APPENDIX E

FSDRIP MANAGER'S ROLE

APPENDIX E

STEWARDING NATURE: ROLE OF FSDRIP MANAGER

1. DEFINE PROJECT AREAS AND KNOW PERMIT REQUIREMENTS

FSDRIP is to be managed by several entities. The day-to-day maintenance work will be done by a contractor hired by the City of San Diego Park and Recreation Department (PRD). The PRD will oversee this work with guidance from this management plan and, if needed, input from a project biologist.

The first job of the FSDRIP maintenance manager is to familiarize themselves with the habitats present. For this purpose a general map has been created (Figures 2, 3 and 4). A careful review of this map should be made to define where buffer areas are intended to exist, since they do not always exist beside the walkways in all areas of the project. In particular, there is no buffer zone along the northern edges of the Phase IIa and IIb areas. It is also expected that as the rest of the properties along the edge of the project are developed, additional buffer areas outside the walkway will be turned over to private landscape maintenance as was done at the River Scene and Bay Colony developments.

The second job of the manager is to understand the goals that have been set for the project by the CORPS permit. It is recommended that any new manager review the permit requirements and all previous reports regarding the project to understand the decisions made in the past. The manager should also be familiar with the behavior, recognition, and vocalization of listed species such as the California least tern, least Bell's vireo and California gnatcatcher, so impacts to those species can be avoided.

2. NON-PERMITTED USES

In order to preserve the project goals for habitat establishment, some uses are not permitted at the project and reasonable steps should be taken to insure that they do not occur. As FSDRIP is first a wildlife habitat and other uses are of a secondary importance, uses that conflict with the wildlife habitat should be guarded against. Non-permitted uses include boating, swimming, fires, and night

use. Fishing, while allowed, is not encouraged. Dogs must be on a leash when within the project.

The PRD plays the primary role by installing and maintaining signs to notify the public about non-permitted uses at all major entry ways to the project. These signs may need to be changed over time to keep them up to date. Management recommendations will be made by the City to further insure disruptive activities cease at the project or institute rehabilitation efforts.

Presently, vehicular access is limited to the streets along the edges of the project. Bollards are installed at each of the street entries to the walkways to enforce this. The maintenance contractor is responsible to make sure that these bollards are always in place and locked to prevent unauthorized vehicles from entering the project. Further, foot access limitations to some areas of the project may become necessary if the City is not able to contain access and protect habitat sufficiently.

Public relations, rather than individual enforcement, will play the primary role in assuring the habitats at FSDRIP are protected. Public education about the project and its intentions will be necessary. An interpretive program which teaches the public the goals of the project, describes the types of prohibited activities, provides the reasons for non-permitted activities, and invites their participation in project protection will be necessary to prevent habitat destruction, especially as residential densities rise along the project edges.

3. HOW FSDRIP NATIVE HABITAT MAINTENANCE DIFFERS FROM ORNAMENTAL MAINTENANCE

Natural habitat maintenance utilizes the same horticultural techniques as those used in maintaining ornamental landscapes; but, the vision of what is being created is different, as well as the species present. The goal in most ornamental landscapes is to create an unchanging landscape which always looks as the designer intended it. With the typical ornamental landscape, aesthetics are usually the single biggest consideration. In contrast the goal in maintaining a natural system is to keep it in balance so it can continue to dynamically change and evolve through time. But, most importantly, the manager of a natural habitat area allows the habitat to naturally progress. Each of the common horticultural practices applied to the ornamental landscape is compared in Table E-1 with their counterpart in the natural landscape. This comparison is made to help educate the FSDRIP manager

in a process which may best be described as habitat stewarding rather than landscape maintenance.

4. FSDRIP MAINTENANCE SYSTEM

The project character is one of a wildlife habitat corridor bordered in most parts by a buffer/transition zone in most areas between the habitat areas and the urban developments along the project edge. Within the habitat zones, nature will largely be allowed to take its course. It will be the job of the maintenance manager to envision how both individual plant species and their associations will develop over time and recommend remedial measures to encourage this succession if necessary. Normal ornamental pruning, pest control, fertilization, irrigation, and weed control will not be allowed in these areas. Instead, only methods that focus on the development of the three vegetation types as wildlife habitat will be allowed. A limited degree of aesthetic and safety maintenance shall be allowed in the buffer zone areas. The general performance standards and restrictions are summarized below.

Invasive Plants

Invasive, exotic species will be removed on at least a monthly basis over the entire project during the non-nesting season (September 15 to March 1). During the remainder of the year, only noxious, invasive weedy species will be removed monthly subsequent to a visual inspection to ensure the work area is free of nests. Work would be done by hand and limited to two persons during the nesting season. The list in Table E-2 includes the species that shall be eradicated completely from the project as well as those that should to be kept under continuing control.

TABLE E-1

ORNAMENTAL MAINTENANCE COMPARED TO NATURAL AREA MAINTENANCE

Ornamental Systems	Natural Systems
Weeds Weed out all plants not planted	Remove only invasive exotic species; favor long-term native species dominants.
Always keep weed-free basins around container plantings in groundcovers.	Maintain weed-free basins around container plantings only during first two to three years after planting.
Herbicides often used to remove weeds.	Herbicides used only where required for invasive exotic species eradication.
Weed whipping often used.	Almost no weed whipping used except along walkway edges and then only after weeds have been eliminated.
Pruning Prune to maintain safest and most beautiful or utilitarian form (shearing common).	No pruning at all in habitat areas (dead wood is left in place); safety and minor aesthetic pruning in buffer zone (natural heading back, little shearing).
Fertilization Fertilizer used regularly to promote green, lush, quick growth.	Fertilizer used to establish plants and push early growth.
	No long-term use.
	Soil root fungi help plants get additional nutrients.
Pests Use pesticides when cost justified to prevent unattractive or fatal damage to plants.	Use pesticides only when essential for plants to establish.
Generally low threshold levels of damage justify chemical use.	High threshold of damage before chemical use is justified.
Ongoing use expected when needed.	No long-term use expected.

TABLE E-1

ORNAMENTAL MAINTENANCE COMPARED TO NATURAL AREA MAINTENANCE (Continued)

Ornamental Systems	Natural Systems
Rodents controlled with traps and poisons.	Rodents controlled if necessary, according to the recommendation of a licensed pest control advisor.
Disease Fungicides used when necessary to prevent infection or spread of disease.	No fungicides necessary.
Dead plants removed and replaced with same species originally planted.	Replace dead plants as necessary. Use substitute species better adapted to site if necessary.
Mature dead plants removed.	Mature dead plants not removed.
Weeds, dead wood, and trimming removed.	Only weed waste removed from site.
Irrigation Water year-round as necessary to keep plant growing and looking lush and green.	Water as necessary to establish planting and to lower fire danger.
	Once established, plants are weaned from irrigation and should be able to survive on no further irrigation, although summer irrigation can keep plants growing and green.
Brown plants in summer are considered dead plants.	Many species of plants turn brown in summer dry areas but are still alive and are dormant or in seed.
Trash Trash removed including all organic debris.	Trash removed, but dead wood and leaf litter left.
Walkways kept clean.	Walkways kept clean.
Riprap Maintenance All plant growth kept out of riprap.	Native plant growth allowed to grow into riprap.

TABLE E-1

ORNAMENTAL MAINTENANCE COMPARED TO NATURAL AREA MAINTENANCE (Continued)

Ornamental Systems	Natural Systems
Appearance Lush and green year-round. Flowers if possible at all seasons. Plants pruned to remove all unsightly growth.	Greenest in winter/spring season. Most flowers in spring and early summer. All plant growth okay.
Plants replaced if they do not look good.	Plants replaced if they die. Substitutions made from species better adapted to site but not for aesthetics.
Plants staked or trained to grow a certain way.	Staking only to stabilize plants against wind or flood damage.
Project Disturbance Due to Vandalism or Flooding Original landscaping restored. Access limited during repair period.	Some ongoing disturbance expected from flooding, people, and animals; only major disturbances to plantings and irrigation are repaired.
Signs used if necessary to limit access.	Foot and bicycle traffic access limited only to walkways; general access to habitat discouraged but fishing access allowed.
	Signs used to keep out people/dogs and educate public as necessary about project goals and restrictions.

TABLE E-2

FSDRIP WEEDS

Complete Weed Eradication

Arundo donax	giant reed
Chrysanthemem coronarium	garland chrysanthemum
Cortaderia selloana	pampas grass
Eichornia crassipes	water hyacinth
Eucalyptus spps.	eucalyptus species
Fraxinus spps.	ash species
Hydrilla verticillata	hydrilla
Nicotiana glauca	wild tobacco
Osteospermum fruiticosum	African daisy
Pennisetum clandestinum	kikuyu grass
Pennisetum ruppelii	pink fountain grass
Pennisetum setaceum	fountain grass
Phoenix canariensis	Canary island date palm
Phragmites communis	common reed
Ricinis communis	castor bean
Salsola iberica	Russian thistle
Schinus molle	California pepper
Schinus terebinthifolia	Brazilian pepper
Tamarix spps.	tamarisk
Washintonia spps.	Mexican and California fan palms

The following species shall constitute no more than 10 percent of visual groundcover in any area of 5000 square feet or greater at any time.

Weed Control

Brassica nigra	wild mustard
Conzyza canadensis	horseweed
Cynodon dactylon	Bermuda grass
Melilotus albus	white bee clover
Melilotus indicus	yellow bee clover
Raphanus sarivus	wild radish
Sonchus asper	sow thistle

Pruning

No pruning should occur in the habitat areas. Pruning in the buffer zone areas will be limited to keeping the walkway clear, removing dangerous tree limbs, and keeping a low shrub and groundcover layer up to five feet from either side of the sidewalk. Perennial shrub species shall generally be allowed to grow to mature size except where they interfere with sidewalk passage. The visual dominance of evergreen shrubs shall be favored over more drought deciduous and annual vegetation. However, pruning in walkway areas not bordered by a buffer zone shall only be for clearance of the walkway itself. All pruning will be done according to the standards approved by the International Society of Arborculture and shall be made to maintain the natural form of each species. No hedge or "poodle" pruning will be allowed. No pruning shall be allowed for the purpose of maintaining view corridors to the river or beyond the project if such pruning requires entry into the riparian woodland habitat.

Staking

Only tree species will be staked, if necessary, to stabilize them during their establishment period. All stakes are to be removed from trees as soon as they can remain upright without support. No stakes will remain on trees beyond the end of their third full year after planting. Stakes and ties, once removed, will be taken off site for disposal. If staking is necessary, two stakes of adequate size to stabilize the tree will be driven a minimum of two feet into the ground on opposite sides of the plant. A tree tie will be used to secure the plant to both posts at the lowest possible point where the tree can hold itself upright.

Pest Control

Few pesticides are expected to be needed at the project as high thresholds of damage will be tolerated. In the event that a major insect or rodent outbreak begins to do unacceptable levels of damage to the habitat or buffer areas, a licensed pest control adviser shall be consulted along with a native plant revegetation specialist and wildlife biologist from USFWS and/or CDFG to decide if chemical or management procedures should be used to bring it under control and ensure sensitive wildlife are not harmed.

Disease Control

No disease control measures will be utilized in the habitat or buffer zone areas. Any dead plants shall be left in place. If replacements are made for diseased plants, substitute species should be considered which are more disease resistant. A native plant revegetation specialist or nursery worker should be consulted in this effort. Any chemical applications must be applied only upon the recommendation of a licensed pest control adviser.

Fertilization

No fertilization shall be done to any plantings unless recommended by a native plant revegetation horticulturist to meet resource agency permit requirements.

Trash

All inorganic trash and debris shall be removed from the project. In the habitat areas, all organic debris except invasive, exotic species shall remain in the project area. Under no circumstances shall invasive, exotic or brush trimmings taken from the buffer zone be dumped in large piles in the habitat areas of the project. No oil, fertilizers, or left over pesticides shall be dumped into the project at any time. Animal droppings will generally only be removed from the walkway areas of the project.

Channel Dredging

The City of San Diego Engineering and Design Department (E&D) will be responsible for devising a program for annual monitoring of sediment levels in the open water areas of the channel. E&D will decide when sediment removal is necessary to maintain flood control channel capacity. If sediment removal is required, entry and egress for such work will be permissible only from the bridge crossings at the project and shall not be allowed to cross over any of the riparian woodland habitat areas. Sediment removal will be scheduled during non-breeding seasons (September 15 - March 1). Any material dredged from the channel will not be dumped in habitat areas but will be taken to an approved deposition area. Areas designated for freshwater marsh in the original

revegetation plan will be preserved during any sediment removal process.

Disturbance/Vandalism

Disturbance to the riparian habitat areas shall be discouraged through both maintenance and signage practices. The PRD will institute a program for project kiosks which will both alert the public to the access and use limitations of the project and actively educate the public regarding the biological values present.

Night-lighting is not present at the project and should not be installed in the future since it would detrimentally affect habitat values.

The only motorized vehicular access permitted will be for maintenance, fire, or rescue purposes. Otherwise, the only traffic that will be allowed is pedestrians or bicyclists on the project walkways. Nature trails will not be installed within the habitat areas of the project. Locked bollard entries shall be maintained at all entryways off streets that cross the project. These entries shall be opened only to let maintenance or emergency vehicles pass and then shall be closed and locked immediately once the project is entered or exited.

Fishing access will be allowed, but not encouraged. Fishing access will be discouraged horizontally along the shoreline. Instead, direct access at specific points will be provided and encouraged.

Flood damage to the channel will be evaluated by the City of San Diego Engineering Department. If damage is considered major and repairs are warranted, then revegetation per the requirements in CORPS permit and original plan intentions will take place once repairs are completed. Because the river is a dynamic system, minor amounts of channel vegetation disturbance are expected and will be tolerated within the management program. Such areas will be allowed to revegetate naturally without additional human help.

Irrigation

The irrigation system at FSDRIP was designed initially to be temporary and used just to establish

the original plantings. It consists of two main components: an overhead broadcast system to cover the entire project area and a drip system to water just the container stock. The concept was to water long enough for the plants to become established and then abandon one or both of these systems. For fire and aesthetic reasons, however, it will be necessary to continue to give some supplemental water to the upper slope plantings on a continuing basis.

In order to achieve these objectives and also meet current City of San Diego goals for water conservation, an irrigation management program has been devised for the project. Each of the irrigation zones is documented in the controller boxes at the project. The maintenance contractor will be required to provide the PRD with monthly documentation of the irrigation times for each zone and system. The California Irrigation Management Information System (CIMIS) will be used to set a general watering schedule for these areas which will then be given minor adjustments in the field by the PRD based on actual weather conditions. The CIMIS system is designed to provide water at the expected rates of plant usage as calculated for location, time of year, and type of vegetation grown. A copy of the CIMIS will be in the possession of the FSDRIP maintenance manager.

The overhead system consists of two types of heads. Pop-up spray heads are in the buffer zone and gear driven rotors cover the remainder of the dike face. The bottom row of rotors were disconnected once the plants were established because the plants in this zone are close to the river and should be able to obtain all of their water needs from it. Irrigation for the middle and upper zones will be left in place and may be used to supplement watering over the dry summer months.

When an irrigation zone is no longer needed and is designated for abandonment, the following steps should be taken: zero-out the station in the controller, disconnect the control wire in the controller, disconnect the solenoid or control wire at the valve, and wind down the valve stem. These steps will effectively prevent the zones from being accidentally or inadvertently reactivated.

If irrigation in a zone is temporarily discontinued but the zone is not designated for abandonment, the following steps should be taken: zero-out the station in the controller and wind down the valve stem.

The system of drip emitters was designed to provide water to all container plantings. In most cases, separate lines were installed for trees and shrubs. It is desirable for certain species to continue to be irrigated in order to ensure survival, in addition to good looks and/or speed of growth.

For plants that are to be removed from the drip system, if it continues to be used, the tubing should be disconnected from the emitter and a plug placed into the emitter. The tubing should be left in place, as it is below ground. If the entire drip system is to be abandoned, the same procedure outlined above for the overhead system should be followed; however there will be no aboveground parts to remove with the drip system.

Irrigation Scheduling

Factors to consider when determining an irrigation schedule and how much water to apply include: plant type, weather, time of year, soil type, and aspect.

Plant Type

Individual species needs must be known and met for the plants to fulfill their intended function. Some species require constant moisture, such as the freshwater marsh species. Others tolerate little or no summer water, such as *Fremontedendron mexicanum* and *Rhus integrifolia*. Others have a rather wide range of tolerance, such as *Heteromeles arbutifolia*. As the irrigation system applies the same amount of water to each plant, it is important to gauge a good average and meet the needs of the weakest link in the plant palette. This must be done by observation.

Weather

Weather, in conjunction with the time of year, plays a big part in the water need of plants. The maintenance manager needs to make adjustments for rain by turning the system off, preferably in advance of a storm. For unseasonable weather, by slightly increasing or decreasing the irrigation, it is possible to help the plantings avoid undue stress and save water. The manager can consult and use the CIMIS system, described later in this section, to make weather related adjustments.

Time of Year/Day

The changing of the seasons and the associated weather play the biggest part in plant water needs. The single most important factor in changing plant water needs is day length, which changes throughout the year but is uniform from year to year. Longer days mean greater transpiration and higher water use. Shorter days also coincide with dormancy in many species and reduced water need. Irrigation will be early in the morning or late at night to avoid loss of water to evaporation and to remain within the water conservation guidelines.

Soil Type

Soil plays a factor in irrigation needs because the soil is a reservoir for air and water. The coarse, sandy soils found at FSDRIP tend to dry out and do not retain moisture. This tends to necessitate more frequent irrigation than a soil with a greater water holding capacity.

Aspect

Aspect plays a role in plant water needs. At FSDRIP, the dike faces are oriented to the north and south. The north shore, which have a southern exposure, will have a higher evaporative loss than the south shore, which faces north. This is because the north dike face receives more direct rays from the sun, which increases both transpiration and evaporation. The maintenance manager must keep this in mind when setting schedules and adjust times accordingly.

CIMIS

CIMIS is a valuable irrigation tool for the maintenance manager. It is a weather station driven system that provides the manager with actual reference evapotranspiration (ET_o) figures for selected areas statewide. By plugging in the specific site variables, the manager can program irrigation efficiently and without guessing. Used properly, it can significantly reduce waste.

For a project like FSDRIP, CIMIS data can assist in formulating irrigation scheduling and can be used as a check of actual consumption.

The reference evapotranspiration (ET_o) number is expressed in inches and can be given for any time frame desired (i.e., day, week, month). This number is then multiplied by a crop coefficient (K_c) and the resulting total is the actual evapotranspiration (ET_o), or the amount of water that must be supplied to the crop, expressed in inches.

The nearest weather station to FSDRIP is in San Diego. The historical ET_o for this station is as follows:

J	F	M	A	M	J	J	A	S	O	N	D
2.2	2.5	1.3	1.4	4.4	4.0	4.6	4.6	1.9	1.3	2.2	1.9

For FSDRIP, it is expected that the crop coefficient should be set between 0.25 and 0.5. Thus for June, with an ET_o at 4.0 and using a K_c of 0.5, 2.0 inches of water would need to be applied to the project (4.0 x 0.5 = 2.0). The manager would then decide how to apply this 2.0 inches during the month, such as two applications of one inch or four applications of one-half inch, etc. It is recommended that irrigation not be applied too frequently, as it will result in applying water to only the uppermost layer of soil. This is not only inefficient, but can result in plant rooting only along the surface. Irrigations to the mature FSDRIP landscape should not occur more often than weekly.

To determine the actual run time for each station, the desired amount of water, expressed in inches, is divided by the precipitation rate for each type of sprinkler head, which is also expressed in inches.

As an example, assuming proper spacing, Hunter rotors have a precipitation rate of 0.4 inches per hour. To apply 0.5 inches, the sprinklers would need to run one hour, 15 minutes (0.5 t 0.4 = 1.25). In order to reduce possible runoff, it is suggested to apply two cycles of 38 minutes each.

This method is easily repeated for each type of head, though it is more complicated to calculate for drip systems because square footages are more difficult to gauge which makes precipitation rates difficult to determine. Moreover, if the drip system is to be utilized over the long term, it is likely to require significant revisions to the system. This is because emitters must be moved away from the base of the plant and emitters added to accommodate the increased size of the plant material, especially the tree species.

Historically, July and August have the highest ET_o in San Diego, with an average of 4.6 inches per month. Based on this ET_o, a model irrigation program for July and August shall be laid out. Using a crop coefficient (K_c) of 0.5, 2.3 inches of water is needed for each month (4.6 x 0.5 = 2.3). With 2.3 inches required for the month, about 0.6 inches would be needed each week (2.3 ÷ 4 = 0.6). So, for Hunter rotor heads, which have a precipitation rate of 0.4 inches per hour, it will be necessary to water 90 minutes per week. This, of course, assumes a properly designed system with uniform coverage and also assumes that the system has been installed correctly and is well maintained.

With the amount of time needed per week, it is recommended that it be applied with two to three cycles in order to reduce runoff potential. The manager will need to determine how much water can be applied in one cycle without any runoff. It is recommended that all of the water for each week be applied on the same day, or at a maximum over two days in the week. This will result in deeper watering of the soil profile and will be of more benefit to the plants than frequent shallow irrigation.

The manager will need to make adjustments in this schedule. It may be appropriate for the north side, which faces south, but the south side, with its northern exposure, could possibly need as little as half that amount. Soil texture may vary from area to area and adjustments should be made to reflect those differences. This can only be done in the field by observation. The manager should probe the soil to gauge its moisture content and visually assess the plant material for signs of unacceptable water stress. By utilizing this type of system, educated decisions can be made with regard to irrigation scheduling.

Riprap Maintenance

Native species which do not interfere with either the safety or structural integrity of the riprap will be allowed to remain. In general, this will mean that over time, as the gaps between the riprap fill with sediment, riparian tree and shrub species will be allowed to remain.

5. CONCLUSION

From the standpoint of traditional landscaping, the project is expected to be more dynamic than an ornamental one and will change and evolve through time. Likewise, the urban surroundings are also expected to be dynamic along the edges of the project. In one aspect, the project has been set up as static, and that is in its designation as permanent wildlife habitat not to be disturbed by future human developments nearby or within the site. It will be the challenge of the FSDRIP manager in the future to sufficiently educate the public and owners about this aspect of the project habitat values and to protect it in the face of demands which will almost certainly be made to use the project for other purposes. But, if successful, the managers will leave a legacy not only for the wildlife of the project but also for all those living in this densely urban area to enjoy now and in the future.