North Fork Putah Creek Channel Maintenance Plan: Drummond Ave. to Mace Blvd.

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1. History and Background

The North Fork of Putah Creek (North Fork) is a remnant channel of the creek running northeasterly from a diversion dam on the main channel, through and including the U.C. Davis Arboretum, to Mace Blvd. Water was diverted in the early 1900's into the current South Fork to abate the flood hazard it presented to the City of Davis.

The North Fork offers considerable aesthetic and wildlife habitat value. Much of this value results from the multi-layer canopy, riparian woodland community including a dense shrub layer and developed tree canopy. Several City parks and open space areas including Putah Creek Parkway, Oakshade Green Belt, Putah Creek Park, and Woodbridge Green Belt, are established along the length of the North Fork. The parks and open spaces focus on the natural beauty and wildlife habitat offered by the remnant riparian forest. These areas offer recreational opportunities such as walking/jogging, bike riding, and wildlife watching. Bike path connectivity along the creek is an important transportation route between the southern and northern portions of Davis.

Many members of the local community take strong ownership in the North Fork and the natural resources it harbors. In the past, local volunteers have assisted in maintenance and habitat enhancement activities. Adjacent open space maintenance has centered on wildlife habitat improvement for public appreciation.

The natural drainage capability of the North Fork channel makes it ideal for stormwater runoff conveyance use. The city uses the segment of channel from Drummond Ave to Mace Blvd for this purpose, draining the eastern portion of the South Davis Drainage Basin. The Drummond to Mace segment receives annual low water channel maintenance by the Public Works Department (PW) to maintain the stormwater conveyance function to prevent residential flooding.

In recent years, concern regarding an increasing fire hazard along the North Fork has been voiced by the Fire Department. The build up of large woody debris and dense "belts" of sub-canopy shrub layer poses a fire threat. In addition, much of the North Fork is difficult to access with fire suppression equipment.

In addition to the growing concern regarding fire hazard, there has recently been an increase in public concern regarding tree fall and broken limb hazards. PW has responded to tree fall calls from residents along the segment from both city and county residents.

The primary goals of this management plan are to define stormwater conveyance, fuel reduction, habitat, and tree fall maintenance objectives and responsibilities, and serve as a guide to help reduce conflict and promote balance between those maintenance objectives.

2. Segment Description and Management Responsibilities

The segment of the North Fork addressed by this document begins approximately 600 feet east of Drummond Ave., running northeast to Mace Blvd (Figure 1).

PW maintenance responsibility includes the low water channel, the entire northern bank out to approximately 3 feet from top of bank, and the eastern segment of the southern bank (across from the west edge of Woodbridge Natural area to the end of the segment). The Parks and Community Services Department (PCS) maintain the adjacent parks and open space areas.

A large portion of the southern bank (across from start of segment to western edge of Woodbridge Natural Area) is composed of unincorporated Yolo County residential parcels. Fuel reduction and tree maintenance along the southern bank is the responsibility of the property owners. Yolo County staff should be responsible for public outreach to these residents. Yolo County should also coordinate with the Davis Fire Department to enforce fuel maintenance. Exhibit C provides a general delineation of maintenance responsibilities.

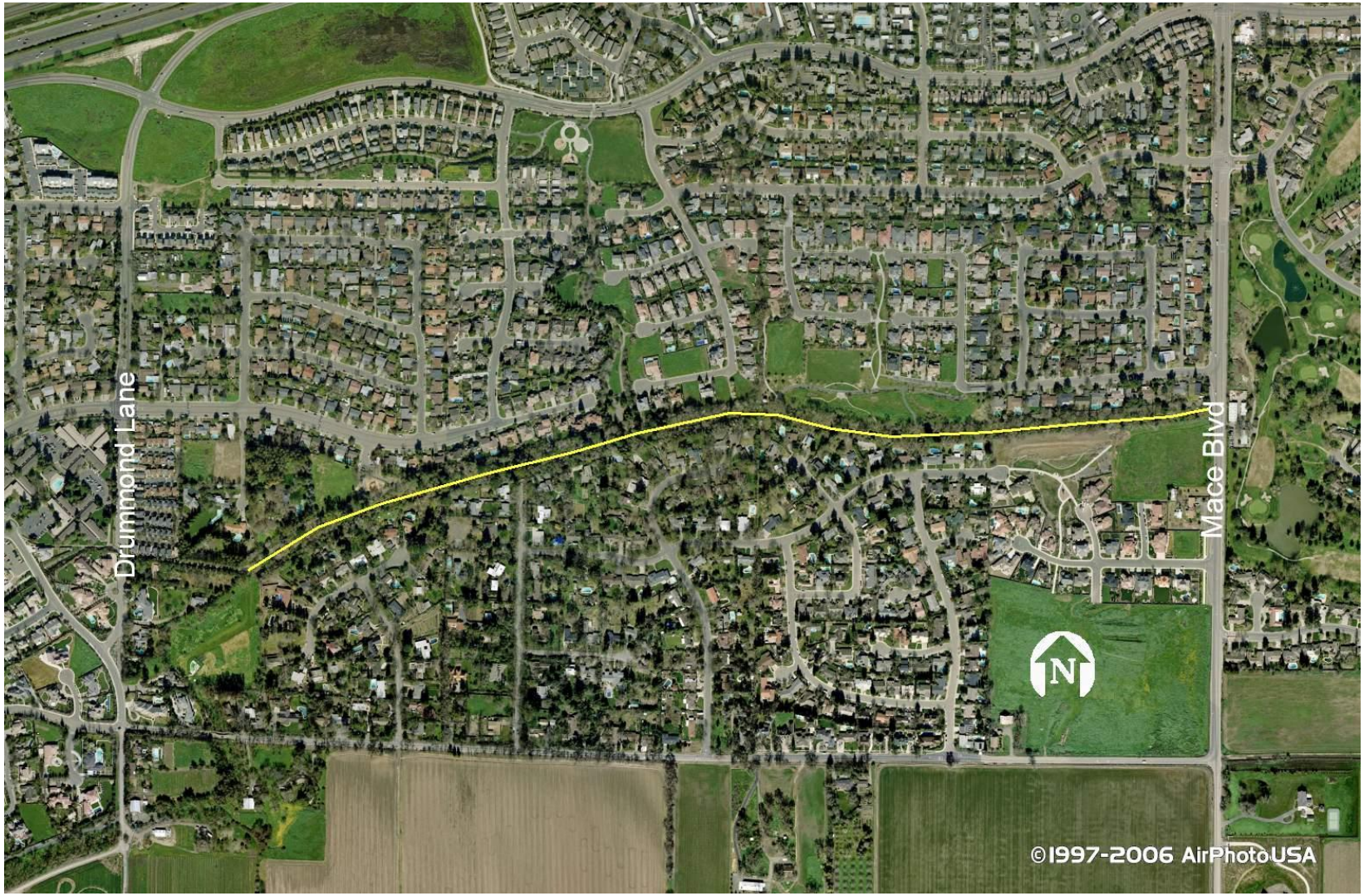
The City's Fire Department, in coordination with the Wildlife Resource Specialist, will be responsible for fuel hazard monitoring and determination of action threshold for sections within the City's management responsibility. The Wildlife Resource Specialist will also be responsible for the pre-maintenance survey to identify potential impacts to sensitive resources, and to mark removable trees and shrubs.

3. Existing Conditions

3.1 Hydrology

As described above, the North Fork no longer conveys the main flow of Putah Creek. The Drummond – Mace segment receives urban stormwater runoff via 12 drain outfalls, draining a total of approximately 823 acres mixed urban land uses. Stormwater flows easterly along the channel to Mace Boulevard were it enters a 72" diameter pipe. The outlet pipe runs under Mace to the El Macero Drainage Channel, eventually draining into the Yolo Bypass. Water flow through this segment is largely seasonal. Peak stormwater conveyance occurs during the winter months. The channel receives varying amounts of nuisance runoff (i.e. landscape irrigation, hydrant flushing, residential car washing, etc.) during the non-rainy season.

Figure 1 – Drummond to Mace Segment of North Fork Putah Creek.



3.2 Biological Resources

3.2.1 Native Vegetation

The vegetation community associated with the North Fork is classified as a Central valley mixed riparian woodland. The tree canopy is dominated by black walnut (*Juglans hindsii*) and Valley oak (*Quercus lobata*). Under story native species include California rose (*Rosa californica*), blue elderberry (*Sambucus mexicana*), and box elder (*Acer negundo*). Toyon (*Heteromeles arbutiffolia*) and California blackberry (*Rubus vitifolius*) also occurs intermittently along the segment. A significant amount of suppressed oak and walnut saplings occur under the shrub layer. A list of native species commonly occurring along the segment is found in Exhibit A.

3.2.2 Non-Native Vegetation

The North Fork is in close proximity to urban development. Non-native species are commonly used in adjacent urban landscapes and have spread to the North Fork channel via seed dispersed by birds or stormwater conveyance. Several large non-native trees including eucalyptus (*Eucalyptus spp.*), and Canary Island pine (*Pinus canariensis*) occur along the segment. Many of the non-native trees were planted here during earlier vegetation establishment efforts. Tree of Heaven (*Ailanthus altissima*), European privet (*Ligustrum vulgare*), and wild almond (*Prunus dulcis*) are prominent in the under story. A list of non-native species commonly occurring along the segment is found in Exhibit A.

3.2.3 Birds

The multi-layer vegetative structure of the North Fork provides habitat to a wide variety of resident and migratory birds. The mature canopy and mosaic of dense vegetation and open areas offer abundant cover and foraging opportunity. The state threatened Swainson's hawk (*Buteo swainsoni*) is known to nest in the mature trees along this segment. Sensitive and common birds potentially occurring along this segment are listed in Exhibit B.

3.2.4 Mammals

The Drummond to Mace segment of the North Fork provides cover and foraging opportunity to many common mammalian species. Of particular interest is the known occurrence of an active Sacramento Valley red fox (*Vulpes vulpes patwin*) den. Other common species often observed in the North Fork include Western grey squirrel (*Sciurus griseus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). A list of mammals potentially occurring along the North Fork is provided in Exhibit B.

3.2.5 Amphibians/ Reptiles

Suitable habitat for native amphibian species is found along this segment. The most common amphibian to the Drummond to Mace segment is the Pacific treefrog (*Hyla regilla*) which utilizes the pockets of impounded water for reproduction. Salamander species may be present, but have not been recently documented. Reptiles common to the North Fork include the pond slider (turtle) (*Trachemys scripta*), gopher snake (*Pituophis melanoleucus*), common garter snake (*Thamnophis sirtalis*), and Western fence lizard

(*Sceloporus occidentalis*). Exhibit B provides a comprehensive list of potentially occurring amphibians and reptiles.

3.3 Fire Hazard

The Drummond to Mace segment of the North Fork presents a fire risk that could potentially lead to loss or damage of residential structures and/ or habitat. This is largely due to sections of dense vegetation, accumulation of leaf litter, slash and fallen trees, and the steep banks. In several areas along this segment, especially along the privately owned southern bank, dense shrubs and intermediate trees create a fuel ladder to the tree canopy. Fire has the potential to quickly run up into the canopy at these locations. Canopy fires are difficult to suppress and may promote embers into adjacent vegetation or residential areas.

Though infrequent, fires have occurred along the North Fork. Historic fires have been human caused. The channel is attractive to young people and homeless and the risk of accidental or intentional ignition is high. Fire suppression response is hampered by a lack of adequate equipment access to many sections of creek.

3.4 Tree Fall Hazard

As is consistent with any dense stand of trees, there is a risk of tree fall. Shallow rooted non-native species are especially prone to falling over. Falling trees present a hazard to life and property. Along this segment, tree fall is more common along the bank slopes and channel bottom.

Many County residents along the southern bank of the segment have structural improvements (i.e. utility sheds and deck patios) close to the top of bank, and in some instances, down on the bank. In the past, County residents have called upon the City to remove trees that had fallen from the north bank and/ or channel onto their property. Being as the trees originated from city maintained areas (City trees), the City accepted responsibility.

PG&E frequently conducts tree pruning along this segment associated with power line clearing.

4. City of Davis Maintenance Objectives

4.1 Stormwater Conveyance

Maintaining the flow of stormwater runoff through the Drummond to Mace segment continues to be a primary objective. Fallen trees or significant accumulation of sediment, trash, and/or woody debris can slow or block the flow of water. Blockage and flooding of the channel may cause bank erosion or stormwater runoff to back up in the surface drainage system, possibly flooding streets or homes. Priorities should include the removal

of fallen cross channel trees, outfall bar screen cleaning, and silt and debris removal from outfall aprons.

4.2 Fuel Reduction

A second objective is to reduce the density of vegetation and accumulation of dead woody debris from the banks to reduce the fire hazard. This should be accomplished by thinning dense pockets of shrubs and intermediate trees, and removing dead woody debris and accumulated duff (i.e. thick layers of twig, leaf, and bark). The retention of some large logs is desirable to improve amphibian and reptile habitat. Fuel reduction priority should be given to vegetated areas that have structures immediately up slope. Areas that have fuel breaks (i.e. bike paths, irrigated turf, etc.) at the top of the bank, or where structures are set back ≥ 50 feet from the top of bank, should be managed to provide cover habitat (see Habitat Conservation below). However, these areas should be evaluated and thinned to reduce the risk of movement of fire from the ground to tree canopy. Exhibit D highlights general areas where fuel reduction activities should be focused. On site monitoring and pre-maintenance surveys will provide specific needs.

Selection priority should be given to non-native, suppressed, or diseased individuals during any necessary vegetation removal. Some of the more mature non-native trees offer significant habitat value and should be left.

4.3 Habitat Conservation

A third maintenance objective is to preserve and improve the multi-layer vegetation community including a developed mature tree canopy, dense to sparse shrub layer, and herbaceous ground cover. These three layers currently exist along the Mace to Drummond segment and offer nesting/ roost, cover, and foraging habitat to a wide variety of wildlife species.

Vegetation thinning for fuel reduction purposes can be accomplished with limited, possibly beneficial, impacts to wildlife habitat. Although many of the plant species found along the segment are fire tolerant, heavy and dense fuels promote intense fires, which may result in permanent loss of individuals and devastating loss of habitat. One strategy would be to break up large, dense, shrub “belts” into clusters. This would help to slow the speed and intensity of a fire while retaining functional cover habitat.

Removing invasive non-native trees and shrubs can help promote native species by allowing more light penetration, effectively releasing the small native tree and shrub saplings. Promoting native vegetation will enhance foraging opportunity for wildlife, and assist in the succession of the next generation of trees and shrubs.

Snags (dead dominant trees) should be retained when appropriate. Snags are an important wildlife element in the riparian forest system. Removal of snags should only be considered if they present an imminent hazard to life or property. Similarly, retention of

several larger diameter logs should be considered to promote amphibian and reptile habitat.

4.4 Fallen Tree Removal

The maintenance objectives for this segment lay primarily with stormwater conveyance, fuel reduction, and habitat conservation. However, fallen trees can impact any or all of these objectives. Fallen trees that may block the flow of water in the channel should be removed during scheduled channel maintenance.

It shall be the responsibility of the City to remove City trees that have fallen on private property. Trees that are at threat of falling (i.e. leaning or hung up) on private property should be assessed by the City Arborist. If the Arborist determines that there is a strong possibility of tree fall, then the tree should be removed during scheduled fuel reduction maintenance.

County staff or County residents shall be responsible for trees originating on County or private property outside of the City maintenance responsibility (i.e. south side of the low water channel).

City and County staff should communicate with PG&E crews regarding cleaning up and removal of tree pruning slash.

5. Maintenance Activities

5.1 Initial Fuel Reduction Effort

An initial fuel reduction effort should occur to reduce the fire hazard. This effort should be conducted as soon as possible upon completion of this document. Subsequent fuel reduction maintenance will be conducted, as needed, based on monitoring. Removal of trees at risk of falling and non-species like the European privet, feral almond, and tree-of-Heaven should be priority. If thinning of native trees and shrubs is necessary, suppressed or diseased individuals should be priority. Some diseased dominant trees may be left for snag recruitment.

5.2 Annual Maintenance

After the initial fuel reduction effort, routine conveyance, vegetation and trash clean up maintenance will continue. Trash clean up events should include local city and county resident volunteers.

5.3 Monitoring/ Implementation Timing

The Drummond to Mace segment should be monitored annually to assess the need for stormwater conveyance, fuel reduction and trash clean up maintenance. The Wildlife

Resource Specialist and Davis Fire Department staff will conduct the survey(s). Ideally, the segment will be surveyed for fuel hazard during the summer. This will give the assessor good representation of fuel conditions. Stormwater conveyance problems and trash may be identified at this time, but can be surveyed anytime before the rainy season.

Fuel reduction and stormwater conveyance maintenance activities will be scheduled to reduce potential impacts to wildlife species. Maintenance activities will occur outside of the core bird breeding season (March 1 to July 31, annually). Necessary fuel reduction activities must occur prior to the following fire season (generally May 15 to November 31, annually). A schedule of the monitoring and implementation timing is provided in Exhibit E.

5.4 Pre-Maintenance Survey

Prior to any proposed maintenance activity within the channel or banks, the Wildlife Resource Specialist will conduct a pre-maintenance survey. The survey should occur no sooner than 2 weeks prior to proposed maintenance activity. The survey will document any sensitive resources and, for the purposes of fuel reduction, identify target species for removal. A survey report will be generated and include detailed information regarding sensitive species avoidance, as well as, information on target vegetation for fuel reduction.

Exhibit A –
Inventory of plant species found occurring along the North Fork Putah Creek.

Trees
Aristocrat pear (*Pyrus calleryana 'Aristocrat'*)*
Black walnut (*Juglans hindsii)*****
Box elder (*Acer negundo*)*****
California buckeye (*Aesculus californica*) *****
California fan palm (*Washingtonia filifera*)****
Canary Island pine (*Pinus canariensis*)*
Cork oak (*Quercus suber*)*
Cawtawba (*Catalpa spp*.)**
English elm (*Ulmus procera*)*
European privet (*Ligustrum vulgare*)**
Fremont cottonwood (*Populus fremontii*)*****
Wild almond (*Prunus dulcis*)**
Holly oak (*Quercus ilex*)**
Incense cedar (*Calocedrus decurrens*)*****
Interior live oak (*Quecus wislizeni*)*****
Locust (*Robinia spp*.)*
Tree of Heaven (*Ailanthus altissima*)**
Valley oak (*Quercus lobata*)*****

Shrubs/Vines
Blue Elderberry (*Sambucus mexicana)*****
California blackberry (*Rubus vitifolius*)*****
California man-root "wild cucumber" (*Marah fabaceus*)*****
California wild rose (*Rosa californica*)*****
English ivy (*Hedera helix*)**
Poison oak (*Toxicodendron diversilobum*)*****
Toyon (*Heteromeles arbutiffolia*)*****
Wild grape (*Vitis californica*)*****

Grasses/Rushes/Sedges/Forbs
Bermuda grass (*Cynodon dactylon*)**
Cattail (*Typha latifolia*)****
Curly dock (*Rumex crispus)**
Giant reed (*Arundo donax*)**
Nutsedge (*Cyperus spp.*)*****
Wild oats (*Avena fatua*)**

* Non-native but desirable.
** Non-native and not desirable (remove)
*** Native but should be controlled (remove if needed)
**** Desirable species

Exhibit B –
Wildlife potentially occurring along the North Fork Putah Creek

Amphibians / Reptiles
CALIFORNIA SLENDER SALAMANDER (*Batrachoseps attenuatus*)
WESTERN TOAD (*Bufo boreas*)
PACIFIC TREEFROG (*Hyla regilla*)
WESTERN POND TURTLE (*Emys marmorata*)
SLIDER (*Trachemys scripta*)
WESTERN FENCE LIZARD (*Sceloporus occidentalis*)
SOUTHERN ALLIGATOR LIZARD (*Elgaria multicarinata*)
RINGNECK SNAKE (*Diadophis punctatus*)
RACER (*Coluber constrictor*)
GOPHER SNAKE (*Pituophis melanoleucu*)
COMMON KINGSNAKE (*Lampropeltis getula*)
COMMON GARTER SNAKE (*Thamnophis sirtalis*)
WESTERN RATTLESNAKE (*Crotalus viridis*)

Birds
GREAT EGRET (*Ardea alba*)
SNOWY EGRET (*Egretta thula*)
GREAT BLUE HERON (*Ardea herodias*)
GREEN HERON (*Butorides virescens*)
TURKEY VULTURE (*Cathartes aura*)
MALLARD (*Anas platyrhynchos*)
WOOD DUCK (*Aix sponsa*)
WHITE-TAILED KITE (*Elanus leucurus*)
SHARP-SHINNED HAWK (*Accipiter striatus*)
COOPER'S HAWK (*Accipiter cooperii*)
RED-SHOULDERED HAWK (*Buteo lineatus*)
SWAINSON'S HAWK (*Buteo swainsoni*)
RED-TAILED HAWK (*Buteo jamaicensis*)
AMERICAN KESTREL (*Falco sparverius*)
RING-NECKED PHEASANT (*Phasianus colchicus*)
WILD TURKEY (*Meleagris gallopavo*)
CALIFORNIA QUAIL (*Callipepla californica*)
VIRGINIA RAIL (*Rallus limicola*)
COMMON MOORHEN (*Gallinula chloropus*)
AMERICAN COOT (*Fulica americana*)
ROCK PIGEON (*Columba livia*)
MOURNING DOVE (*Zenaida macroura*)
BARN OWL (*Tyto alba*)
WESTERN SCREECH OWL (*Megascops kennicottii*)
GREAT HORNED OWL (*Bubo virginianus*)
LONG-EARED OWL (*Asio otus*)
BLACK-CHINNED HUMMINGBIRD (*Archilochus alexandri*)
ANNA'S HUMMINGBIRD (*Calypte anna*)
RUFOUS HUMMINGBIRD (*Selasphorus rufus*)
LEWIS' WOODPECKER (*Melanerpes lewis*)
ACORN WOODPECKER (*Melanerpes formicivorus*)
RED-BREASTED SAPSUCKER (*Sphyrapicus ruber*)
NUTTALL'S WOODPECKER (*Picoides nuttallii*)
DOWNY WOODPECKER (*Picoides pubescens*)
HAIRY WOODPECKER (*Picoides villosus*)
NORTHERN FLICKER (*Colaptes auratus*)
PACIFIC-SLOPE FLYCATCHER (*Empidonax difficilis*)
BLACK PHOEBE (*Sayornis nigricans*)
ASH-THROATED FLYCATCHER (*Myiarchus cinerascens*)
WARBLING VIREO (*Vireo gilvus*)
WESTERN SCRUB-JAY (*Aphelocoma californica*)
YELLOW-BILLED MAGPIE (*Pica nuttalli*)
AMERICAN CROW (*Corvus brachyrhynchos*)
COMMON RAVEN (*Corvus corax*)
TREE SWALLOW (*Tachycineta bicolor*)
CLIFF SWALLOW (*Petrochelidon pyrrhonota*)
BARN SWALLOW (*Hirundo rustica*)
OAK TITMOUSE (*Baeolophus inornatus*)
BUSHTIT (*Psaltriparus minimus*)
BEWICK'S WREN (*Thryomanes bewickii*)
HOUSE WREN (*Troglodytes aedon*)
GOLDEN-CROWNED KINGLET (*Regulus satrapa*)
RUBY-CROWNED KINGLET (*Regulus calendula*)
SWAINSON'S THRUSH (*Catharus ustulatus*)
HERMIT THRUSH (*Catharus guttatus*)
AMERICAN ROBIN (*Turdus migratorius*)
VARIED THRUSH (*Ixoreus naevius*)
NORTHERN MOCKINGBIRD (*Mimus polyglottos*)
EUROPEAN STARLING (*Sturnus vulgaris*)
CEDAR WAXWING (*Bombycilla cedrorum*)
ORANGE-CROWNED WARBLER (*Vermivora celata*)
YELLOW WARBLER (*Dendroica petechia*)
YELLOW-RUMPED WARBLER (*Dendroica coronata*)
WILSON'S WARBLER (*Wilsonia pusilla*)
WESTERN TANAGER (*Piranga ludoviciana*)

Exhibit B cont…

SPOTTED TOWHEE (*Pipilo maculatus*)
CALIFORNIA TOWHEE (*Pipilo crissalis*)
SONG SPARROW (*Melospiza melodia*)
WHITE-CROWNED SPARROW (*Zonotrichia leucophrys*)
GOLDEN-CROWNED SPARROW (*Zonotrichia atricapilla*)
DARK-EYED JUNCO (*Junco hyemalis*)
BLACK-HEADED GROSBEAK (*Pheucticus melanocephalus*)
BREWER'S BLACKBIRD (*Euphagus cyanocephalus*)
BROWN-HEADED COWBIRD (*Molothrus ater*)
HOUSE FINCH (*Carpodacus mexicanus*)
AMERICAN GOLDFINCH (*Carduelis tristis*)
HOUSE SPARROW (*Passer domesticus*)

Mammals

VIRGINIA OPOSSUM (*Didelphis virginiana*)
ORNATE SHREW (*Sorex ornatus*)
BROAD-FOOTED MOLE (*Scapanus latimanus*)
YUMA MYOTIS (*Myotis yumanensis*)
HOARY BAT (*Lasiurus cinereus*)
BRAZILIAN FREE-TAILED BAT (*Tadarida brasiliensis*)
DESERT COTTONTAIL (*Sylvilagus audubonii*)
BLACK-TAILED JACKRABBIT (*Lepus californicus*)
CALIFORNIA GROUND SQUIRREL (*Spermophilus beecheyi*)
WESTERN GRAY SQUIRREL (*Sciurus griseus*)
EASTERN FOX SQUIRREL (*Sciurus niger*)
BOTTA'S POCKET GOPHER (*Thomomys bottae*)
WESTERN HARVEST MOUSE (*Reithrodontomys megalotis*)
DEER MOUSE (*Peromyscus maniculatus*)
BLACK RAT (*Rattus rattus*)
NORWAY RAT (*Rattus norvegicus*)
HOUSE MOUSE (*Mus musculus*)
CALIFORNIA VOLE (*Microtus californicus*)
COMMON MUSKRAT (*Ondatra zibethicus*)
COYOTE (*Canis latrans*)
RED FOX (*Vulpes vulpes*)
GRAY FOX (*Urocyon cinereoargenteus*)
RACCOON (*Procyon lotor*)
LONG-TAILED WEASEL (*Mustela frenata*)
STRIPED SKUNK (*Mephitis mephitis*)

Exhibit C – Maintenance Responsibility

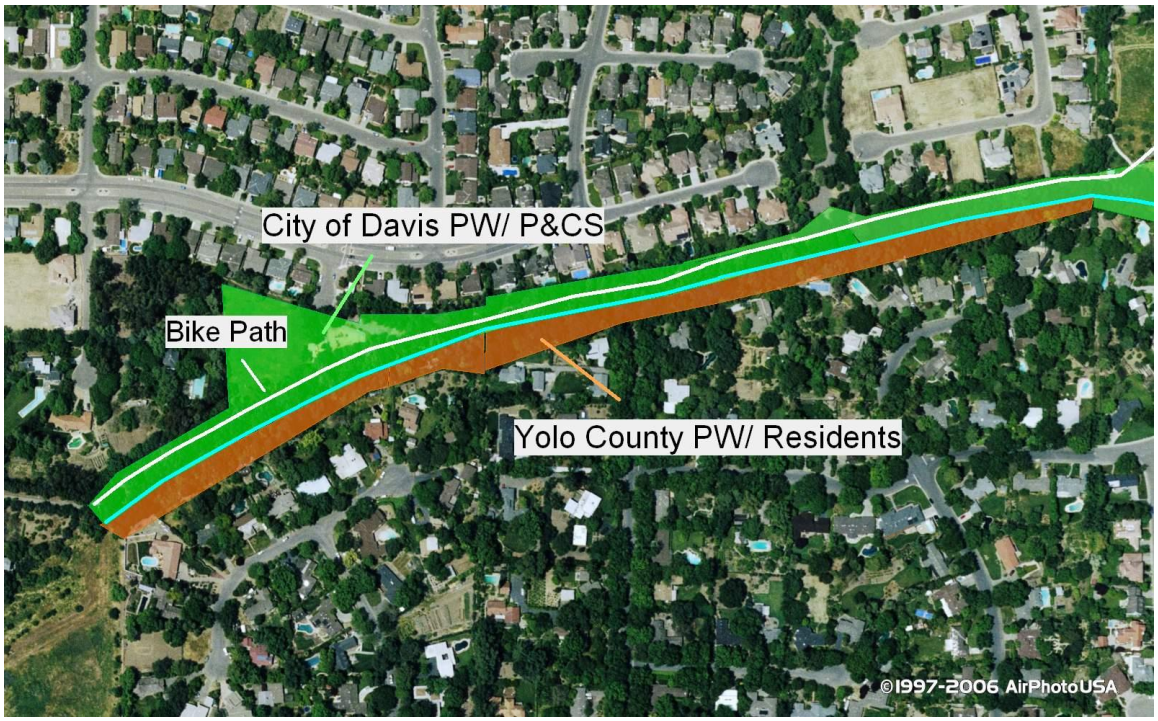


Exhibit D - Priority Fuel Reduction Areas.

Exhibit E – Monitoring and Maintenance Implementation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Annual Fuel/ SW Monitoring												
Initial and Periodic Fuel Reduction Maint.												
Annual SW Maint												
Annual Bird Breeding												
Annual Fire Season												

Orange = Monitoring period
Green = Maintenance period
Red = Sensitive bird breeding period
Yellow = Fire season