APPENDIX B
List of Federal and State Protected Species

Scientific Name	Common Name	Federal Status	State Status
Acipenser fulvescens	Lake Sturgeon		T
Acris crepitans blanchardi	Blanchard's Cricket Frog		SC
Agalinis gattingeri	Gattinger's Gerardia		E
Agalinis skinneriana	Skinner's Gerardia		E
Alasmidonta marginata	Elktoe		SC
Alasmidonta viridis	Slippershell Mussel		SC
Ammocrypta pellucida	Eastern Sand Darter		T
Ammodramus henslowii	Henslow's Sparrow		T
Aristida longespica	Three-awned Grass		T
Asclepias purpurascens	Purple Milkweed		SC
Asclepias sullivantii	Sullivant's Milkweed		T
Baptisia lactea	White or Prairie False Indigo		SC
Beckmannia syzigachne	Slough Grass		T
Botaurus lentiginosus	American Bittern		SC
Buteo lineatus	Red-shouldered Hawk		T
Callitriche heterophylla	Large Water-starwort		T
Carex festucacea	Fescue Sedge		SC
Carex platyphylla	Broad-leaved Sedge		T
Castanea dentata	American Chestnut		E
Chlidonias niger	Black Tern		SC
Cirsium hillii	Hill's Thistle		SC
Cistothorus palustris	Marsh Wren		SC
Clemmys guttata	Spotted Turtle		T
Cuscuta indecora	Dodder		SC
Cypripedium candidum	White Lady-slipper		T
Dalea purpurea	Purple Prairie-clover		X
Dendroica cerulea	Cerulean Warbler		SC
Dentaria maxima	Large Toothwort		T
Diarrhena americana	Beak Grass		T
Dorydiella kansana	Leafhopper		SC
Draba reptans	Creeping Whitlow-grass		T
Epioblasma triquetra	Snuffbox		E
Euonymus atropurpurea	Wahoo		SC
Falco peregrinus	Peregrine Falcon		E
Fimbristylis puberula	Chestnut Sedge		X
Flexamia delongi	Leafhopper		SC

Scientific Name	Common Name	Federal Status	State Status
Flexamia reflexus	Leafhopper		SC
Galearis spectabilis	Showy Orchis		T
Gallinula chloropus	Common Moorhen		SC
Gentiana flavida	White Gentian		E
Gentianella quinquefolia	Stiff Gentian		T
Great Blue Heron Rookery	Great Blue Heron Rookery		
Great Lakes Marsh			
Gymnocarpium robertianum	Limestone Oak Fern		T
Haliaeetus leucocephalus	Bald Eagle		T
Hemicarpha micrantha	Dwarf-bulrush		SC
Hiodon tergisus	Mooneye		T
Hydrastis canadensis	Goldenseal		T
Hypericum gentianoides	Gentian-leaved St. John's-wort		SC
Ixobrychus exilis	Least Bittern		T
Jeffersonia diphylla	Twinleaf		SC
Juncus brachycarpus	Short-fruited Rush		T
Juncus scirpoides	Scirpus-like Rush		T
Lakeplain Oak Openings			
Lakeplain Wet Prairie	Alkaline Wet Prairie, Midwest Type		
Lakeplain Wet-mesic Prairie	Alkaline Tallgrass Prairie, Midwest Type		
Lampsilis fasciola	Wavy-rayed Lampmussel		T
Lithospermum incisum	Narrow-leaved Puccoon		X
Lithospermum latifolium	Broad-leaved Puccoon		SC
Ludwigia alternifolia	Seedbox		SC
Lycopodiella margueriteae	northern prostrate clubmoss		T
Lycopodiella subappressa	Northern Appressed Clubmoss		SC
Macrhybopsis storeriana	Silver Chub		SC
Mesic Northern Forest			
Monarda didyma	Oswego Tea		X
Moxostoma carinatum	River Redhorse		T
Myotis sodalis	Indiana bat	Endangered	
Notropis anogenus	Pugnose Shiner		SC
Noturus miurus	Brindled Madtom		SC
Noturus stigmosus	Northern Madtom		E
Obovaria subrotunda	Round Hickorynut		E

Scientific Name	Common Name	Federal Status	State Status
Panax quinquefolius	Ginseng		T
Panicum leibergii	Leiberg's Panic-grass		T
Pantherophis gloydi	Eastern Fox Snake		T
Papaipema beeriana	Blazing Star Borer		SC
Papaipema sciata	Culvers Root Borer		SC
Penstemon calycosus	Smooth Beard Tongue		T
Percina copelandi	Channel Darter		E
Plantago cordata	Heart-leaved Plantain		E
Platanthera ciliaris	Orange or Yellow Fringed Orchid		T
Platanthera leucophaea	Prairie Fringed Orchid	Threatened	E
Pleurobema sintoxia	Round Pigtoe		SC
Poa paludigena	Bog Bluegrass		T
Polygala cruciata	Cross-leaved Milkwort		SC
Polygala incarnata	Pink Milkwort		X
Polygonatum biflorum var. melleum	Honey-flowered Solomon-seal		X
Polygonum careyi	Carey's Smartweed		T
Prosapia ignipectus	Red-legged Spittlebug		SC
Pterospora andromedea	Pine-drops		T
Rallus elegans	King Rail		E
Ranunculus ambigens	Spearwort		T
Ranunculus rhomboideus	Prairie Buttercup		T
Sander canadensis	Sauger		T
Scirpus clintonii	Clinton's Bulrush		SC
Scleria pauciflora	Few-flowered Nut-rush		E
Scleria triglomerata	Tall Nut-rush		SC
Seiurus motacilla	Louisiana Waterthrush		SC
Simpsonaias ambigua	Salamander Mussel		E
Solidago bicolor	White Goldenrod		SC
Sterna forsteri	Forster's Tern		SC
Sterna hirundo	Common Tern		T
Trillium undulatum	Painted Trillium		E
Triplasis purpurea	Sand Grass		SC
Villosa fabalis	Rayed Bean	Candidate	E
Villosa iris	Rainbow		SC
Vitis vulpina	Frost Grape		T

Scientific Name	Common Name	Federal Status	State Status
Wilsonia citrina	Hooded Warbler		SC
Zizania aquatica var. aquatica	Wild-rice		T

SC = Species of Special Concern (rare or uncertain; not legally protected)
T = Threatened (legally protected)
E = Endangered (legally protected)

APPENDIX C
Air Quality Model Calculations

CALCULATION SHEET-COMBUSTIBLE EMISSIONS

Assumptions for Combustible Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	1	300	8	90	216000
Diesel Road Compactors	0	100	8	40	0
Diesel Dump Truck	1	300	8	30	72000
Diesel Excavator	1	300	8	10	24000
Diesel Hole Trenchers	1	175	8	60	84000
Diesel Bore/Drill Rigs	1	300	8	60	144000
Diesel Cement & Mortar Mixers	1	300	8	60	144000
Diesel Cranes	1	175	8	15	21000
Diesel Graders	1	300	8	10	24000
Diesel Tractors/Loaders/Backhoes	1	100	8	10	8000
Diesel Bull Dozers	1	300	8	10	24000
Diesel Front End Loaders	1	300	8	10	24000
Diesel Fork Lifts	1	100	8	10	8000
Diesel Generator Set	6	40	8	60	115200

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bull Dozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork Lifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTIBLE EMISSIONS

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.105	0.493	1.307	0.098	0.095	0.176	127.585
Diesel Road Paver	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Diesel Dump Truck	0.035	0.164	0.436	0.033	0.032	0.059	42.528
Diesel Excavator	0.009	0.034	0.122	0.008	0.008	0.020	14.184
Diesel Hole Cleaners\Trenchers	0.047	0.226	0.538	0.043	0.041	0.069	49.598
Diesel Bore/Drill Rigs	0.095	0.363	1.135	0.079	0.078	0.116	84.057
Diesel Cement & Mortar Mixers	0.097	0.368	1.155	0.076	0.075	0.116	84.057
Diesel Cranes	0.010	0.030	0.132	0.008	0.008	0.017	12.270
Diesel Graders	0.009	0.036	0.125	0.009	0.008	0.020	14.184
Diesel Tractors/Loaders/Backhoes	0.016	0.072	0.064	0.012	0.012	0.008	6.093
Diesel Bull Dozers	0.010	0.036	0.126	0.009	0.008	0.020	14.184
Diesel Front End Loaders	0.010	0.041	0.132	0.009	0.009	0.020	14.181
Diesel Aerial Lifts	0.017	0.068	0.075	0.012	0.012	0.008	6.090
Diesel Generator Set	0.154	0.477	0.758	0.093	0.090	0.103	74.558
Total Emissions	**0.614**	**2.410**	**6.104**	**0.488**	**0.476**	**0.750**	**543.570**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTIBLE EMISSIONS

Construction Worker Personal Vehicle Commuting to Construction Site-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	60	15	15	0.08	0.10	0.18
CO	12.4	15.7	60	60	15	15	0.74	0.93	1.67
NOx	0.95	1.22	60	60	15	15	0.06	0.07	0.13
PM-10	0.0052	0.0065	60	60	15	15	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	60	15	15	0.00	0.00	0.00
							-		

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	60	2	2	0.00	0.00	0.01
CO	1.32	3.21	60	60	2	2	0.01	0.03	0.04
NOx	4.97	12.6	60	60	2	2	0.04	0.10	0.14
PM-10	0.12	0.33	60	60	2	2	0.00	0.00	0.00
PM 2.5	0.13	0.36	60	60	2	2	0.00	0.00	0.00

Daily Commute New Commuters									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	15	60	0	0	-	0.00	-
CO	12.4	15.7	15	60	0	0	-	0.00	-
NOx	0.95	1.22	15	60	0	0	-	0.00	-
PM-10	0.0052	0.0065	15	60	0	0	-	0.00	-
PM 2.5	0.0049	0.006	15	60	0	0	-	0.00	-

Truck Emission Factor Source: USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway vehicle emission factor model.

CALCULATION SHEET-FUGITIVE DUST

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor		Units	Source
General Construction Activities	0.19	ton PM10/acre-month		MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month		MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Road Upgrade and General Construction Area (0.19 ton PM10/acre-month)

			Conversion Factors	
Duration of Construction Project	3	months	0.000022957	acres per feet
Length	0	miles	5280	feet per mile
Length (converted)	0	feet		
Width	0	feet		
Area	2.00	acres		

New Roads (0.42 ton PM/acre-month)

Duration of Construction Project	3	months
Length		miles
Length (converted)		feet
Width		feet
Area	0.26	acres

	Project Emissions (tons/year)			
	PM10 uncontrolled	PM10 controlled	PM2.5 uncontrolled	PM2.5 controlled
Road Upgrade and General Construc	1.14	0.57	0.11	0.06
New Roads (0.42 ton PM/acre-month	0.33	0.16	0.03	0.02
Total	**1.47**	**0.73**	**0.15**	**0.07**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

CALCULATION SHEET-SUMMARY OF EMISSIONS

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)						
Emission source	VOC	CO	NOx	PM-10	PM-2.5	SO2
Combustible Emissions	0.61	2.41	6.10	0.49	0.48	0.75
Construction Site-fugitive PM-10	NA	NA	NA	0.73	0.07	NA
Construction Workers Commuter & Trucking	0.18	1.71	0.27	0.00	0.00	NA
Total emissions	**0.80**	**4.12**	**6.37**	**1.23**	**0.55**	**0.75**
De minimis threshold (1)	NA	100.00	NA	100.00	100.00	NA

1. De-minimis thresholds for County.