

Vernal Pool Conservation Measures:

- CM 1. Prior to or concurrently CBP should offset impacts to ____ acre of vernal pool habitat by restoring ____ acre of vernal pool habitat at a site to be determined through coordination with CBP and the Service.
- CM 2. CBP should temporarily fence (with silt barriers) the limits of project impacts (including construction staging areas and access routes) to prevent additional vernal pool impacts and prevent the spread of silt from the construction zone into adjacent vernal pools to be avoided. Fencing should be installed in a manner that does not impact habitats to be avoided. CBP should provide the final plans for project construction. These final plans should include photographs that show the fenced limits of impact and all areas of vernal pools to be impacted or avoided. If work occurs beyond the fenced or demarcated limits of impact, all work should cease until the problem has been remedied to the satisfaction of CBP, and the U.S. Fish and Wildlife Service (Agencies). Temporary construction fencing should be removed upon project completion.
- CM 3. The changing of oil, refueling, and other actions that could result in a release of a hazardous substance should be restricted to designated areas that are a minimum of 100 feet from the vernal pool preserve. Such designated areas should be surrounded with berms, sandbags, or other barriers to further prevent the accidental spill of fuel, oil, or chemicals. Any accidental spills should be immediately contained, cleaned up, and properly disposed of.
- CM 4. Impacts from fugitive dust should be avoided and minimized through watering and other appropriate measures.
- CM 5. CBP should staff a qualified biologist with a minimum 3 years of vernal pool experience (project biologist) during project construction and who will be responsible for overseeing compliance with protective measures. The project biologist must be knowledgeable of vernal pool biology and ecology. CBP should submit the project biologist's name, address, telephone number, and work schedule on the project to the Service at least 30 days prior to initiating project impacts. The project biologist will perform the following duties:
- a. Allow salvage of live plants and collection of inoculum for transplant to pools, watersheds and surrounding uplands to be restored/enhanced as practicable and approved by the Service;
 - b. Be on site during work and/or grading adjacent to vernal pool preserve to ensure compliance with all conservation measures;
 - c. Oversee installation of and inspect the fencing and erosion control measures within or up-slope of vernal pool preserve a minimum of once per week and daily during all rain events to ensure that any breaks in the fence or erosion control measures are repaired immediately;

- d. Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust;
- e. Train all contractors and construction personnel on the biological resources associated with this project and ensure that training is implemented by construction personnel. At a minimum, training will include: 1) the purpose for resource protection; 2) a description of the San Diego fairy shrimp and its habitat; 3) the conservation measures given in the biological opinion that should be implemented during project construction to avoid and/or minimize impacts to the San Diego fairy shrimp; including strictly limiting activities, vehicles, equipment, and construction materials to the fenced project footprint to avoid sensitive resource areas in the field (i.e., avoided areas delineated on maps or on the project site by fencing); 4) environmentally responsible construction practices as outlined in measure 8; 5) the protocol to resolve conflicts that may arise at any time during the construction process; 6) the general provisions of the Act, the need to adhere to the provisions of the Act, and the penalties associated with non-compliance with the Act;
- f. Halt work, if necessary, for any project activities that are not in compliance with the conservation measures. The biologist will report any non-compliance issues to the Agencies within 24 hours of its occurrence and confer with the Agencies to ensure the proper implementation of species and habitat protection measures;
- g. Submit quarterly compliance reports (including photographs of impact areas) to the Agencies to show that authorized impacts were not exceeded and general compliance with all conservation measures and terms and conditions. A separate memo/report should be prepared and submitted to the Agencies immediately if/when an impact occurs outside of the approved project limits;
- h. Submit a final report to the Agencies within 60 days of project completion that includes: as-built construction drawings with an overlay of pools that were impacted or preserved, photographs of the vernal preserve, and other relevant information documenting that authorized impacts were not exceeded and that general compliance with the project as described in this biological opinion, including the conservation measures, was achieved.

CM 6. CBP should ensure that the following conditions are implemented during project construction:

- a. Employees will strictly limit their activities, vehicles, equipment, and construction materials to the fenced project footprint;

- b. The project site will be kept as clean of debris as possible. All food related trash items will be enclosed in sealed containers and regularly removed from the site;
- c. Pets of project personnel will not be allowed on the project site;
- d. Disposal or temporary placement of excess fill, brush or other debris will not be allowed in waters of the United States or their banks;

CM 7. Grading activities immediately adjacent to vernal pools should be timed to avoid wet weather to minimize potential impacts (e.g., siltation) to the vernal pools unless the area to be graded is at an elevation below the pools. To achieve this goal, grading adjacent to avoided pools should comply with the following:

- a. Grading will occur only when the soil is dry to the touch both at the surface and one inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates the soil is dry.
- b. After a rain of greater than 0.2 inch, grading will occur only after the soil surface has dried sufficiently as described above, and no sooner than two days (48 hours) after the rain event ends.
- c. To prevent erosion and siltation from storm water runoff due to unexpected rains, Best Management Practices (i.e., silt fences) will be implemented as needed during grading.
- d. If rain occurs during grading, work will stop and resume only after soils are dry, as described above.
- e. Grading will be done in a manner to prevent run-off from entering preserved vernal pools.

CM-8. CBP should develop a vernal restoration/enhancement plan prior to or concurrently with the onset of project impacts. The final plan should include the following information and conditions:

- a) Implementation of the restoration/enhancement will be conducted under the direction of a qualified biologist (vernal pool restoration specialist) with at least three years of vernal pool restoration experience, to be approved by the Agencies;

- b) To avoid impacts to any extant vernal pools, all conservation measures required at the project construction site to avoid and minimize impacts to adjacent vernal pools and their watersheds should also be implemented at the restoration/enhancement site and thus specified in the restoration/enhancement plan.
- c) All vernal pools to be avoided and their watersheds will be enhanced as appropriate to achieve the same success criteria as the restored pools and surrounding uplands. Enhancement activities will include addition of vernal pool plant species and addition of coastal sage scrub/native grassland plant species in the surrounding uplands. All plant material used for enhancement will be collected from local sources as close to the site as feasible;
- d) All restoration/enhancement activities should commence the first summer-fall season prior to or concurrently with the initiation of project impacts;
- e) All final specifications and topographic-based grading, planting and watering plans for the vernal pools, watersheds and surrounding uplands (including adjacent mima mounds) at the restoration sites. Grading plans will have 0.1-foot contours. Vernal pool size and depth will be similar to extant pools closest to the restoration area. The grading plans will also show the watersheds of extant vernal pools, and overflow pathways that hydrologically connect the restored pools in a way that mimics natural vernal pool complex topography/hydrology;
- f) A hydraulic analysis that shows each proposed vernal pool and its watershed, the vernal pool to watershed ratio, and hydrologic connection between the pools. The vernal pool to watershed ratio will be similar to extant pools closest to the restoration area. Restored pools and their watersheds will not impact the watersheds of any extant pools except where needed to establish hydrologic connections;
- g) If inoculum will be used for restoration/enhancement, the plan will identify any proposed donor pools and include documentation that they are free of versatile fairy shrimp (*Branchinecta lindahli*). No more than 5 percent of the basin area of any donor pool will be used for collection of inoculum. Collection of inoculum from Agency approved donor pools will be consistent with Conservation Measure 8;
- h) Inoculum and planting will not be installed until the Agencies has approved of habitat restoration site grading. All planting will be installed in a way that mimics natural plant distribution, and not in rows. Inoculum will not be introduced into the restored pools until after they have been demonstrated to retain water for the appropriate amount of time to support XXXX (insert name of listed vernal pool species) and have been surveyed for versatile fairy shrimp to the satisfaction of the CFWO. If versatile fairy shrimp are detected in the

restored or enhanced pools, inoculum will not be introduced until measures approved by the CFWO are implemented in attempt to remove the versatile fairy shrimp from the pools. Inoculum will be spread evenly over the surface, no more than 0.25 inch deep. If there is any ponding water at the time of soil inoculation, the soil will only be placed on the wet soil adjacent to the ponded areas. Inoculum will be placed into the bottoms of the restored/enhanced pools in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts and plant seeds within the surface layer of soil (e.g., collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation)

- i) Plant palettes (species, size and number/acre) and seed mix (species and pounds/acre) will be included in the restoration/enhancement plan. The plant palette will include native species specifically associated with the on-site habitat type(s). The source and proof of local origin of all plant material and seed will be provided;
- j) Native plants and animals will be established within the restored/enhanced pools, their watersheds and surrounding uplands. This can be accomplished by redistributing topsoil containing seeds, spores, bulbs, eggs, and other propagules from affected pools and adjacent vernal pool and upland habitats; by the translocation of propagules of individual species; and by the use of commercially available native plant species. Any vernal pool inoculum or plant material from an off-site source must be approved by the Agencies. Topsoil and plant materials from the native habitats to be affected on-site will be applied to the watersheds of the restored/enhanced pools to the maximum extent practicable. Exotic weed control will be implemented within the restoration/enhancement areas to protect and enhance habitat remaining on-site;
- k) In the event that natural rain is inadequate to support plant establishment, artificial watering of the restored/enhanced pools and their watersheds may be done upon approval by the Agencies. Any artificial watering will be done in a manner that prevents ponding in the pools. Any water to be used will be identified and documented to be free of contaminants that could harm the pools;
- l) Use of herbicides within and immediately adjacent to restored/enhanced pools will only be used under conditions authorized by the Agencies. All herbicide and pesticide use will be under the direction of a licensed pest control advisor and will be applied by a licensed applicator, under the supervision of a vernal pool restoration specialist. Glyphosate-based herbicides, such as RoundUp or Aquamaster, will be applied on all areas that have been dethatched. Herbicide will only be applied when wind speed is less than 5 miles per hour to reduce the potential for drift. Spray nozzles will be of a design to maximize the size of droplets and thus reduce the potential for drift of herbicide to non-target

plants. A 10-foot buffer will be maintained around concentrations of any sensitive plant species. Application of herbicide will not occur if rain is projected within 24 hours of the scheduled application activity. When vernal pools are ponding or close to saturation, only hand herbicide application will be used in the pools. Herbicide spraying will be permitted, but applicators will stay at least 3 feet from the edge of the vernal pools. The saturated glove technique will be used around the edges of pools that are ponded by specially trained herbicide applicators under the direct supervision of the vernal pool restoration specialist. If weeds are not completely controlled by herbicide, then weed populations will be removed by weed trimming. Weed trimming will be used on the specific patches of sensitive plants to establish a buffer around the populations. Hand weeding will generally only be used around the vernal pools and other sensitive resources;

- m) A final implementation schedule that indicates when all vernal pool impacts, as well as vernal pool restoration/enhancement grading and planting will begin and end. A temporal loss of vernal pools should be avoided by initiating the restoration work prior to or concurrent with impacts. This will minimize the length of time inoculum is kept in storage and ensure that there is appropriate habitat to translocate it to.
- n) Five years of monitoring and success criteria for vernal pool and upland habitat restoration/enhancement areas that includes quantitative hydrological, vegetation transects, viable cyst, hatched fairy shrimp, and gravid female measurements, and complete flora and fauna inventories, and photographic documentation. To minimize impacts to the vernal pool's soil surface during monitoring, cobbles should be oriented within the restored vernal pools to serve as stepping stone;
- o) Restoration success for fairy shrimp will be determined by measuring the ponding of water, and density of viable cysts, hatched fairy shrimp, and gravid females, within the restored pools. Water measurements will be taken in the restored pools to determine the depth, duration and quality (e.g., pH, temperature, total dissolved solids, and salinity) of ponding. Dry samples will be taken in the restored pools to determine the density of viable cysts in the soils. Wet samples will also be taken in the restored pools to determine the density of hatched fairy shrimp and gravid females. The pools must pond for a period of time similarly to reference vernal pools during an average rainfall year and at an appropriate depth and quality to support fairy shrimp. The hatched fairy shrimp, and gravid female density of the restored pools must not differ significantly ($p < 0.05$) from reference pools for, at least, three wet seasons before a determination of success can be made. The average viable cyst density of the restored pools must not differ significantly ($p < 0.05$) from reference pools at the end of the monitoring period before a determination of success can be made. Vernal pools selected as reference or control pools for evaluating restoration success will be identified and described in the restoration

plan. Alternate methods of determining success may be used upon approval by the Agencies;

- p) Monitoring and success criteria for vernal pool and upland restoration/enhancement areas will include: coastal sage scrub/native grassland species richness and cover criteria for all five years of monitoring; 0 percent cover for weed species categorized as High or Moderate in the Cal-IPC Invasive Plant Inventory and relative cover of all other weed species is no more than 5 percent and 10 percent coverage in the pools basins and watersheds, respectively, for other exotic/weed species for all five years of the monitoring period. Container plant survival will be 80 percent of the initial plantings for the first five years. At the first and second anniversary of plant installation, all dead plants will be replaced unless their function has been replaced by natural recruitment. The method used for monitoring will be described and a map of proposed sampling locations will be included. Photo points will be used for qualitative monitoring and stratified-random sampling will be used for all quantitative monitoring;
- q) Verification that restoration/enhancement of vernal pool is complete will require written sign-off by the Agencies. If a performance criterion is not met for any of the restored/enhanced vernal pools or upland habitat in any year, or if the final success criteria are not met, the CBP should prepare an analysis of the cause(s) of failure and, if deemed necessary by the Agencies, propose remedial actions for approval. If any of the restored/enhanced vernal pools or upland habitat have not met a performance criterion during the initial five-year period, the CBP's maintenance and monitoring obligations will continue until the Agencies deems the restoration/enhancement successful, or contingency measures must be implemented. Restoration/enhancement will not be deemed successful until at least two years after any significant contingency measures are implemented, as determined by the Agencies;
- r) Annual reports should be submitted to the Agencies by December 1 of each year that assess both the attainment of yearly success criteria and progress toward the final success criteria. The reports should also summarize the project's compliance with all Agencies biological opinion conservation measures and terms and conditions The first annual report should include as built grading, planting, and watering plans for the vernal pool restoration;

CM-9. CBP should ensure the long-term management of the preserved areas will occur in perpetuity. CBP should hire a qualified biological manager to prepare a long-term management and monitoring plan and submit it to the Agencies for approval prior to impacts. The plan should include a Property Analysis Record (PAR) (Center for Natural Lands Management ©1998), or other similar cost estimation study, to determine the costs for long-term management of San Diego fairy shrimp habitat to identify the level of funding that is necessary to adequately preserve and manage the habitat in perpetuity. CBP should provide adequate funding, as defined by the PAR or similar cost estimation

study, to implement the long-term management plan. This could be through the establishment of a non-wasting endowment account (or other mechanism approved by the Agencies). Management activities should be funded by the CBP. The expenditure of these funds will be at the discretion of the qualified biological firm in consultation with the Agencies. Any funds not expended in any given year will be set aside for use in future years for similar activities and will not diminish the annual obligation. Accounting for these carryover funds will be part of an annual report provided to the Agencies. These reports will also summarize the amount expended, carryover amount, and total amount in reserve for conserved areas. The Vernal Pool Management and Maintenance Program (VPMP), will include, but is not limited to the following provisions:

- a. No lighting will be installed within areas with conserved vernal pools. Any lighting adjacent to the conserved areas will be shielded and directed away from the habitat.
- b. Weeding in the areas with conserved vernal pools will be conducted at least twice a year, generally in the spring, to remove new invasions of non-native species. Weeding will concentrate on bent grass and Italian ryegrass, although efforts will be made to remove new invasions of problematic species. Weeding will be done by hand or hoe using personnel trained to distinguish between native and weed species. No herbicide will be permitted within these lots, unless prior approval is received from the Agencies.
- c. Maintenance of the conserved areas will include removal of trash and repair of protective fencing, signage, and drainage ditches and swales intended to divert water away from the conserved vernal pools.
- d. No brush management will be conducted within the areas that contain preserved vernal pools.
- e. Monitoring will be conducted over the life of the project in accordance with a specific schedule. The monitoring schedule includes specific tasks to be done at specific intervals. The company performing the maintenance and monitoring must meet certain qualifications. CBP should insure that these qualifications are met when hiring the maintenance and monitoring company. An annual report to the Agencies is required.

CM-10. CBP should post a performance bond or letter of credit with _____ for grading, planting, irrigation, and 5 years of maintenance and monitoring of for wetland/riparian and upland mitigation (including a 20% contingency to be added to the total costs). This bond or letter of credit is to guarantee the successful implementation of the mitigation construction, maintenance and monitoring.

CM-11. CBP should execute and record a perpetual biological conservation easement over the approximately _____-acres to be avoided/preserved on- or off-site (including any creation/restoration/enhancement areas) by the project. The easement will be in favor

of the _____ or other agent approved by the Agencies. The Agencies will be named as third party beneficiaries. The easement will be approved by the Agencies prior to its execution and should follow the attached template. There should be no active trails in the easement areas. CBP should submit a draft easement to the Service for review prior to initiating project impacts. CBP should submit the final easement and evidence of its recordation to the Service.