

by land-use changes such as increased impervious surface areas, channel straightening, culverting, bank armoring, or changes in grade controls. Channel evolution models can be used to conceptualize how streams adjust to urban development (**Figure 4**). For example, “Urban equilibrium” is a term used to describe a channel that has deviated from its natural or original shape, but has finished adjusting to the urban influences (reduced sediment and increased discharge) affecting it so that it is relatively stable in its profile and planform dimensions. A channel in urban equilibrium, stage VI in **Figure 4** is neither excessively eroding nor depositing sediment and has a healthy riparian corridor established along its edges. From a geomorphic perspective, the channel has achieved a new balance in its bankfull width, depth, slope, and sediment composition in relation to discharge and sediment inputs. In general, the Chimes Creek appears to be between stages III and IV in the context of urban channel evolution.

Results from the geomorphic analysis suggest Chimes Creek has not reached “Urban Equilibrium” and will continue to incise unless modifications to the channel are made to control existing knickpoints and channel incision. Therefore each design alternative should target bank erosion and vertical channel stability. Overall, roughly 63% (STA 0+00 – 7+00) of Chimes Creek is actively incising while 37% is stable. Vertical incision via knickpoint migration has led to toe scour, geotechnical bank failure, and property loss along the entire lower section.

SECTION 3. BIOLOGICAL RECONNAISSANCE

Description of the Existing Biological and Physical Conditions

A Biological Reconnaissance Survey was performed on April 9, 2009 at which time habitat types and vegetation composition were mapped¹. Ruderal/disturbed riparian woodland communities occur over the project area adjacent to individual homes, driveways, and along streets. These areas, if not landscaped, are dominated by a mixture of native and introduced or exotic plant species. The creek generally has little canopy coverage, with the exception of notable areas between stations 0+00 and 2+50[end point near Nairobi], as well as between 9+00 and 11+45 where a dense overstory of mature trees shades the creek.

Areas adjacent to the top of bank (mostly in the backyards of private residences) contain vegetation communities dominated by exotics and common landscaping species. Species observed include non-native grasses, such as wild oats (*Avena sativa*) and Bermuda grass (*Cynodon sp.*), ivy (*Hedera sp.*), Himalayan blackberry (*Rubus discolor*), cheeseweed (*Mallow sp.*), brisly ox-tongue (*Helminthotheca echioides*), bamboo (*Bambusa sp.*). Some “backyard” areas were landscaped with a variety of ornamentals including non-native rose plants and a variety of fruit trees. Stands of fennel (*Foeniculum vulgare*) and bamboo were observed in patches along the reach. In most areas, the creek is severely incised, with no adjacent wetland band between the creek and upland areas.

¹ Questa Engineering Corp., April 9, 2009. Biological Reconnaissance Survey of Chimes Creek.

As stated, most of the creek has little or no canopy coverage, and tree species generally include ornamentals associated with residential landscaping, including plums (*Prunus sp.*) and other fruit trees. There are, however, certain portions of the creek that run beneath a dense canopy of native trees, including willows (*Arroyo salix* and *Arroyo laevigata*), redwoods (*Sequoia sp.*), oaks (*Quercus spp.*), black walnuts (*Juglans californica*), acacias (*Acacia sp.*), and magnolias (*Magnolia sp.*). Other large non-native tree species were also observed, including eucalyptus (*Eucalyptus sp.*) and poplar (*Populus sp.*). One property owner at has recently planted big leaf maple (*Acer macrophyllum*), buckeye (*Aesculus californica*), and dogwood saplings (*Cornus californica*). Large trees have been mapped on **Sheets 1 and 2**.

During the field survey, tree frogs (*Hyla regilla*) were the only wildlife observed along the project reach, although several domestic dogs were present. No fish species were observed. There was no evidence of large mammal denning activity such as den openings, signs of scat, or signs of extensive small mammal burrows observed along the creek reach during the field survey. A few small bird species were observed, though their species could not be confirmed. Oak, redwood, walnut and other trees may provide roosts or temporary perch areas to a variety of bird species. Trees within or immediately adjacent to the creek channel did not contain any hollowed cavities suitable for raptor nesting, though some nearby trees not accessible at the time of site visits could potentially serve as nesting sites.

Sensitive Species Records

Species of concern, those plants and animals considered as “special-status” species identified as such by the California Native Plant Society (CNPS), Department of Fish and Game Natural Diversity Database (CNDDDB), or U.S. Fish and Wildlife Service (USFWS) under the state and federal Endangered Species Acts are known to occur in the project region. The record search of the CNDDDB and CNPS electronic databases for the Oakland East 7.5 minute USGS topographic quadrangle indicate the potential occurrence of several candidate, sensitive, or special status plants and animals in the region (**Table 4** and **Table 5**)².

Table 4

**Listed Plant Species
(Endangered, Threatened, CNPS) with
Potential to Occur in the Vicinity of the Chimes Creek Restoration Project**

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
Federal, State and CNPS proposed, candidate or species of concern					
<i>Amsinckia lunaris</i>	bent-flowered fiddleneck	--/--/1B.2	Cismontane woodland, valley and foothill grassland. 50-500m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Arctostaphylos pallida</i>	pallid manzanita	T/E/1B.1	Broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub. Grows on uplifted marine terraces on siliceous shale or thin chert. May require fire. 185-465m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Astragalus tener</i> var. <i>tener</i>	alkali milk-vetch	--/--/1B.2	Alkali playa, valley and foothill grassland, vernal pools. Low ground, alkali flats, and flooded lands; in annual grassland or in playas or vernal pools. 1-170m.	No suitable habitat at project site, (no alkali soils).	No potential to occur within impacted area.
<i>California macrophylla</i>	round-leaved filaree	--/--/1B.1	Cismontane woodland, valley and foothill grassland. Clay soils. 15-1200m.	No suitable habitat at project site.	No potential to occur within impacted area.

² California Department of Fish and Game, 2009. Search of the California Department of Fish and Game Natural Diversity Database, Oakland East Quadrangle.

Scientific Name	Common Name	Fed/State/CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
<i>Chorizanthe robusta var. robusta</i>	robust spineflower	E/--/1B.1	Cismontane woodland, coastal dunes, coastal scrub. Sandy terraces and bluffs or in loose sand. 3-120m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Clarkia concinna ssp. automixia</i>	Santa Clara red ribbons	--/~/4.3	Cismontane woodland, chaparral. On slopes and near drainages. 90-970m.	M marginally suitable habitat at project site.	Very low potential to occur within impacted area. None observed during Biological Reconnaissance Survey. Lack of recent recorded observation in project quadrangle.
<i>Clarkia franciscana</i>	Presidio clarkia	E/E/1B.1	Coastal scrub, valley and foothill grassland. Serpentine outcrops in grassland or scrub. 20-335m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Cordylanthus maritimus ssp. palustris</i>	Point Reyes bird's-beak	--/~/1B.2	Usually in coastal salt marsh with salicornia, distichlis, jaumea, spartina, etc. 0-15M.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Dirca occidentalis</i>	western leatherwood	--/~/1B.2	Broadleafed upland forest, chaparral, closed-cone conif for, cismontane wdlnd, n coast conif for, rip for, rip wdlnd. On brushy slopes, mesic sites; mostly in mixed evergreen & foothill woodland communities. 30-550m.	Riparian habitat at project site suitable for this species.	Very low potential to occur within impacted area. None observed during Biological Reconnaissance Survey.
<i>Eriogonum luteolum var. caninum</i>	Tiburon buckwheat	--/~/1B.2	Chaparral, valley and foothill grassland, cismontane woodland, coastal prairie. Serpentine soils; sandy to gravelly sites. 0-700m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Fritillaria liliacea</i>	fragrant fritillary	--/~/1B.2	Coastal scrub, valley and foothill grassland, coastal prairie. Often on serpentine; various soils reported though usually clay, in grassland. 3-410m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Helianthella castanea</i>	Diablo helianthella	--/~/1B.2	Broadleaved upland forest, chaparral, cismontane wdlnd, coastal scrub, riparian woodland, valley & foothill grassland. Usually in chaparral/oak woodland interface in rocky, azonal soils. Often in partial shade. 25-1150m.	Riparian habitat at project site is suitable for this species.	Very low potential to occur within impacted area. None observed during Biological Reconnaissance Survey. Lack of recent recorded observation in project quadrangle.

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
<i>Hoita strobilina</i>	Loma Prieta hoita	--/--/1B.1	Chaparral, cismontane woodland, riparian woodland. Serpentine; mesic sites.	Riparian habitat at project site is moderately suitable for this species. No serpentine soils on site.	Very low potential to occur within impacted area. None observed during Biological Reconnaissance Survey. Lack of recent recorded observation in project quadrangle.
<i>Horkelia cuneata ssp. sericea</i>	Kellogg's horkelia	--/--/1B.1	Closed-cone coniferous forest, coastal scrub, chaparral. Old dunes, coastal sandhills; openings. 10-200m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Monardella villosa ssp. globosa</i>	robust monardella	--/--/1B.2	Broadleaved upland forest, chaparral, cismontane woodland, valley and foothill grassland. Openings. 30-300m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Plagiobothrys diffusus</i>	San Francisco popcorn-flower	--E/1B.1	Valley and foothill grassland, coastal prairie. Historically from grassy slopes with marine influence. 60-485m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Potamogeton filiformis</i>	slender-leaved pondweed	--/--/2.2	Marshes and swamps. Shallow, clear water of lakes and drainage channels. 15-2310m.	Riparian habitat at project site is moderately suitable for this species. Water at site is very turbid.	Very low potential to occur within impacted area. None observed during Biological Reconnaissance Survey. Waters very turbid and polluted.
<i>Sanicula maritima</i>	adobe sanicle	--/R/1B.1	Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie. Moist clay or ultramafic soils. 30-240m.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Streptanthus albidus ssp. peramoenus</i>	most beautiful jewel-flower	--/--/1B.2	Chaparral, valley and foothill grassland, cismontane woodland. Serpentine outcrops, on ridges and slopes. 120-730m.	No suitable habitat at project site.	No potential to occur within impacted area.

Table 5

**Listed Bird, Mammal, Reptile, Amphibian, and Invertebrate Species
(Endangered, Threatened, Proposed, Rare, Candidate or Special Concern) with
Potential to Occur in the Vicinity of the Chimes Creek Restoration Project**

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
Federal and State threatened, endangered, and special concern species					

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
Birds					
<i>Accipiter cooperii</i>	Cooper's hawk	--/--/--	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	Riparian habitat at project site is suitable for this species.	High. Recorded observations along the project reach in 2006.
<i>Aquila chrysaetos</i>	golden eagle	--/--/--	Rolling foothills, mountain areas, sage-juniper flats, & desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Melospiza melodia pusilla</i>	Alameda song sparrow	--/SC/--	Resident of salt marshes bordering south arm of san francisco bay. Inhabits salicornia marshes; nests low in grindelia bushes (high enough to escape high tides) and in salicornia.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Rallus longirostris obsoletus</i>	California clapper rail	E/E/--	Salt-water & brackish marshes traversed by tidal sloughs in the vicinity of san francisco bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	No suitable habitat at project site.	No potential to occur within impacted area.
Mammals					
<i>Antrozous pallidus</i>	pallid bat	--/SC/--	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Creek is suitable foraging habitat for this species.	No potential to occur within impacted area.
<i>Dipodomys heermanni berkeleyensis</i>	Berkeley kangaroo rat	--/--/--	Open grassy hilltops & open spaces in chaparral & blue oak/digger pine woodlands. Needs fine, deep, well-drained soil for burrowing.	No suitable habitat at project site.	No potential to occur within impacted area.

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
<i>Lasionycteris noctivagans</i>	silver-haired bat	--/--/--	Primarily a coastal & montane forest dweller feeding over streams, ponds & open brushy areas. Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes & rarely under rocks. Needs drinking water.	Riparian habitat at project site is suitable for this species.	No potential to occur within impacted area.
<i>Lasiurus cinereus</i>	hoary bat	--/--/--	Prefers open habitats or habitat mosaics, with access to trees for cover & open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	Riparian habitat at project site is suitable for this species.	No potential to occur within impacted area.
<i>Scapanus latimanus parvus</i>	Alameda Island mole	--/SC/--	Only known from alameda island. Found in a variety of habitats, especially annual & perennial grasslands. Prefers moist, friable soils. Avoids flooded soils.	Riparian habitat at project site is not suitable for this species.	No potential to occur within impacted area.
<i>Taxidea taxus</i>	American badger	--/SC/--	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Need sufficient food, friable soils & open, uncultivated ground. Prey on burrowing rodents. Dig burrows.	Riparian habitat at project site is not suitable for this species.	No potential to occur within impacted area.
Reptiles and Amphibians					
<i>Actinemys marmorata</i>	western pond turtle	--/SC/--	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches with aquatic vegetation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat for egg-laying.	Riparian habitat at project site is marginally suitable for this species. No suitable basking sites or pooling sites present, turbid and polluted waters.	Low potential to occur within impacted area. Lack of historic observations, suitable habitat features, and degraded site conditions.

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
<i>Ambystoma californiense</i>	California tiger salamander	T/SC--	Central valley dps federally listed as threatened. Santa barbara & sonoma counties dps federally listed as endangered. Need underground refuges, especially ground squirrel burrows & vernal pools or other seasonal water sources for breeding.	Riparian habitat at project site is marginally suitable for this species. No burrows observed.	Very low. Lack of historic observations, suitable habitat features, and degraded site conditions.
<i>Masticophis lateralis euryxanthus</i>	Alameda whipsnake	T/T--	Restricted to valley-foothill hardwood habitat of the coast ranges between vic of monterey and n san francisco bay. Inhabits south-facing slopes and ravines where shrubs form a vegetative mosaic with oak trees and grasses.	No suitable habitat present. Chaparral communites ¼ mile away may be suitable habitat.	No potential to occur. Nearby potentially suitable habitat is seperated from site by I-580 and urban residential neighborhood.
<i>Rana boylii</i>	foothill yellow-legged frog	--/SC--	Partly-shaded, shallow streams & riffles with a rocky substrate in a variety of habitats. Need at least some cobble-sized substrate for egg-laying. Need at least 15 weeks to attain metamorphosis.	Riparian habitat at project site is marginally suitable for this species. No suitable substrate present.	Low potential to occur within impacted area. Lack of historic observations, suitable habitat features, and degraded site conditions.
<i>Rana draytonii</i>	California red-legged frog	T/SC--	Lowlands & foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	Riparian habitat at project site is marginally suitable for this species. No suitable pooling features present.	Low potential to occur within impacted area. Lack of historic observations, suitable habitat features, and degraded site conditions.
Invertebrates					
<i>Euphydryas editha bayensis</i>	Bay checkerspot butterfly	T/---	Restricted to native grasslands on outcrops of serpentine soil in the vicinity of san francisco bay. Plantago erecta is the primary host plant; orthocarpus densiflorus & o. Purpurascens are the secondary host plants.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Helminthoglypta nickliniana bridgesi</i>	Bridges' coast range shoulderband	--/---	Inhabits open hillsides of alameda and contra costa counties. Tends to colonize under tall grasses and weeds.	No suitable habitat at project site.	No potential to occur within impacted area.

Scientific Name	Common Name	Fed/State/ CNPS Status	Preferred Habitat	Suitable Habitat Present within Project Area	Potential for Species to Occur in the Impacted Area
<i>Microcina leei</i>	Lee's micro-blind harvestman	--/--/--	Xeric habitats in the san francisco bay region. Found beneath sandstone rocks in open oak grassland.	No suitable habitat at project site.	No potential to occur within impacted area.
<i>Tryonia imitator</i>	mimic tryonia (=California brackishwater snail)	--/--/--	Inhabits coastal lagoons, estuaries and salt marshes, from sonoma county south to san diego county. Found only in permanently submerged areas in a variety of sediment types; able to withstand a wide range of salinities.	No suitable habitat at project site.	No potential to occur within impacted area.

Source: CNDB search of Oakland East Quadrangle

E – Endangered under the Federal or State Endangered Species Act

T – Threatened under the Federal or State Endangered Species Act

SC – California species of special concern

1A - Presumed extinct in CA

1B.1 – RTE in CA & elsewhere; Seriously threatened in CA

1B.2 - RTE in CA & elsewhere; Fairly threatened in CA

1B.3 - RTE in CA & elsewhere; Not very threatened in CA

2.3 - RTE in CA only; Not very threatened in CA

3.1 - More info is needed; Seriously threatened in CA

Plants

As indicated in **Table 4**, most of the special-status plants occur in habitats that do not occur in the project area, these habitats include marshes, swamps, cismontane woodland, alkali playa, serpentine outcrops, closed-cone pine forest, coastal scrub or chaparral. There is no such suitable habitat along Chimes Creek. Furthermore, none of the other species were observed on the project sites during field survey. Based on associated habitats, however, there are several plant species that may have a low potential for occurrence.

Plant species with a potential to occur at the project reach are those associated with riparian woodlands. Habitat is marginally suitable for alkali milk vetch (*Astragalus tener* var. *tener*), Santa Clara red ribbons (*Clarkia concinna* ssp. *automixia*), western leatherwood (*Dirca occidentalis*), Diablo helianthella (*Helianthella castanea*), Loma Prieta hoita (*Hoita strobilina*), and slender leaved pondweed (*Potamogeton filiformis*).

Prior to the site survey, these species were identified as those potentially occurring at the project site, to focus the survey efforts. No individuals of the above listed species were observed during the April 9th site survey. This survey period coincided with the flowering period alkali milk vetch (March-June), Santa Clara red ribbons (spring-summer), and Diablo helianthella. It should be noted that, with the exception of western leatherwood and slender leaved pondweed, each of these species has only one recorded observation in the East Oakland quadrangle, all of which were made between 1865 and 1936. Given the rapid urbanization of Oakland during the

20th century, it is highly unlikely these populations exist in Oakland, including at or near the project site.

Western leatherwood has been observed extensively throughout the Oakland East quadrangle. The nearest recorded sighting was made prior to 1994 in the vicinity of Leona Heights Park, approximately 0.9 miles north northwest of the project site. Western leatherwood is a perennial shrub species easily identifiable by its light green leaves, mottled grey bark, and showy yellow flowers present throughout the year. Habitat at the project site is suitable for this species, as it is found in a variety of woodland habitats including riparian zones. There were however no individuals of this species observed during the April 9th, 2009 site survey.

There is one recorded observation of slender leaved pondweed in the Oakland East quadrangle. This observation was made in 1992 at the Oakland Hills quarry, approximately 5 miles north northwest of the project reach. The pondweed is an aquatic perennial with slender nearly cylindrical stems measuring less than 20 inches long. The plant is entirely submerged in shallow, standing, or slow moving water. It is difficult to differentiate from more common types of pondweed. No pondweeds were observed during the April 9th, 2009 site survey. Waters were observed to be highly turbid, and likely contain elevated levels of pollutants given the urban environment. Hydrologic alteration and water quality issues may pose a threat to this taxon. Based on these observations and conditions, it is highly unlikely that this species inhabits the project reach³.

Animals

The habitat of occurrence for most of the special-status or sensitive animal species identified in **Table 5**, such as salt marsh, chaparral, coastal scrub, native grassland, serpentine outcrops, etc. do not occur at the project site. Based on associated habitats, however, there are several animal species that may have a low potential for occurrence, including Cooper's hawk (*Accipiter cooperii*), western pond turtle (*Actinemys marmorata*), California tiger salamander (*Ambystoma californiense*), pallid bat (*Antrozous pallidus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) foothill yellow-legged frog (*Rana boylii*), and California red-legged frog (*Rana draytonii*). The following provides a discussion of the potential for occurrence of each of these species, along with possible avoidance measures to include in project design. Discussion of Alameda whipsnake potential presence is also included, as the snake remains a high profile species in the area.

Cooper's hawk

Although not endangered, threatened, or a State Species of Special Concern, the Cooper's hawk is protected by the Federal Migratory Bird Treaty Act, under which it is a violation to directly kill or destroy any parts of the bird, nest, or eggs. It is a short winged, long tailed hawk. The hawk nests in heavily wooded areas adjacent to streams and rivers, usually in tall canopies with an open understory. Nesting season for Coopers hawks can start as early as March and as late as early June. Juveniles are raised on a diet of small and medium sized birds, insects, and rodents for a period of 90 days. Two adult hawks and four juveniles were observed

³ Washington Natural Heritage Program and U.S.D.I. Bureau of Land Management, 2005. Field Guide to Selected Rare Plants. Retrieved on April 21, 2009 at <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/potfil.pdf>.

on July 30, 2006 in an oak tree adjacent to Chimes Creek in the vicinity of the project reach. Habitat at the project reach remains highly suitable for this species. While creek restoration would likely improve habitat for this species by contributing to a stable environment and natural assemblage of plant species, construction activities could potentially harm the Cooper's hawk, and sensitive species avoidance measures should be implemented to avoid potential impacts during the construction phase.

- 1) Within seven days prior to the start of any work, a pre-construction survey should be conducted for *A. cooperii* by a qualified biologist. If any *A. cooperii* are found that will be impacted by construction activities, construction should stop and the biologist should monitor the nest to determine when the young reach independence or the nest fails.
- 2) Prior to construction activities, biologists should conduct a training session for construction personnel on the identification of *A. cooperii*. Construction personnel should be instructed to notify the project biologist if *A. cooperii* are observed during project construction.
- 3) Any trees which may need to be removed during construction should be surveyed for potential *A. cooperii* nests. If nest sites are found, construction activities/goals should be realigned and/or relocated to remove the impact.
- 4) All construction and vehicle traffic should take place within the identified mobilization and work areas.
- 5) If construction activities occur during the general bird breeding season (Feb 1- Aug 15) a qualified biologist should be consulted to walk the project site and delineate active nest areas to be avoided. If avoidance is not possible, relocation by a qualified biologist or documentation of species take is recommended.

Reptiles and Amphibians

Western pond turtle

The western pond turtle is found in many streams throughout California and would be expected within those having deepwater pools and areas for basking in the sun. Although the turtle spends much of its life in water, it requires terrestrial habitats for nesting. The turtle's range extends from Puget Sound in Washington south to Baja California. There is one recorded observation of this turtle in the Oakland East quadrangle, taken 5.5 miles northwest of the project site at an unknown date.

Habitat at the project site is marginally suitable for this species. The channel is severely incised, and lacks hydrologic features conducive to pool formation (i.e., embedded woody debris, rocky substrate, etc.). The only deep water along the project reach is at the downstream nick point, where the six-foot drop creates forceful creek flows not suitable for this species. Additionally, the creek was observed to be very silty and turbid, and likely contains elevated levels of pollutants conveyed by urban runoff. The lack of historic observations along Chimes

Creek, degraded nature of the project reach, and lack of suitable habitat suggests a very low likelihood of occurrence for this species.

California tiger salamander

The California tiger salamander is a deep black colored salamander with irregular roundish yellow spots. endemic to California. They are endemic to California, and their historic habitat has been severely fragmented. Known populations exist in the Central Valley and adjacent foothills and coastal grassland. Suitable habitat includes grasslands, oak savanna, and edges of mixed woodland and lower elevation coniferous forest. Ground squirrel burrows are necessary for the survival of this species, which it uses to escape high heats and rains⁴. There is one recorded occurrence of this species in the Oakland East quadrangle, taken 4 miles southwest of the site in 1886.

Although riparian woodland meets the general habitat requirements of this species, there were no groundsquirrel burrows or other burrow features observed during the Biological Site Reconnaissance. Given the rapid urbanization of Oakland during the 20th century, it is highly unlikely that the population observed in 1886 remains. Furthermore, the project site is outside of the Department of Fish and Games Generalized Range Map of California tiger salamander⁵. It is therefore determined that presence of the California tiger salamander is highly unlikely.

Yellow-legged frog

The foothill yellow-legged frog is found from the northernmost coastal counties south to Los Angeles County and along the western flank of the Sierra south to Kern County. They inhabit rocky streams within a variety of woodland, chaparral and meadow habitats. Habitat variables closely associated with the presence of this species include stream sites that are partly shaded, less than 0.6 meters deep, and have riffles with at least cobble-sized substrate. They are active during the day. There is one recorded observation of this species in the Oakland East quadrangle, taken 5 miles north northwest of the project site at an unnamed tributary to Moraga Creek in 1997.

Habitat at the project site is marginally suitable for this species. Although there are some parts of the project reach with a cobbled substrate, the creek bottom is generally covered in a thick layer of silt. As previously discussed, the creek is highly turbid, and likely has elevated levels of pollutants conveyed within urban runoff. Given the lack of historic observations along Chimes Creek, and the degraded nature of the project reach, there is a low likelihood of occurrence for this species.

California red legged-frog

The California red-legged frog (CRLF) is a large native frog species. It spends most of its life inhabiting permanent ponds at least 2 feet in depth, adjacent to emergent and shoreline

⁴ University of Michigan Museum of Zoology, 2008. Animal Diversity Website, *Ambystoma californiense* entry. Retrieved April 21, 2008 from

http://animaldiversity.ummz.umich.edu/site/accounts/information/Ambystoma_californiense.html.

⁵ California Department of Fish and Game, date unknown. Department of Fish and Games Generalized Range Map of California Tiger Salamander. Retrieved on April 21, 2009 from <http://www.dfg.ca.gov/wildlife/nongame/docs/CTSRANGE102303.pdf>.

vegetation. The breeding period for CRLF is between early and late winter. It usually breeds in ponds, though will also breed in deep pools of intermittent streams. This species was observed 4.5 miles northwest of the project site during the 1940's, and more recently (1997) at Thornhill Pond 6 miles north.

Habitat at the project site is marginally suitable for this species. The channel is severely incised, and lacks hydrologic features conducive to pool formation (i.e., embedded woody debris, rocky substrate, etc.). The only deep water along the project reach is at the downstream nick point, where the six-foot drop creates forceful creek flows not suitable for this species. Additionally, the creek was observed to be very silty and turbid, and likely contains elevated levels of pollutants conveyed by urban runoff. The lack of historic observations along Chimes Creek, degraded nature of the project reach, and lack of suitable habitat suggests a very low likelihood of occurrence for this species.

Alameda whipsnake

The Alameda whipsnake is a slim, dark snake that grows to 3-4 feet in length. There are several recorded observations of this species in the Oakland East quadrangle, the precise locations of which have been deemed to sensitive to reveal. Several habitat variables have been identified as being associated with the Alameda whipsnake. The whipsnake is almost always associated with open canopy chaparral and coastal scrub stands, although it may utilize adjacent grassland, oak savannah, or other woodland communities if they are immediately adjacent to these shrub habitats. Slope exposure to sunlight is also very important for whipsnake presence. Whipsnakes show a strong preference for south, southwest, or southeast facing slopes as these sites allow for early morning basking⁶.

The project is not immediately adjacent to any chaparral or coastal shrub communities. The nearest chaparral outcrops are located approximately ¼ mile north northeast of the project site, beyond several urban residences and across Interstate-580. There are no southfacing slopes at the site, as the topography is largely flat or gently sloping (with the exception of the incised channel). Also absent on the project site and adjacent properties are rock outcrops or rodent burrows that may serve as retreat sites. During the biological site reconnaissance, no evidence of snake activity was observed (i.e., shedded skin), nor were any lizards seen (the snakes main prey). The project site is outside of the CA Department of Fish and Game determined Alameda Whipsnake Critical Habitat⁷.

Based on the habitat conditions at the project site and surrounding area, contrasted with habitat requirements of the Alameda whipsnake, it is concluded that there is a very low likelyhood of whipsnake occurance.

Pallid bat

Pallid bats roost in a variety of habitats, preferring rocky outcrops. They are sometime found in oak and pine woodlands, and occasionally on farmland. Roosting sites vary based on

⁶ McGinnis, Samuel Biological Consultant, 2006. Report on Findings of Field Survey [for] Alameda Whipsnake [at] Campus Drive, Oakland, CA. Available from Questa Engineering Corp, ref: Adney Hydro.

⁷ California Department of Fish and Game, date unknown. CA Department of Fish and Game determined Alameda Whipsnake Critical Habitat. Retrieved on April 21, 2009 from http://www.fws.gov/sacramento/es/maps/M2_aws_2_fCH_92106.pdf.

surroundings, with pallid bats having been found in caves, rock crevices, mines, hollow trees, and buildings. They hunt later in the evening than other species of bats. Their diet largely consists of large flying and ground-dwelling insects, including beetles, crickets, grasshoppers, cicadas, moths, spiders, scorpions, centipedes, and the occasional small lizard or mouse⁸. The nearest recorded observation was made 2 miles northeast at Redwood Canyon in 1932. There are four other recorded observations of this species in the Oakland East quadrangle, all made between 1931 and 1967.

No crevices, hollow trees, or other suitable roosting sites were observed at the project site. It is possible that, if present nearby, the pallid bat could potentially use Chimes Creek as a foraging site, as creeks and waterbodies have high numbers of insects relative to terrestrial habitats. Creek restoration would likely benefit this and other bat species over the long term, by improving the site's function as a riparian corridor. Given the rapid urbanization of Oakland during the late 20th century, it is highly unlikely that the population observed in 1931 remains. Furthermore, if present any pallid bat foraging would occur in the evening, outside of the construction window. The project would therefore have little or no effect on this species.

Silver-haired bat

Silver-haired bats are medium sized with unique dark, silver-tipped fur. They inhabit temperate woodlands. They roost behind loose tree bark and in hollow snags, showing a preference for willows, maples, and ash trees. Man-made structures such as sheds and garages also occasionally serve as roosting habitat. And their diet primarily includes insects including flies, beetles, and moths⁹. There is one recorded observation of this species in the Oakland East quadrangle, made approximately 4.5 miles northwest of the project site in Piedmont in 1920.

Riparian woodland as occurs at the project site is suitable habitat for this species. However, the sole recorded observation of this species is very old, and not in close proximity to the project site. It is unlikely that this species inhabits the project reach. If present, potential impacts would be those limited to removal of suitable roosting habitat (i.e., trees). It should be noted that this species does not have any Federal or State protection status.

Hoary bat

The hoary bat is a widespread bat species, found in every state in the U.S. except Alaska. They are the size of a plump mouse, with rounded noses, small eyes, and short rounded ears. They roost in the foliage of trees, showing a preference for dense leafy areas with open spaces below. They forage along streams, primarily consuming insects and moths in particular. The nearest recorded observation was made 2 miles northeast at Redwood Canyon in 1949.

Riparian woodland as occurs at the project site is suitable habitat for this species. However, the recorded observations of this species within the surrounding area are very old, and these populations are likely no longer in existence. It is unlikely that this species inhabits the project reach. If present, potential impacts would be those limited to removal of suitable roosting

⁸ University of Michigan Museum of Zoology, 2008. Animal Diversity Website, pallid bat entry. Retrieved April 21, 2008 from http://animaldiversity.ummz.umich.edu/site/accounts/information/Antrozous_pallidus.html.

⁹ University of Michigan Museum of Zoology, 2008. Animal Diversity Website, silver-haired bat entry. Retrieved April 21, 2008 from http://animaldiversity.ummz.umich.edu/site/accounts/information/Lasionycteris_noctivagans.html.

habitat (i.e., trees). It should be noted that this species does not have any Federal or State protection status.

Summary and Suggested Sensitive Species Avoidance Measures

Riparian woodland habitat occurring at the project site is suitable habitat for a variety of special status or protected plants and animals. Based the micro-habitat needs of special status species, historic recorded observations, and conditions observed during the Biological Reconnaissance Survey, it is highly unlikely that any special status species occur at, inhabit, or otherwise utilize the project site at Chimes Creek, with the possible exception of the Cooper's hawk (protected under the Migratory Bird Treaty).

Creek restoration and recontouring would likely benefit existing biological communities. Bank stabilization would improve water quality by reducing turbidity and inputs of fine sediments to the creek (assuming cooperation with the landscaping efforts of adjacent landowners). Recontouring incised areas of the creek with gently sloping banks would allow for natural establishment of pioneer grass and shrub species (or manual seeding opportunity) followed by the eventual establishment of trees and development of a canopy over the creek. Installation of short drop structures would alleviate problems associated with channel bed degradation while creating riffles to oxygenate the creek and promote favorable habitat characteristics for aquatic species. Additional restoration activities could potentially include installation of large woody debris (ex: tree stumps, logs, etc.) and more favorable substrate (rocks or cobblestones), both of which would benefit riparian species by creating habitat niches.

The majority of biological impacts will likely be those associated with the loss of native trees. Whenever feasible, existing trees adjacent to the creek should be left in place. If removed, we recommend that these species be replaced in a quantity and quality equal to or exceeding that of those removed (to be determined by either the permitting agencies or a qualified biologist). Despite their low potential for occurrence, we recommend that minimal sensitive species avoidance measures be integrated to the project design, to be implemented at the time of construction. Integration of these measures will insure that the project has little or no impact on special status species, as well as those more common species occurring in the Chimes Creek watershed. Recommended measures are as follows:

- Whenever feasible, existing trees within the alignment should be left in place. All trees to be removed should be clearly marked on the project plan sheets.
- Project should include implementation of the developed revegetation plan which replaces removed vegetation in such a quantity/quality that equals or exceeds that of vegetation removed.
- In-channel construction activities should be limited to the summer low-precipitation period (August 1st – October 15th) to reduce the potential for impacts on aquatic and species, nesting birds, and water quality.
- Large trees (6-12" diameter) should be inspected prior to removal for the presence of Cooper's hawk, silver-haired bat, hoary bat, or any other bird or bat nesting or roosting

sites. If nest or roosting sites are found, an approved biologist should be employed to determine and implement appropriate relocation procedures.

- Herpetological exclusion fencing should be erected around the perimeter of the work area prior to construction initiation. Fencing should remain until work in sensitive areas is complete.

These recommended sensitive species avoidance measures are considered to be in addition to any best management practices, stormwater pollution protection programs, or other construction phase impact prevention measures determined to be required as part of the project. Implementation of these measures will ensure that the project has minimal impacts on the biological resources occurring at the project reach.

SECTION 4. HYDRAULIC ANALYSIS

A feasibility level hydraulic analysis consists of two primary steps: 1) analysis of existing conditions to determine site constraints and 2) prediction of likely impacts of bank stabilization to local flooding, hydraulics, and downstream erosion problems. This section presents the results of the hydraulic model runs for existing conditions along Chimes Creek and outlines the hydraulic and geomorphic constraints for bank stabilization alternatives.

The 2009 Chimes Creek topographic basemap (**Sheets 1 & 2**) was used to guide selection of cross-section locations throughout the project site. Cross-sections were selected based on proximity to known erosion sites, position in the longitudinal profile, and planform location. Cross section geometry was used with HEC-RAS (Hydrologic Engineering Center River Analysis System) hydraulic modeling software developed by the US Army Corps of Engineers to predict pertinent hydraulic variables such as velocity, depth, and shear stress. The HEC-RAS model was completed for five recurrence flow profiles: the 2-year, or Q2, Q10, Q25, and Q100, as determined from Balance Hydrologic's modeling results (**Table 6**). All discharges were scaled up by 10% to provide a conservative estimate of flows in the channel and to account for watershed areas not included in the Balance Hydrologic flow frequency analysis. For each cross-section, average flow velocity, water surface elevation and shear stress were calculated.

Methods

- **1D Hydraulic Model**

HEC-RAS is a one-dimensional hydraulic model capable of calculating water surface profiles for steady gradually varied flow. The basic computational procedure is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction (Manning's n coefficient) and contraction/expansion (coefficient multiplied by the change in velocity head).