VEL. | CWSEL | SEC. | VEL. | CWSEL | SEC. | VEL. | CWSEL |
| 280+43 | 2.50 | 36.37 | 276.7 | 7.98 | 30.26 | 276.7 | 4.99 | 30.02 |

3) COMPARISON OF THE 10-YEAR STORM AT FASHION VALLEY ROAD

| EXISTING BOYLE RUN | | | PROPOSED RUN | | |
|---|---|---|---|---|---|
| SEC. | VEL. | CWSEL | SEC. | VEL. | CWSEL |
| 276.7 | 3.15 | 23.26 | 276.7 | 9.31 | 19.21 |



✳ NOTE:

SECTIONS 19008 AND 30483 ARE OFF OF THE MAP
19008 IS NEAR OCEAN
30483 IS NEAR HIGHWAY 163

**LEVI – CUSHMAN**
SPECIFIC PLAN

# HEC-2 CROSS SECTIONS

# V. DEFINITIONS

ACCESS - Potential locations for entry roads into a parcel as shown on the Parcel Summary Maps, IG Section III. The actual entry location will be determined at the PCD/PRD stage.

ADT - Average Daily Trips. In the LCSP, ADT are used to a) define the volume of traffic generated by particular land uses, and b) indicate the capacity of a street or street system to handle traffic.

BARRIER (VEGETATIVE BARRIER) - Within the RIVER BUFFER adjacent to the San Diego River, a physical barrier of vegetation must be maintained. See IG Section II F3. The barrier will incorporate native riparian species including thorny shrubs such as wild rose and blackberry to restrict access into the RIVER CHANNEL. The barrier will be no less than 5 feet wide and have an understory height no greater than 4 feet to allow visual access to the river. Trees planted within the barrier shall be located and maintained to permit a break in the plant overstory along at least 20 percent of the barrier. These breaks, intended to provide panoramic view areas, should occur at the terminus of view corridors and no individual break shall be greater than 50 linear feet. See SCREEN BREAK.

BIKEWAYS -

Bicycle Paths - Bicycle paths are two-way facilities separate from roadways. When designed exclusively for bicycles, paths shall have a width of eight feet with a two-foot shoulder on either side. A minimum eight-foot vertical clearance to obstructions shall be provided at the outside edge of the bike path. When a bicycle path is combined with a pedestrian path, it shall be ten feet wide with the two-foot horizontal and eight- foot vertical clearance required only on one side of the path. See Typical Designs Adjacent to the Buffer, LCSP Figure 3.4.

Bicycle Lanes - Bicycle lanes are striped or marked lanes in the roadway designated for preferential one-way use. Bicycle lanes shall be six feet wide.

Bicycle Routes - Bicycle routes are signed bikeways shared with pedestrian or motor vehicles with no specially marked lane. Widths of routes vary based on vehicular traffic and road conditions.

BUFFER/RIVER BUFFER - A minimum 25-foot wide area adjacent to both sides of the San Diego River will act to buffer the river from adjacent development. The buffer will always contain a 5-foot plant BARRIER to prevent direct access into the river and may contain a pedestrian and/or bike path,

landscaping, and passive recreational areas. Paved paths within the buffer may not be any wider than 10 feet.

CANAL - The CANAL is a waterway approximately 40 feet wide located on the south side of the island. The CANAL will be an artificial lake that visually connects but is physically separated from the river channel. Pedestrian bridges will connect Parcels B, C, P, and Q to the island. Pedestrian walkways (the RIVERWALK), retail stores, and restaurants will line either side of the canal.

DEVELOPMENT AREA - 1) One of three major divisions of the LCSP project area and the minimum unit for which discretionary development applications can be submitted. 2) That portion of a site on which structural development may occur. It is measured as the area within the gross parcel boundary less setbacks and rights- of-way.

FLOODWAY - The floodway includes those areas subject to flooding during a 100-year storm.

FLOODWAY TRANSITION AREA - A river overflow area where no permanent structural development is permitted unless mitigation is accomplished in compliance with the San Diego River Wetlands Management Plan. Floodway Transition Areas occur on Parcels C, H, and I.

HEIGHT ENVELOPE - Isometric drawings of height limits/ requirements as provided on each Parcel Summary Maps in IG Section III. The effect of building heights sloping toward the river is to visually maintain the valley character within the project and maximize views of the river from all parcels.

PEDESTRIAN NODES -

Major - Sites of large-scale, major pedestrian-oriented activity; locations where pedestrians gather, group and rest such as plazas, courtyards, etc. (See Figure LCSP 3.5).

Minor - Sites of small scale, minor pedestrian-oriented activity; locations where pedestrians gather, group and rest such as small parks, mini-plazas, etc. (See LCSP Figure 3.5).

PEDESTRIAN PATHS -

Primary - The principal element in the pedestrian network; to be 10 feet wide and located as illustrated in LCSP Figure 3.5. When combined with a bikeway in the BUFFER, the pedestrian/bike path shall be 10 feet wide with a two foot clear shoulder along the side used by cyclists.

Minor - The smallest link in the pedestrian path system which connects the least traveled areas into the pedestrian network. Minor pedestrian paths are to be 6 feet wide.

RIVER BUFFER - See BUFFER

RIVER CHANNEL/CORRIDOR - The river channel or river corridor is the water surface and the sides of the channel, including the slopes and areas of wetland habitat extending to

the top of the river banks. It does not include any portion of the buffer.

RIVERWALK - Public promenade located on both sides of the CANAL.

SCREEN BREAK - A visual break in the BUFFER vegetation adjacent to the river or in the perimeter screen plantings where an absence of overstory material permits expanded views into the river corridor. Occurs on no less than 20 percent of the river frontage at the terminus of view corridors and in no case is an individual break greater than 50 linear feet.

STEP-BACK - An architectural design in which upper floors of a building recede from lower floors, resulting in a step-like profile.

THEME ENTRIES -

Major - Wedge-shaped landscaped entries into the project that announce and enunciate the dominant themes and images of the development with fountains or pools as elements. It includes monumentation and is measured as a 120' radius from the corner where the entry is located.

Secondary - An intermediate size theme entry node that is landscaped and incorporates some water or monument features. Measured as a 90' radius from the corner where the entry is located.

Minor - The smallest of the theme entries into the project; it is landscaped and includes monumentation. Dimensions are measured as a radius of 45' from the corner where the entry is located.

THEME TOWER - Proposed for the center of the island, the theme tower would provide a focal point for the entire project.

TRANSITION ZONE - See FLOODWAY TRANSITION AREA.

TRANSPORTATION CENTER - The transportation center will be located at the intersections of Parcels F, G, J and K. Stops for the LRT, buses, intra-valley transit or shuttles, taxis, etc., are proposed, as are traveler-oriented services such as hotels, restaurants, ticket booths, etc.

VIEW CORRIDOR - Important sight lines which must be preserved to and from the RIVER CHANNEL and the island from pedestrian and vehicular levels (See LCSP Figure 3.7).