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7. Ecological Characteristics of Area 3 and the Ecological Risk Assessment

The San Gabriel Valley Area 3 *Superfund* Site (Area 3) consists of an urban environment with residential, commercial, and industrial areas. Figure 7-1 shows the location of two relatively large green spaces in Area 3 coincide with two golf courses.

The wildlife found in Area 3 consists of common species tolerant of human disturbance. The occurrence of native vegetation in Area 3 is unlikely; parks and residential yards provide the only wildlife habitat. The hills in the western portion of Area 3 have been developed as low-density residential housing. Therefore, these residential yards are larger and contain more trees than neighborhoods consisting of high-density residential housing elsewhere in Area 3. Burrowing animals (e.g., ground squirrels) and birds likely occur at a higher density in the hills in the western portion of Area 3.

7.1 Terrestrial Ecology

Ornamental trees and exotic grasses of residential yards and parks provide the current biological habitat in Area 3. Commonly planted ornamental trees include pepperwood trees (*Umbellularia californicus*), junipers (*Juniperus spp.*), and eucalyptus (*Eucalyptus globulus*).

Birds of prey could feed on the small mammals present; however, birds of prey are unlikely to nest in urbanized area. Birds of prey that might be observed in Area 3 include the turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), and black-shouldered kite (*Elanus caeruleus*). These carnivores occupy large home ranges and likely reside in the surrounding hills or the riparian habitat of the San Gabriel River southeast of Area 3. Exhibit 7-1 presents the species common to an urban habitat like Area 3.

Each section of this report provides a discussion of the subject, followed by any tables or figures cited in the text. In addition, exhibits and text boxes noted in the margins present key concepts, tables, and figures.

*The glossary explains words presented in **bold**, **italicized** text.*

Figure 7-1 shows two relatively large green spaces located in Area 3.

Exhibit 7-1 presents the species common to an urban habitat.

EXHIBIT 7-1
Species Common to Urban Habitat

Mammals	Reptiles	Birds
Raccoon (<i>Procyon lotor</i>)	Western fence lizard (<i>Sceloporus occidentalis</i>)	Mourning dove (<i>Zenaida macroura</i>)
Striped skunk (<i>Mephitis mephitis</i>)		Starling (<i>Sturnus vulgaris</i>)
California ground squirrel (<i>Spermophilus beecheyi</i>)		Crow (<i>Corvus brachyrhynchos</i>)
Audubon's cottontail (<i>Sylvilagus audubonii</i>)		American robin (<i>Turdus migratorius</i>)
Coyote (<i>Canis latrans</i>)		Wrens (e.g., house wren [<i>Troglodytes aedon</i>])
Various mice (e.g., house mouse [<i>Mus musculus</i>] and deer mouse [<i>Peromyscus maniculatus</i>])		House finch (<i>Carpodacus mexicanus</i>)
		Black phoebe (<i>Sayornis nigricans</i>)
		Northern mockingbird (<i>Mimus polyglottos</i>)
		House sparrow (<i>Passer domesticus</i>)
		Lesser goldfinch (<i>Carduelis psaltria</i>)

Source: California Department of Fish and Game (CDFG), 2005.

7.2 Wetland Ecology

Most of the washes located in Area 3 consist of concrete-lined channels that carry ephemeral surface water flows to the Rio Hondo and provide no habitat for wildlife. The Alhambra Wash, an open channel, converges with the smaller San Pasqual Wash and forms the eastern edge of the Alhambra Municipal Golf Course. The Rubio Wash, an open channel in much of the San Gabriel Golf Course, is generally subterranean in the surrounding urban area.

The Eaton Spreading Basin, located in the eastern portion of Area 3, intermittently contains standing water. This location only provides marginal additional habitat because of the few surrounding trees compared to the nearby urban area.

Three aerated ponds built in the Alhambra Municipal Golf Course provide the only potential wetland habitat for wildlife in Area 3. Mown grass surrounds these wetlands and contains no riparian habitat. Various ducks and American coots (*Fulica americana*) have been observed at these ponds, and geese occasionally might use them as well. The occurrence of waterfowl indicates the presence of food sources, including water column plants and invertebrates. Aquatic insects emerging from the water and fish, if present, could provide food for other birds.

7.3 Special-Status Species

Four threatened or endangered species in Area 3 have been reported to the California Department of Fish and Game (CDFG) based on review of the California Natural Diversity Database (CDFG, 2005). The database identifies species that are present now or were present at one time.

Exhibit 7-2 lists the species reported in Area 3 that have been identified by the State of California or federal government as threatened or endangered.

EXHIBIT 7-2

Species Common to Urban Habitat

Species	Status	Observation
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>):	Federal – Candidate species for listing as threatened or endangered. State of California – Endangered.	No habitat exists in Area 3, but nesting habitat occurs in the riparian willows and cottonwoods of the San Gabriel River.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>):	Federal – Endangered. State of California – Endangered.	Species unlikely to occur in Area 3 due to lack of riparian woodland habitat. Only reported observations occurred prior to 1906.
Coastal California gnatcatcher (<i>Polioptila californica californica</i>):	Federal – Threatened. State of California – Unlisted.	Species occupies coastal scrub habitat below 2,500 feet elevation that occurs in Area 3. However, only one bird identified by call along San Gabriel River near Whittier Narrows in 2000.
Least Bell's vireo (<i>Vireo bellii pusillus</i>):	Federal – Endangered. State of California – Endangered.	Species reported to occur in Whittier Narrows wildlife sanctuary 4 miles southeast of Area 3; unlikely to occur in Area 3 due to lack of riparian woodland habitat.

Source: CDFG, 2005.

Table 7-1 lists 16 other species considered at risk by the CDFG that have been reported in areas covered by the Los Angeles and El Monte quadrangles, although not necessarily in Area 3. The occurrence of these species in Area 3 is unlikely due to the absence of suitable habitat.

7.4 Ecological Risk Assessment

This section presents a summary of the approach, methodology, and results of the *ecological risk assessment* completed as part of the *remedial investigation* (RI). The ecological risk assessment evaluates whether contaminated *groundwater* underlying Area 3 poses a potential for risk to ecological *receptors*. This ecological risk assessment found no unacceptable risks to water column organisms, amphibians and reptiles, plants, or birds, even when using very conservative assumptions in the assessment.

The HHRA conforms to the regulatory guidelines outlined in Appendix F, which include the following steps.

- Environmental Data Evaluation (Section 7.4.2)
- Exposure Estimate (Section 7.4.3)
- *Uncertainty* Analysis (Section 7.4.4)

Exhibit 7-2 lists the threatened or endangered species reported in Area 3.

Table 7-1 presents the other species considered at risk in Area 3.

Table 7-2 presents the DQOs developed to guide data collection, analysis, and interpretation for the ecological risk assessment.

Appendix G presents the complete ecological risk assessment and includes the site survey report as Attachment G-1.

Table 7-2 presents the *data quality objectives* (DQOs) developed to guide the ecological risk assessment. The DQOs define the evaluation to be completed in this subtask and identify potential evaluation results. Methods to avoid incorrect results are also provided. As indicated in Table 7-2, the ecological risk assessment will only evaluate groundwater data for potentially complete *exposure pathways* to ecological receptors. Incomplete exposure pathways for groundwater and soil data are excluded. Table 7-2 also lists the data needs to complete the subtask and describes how the data will be used. Finally, Table 7-2 includes an evaluation of the assessment conducted to determine the quality and usability of the data set.

Appendix G presents the complete ecological risk assessment. The following subsections summarize the risk evaluation.

The ecological risk assessment incorporates the results of a site survey of Area 3 that identifies areas where plants and animals might be exposed to contaminated groundwater. The site survey also confirms that the risk assessment followed scenarios appropriate for the site conditions. Appendix G, Attachment G-1 provides the site survey report.

Figure 7-1 shows the locations of the two areas with potential for groundwater exposure to ecological receptors include the San Gabriel Golf Course and Alhambra Municipal Golf Course. Limited terrestrial habitat within the golf courses occurs in landscaped grasses, trees, and ornamental shrubs. Wells at each golf course provide groundwater for irrigation. Each golf course also contains man-made ponds filled with groundwater used for irrigation. These ponds provide aquatic habitat for waterfowl, fish, and turtles.

Exposure pathways potentially exist from contaminated groundwater to water column organisms (invertebrates and fish), amphibians and reptiles, terrestrial plants, and semiaquatic avian wildlife receptors (e.g., mallard, osprey, and double-crested cormorant) through ingestion and direct contact with groundwater in these ponds and irrigation water.

7.4.1 Approach and Methodology

This assessment follows a tiered approach, consistent with the first two steps outlined in the ecological risk assessment guidance (United States Environmental Protection Agency [EPA], 1997b) to provide a conservative screening-level evaluation. A tiered approach maximizes confidence in any conclusions by using increasingly sophisticated levels of data collection and analysis as needed. Risk assessments use conservative assumptions to prevent overlooking potential ecological risks.

7.4.2 Environmental Data Evaluation

Contaminated groundwater underlying Area 3 poses a potential risk to ecological receptors because the golf courses pump groundwater into surface features and use the groundwater for irrigation. The ecological risk assessment uses data obtained from groundwater samples collected from irrigation wells at

the golf courses. Analysis of the groundwater samples includes testing for 68 *contaminants of potential ecological concern* (COPECs). Of these 68 COPECs tested, only the following 10 COPECs were detected in the groundwater at concentrations that exceed the laboratory reporting limit.

- 1,1-dichloroethene
- 1,2-dichloroethane
- acetone
- carbon tetrachloride
- chloroform
- cis-1,2-dichloroethene (cis-1-2-DCE)
- perchlorate
- *tetrachloroethene* (PCE)
- trans-1,2-dichloroethene
- *trichloroethene* (TCE)

The *ecological potential exposure pathway model* describes the predicted relationships between ecological receptors and the COPECs to which they are potentially exposed, as illustrated in Figure 7-2. Exposure can occur when chemicals migrate from a source to an *exposure point* (i.e., a location where receptors can encounter the chemicals) or when a receptor moves into direct contact with chemicals or contaminated media. An exposure pathway is complete if there is a way for the receptor to take in chemicals through ingestion, inhalation, or dermal absorption. An exposure pathway is complete only when all the following components are present.

- COPEC source (e.g., chemicals used on the site or found in environmental media)
- Mechanism for COPEC release and transport (e.g., groundwater discharges to surface water)
- Exposure point (e.g., surface water at golf courses)
- Feasible route of exposure (e.g., ingestion)
- Receptor (e.g., plant, bird, or water column organism)

An incomplete exposure pathway occurs when any one of these components is absent and presents no risk.

7.4.3 Exposure Estimate

This ecological risk assessment evaluates exposure based on maximum measured concentrations in site media (e.g., water) to which receptors could potentially be exposed. The maximum detected concentrations provide a conservative estimate of each COPEC found in groundwater and a worst-case concentration to which plants or animals could be exposed through direct contact. If the COPEC was not detected, the assessment uses the maximum detection limit to evaluate exposure.

Figure 7-2 presents the ecological potential exposure pathway model.

The assessment compares the COPEC concentrations to *toxicity reference values* (TRVs), which represent the maximum concentration of a COPEC without harmful effects to plants or animals. The risk assessment calculates TRVs separately for each COPEC and for each plant or animal group. The assessment also calculates exposure for birds as a dose, based on estimated concentrations in food and drinking water. The doses were compared to diet-based TRVs.

The ecological risk assessment identifies specific COPECs in groundwater that could pose harmful risks to plants or animals. Exposure concentrations that exceed the TRVs result in *hazard quotients* (HQs) greater than one. This risk assessment considers the COPECs with HQs greater than or equal to 1 to pose a potential risk to receptors. However, HQs greater than or equal to 1 do not necessarily indicate the presence of risks because the derivations of TRVs use intentionally conservative assumptions. HQs less than 1 indicate no potential risks exist.

7.4.4 Uncertainty Analysis of the Ecological Risk Assessment

Uncertainties, inherent in all ecological risk assessments, result from variability in natural processes, imperfect or incomplete knowledge, or errors. The nature and magnitude of uncertainties depend on the amount and quality of data available, the degree of knowledge concerning site conditions, and the assumptions made to perform the assessment.

An uncertainty analysis helps to limit decision making errors by identifying methods or approaches for avoiding, or at least minimizing, the possibility of reaching incorrect conclusions. The analysis evaluates the sources of uncertainty associated with key data and assumptions used to develop the ecological risk assessment. Appendix G presents the sources of uncertainty associated with key data and assumptions in the ecological risk assessment.

7.5 Results of the Ecological Risk Assessment

No predicted harmful risk effects exist for water column organisms; all HQs were less than 1. The maximum concentrations for groundwater COPECs did not exceed the TRVs for amphibians or terrestrial plants. Therefore, no unacceptable risk of harmful effects (HQs greater than 1) exists for amphibians or terrestrial plants from these groundwater COPECs.

Exposure doses for detected COPECs did not exceed the TRVs (HQs greater than 1) for each of three representative bird species (mallard, osprey, and double-crested cormorant). Thus, the COPECs do not pose an unacceptable risk to semiaquatic birds.

7.6 Summary of the Ecological Risk Assessment

This ecological risk assessment evaluates the potential for risks to water column organisms (invertebrates and fish), amphibians and reptiles, terrestrial plants, and semiaquatic avian wildlife from groundwater COPECs within Area 3. COPEC concentrations are likely lower in surface water and irrigation water than in groundwater due to volatilization and degradation of the chemicals as they are transported and stored prior to irrigation. Therefore, this ecological risk assessment considers that the COPECs in groundwater used for irrigation at the Alhambra Municipal Golf Course and San Gabriel Country Club in Area 3 present no apparent risk to ecological receptors and no further action is recommended.

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Glossary

Glossary

contaminant: A substance not naturally present in the environment or present in unnatural concentrations that can, in sufficient concentration, adversely alter an environment.

contaminants of potential ecological concern: Contaminants that potentially pose a risk to ecological receptors.

data quality objectives: Performance and acceptance criteria that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

ecological potential exposure pathway model: A schematic diagram that shows how chemicals at original point of release might move in the environment to the ecological receptors (e.g., birds, mammals, fish, plants) that might come into contact with contaminated media.

ecological risk assessment: A process for systematically evaluating the likelihood that adverse ecological effects may occur as a result of exposure to one or more contaminants.

exposure pathway: Route by which a contaminant travels from a source (e.g., leaky tank or contaminated soil) to receptors. A pathway can involve multiple media (e.g., soil runoff to surface waters and sediment, or volatilization to the atmosphere).

exposure point: Where an environmental contaminant contacts/enters into an organism (e.g., inhalation, ingestion, dermal exposure).

groundwater: Water occurring underground, in the zone of saturation in an aquifer.

hazard quotient: The ratio of the estimated intake to the reference dose. The value is used to evaluate the potential for noncancer health effects, such as organ damage, from chemical exposures.

receptor: A plant or animal species used to estimate the potential exposure to contamination and likelihood of adverse effects to similar organisms in the environment.

remedial investigation: Actions undertaken to characterize the full nature and extent of contamination, including characterization of hazardous substances, identification of contaminant sources, and assessment of human health and ecological risk.

Superfund: The program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA solid waste emergency and

long-term response actions, including conducting or supervising cleanup actions.

tetrachloroethene: A volatile organic compound primarily used for dry cleaning clothing and in manufacturing processes as a solvent and metal degreaser.

toxicity reference value: Species-specific and chemical-specific estimates of an exposure level that is unlikely to cause unacceptable adverse effects on growth, reproduction, or survival

trichloroethene: A volatile organic compound that is a colorless or blue organic liquid with a chloroform-like odor. TCE is primarily used in manufacturing processes as a solvent, metal degreaser, and textile degreaser.

uncertainty: Variability in natural processes, imperfect or incomplete knowledge, or errors in modeling and estimating the potential for risk to human and ecological receptors.

Tables

Figures
