M E M O R A N D U M

DATE:	March 4, 2011
TO:	Jolanta Uchman, Xavier Fernandez, SF Bay Water Resources Control Board Brenda Blinn, California Department of Fish and Game
FROM:	Steve Peterson, ESP Tim Lacy, LSA
SUBJECT:	Proposed Revisions to the Potrero Hills Landfill Mitigation and Monitoring Plan – (Updated March 4, 2011)

The following sections are revised and/or reorganized sections of the Mitigation and Monitoring Plan for the Potrero Hills Landfill Expansion Project (July 2010). These changes were made at the request of the SF Bay Regional Water Quality Control Board during a meeting with the Potrero Hills Landfill and their consultants on January 19, 2011. These changes will be incorporated into the final, consolidated Mitigation and Monitoring Plan to be prepared at the end at the end of the permitting process.

3.3 PROPOSED MITIGATION SITES

3.3.5 Griffith Ranch Parcel Mitigation Area

Location. The Griffith Ranch parcel is located on the east side of Scally Road approximately 0.5 mile south of State Highway 12 (Figure 2). The entire 143-acre parcel will be dedicated as mitigation lands with approximately 112 acres being dedicated immediately and the remaining approximately 31 acres in the southwest corner of the parcel placed in the conservation easement after the closure of the combined Phase I/Phase II landfill. During this period, the southwest corner of the parcel (designated the Griffith Ranch Remainder) will be used as a secondary access point from Scally Road for maintenance vehicles and monitoring crews. No landfill facilities will be established on this parcel nor will any mitigation features be constructed here. This area will be grazed in conjunction with the larger Griffith Ranch mitigation parcel. There are no jurisdictional wetlands on this portion of the parcel.

The southern third of the Griffith Ranch encompasses a portion of the northern ridge of the Potrero Hills that descends northward to a gently-sloping flatland that makes up the northern two-thirds of the parcel. Vegetation is dominated by non-native grassland. A few blue gum (*Eucalyptus globulus*) trees located near what used to be an old ranch house/barn complex but these structures and trees are located on the PHLF portion of the parcel. Two occupied residences with outbuildings are located on a separate parcel, not owned by PHLF, that is surrounded on the south, east and north sides by the Griffith Ranch parcel. This separate parcel also contains a commercial animal internment site used primarily for burial of laboratory animals. The remainder of the Griffith Ranch parcel is fenced and currently grazed by cattle. Adjacent land uses include cattle ranching to the west, north, and east and

the PHLF to the south and west. The Assessor Parcel Numbers (APN's) for Griffith Ranch are 004-61-20400 (main parcel) and 004-61-20070 (southwest corner extension).

3.4 WATER RIGHTS

Potrero Hills Landfill has applied for stock pond certificates for the two new ponds to be constructed on the Southern Hills parcel (Ponds SH1 and EV1) and the two existing stock ponds located on the Southern Hills parcel (Pond 7) and the Eastern Valley parcel (Pond 3). Existing Ponds 2, 6, (Eastern Valley parcel) and 5 (Pond 5 Buffer Area) and proposed ponds GR1 and GR2 (Griffith Ranch parcel) are not associated with drainages and are filled (or will be filled) by direct rainfall and sheet flow. Such ponds are not regulated by the State Water Board.

5.1 PERFORMANCE CRITERIA

This section has been reorganized by habitat type rather than by parcel. Sections 5.1.2 through 5.1.7 have been consolidated into Sections 5.1.4 through 5.1.4.

5.1.2 Seasonal Pond Creation Performance Criteria

The following performance criteria will be applied to all constructed seasonal ponds. Seasonal ponds are proposed to be constructed on two mitigation parcels: 1) the Southern Hills parcels (Ponds SH1, secondary ponded area of Pond 7/Seasonal Wetland 4, and EV1) and 2) the Griffith Ranch parcel (GR1 and GR2).

Performance Criterion 1. Constructed Pond Period of Inundation. The period of inundation shall be a minimum of 12 weeks of continuous inundation in a normal rainfall year for all constructed ponds. This criterion will be achieved in the first year of monitoring and each subsequent year. If the ponds fail to hold water for the required period, remedial actions will be taken to increase the ponds ability to hold water. This may include adding clay to the pond bottoms or compacting the pond bottoms. Remedial actions will be implemented within 6 months of identification of the problem.

Performance Criterion 2. CTS Breeding and Metamorphosis. The created seasonal ponds shall provide breeding and larval development habitat for CTS. At the end of 10 years, there will be evidence that the pond has 1) been used as breeding habitat by CTS (eggs or larvae observed) and 2) that larvae have metamorphosed from the constructed ponds in normal rainfall years.[1]

- In order to document breeding attempts, a survey of each pond will be conducted within 2 weeks of the ponds filling to document the presence of California tiger salamander eggs in the ponds. Depending on the pond size, 2-5 egg frames will be placed in each breeding pond (both preserved and constructed) and checked for the presence of eggs. Egg frames will be placed in the ponds after the first rain and removed from the pond once the eggs have

[1] Normal rainfall is determined using the range shown in the NRCS National Water and Climate Center tables (http://www.wcc.nrcs.usda.gov/climate/wetlands.html). The lower and upper limits of the normal range are indicated by the columns labeled "30% chance will have less than" and "30% chance will have more than" in the WETS table.

hatched. The number of eggs per frame will be recorded. This criterion would be partially met if eggs (or larvae) are observed in the constructed ponds by the end of the monitoring period (Appendix E2).

- At least 3 surveys for California tiger salamander larvae will be conducted each year in both the constructed and preserved ponds (Appendix E3). Larvae will be sampled quantitatively and reported either on an area or volume basis (e.g., nm. larvae per square ft or nm. larvae per cubic ft). This criterion would be partially met if constructed ponds are shown to support larvae late in the season that show evidence that they will transform before the pond dries. By the end of the monitoring period, larvae should be present in the constructed ponds during normal rainfall years whenever larvae are present in reference ponds. Wildlife monitoring procedures are detailed in Section 5.4.

Performance Criterion 3. Wildlife Species Diversity. At the end of the 10-year wildlife-monitoring period, the mitigation lands shall support at least 90 percent of the native vertebrate species characteristic of the parcel prior to project development.

Performance Criterion 4. Hydrophytic Plant Species. At the end of the 10-year monitoring period, both the absolute and relative cover of hydrophytic species[2] in the created seasonal pond habitat shall be within the range of cover values for hydrophytic species observed for the reference ponds (Ponds 3, 5, 7) on the reference site. Reference sites will be subject to the approval of the executive officer of the Water Board. The relative cover of hydrophytic species shall not be less than 51 percent in order to meet minimum wetland vegetation parameter criteria.

Interim performance criteria are as follows:

Year 2 - relative cover shall have at least 51 percent relative cover of hydrophytic species.
Year 4 - relative cover shall have at least 60 percent of the mean relative cover by hydrophytic species in the reference sites (but shall not be lower than 51 percent total relative cover of hydrophytic species).
Year 6 - relative cover shall have at least 70 percent of the mean relative cover by hydrophytic species in the reference sites (but shall not be lower than 51 percent total relative cover of hydrophytic species).
Year 8 - relative cover shall have at least 75 percent of the mean relative cover by hydrophytic species in the reference sites (but shall not be lower than 51 percent total relative cover of hydrophytic species).
Year 10 – both the relative and absolute cover of hydrophytic species in the created seasonal ponds shall be within the range of cover values for hydrophytic species observed for the reference ponds. (Proposed reference sites for the constructed ponds are existing Ponds 3, 5, 7.) The total relative cover of hydrophytic species shall not be less than 51 percent.

The purpose of the interim performance criteria is to document a trend toward achieving the ultimate goal for this criterion. Specific values for relative cover are based on past experience in monitoring vegetation in the region and are not intended to be absolute requirements. Created ponds that show an increasing trend in relative cover during the monitoring period may be considered to meet the interim

[2] "Hydrophytic species" are defined in accordance with USFWS (1988).

performance criteria even if the exact values are not met. Ponds that do not meet the interim performance criteria will be reevaluated and remedial actions implemented to ensure that over all goal set for this criterion is met by the end of the monitoring period.

Performance Criterion 5. Native Plant Species. At the end of the 10-year monitoring period, the relative cover of native hydrophytic plant species shall be within the range of relative native hydrophytic plant species cover for the reference site (Ponds, 3, 5, 7).

Interim performance criteria are as follows:

> **Year 1 -** the seasonal ponds will show establishment of native hydrophytic plant species.
> **Years 2 through 10** - the relative cover of native plant species will increase annually.

Performance Criterion 6. Invasive Exotic Plant Species[3]. By the end of the 10-year monitoring period, absolute cover by invasive exotic plants in the created wetlands and adjacent uplands shall be no greater than 5 percent. Invasive species control programs will also be implemented in the uplands of the parcel where artichoke thistle (*Cynara cardunculus*) and purple star thistle (*Centaurea calcitrapa*) are of primary concern. In the uplands, invasive weeds will be reduced by 90 percent areal coverage by the end of the 10-year monitoring period.

Performance Criterion 7. Plant Species Diversity. At the end of the 10-year monitoring period, the seasonal ponds shall support at least 80 percent of native hydrophytes characteristic of seasonal ponds on the Southern Hills parcel (Pond 7), the preserved Pond 5 Buffer area (Pond 5), and the Eastern Valley (Pond 3). The preserved grasslands shall support at least 95 percent of native species characteristic of the site prior to project implementation.

Performance Criterion 8. Seasonal Pond Acreage. At the end of the 10-year monitoring period, at least 1.78 acre of new seasonal pond (1.05 acre on Southern Hills, 0.78 acre on Griffith Ranch). The Pond 5 Buffer Area shall support at least 0.45-acre of seasonal pond, which is the pre-project pond area . Pond areas will be delineated using standard methods employed during Corps delineations.

(New Table to be added to Section 5.1)
Table 5.1.X. Potrero Hills Invasive Plant Species (Cal-IPC and CDFA Ratings)

Scientific Name	Common Name	Cal-IPC	CDFA*	Comments
Cynara cardunculus	Artichoke-Thistle	Moderate	B	Discrete stands allowing for focused control
Aegilops triuncialis	Goat-Grass	High	B	Control difficult
Lepidium latifolium	Pepperweed	High	B	Targeted for control in wetlands on Directors Guild
Centaurea calcitrapa	Purple starthistle	Moderate	B	High impacts in Solano County and

[3] Invasive exotic plant species are those species classified as "List A" species by the Cal-IPC 2011 and subsequent updates. The complete list is available at http://www.cal-ipc.org/.

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Scientific Name	Common Name	Cal-IPC	CDFA*	Comments
				PHLF, relatively discrete patches
Centaurea solstitialis	Yellow starthistle	High	C	Widespread, difficult to control
Taeniatherum caput-medusae	Medusa-head	High	C	Widespread, only feasible control through grazing
Xanthium spinosum	Cocklebur	Not on list	Not listed	Impacts Pond 7, discrete stand possible to control
Cirsium vulgare	Bull-thistle	Moderate	C	Control difficult
Chondrilla juncea	Skeleton weed	Moderate	A	Small stands, eradication possible
Convolvulus arvensis	Bindweed	Not on list[4]	C	Minor impacts
Picris echioides	Ox-tongue	Limited	Not listed	Wetland impacts
Silybum marianum	Milk-thistle	Limited	Not listed	Minor impacts

* All plants rated A, B or C are regulated by State of California as Noxious Weeds

DEFINITIONS AND SOURCES
Cal-IPC California Invasive Plant Council Inventory Database 2011. Available online at http://www.cal-ipc.org/ip/inventory/weedlist.php
CDFACalifornia Department of Food and Agriculture Noxious Weed Ratings 2010. Available online at http://www.cdfa.ca.gov/phpps/ipc/weedinfo/winfo_list-pestrating.htm
Cal-IPC Limited: Invasive but ecological impacts statewide are minor
Cal-IPC Moderate: Species with substantial and apparent but not severe ecological impacts
Cal-IPC High: Species with severe ecological impacts
CDFA A: Pest of known ecological detriment but not established in California or with limited enough distribution to allow possibility of eradication or containment
CDFA B: Pest of limited distribution in California
CDFA C: Pest that is widespread in California

5.1.3 Seasonal Wetland Performance Criteria

Seasonal wetlands will be created on two parcels as part of the mitigation: Griffith Ranch and Director's Guild. On the Griffith Ranch parcel, after 10 years, 4.07 acres of seasonal wetland habitat, 1.03 of seasonal swale, and 0.73 acres of seasonal pond will be created. On the Director's Guild parcel approximately 0.42 acre of playa pool habitat will be restored and an additional 0.77 acres of seasonal swale will be created. The dominant vegetation in the seasonal wetlands, swales, and playa pool is dependent on hydrology, so the composition of the vegetation is subject to annual changes depending on rainfall. Colonization by native and naturalized hydrophytic grasses and forbs must occur in sufficient numbers to meet performance criteria.

[4] Evaluated but only considered as a weed in agricultural situations (not wildlands)

The performance standards are intended to be reasonable measures on which to base analysis of monitoring results, to determine trends (*i.e.* are wetland conditions establishing), and the potential need for corrective actions.

Performance Criterion 1. Wildlife Species Diversity. At the end of the 10-year wildlife-monitoring period, the mitigation lands shall support at least 95 percent of the native vertebrate species characteristic of the parcel prior to project development. Populations of all of the listed species (Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp) must be documented to exist on the Director's Guild site following project implementation.

Performance Criterion 2. Hydrophytic Plant Species – Seasonal Wetlands. At the end of the 10-year monitoring period, the absolute cover of hydrophytic species[5] in the constructed seasonal wetlands shall be within the range of absolute cover values for hydrophytic species observed for the reference wetlands on the reference site (Director's Guild vernal pools (excluding the playa pool)). The relative cover of hydrophytic species shall not be less than 51 percent in order to meet minimum wetland vegetation parameter criteria.

Interim performance criteria are as follows:

> **Year 2 –** absolute cover of hydrophytic species shall be at least 5-15 percent that of reference site wetlands. Relative cover of hydrophytic species shall be at least 51 percent.
> **Year 4 –** absolute cover of hydrophytic species shall be at least 16-25 percent that of the reference site. Relative cover of hydrophytic species shall be at least 51 percent.
> **Year 6** – absolute cover of hydrophytic species shall be at least 26-50 percent that of the reference site wetlands. Relative cover of hydrophytic species shall be at least 51 percent.
> **Year 8** – absolute cover of hydrophytic species shall be at least 51-75 percent that of the reference site wetlands or be within the range of cover values for hydrophytic species observed in the reference site wetlands. Relative cover of hydrophytic species shall be at least 51 percent.
> **Year 10** – absolute cover of hydrophytic species shall be within the range of cover values for hydrophytic species observed in the reference site wetlands. (Reference sites will be subject to the approval of the executive officer of the Water Board.) Relative cover of hydrophytic species shall be at least 51 percent.

The purpose of the interim performance criteria is to document a trend toward achieving the ultimate goal for this criterion. Specific values for absolute cover in the interim period are based on past experience in monitoring vegetation in the region and are not intended to be hard and fast requirements. Seasonal wetlands that show an increasing trend in absolute cover during the monitoring period may be considered to meet the interim performance criteria even if the precise stated values are not met. Constructed seasonal wetlands that do not meet the interim performance criteria will be reevaluated and to determine if remedial actions are necessary during the monitoring period to ensure that the overall goal set for this criterion is met by the end of the monitoring period.

Performance Criterion 3. Native Plant Species. At the end of the 10-year monitoring period, the relative cover of native hydrophytic plant species shall be within the range of relative cover for the

[5] "Hydrophytic species" are defined in accordance with USFWS (1988).

native hydro 3phytic plant species at the reference site (Director's Guild vernal pools (excluding the playa pool)).

Interim performance criteria are as follows:

> **Year 1 -** the seasonal ponds will show establishment of native hydrophytic plant species.
> **Years 2 through 10** - the relative cover of native plant species will increase annually.

Performance Criterion 4. Invasive Exotic Plant Species[6]. By the end of the 10-year monitoring period, absolute cover by invasive exotic plants in the created wetlands and adjacent uplands shall be no greater than 5 percent. Invasive species control programs will also be implemented in the uplands of the parcel where artichoke thistle (*Cynara cardunculus*) and purple starthistle (*Centaurea calcitrapa*) on the Griffith Ranch and perennial pepperweed (*Lepidium latifolium*) on the Director's Guild are of primary concern. In the uplands, invasive weeds will be reduced by 90 percent areal coverage by the end of the 10-year monitoring period.

Performance Criterion 5. Plant Species Diversity. At the end of the 10-year monitoring period, the seasonal ponds shall support at least 80 percent of native hydrophytes characteristic of the seasonal wetlands on the Director's Guild parcel (excluding the playa pool). The preserved grasslands shall support at least 95 percent of native species characteristic of the site prior to project implementation.

Performance Criterion 6. Wetland Acreage. By the end of the five-year monitoring period, the Griffith Ranch shall support at least 5.44 acres of Section 404-jurisdictional area and the Director's Guild parcel shall support 0.42 acre of playa pool along the restored berm and 0.77 acre (1,898 ft) of constructed seasonal swale. On the Director's Guild, preserved seasonal wetland acreage (65.12 acre) and seasonal swale acreage (0.21 acre) shall be the same as prior to project implementation. This wetland area will be delineated using standard methods employed during Corps delineations to determine this area.

Performance Criterion 7. Vernal Pool Crustacean Habitat. By the end of the 10-year monitoring period, the restored portions of the playa pool (restored berm) and the constructed swale on the Director's Guild parcel shall support listed vernal pool crustaceans. The berm area shall support the same species observed in the east and west basins of the onsite playa pool. The constructed swale shall support at least one of the listed vernal pool crustaceans observed in the playa pool or smaller vernal pools onsite. Presence of listed vernal pool crustaceans will be assessed using standard sampling methods for vernal pool crustaceans approved by the USFWS.

Performance Criterion 8. Restoration of the Berm in the Director's Guild Playa Pool. The following criteria shall be achieved during restoration of the playa pool berm.

> **Year 1** – During the first winter after restoration activities in the playa pool, the berm should be inundated during the period of highest water in the playa pool provided that the year falls witihin in the normal range of rainfall for the region.
> **Years 2 through 9** – Monitoring shall document that Contra Costa goldfields are colonizing the inundated berm area. Absolute cover of Contra Costa goldfields and other vernal pool

[6] Invasive exotic plant species are those species classified as "List A" species by the Cal-IPC 2011.

species characteristic of the playa pool should show an increasing trend over this period provided that rainfall falls within the normal range for the site.
Year 10 – (1) The absolute cover value of Contra Costa goldfields on the restored berm shall be no less than 15 percentage points that of the absolute cover of Contra Costa goldfield on the undisturbed edge of the east basin of the playa pool (e.g., if the absolute cover of Contra Costa goldfields on the undisturbed edge of the playa pool is 50 percent, the absolute cover of Contra Costa goldfields on the restored berm will be no less than 35 percent). (2) The restored berm shall support 0.42 acres of seasonal wetland. The wetland area will be delineated using standard methods employed during Corps delineations to determine this area.

5.1.4 Annual Grasslands

Non-native, annual grassland dominates the upland portions of all six mitigation areas (Southern Hills, Pond 5 Buffer Area, Eastern Valley, Eastern Hills, Griffith Ranch, and Director's Guild. These habitats will be preserved and enhanced for the benefit of the listed and common wildlife and that currently exist on the site.

Performance Criterion 1. Wildlife Species Diversity. At the end of the 10-year wildlife-monitoring period, the mitigation lands shall support at least 90 percent of the native vertebrate species characteristic of the parcel prior to project development.

Performance Criterion 2. Invasive Exotic Plant Species[7]. By the end of the 10-year monitoring period, absolute cover by invasive exotic plants in the preserved pond and adjacent uplands shall be no greater than 5 percent. Invasive species control programs will also be implemented in the uplands of the parcel where artichoke thistle (*Cynara cardunculus*) and purple starthistle (*Centaurea calcitrapa*), are of primary concern. Invasive weeds will be reduced by 90 percent areal coverage by the end of the 10-year monitoring period compared to pre-project conditions.

Performance Criterion 3. Plant Species Diversity. At the end of the 10-year monitoring period, preserved grasslands, including the disturbed grasslands where berm construction occurs, shall support at least 95 percent of native species characteristic of the parcels prior to project implementation.

Performance Criterion 4. Maintenance of the Movement Corridor. At the end of the 10-year wildlife-monitoring period, the mitigation lands shall provide an unobstructed movement corridor for wildlife linking the Southern Hills parcel with the Griffith Ranch parcel to the north. A site visit each year will document any new features placed or constructed on the site during the previous year, noting whether they are permanent or temporary and assessing their ability to impede wildlife movement across the site. No permanent features that may impede wildlife movement will be constructed on the site and temporary features (i.e., temporary road that may be needed for maintenance of power lines) will be restored to pre-project conditions within 6 months.

[7] Invasive exotic plant species are those species classified as "List A" species by the Cal-IPC 2011.

5.2 VEGETATION MONITORING

5.2.1 All Mitigation Parcels

Quantitative sampling methodology will be used to monitor vegetation parameters. To assess plant cover in seasonal wetlands/vernal pools, a minimum of 30 one-meter square plots (quadrats) will be established at random locations within each habitat. At least one set of 30 plots will be established in each wetland type and in each restored grassland area on each parcel. Random plot locations will vary each sampling year. Quantitative sampling will similarly be conducted in reference wetlands on the reference site each year.

Cover will be estimated by cover classes (<5 percent, 5-15 percent, 16-25 percent, 26-50 percent, 51-75 percent, 76-100 percent) for each species (native and non-native). Unequal cover class intervals allow for an easier estimation of species-cover to area relationships than do equal class intervals. Moreover, the less abundant species, or species with small areal cover, sometimes have an important diagnostic significance, which requires a finer breakdown in the lower scale values as compared to the larger scale values (Mueller-Dombois and Ellenberg, 1974).

Absolute cover estimates will be compared between mitigation features and the reference site in the following manner:

1. For each performance criterion, the number of dominant species (i.e., species in the 26-50 percent, 51-75 percent and 76-100 percent size classes) will be totaled for each of the 30 plots.
2. Absolute cover for each performance criterion will be considered approximately the same (and the performance criterion met) if the absolute cover value of the mitigation feature samples is no less than 15 percentage points that of the absolute cover value of the reference site samples (e.g., if the absolute cover value of the reference site samples is 50 percent, the absolute cover value of the mitigation feature samples will be no less than 35 percent).

For species diversity calculations, only step one of the above procedure (as it pertains to hydrophytic species) will be used. For mapping of jurisdictional wetland acreage, standard Corps delineation methodology will be applied (Environmental Laboratory, 1987).

6.3 IRRIGATION

Seeding and planting will be completed in the fall before the onset of the rainy season, and precipitation and runoff are expected to provide sufficient moisture for seed germination and plantings. No irrigation is planned for mitigation sites where the wetland creation sites will be dominated by annual grasses and forbs.

Trees and shrubs planted on the Southern Hills and Griffith Ranch sites will be irrigated for 2 years to establish the woody vegetation.

9.1 INITIATING PROCEDURES

Remedial measures to correct non-attainment of success criteria may include one or more of the following: regrading, reseeding or replanting. Other measures may apply as appropriate, if approved by the Corps, RWQCB, USFWS, and CDFG.

Should monitoring in year 1 indicate that there is insufficient inflow or water retention in some wetlands, then minor regrading or adjustments in outlet elevations may be made to achieve proper hydrologic functioning. Prior to any regrading, if necessary, the top three inches of soil should be scraped and temporarily stockpiled to ensure seed bank survival. Following regrading, the topsoil will be re-spread in the depression and the surrounding upland area seeded and as described above in the Implementation section. Regrading will be conducted only in the late summer/early fall, after all the plants have set seed.

Should monitoring indicate that soils are allowing water to percolate at an excessive rate (and assuming there are adequate water inputs to the pools and ponds), then additional clay subsoils will be obtained spread onto the bottom of the wetland area as needed. Prior to application, the top three inches of soil will be scraped from the pools or ponds and temporarily stockpiled. All exposed soil will be seeded as described above in the Implementation section. This work will be conducted in the late summer/early fall, if necessary.

Accelerated erosion of onsite watersheds as indicated by qualitative observation should be corrected by minor re-grading of uplands and local reseeding and mulching. Further erosion of offsite watersheds is unlikely based on existing patterns of use. However, should it occur, temporary silt fencing will be installed (keyed into the soil surface) on the upslope part of the pools to trap incoming sediment. Following vegetative stabilization of the area, the silt fences will be removed and the accumulated sediment disposed of properly.

Insufficient germination/survival of seeds and plugs (assuming adequate soil moisture levels) will be corrected locally by reseeding and/or replanting. Seeds and plants will be obtained from local sources only and in such a way that donor populations would not be adversely affected.

If in the opinion of the U.S. Fish and Wildlife Service, California Department of Fish and Game, and PHLF, mitigation cannot be completed or is unsuccessful onsite, then an alternative mitigation site may be used to accomplish the mitigation goals. The preferred alternative site is the Elsie Gridley Preserve located northeast of the Potrero Hills. This mitigation bank could be used to satisfy mitigation requirements in the event that restoration and construction activities are unsuccessful on the mitigation parcels. Every effort will be made, however, to mitigate all impacts from the Phase II expansion in the secondary management zone in order to provide a nexus between the impact and mitigation. Failure to successfully complete mitigation activities on the Potrero Hills mitigation lands will not result in any decrease in preserved area within the Potrero Hills.

11.4 LONG-TERM MANAGEMENT PLAN

A long term management plan will be prepared by Potrero Hills Landfill's biological consultants by the end of Year 5 of the monitoring period. This plan will cover the long-term grazing and weed control activities as well as maintenance of the mitigation features established and monitored during

the initial 10 year monitoring period. The long term management plan will identify the tasks that will be implemented by the resource manager (long-term manger) on a periodic basis to maintain the site as wildlife and plant habitat in perpetuity. In addition, the plan will identify monitoring schedules for listed and special-status species and actions to be implemented if declines in species are identified. The plan will be submitted to the Corps, USFWS, and CDFG for review and approval. Data gathered during the first 5 years of monitoring will be used to determine the appropriate actions for long-term management.

APPENDIX E2
EGG FRAMES

In order to assess California tiger salamander breeding in the constructed and reference ponds, egg frames will be used to detect breeding attempts within 2 weeks of ponds filling. Each egg frame will consist of a 2 ft. by 2 ft. frame constructed of wood or PVC pipe. The frames will be weighted or have holes in the pipes to allow them to remain submerged when the pond fills. The frame will be strung with a grid of nylon string every 4 inches. The frame will be anchored in the pond bottom using stakes. A nylon rope will be attached to each frame and the rope will be attached to anchor on the bank of the pond.

1. Prior to the first rains of the season (approximately October 15 – November 1), 2-5 egg frames will be placed in each of the constructed ponds and reference ponds. The number of frames placed in each pond will be based on pond size (e.g., the smallest pond, Pond 6, would have 2 frames while a larger pond such as Pond 5 would have 5 frames).
2. The egg frames will be placed on the bottom of the pond at varying distances from the high water mark in the pond. The attached ropes will be extended to the pond bank and anchored there with stakes. The location of the stakes will be recorded using GPS and will be flagged.
3. Ponds will be monitored to determine when the ponds begin to fill each year. Once the ponds have filled, monitoring of the frames will commence within 1 week.
4. Egg frames will be monitored weekly for 3-4 weeks after the ponds fill. The monitor will locate each anchor and follow the attached rope to the egg frame in the pond. The frame will be gently raised from the water and inspected for attached tiger salamander eggs. The number of eggs on each frame will be counted. The frames will then be returned to the pond bottom.
5. Egg frames will be removed from the ponds approximately 4 weeks after the ponds have filled. Only frames without eggs will be removed. Frames that have eggs attached at the time of retrieval will be left for another 1-2 weeks to allow the eggs to hatch and then will be removed.
6. Tiger salamanders observed in (larvae or adults) or around (adults) the ponds will be noted in the field notes. Pond depth and general pond condition will also be noted during the monitoring of the frames.
7. Use of egg frames will be discontinued in a constructed pond if the pond is documented to be used as a breeding site by tiger salamanders for 5 consecutive years and has produced metamophs in each of those years when metamorphs have also been produced in at least one of the reference ponds. This condition will be implemented to minimize disturbance in the pond during the early portion of the breeding season once it has been established that tiger salamanders have found the constructed ponds and are using them regularly for breeding.

APPENDIX E3
CALIFORNIA TIGER SALAMANDER LARVAE SAMPLING

Basis for Sampling California Tiger Salamander Larvae

California tiger salamander larvae will be sampled three times each year. Sampling a single time may be sufficient to document presence of larvae during a breeding season but a single sampling event is unlikely to provide sufficient information estimate the number of larvae present and to assess the likelihood that larvae will transform into terrestrial salamanders. The method described here allows for this type of assessment. During each breeding season, three surveys will be conducted for tiger salamander larvae as described below.

Survey 1. The first survey should be conducted during March or early April depending on when ponds filled and when breeding was initiated. In years with early or late rainfall, the timing of the first survey should be adjusted to account for the timing of the pond filling. This schedule should also be adjusted for shallow ponds that are known to dry early. Ideally, larvae should be about ½ inch total length at the time of the first survey. Larvae of this size are readily captured in the seine or dipnet.

The primary purpose of Survey 1 is to document breeding by salamanders in the pond. Results of the first survey combined with data from the egg frames will allow the surveyor to assess if breeding was attempted at a particular pond and if the pond is able to support developing larvae. Breeding attempts may be made in some ponds as documented by the presence of eggs early in the season, but the eggs may not hatch or the larvae may not grow and develop. The first survey of each season allows the surveyor to assess if these initial stages of egg laying and development have occurred. Occasionally, a pond may dry and refill after salamanders have laid eggs in the pond. The first survey provides data to assess additional breeding attempts or failure of the pond as a breeding site in that year.

If salamander larvae are present during Survey 1 they will be sampled quantitatively and the density of larvae recorded for each pond (See **Quantitative Sampling** below).

Survey 2. This survey should be conducted about a 3-4 weeks after the first survey each season, typically in April. The purpose of the second survey is to (1) document the continued development of salamander larvae in each pond, (2) to document additional breeding events that may have occurred after the ponds initially filled, and (3) to determine the density of larvae in the pond.

The presence of larvae that are larger than those observed during Survey 1 satisfies the requirement to document continued salamander larvae growth and development. Additional breeding events are inferred from the presence of more than one size class of larvae being present in the pond. The total length of larvae will be recorded for each size class observed. Finally, the larvae will be sampled quantitatively to determine density of larvae in the pond. The density of larvae in the pond is likely to be highest during this survey as it may be composed of multiple size classes of larvae some of which may not survive due to predation or drying of portions of the pond over the next month. Notes on the

depth and condition of the pond are to be made during this survey. A preliminary assessment as to whether the pond is going to persist long enough to allow larvae to transform to terrestrial salamanders can often be made at this time based on rainfall to date, pond depth, and a visual assessment of the rate at which the pond is drying or receding.

Survey 3. The third survey should be conducted 2-4 weeks after Survey 2 (typically late April or early May), depending on rainfall, the maximum depth of the pond (shallow ponds or deeper stock ponds), and the rate at which the ponds are drying. The purpose of the third survey is (1) to assess the likelihood that larvae in the pond will metamorphose and leave the pond before it dries and (2) to estimate the density of the larvae that are likely to transform and leave the pond. Those transformed larvae that find suitable upland burrows in which to pass the summer and where they can feed and grow will become part of the next generation of breeding salamanders.

In order to assess the likelihood of salamanders surviving to leave the pond, notes on the size and condition of the larvae will be recorded. The total length of the larvae will be recorded. Salamanders that are 4-6 inches long will typically be developing or will possess characteristics of terrestrial salamanders. These characteristics will be noted and include (1) lack of external gills or gills that are being resorbed, (2) the presence of costal grooves and more developed body musculature, (3) presence of well-developed limbs and robust limb musculature, (4) use of limbs to walk in the net rather than the use of swimming motions to move in the net, (5) development of spotting pattern and change in color from green to dark green, brown, or black.

An estimate of the percentage of the salamanders captured that possess these adult characteristics will be made and noted in the field notes. Salamander larvae will be sampled quantitatively and the density of the larvae will be calculated. Salamander larvae density is likely to be lower during this survey than during Survey 2 as more larvae will have been predated by other salamander larvae or invertebrates. The density of larvae in the pond during this survey is considered the best estimate of the number of salamanders recruited into the next generation as this density estimate represents salamanders that are most likely to transform and leave the pond.

Based on the condition of the pond, the presence of cattle and their access to the pond, and the condition of the salamanders in the pond, the surveyor will assess the likelihood of the remaining larvae to transform before the pond dries. This is a qualitative assessment as actual numbers of larvae leaving the pond will not be counted. If multiple size classes were present in the pond during this survey, the surveyor will assess whether some or all of the larvae are likely to transform before the pond dries.

As described above, three surveys for larvae allow surveyors to more completely assess how ponds function for breeding salamanders and developing larvae and to assess the likelihood that the ponds are successfully producing transformed salamanders that will become the next generation of breeding adults. Well timed surveys may allow a surveyor to gather much of this information in only one or two surveys, but we believe that three surveys provides a better overview of the pond conditions and larval growth and development. It should be noted that even in intact and functioning habitats, not all ponds may successfully produce transformed larvae each year. It appears that the most stable systems are those that consist of multiple ponds, most of which have sufficient depth and ponding duration to allow salamander larvae to transform in most years. Smaller ponds within this system may be used as

breeding sites in some years but will only produce transformed larvae in those years when rainfall and other conditions are sufficient to keep the pond from drying early.

Quantitative Sampling

Surveys are conducted using a 10 foot by 4 foot nylon seine with one-eighth inch mesh. For each pull of the seine, we record the length of the pull, depth of the pond through which the seine was pulled, width of the seine, and number of California tiger salamander larvae captured. The lengths of the larvae in each sample are noted. Other amphibians and invertebrates captured in the seine are also recorded. If the pond is too shallow to seine, we use dip nets to sample the pond. As with the seine, the number of sweeps of the net, the lengths of the net sweeps, the width of the net and depth of the net submerged (for shallow ponds) or area of net (for ponds deeper than the height of the net) ar recorded for later use in calculating density of larvae. Surveys dates and surveyors are also noted.

Relative density of CTS larvae captured in each pond during the sampling is calculated by dividing the number of larvae captured in the pond by the area of the pond sampled. The length of larvae is measured directly with a ruler. The smallest, largest and typical size larvae in each pond are measured. In order to standardize the density estimates among project sites, density should be reported as the number of CTS larvae captured on a square foot basis. In the past, LSA has reported density on a volume basis. We will continue to collect pond depth information during sampling; however, we have decided to report density on an area basis rather than a volume basis for the following reasons: (1) other researchers are reporting their estimates on an area basis; (2) many surveyors only report number of larvae captured so by estimating the size of the sampled pools from aerial photographs, we can often calculate density per area even if the density has not been reported; and (3) reporting densities on an area basis provides an easier way to compare results among different sites and surveyors as volume sampled can vary significantly even among pools of the same size.

Notes on the condition of the ponds, and condition of larvae will also be recorded as described above.