Guidelines for Habitat Creation and Restoration

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GUIDELINES FOR HABITAT CREATION AND RESTORATION IN CARLSBAD

Based on restoration guidelines from MHCP Vol II Appendix C, MHCP Vol. III, HMP pp. F-8 to F-11, and OSMP Sec. 3.1.5; input from the wildlife agencies; and expertise from Restoration Ecologist Christina Schaefer (TAIC)

These Guidelines are intended for two purposes: (1) to assist applicants in designing the restoration part of their mitigation program, and (2) to assist City staff in evaluating and approving restoration plans. These Guidelines are not intended to replace or supersede any permit requirements from other agencies, such as the U.S. Fish and Wildlife Service (USWFS), U.S. Army Corps of Engineers (USACOE), or California Department of Fish and Game (CDFG). The document is intended to apprise project applicants and consulting biologists of the typical components included in creation projects for planning purposes only.

According to the Society for Ecological Restoration (SER), ecological restoration "is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed." Restoration as used in these Guidelines is an umbrella term for Ecological Restoration that covers three different activities: *habitat creation, habitat restoration, and habitat enhancement*.

These terms are defined as follows:

- ✓ Creation - the process of creating habitat functions where they did not previously or historically exist. Creation often requires grading and removal of natural or artificial fill material to access a natural or existing topography, soil type, or hydrological gradient.
- ✓ Restoration – the process of returning degraded habitat functions to their pre-existing condition, including converting a site without habitat functions into a self-sustaining habitat.
- ✓ Enhancement – the process of altering a site to increase one or more functions, including the removal of invasive plant species.

There are separate Guidelines for creation, restoration, and enhancement. Both applicants and staff should be very clear about whether a proposed restoration project is intended to be creation, restoration, or enhancement per permit or mitigation requirements covering the project.

Habitat creation or substantial restoration is required by the Habitat Management Plan (HMP) as part of the total mitigation package for all projects in the Coastal Zone that would impact native vegetation. Please refer to HMP Section D 7-7 through 7-9 for an explanation of Coastal Zone mitigation requirements. Although habitat restoration (particularly habitat creation) is more commonly a requirement inside the Coastal Zone, these Guidelines should still be followed for any projects outside the Coastal Zone that include some form of restoration in their mitigation plan.

Basic Principles

The Guidelines presented herein are general and not site-specific, and are intended to be applied flexibly based on site-specific factors. The following principles are the basis for the Guidelines:

- The desired outcome for all restoration projects is to create and enhance biologically functional habitats that support HMP-covered species as well as other species that are important to overall biodiversity.
- Each restoration project should have clearly stated objectives and success criteria. Success criteria should be attainable and stated quantitatively in biological terms.
- Primary success measures should focus on percent cover, survival rate, and percentages for various species. Secondary success measures should deal with presence and abundance of HMP animal species, plant diversity, and distribution of priority plant species. Once the presence of HMP wildlife and plant species has been established, management recommendations should be tailored to avoid or protect these sensitive species and habitats. Management activities should continue, but specific management and avoidance measures may need to be developed and the management/restoration plans revised as necessary.

Final restoration plans should include final specifications and topographic-based grading, planting, and irrigation plans using 10-ft contours. Plans should also include a final implementation schedule that indicates when all habitat impacts, grading, planting and irrigation shall begin and end. Plant palettes should consist of locally native plant species specifically associated with the habitat type(s) to be planted, plant size, and number of plants per acre. A description of seed mix(es) should include plant species and pounds/acre. In addition, to ensure restoration success, a five-year restoration management and monitoring plan should be developed with the following components:

a) The management section should include a threat assessment, invasive species eradication program, steps to remediate any problems that are encountered, and contingency measures in case of restoration failure.

b) The monitoring section should consist of a qualitative and quantitative vegetation monitoring plan, which should include a map of proposed sampling locations. Photo points should be used for qualitative monitoring, and stratified-random sampling should be used for quantitative monitoring.

c) Success criteria should be incorporated into the plan, and developed on a case-by-case basis. The following success criteria are for illustration purposes only and may differ from actual success criteria for an individual project. The information is provided as an

example of the type of criteria and quantification usually associated with creation/restoration projects.

General – The restoration/creation site should*:*

- Be self-sustaining. Self-sustaining is defined as the site requiring no supplemental irrigation for two consecutive years and the site resists invasion by non-native species - no significant weeding being necessary for two consecutive years;
- Exhibit evidence of natural recruitment of native species, where applicable.

Annual **–** The following annual success criteria for each year should be met.

Year 1 Site is covered by no more than 40 to 69 percent exotic vegetation. 50% survival of containerized and live stake individuals.

Year 2 Site is covered by no more than 10 to 39 percent exotic vegetation. 60% survival of containerized and live stake individuals.

Year 3 Site is covered by no more than 5 to 9 percent exotic vegetation. 70% survival of containerized and live stake individuals.

Year 4 Site is covered by no more than 5 to 9 percent exotic vegetation. 80% survival of containerized and live stake individuals.

Year 5 Site is covered by less than 5 percent exotic vegetation. 80% survival of containerized and live stake individuals.

In order to assure credit towards project mitigation requirements, restoration activities should not begin until the restoration plan is approved by the City and Wildlife Agencies. The restoration team should be led by an experienced restoration ecologist with documented experience of successful native habitat restoration in San Diego County. The installation should be performed by an experienced restoration contractor specializing in native habitat restoration. Grading, planting, and irrigation should be completed during the concurrent or next planting season (i.e., late fall to early spring) after the initial grading is complete. The restoration contractor should insure the installation through a performance bond.

Habitat Creation

Any projects involving habitat creation should submit to the City of Carlsbad Planning Department and the appropriate regulatory agency (e.g., CDFG, USFWS, ACOE, CCC, etc.), if required, a Restoration Plan addressing the following tasks:

1. **Setting Objectives** – The restoration ecologist should begin by assembling all necessary information about the proposed restoration project, including the vegetation community to be created, particular species to be addressed, permit conditions, etc. Based on this information, the restoration ecologist should draft proposed objectives for the project. These objectives should set forth the success criteria for the project. Both quantitative and qualitative objectives should be provided. The objectives should be reviewed by the Project Planner to ensure that they relate to the permit requirements. For example, if the mitigation measures for the project require mitigation for southern maritime chaparral supporting Del Mar manzanita, the objectives should state the proportions of Del Mar manzanita and other southern maritime chaparral plants that will be produced and how that will be measured.

2. **Candidate Creation Sites** – The restoration ecologist should identify suitable creation sites. Depending on the type of restoration or creation, suitable sites are those that contain suitable soils, slope, aspect, microclimate factors, adjacency to areas of intact habitat, absence of potential edge effects, jurisdictional wetlands areas, water availability and access for restoration workers. If any proposed sites are not owned or controlled by the applicant, property owner approval must be obtained[1]. Restoration/creation in areas already conserved by previous actions may be approved if the restoration/creation does not impact sensitive or MHCP-covered species or habitats. When creation is carried out on disturbed or agricultural land, it is not necessary to pay the in-lieu mitigation fee for that area.

3. **Site Selection** – In consultation with the Project Planner and based on field confirmation, the restoration ecologist should select the proposed creation site(s) from among the candidate sites. In some cases, the wildlife agencies and/or Coastal Commission may need to give approval to mitigation sites. Once the sites have been selected, they should be mapped using GPS and GIS technologies and entered into the HMP database.

4. **Reference Sites** – In order to be able to measure the success of restoration, it is necessary to select several reference sites that closely match the selected restoration site in terms of soil, slope, aspect, and desired vegetation community. The restoration ecologist should thoroughly survey the reference site(s) and document species present to establish a baseline to which to compare restoration success. The restoration site should attempt to replicate what is found on the reference site. Ideally the reference site would be near the restoration site so that soil and microclimate factors are as similar as possible.

5. **Site Preparation** – The selected site should first be tested for pH, nutrient content, and other important soil characteristics (agricultural soil suitability test). Based on the testing, the restoration ecologist should indicate whether any soil amendments are necessary (most native soils do not need amendments; artificial supplemental amendment encourage weed growth).

[1] To facilitiate implementation of the plan, it is advisable to include discussion of the restoration/creation objectives and suitable candidate sites in the CEQA document (mitigation section) for the project, if possible.

Next, any nonnative plants should be removed from the site prior to planting. If any native annuals are found, care should be taken to minimize impacting them during weed eradication efforts. Weed eradication methods may include spraying with an approved herbicide or using solarization (covering with black plastic for about three weeks). Repeat treatments may be needed to achieve a weed-free condition. Restoration sites may need to be prepared for planting by decompacting the top soil in a way that mimics natural habitat top soil as much as feasible while maintaining slope stability. If major grading is required for the restoration project, weed eradication should occur, if necessary, prior to planting. When weed eradication is complete, the irrigation system can be installed, if one is proposed. Rocks in the soil are generally beneficial and should be left in place.

6. The final step of soil preparation should be native mycorrhizal fungi inoculation. There are several acceptable ways this can be done, and the restoration ecologist should specify the method to be used. If the restoration site is a manufactured slope (either cut or fill), special treatment will be needed to promote plant growth. At a minimum, the top one foot of soil should be contoured (tilled or imprinted), additional soil amendments should be considered, and special erosion control measures may be needed.

7. **Fencing and Signage** – If the site has a history of disturbance from people, fencing and signage may be required as part of the plan. In a preserve, fencing should be installed in such a way to avoid harm to wildlife and promote wildlife movement (smooth-strand wire is recommended; chain-link should be avoided, if feasible). If off-road vehicles have been a problem, access points may need to be blocked with stronger materials such as gates or boulders.

8. **Planting Plan** – Habitat creation will typically involve a combination of manual or hydro-seeding and cuttings or container plants installation. The proportions of each will depend on the desired species composition, structural and age diversity, and the prospects of successful establishment of plants from seed. For native grassland creation, seeding alone may be sufficient. For coastal sage scrub, chaparral, and oak woodland creation some container plants may be necessary. Willows and certain other shrubs can typically be started from cuttings. The restoration ecologist should recommend the most effective methods for each species. The planting palette should include native species associated with the vegetation community that would typically grow onsite, and planting should be implemented in a way that mimics natural plant distribution rather than in rows. Samples of vegetation from a functioning vegetation community in the vicinity of the restoration site that is similar to the restoration site should be collected and the plant palette developed accordingly. Plant species not typically found in the area should not be included in the plant palette. The planting plan should also include a menu of remediation steps if portions of the site show poor growth.

9. **Acquisition of Seeds and Plants** – The restoration ecologist can either collect seeds or purchase seeds from a reliable vendor. In either case, the seeds should be collected from the

coastal southern California region, ideally as close to the restoration site as possible. This requires advance planning by the restoration ecologist. Seeds and bulbs (and soil) may be collected from the impact site prior to grading or from neighboring sites with permission of the property owner. Seed should be inspected by the restoration ecologist to ensure that it is weed free, clean, dry, and free of contaminants. Container plants should also be grown from seeds or cuttings taken from within the region. For certain rare species it may be necessary to contract with a native plant nursery in advance (six months or more) to grow container specimens. Again, this may require considerable advance planning. The restoration ecologist should inspect all container plants for Argentine ants, weeds, signs of disease, or other problems prior to delivery to the site. Plants with indications of any problems should be rejected by the restoration ecologist and replaced by the grower (no substitutes should be accepted). The final species list, application rates and container sizes for a particular site should be recommended by the restoration ecologist.

10. **Initial Planting/Hydroseeding** – Planting should occur in the early winter months (e.g., December) to take advantage of winter rains; seeding should occur no later than February to take advantage of winter rains but at the same time avoid that seed is washed out by heavy rains. Site preparation and planning should be carefully timed accordingly. The restoration ecologist should supervise the planting/hydroseeding process. The seed mix and container plants should be as specified in the restoration plan. Substitutions are not allowed unless recommended by the restoration ecologist and approved by the City. If irrigation is used, care should be taken during hydroseeding and planting to prevent damage to irrigation lines and heads. Irrigation should only be administered for establishment of the planting and should be adjusted based on the amount of winter rains. Upland restoration projects should not be irrigated in the summer to avoid over-irrigating the drought tolerant vegetation communities. The site should be checked for erosion after significant rain events, and any erosion should be immediately repaired. Boulders, cobblestone, logs, or coconut fiber wattles may be used where needed to prevent erosion.

11. **As-Built Conditions** -Within six weeks of project installation, the restoration ecologist should certify in writing that mitigation installation has been completed. The restoration ecologist should submit an as-built (post-restoration) report with as-built plans to the City and Wildlife Agencies describing as-built conditions of the mitigation area. The planner should also visit the site with the restoration ecologist at this time to confirm the as-built condition.

12. **Establishment Monitoring** – The restoration site should be monitored during the first 120 days after installation to ensure that the planting is successfully established and no significant damage occurs to the restoration project. Any failures should be immediately repaired and plantings replaced to meet establishment success criteria. When the restoration project is successfully established and accepted by the agencies (if applicable), the restoration contractor can be relieved of the performance bond.

13. **First Year Maintenance and Monitoring** – Weeding and other routine maintenance should be done weekly for the first six months. Weeding should be done carefully and by hand to avoid harming the seedlings of desired plants. Weed whips should never be used. The restoration ecologist should determine if, at any time, chemical control is necessary. During weeding, hydroseeded areas should be checked for germination and container plants should be checked for general health. Any problems should be immediately reported to the restoration ecologist. If installation has been done during the fall or winter, weed growth will diminish during the summer and weeding can be curtailed. However, monitoring should continue throughout the summer to determine if supplemental irrigation is needed, to replace container plants that have died, to check for signs of trespassing or other sources of damage, to remove trash, monitor herbivory, and to be able to report to the planner on the status of the site. Several vantage points should be selected and photographs should be taken monthly from the exact same spot to document growth and problem areas. An annual report should be submitted to the planner at the end of the first year.

14. **Long-Term Maintenance and Monitoring** (second and subsequent years) – During the next winter and spring, weeding should be resumed at a frequency recommended by the restoration ecologist to maintain control over the weed population. Monitoring by the restoration ecologist should occur quarterly, with photo documentation. At this time, areas of non-growth may become apparent. The restoration ecologist should report this information to the planner, along with recommendations for remediation. By summer of the second year, the restoration ecologist should recommend whether irrigation should be permanently discontinued. If desired plants are generally thriving and free of weeds, maintenance should shift to focus on meeting specific success criteria. Annual reports should be submitted for five years or until the site has achieved success criteria.

15. **Final Sign-Off** – When the site has met all success criteria, the planner and restoration ecologist should schedule a final walk-through with the Wildlife Agencies. The restoration ecologist should be prepared to demonstrate how all quantitative and qualitative objectives have been met. If restoration is part of a Section 404 wetlands permit, the new jurisdictional boundaries should be delineated and documented as part of the success criteria. When final sign-off of the site is given, the site can be turned over to the long term manager.

Habitat Restoration

1. **Objectives** – The process for habitat restoration is very similar to habitat creation, except that some amount of native vegetation will already be present on the site. Objectives for enhancement will typically not be to establish a certain vegetation type but rather to remove sources of disturbance, eliminate non-native species, increase the population of native species, and generally improve the quality of the habitat. The roles of the restoration ecologist and the planner are the same as for habitat creation.

2. **Site Selection** – Qualifying areas for restoration are those with 50% or greater disturbance to native vegetation within a given area. The disturbance can be a combination of non-native vegetation, ground disturbance from vehicles or foot traffic, trash, debris, dead vegetation, repeated fires, illegal construction, or other objective measure of disturbance. Disturbance should be measured by geographic extent (e.g., percent cover within a given area). If habitat restoration is proposed, it will most often be the case that one or more sites have already been identified. The sites should be staked and mapped for entry into the HMP database, and the acreage of credit to be given should be calculated. It may be necessary in some cases to confer with the Wildlife Agencies regarding the acreage of credit to be given.

3. **Reference Sites** – These should be used as with habitat creation.

4. **Site Preparation** – Much greater care is needed in working around existing vegetation. Weed eradication will need to be done primarily by hand. Tilling of the soil should be limited to a few inches in depth in order to not damage the roots of existing plants. Trenching should not be done. One of the keys to success is to minimize ground disturbance. If irrigation is to be provided, lines should be placed at grade, with plans for removal as soon as possible. Existing shrubs or trees may need minor pruning, but native plants should not be removed unless justification is provided by the restoration ecologist. It can be assumed that mycorrhizal fungi are already present in the soil.

5. **Planting Plan and Acquisition of Seeds/Plants** – Same as for habitat creation

6. **Installation** – Hydroseeding creates the least ground disturbance. If container plants are used, they should be limited to one gallon size. Seasonal considerations are the same as for habitat creation.

7. **Maintenance, Monitoring and Sign-Off** – Same as for habitat creation

Habitat Enhancement

Enhancement may not qualify as mitigation alone, but some enhancement may be required as part of an overall mitigation program. Enhancement typically consists of removal of non-natives done under the direction of a restoration ecologist. Native planting in the enhancement areas is recommended. If planting is not planned, the site should be monitored regularly to measure the rate of native plant recruitment, and supplement with native plants if recruitment is lacking or occurring at a slow rate. Monitoring also consists of rechecking the site to verify that the non-natives have not returned and continuously eradicate any weedy species. The restoration ecologist should submit a letter to the planner upon verification that the non-natives have been eradicated.