TABLE 3.2.1-1
SOIL ASSOCIATION CHARACTERISTICS
IN BROOKTRAILS TOWNSHIP

Soil Association	Percolation Rate	Expansion Potential	Erosion Hazard	Liquefaction Potential	Soil Strength	Corrosion Hazard
CW[1]	S[2]	M-L[3]	M-H[3]	VL[3]	P[4]	M[3]
CWc	S	M	H	VL	P	M
CWP	S-MR	L-M	H	VL	F	M
Cc	S-MS	H-M	L	VL	P	H-M
GF	M-MR	L	L-M	L	F	H
HSK	S-MS	L-M	M	VL	P	M
HWS	M	L-M	H	VL	P	M-H
OZs	M	M-L	H	VL	P	H-M
OZv	M	L-M	VH	VL	P	H-M
R	M	L	L	L	P-F	M-L
SYW	VS-M	L-H	M	VL	P	H-M
WC	M	L-M	H	VL	P-F	M
YH	VS-M	H-L	H	VL	P	H-M
YSW	M-S	L-H	H	VL	P	H-M
ZHM	MS-S	L-H	M-H	VL	P	M-L

[1] See Soil Map (Figure 3.2.1-2) for Soil Association names.
[2] VR = Very Rapid
R = Rapid
MR = Moderately Rapid
M = Moderate
MS = Moderately Slow
S = Slow
VS = Very Slow
[3] VH = Very High
H = High
M = Moderate
L = Low
VL = Very Low
[4] G = Good
F = Fair
P = Poor

Source: USDA-SCS, 1995.

Soil erosion can be a problem for the project components in much the same way as compressive soils. Basically, the loss of foundation support can result from excessive erosion. Development of steep hillsides could contribute to increased soil erosion in the areas of construction and thereby cause similar problems for existing structures in the Township. Additionally, erosion eventually results in transportation of soil particles removed from higher elevations and their deposition at lower elevations. The destination site often is a creek or pond. Excessive sedimentation in the waterways of Brooktrails would increase turbidity, thereby reducing the quality of the water captured in the Township's reservoirs.

Liquefaction is the transformation of a soil from a solid state to a liquid state as a response to seismically induced groundshaking. The transformation can be very rapid. The soil characteristics of a liquefaction-prone deposit are saturated conditions; loose, uniformly fine sand; little or no clay-sized particles to act as binders; sufficiently violent vibration to increase pore pressure beyond the shear strength of the sand particles. If these conditions occur within about 30 feet of the ground surface, any structures supported on the soils would be subject to tilting or settlement (sometimes very violent and rapid) as the supporting capabilities of the soil diminished. Liquefiable material at or near the ground surface would need to be replaced or recompacted before it could be used as structural support. The liquefaction potential of the soils in Brooktrails appears to be very low because of the relatively high clay component of the native loams. This may not be the case for Recent alluvial soils, which appear to be mostly sand. On-site testing would be necessary in alluvial areas to determine whether or not liquefaction was likely.

Landslides, earthslips, mudflows and soilcreeps are all expressions of soil conditions related to the instabilities created by steep slopes, shallow soil development, the presence of an excessive amount of water, or the lack of strength in the soil or at the soil/rock interface. Each of these conditions is observable in Brooktrails Township, but usually is reported simply as a "landslide." Earthquake activity does induce some landsliding, but most slides result from the weight of rain-saturated soil and rock exceeding the strength of the underlying material. Erosion of supporting material at the toe of a landslide or of a landslide-prone hillside further contributes to slope instability.

3.2.1-2 IMPACTS AND MITIGATION MEASURES

Brooktrails Township Specific Plan Policies.

Plan policies specifically related to erosion control, slope stability and seismic safety in the Plan area appear in the Environmental Resources chapter of the Plan as SOILS AND GEOLOGY GOAL ER-6.5-1 and ER-6.5-2. The Policies for implementing the Goals are so central to the treatment of grading ,

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erosion control, slope stability and seismic safety in the Plan area that they are reiterated here to allow the reader easy reference to the actual language in the Plan.

SOILS AND GEOLOGY GOAL ER-6.5-1: Ensure that slopes, soils, geotechnical conditions and seismic constraints are adequately considered for all development within Brooktrails Township.

POLICY ER-6.5-1A: Discourage development or ensure adequate mitigation for development within areas characterized by steep slopes and soil limitations, including high erosion hazard, severe soil pressure variations, severe shrink-swell potential and septic system unsuitability.

POLICY ER-6.5-1B: Minimize the potential for soil erosion from all development, particularly in the vicinity of natural waterways and reservoirs.

POLICY ER-6.5-1C: Establish guidelines and criteria for development of areas with steep slopes and areas having soil limitations.

SOILS AND GEOLOGY GOAL ER-6.5-2: Avoid construction in areas that are not geotechnically or seismically suitable for development.

POLICY ER-6.5-2A: Within the Maacama Alquist-Priolo Earthquake Fault Zone, recommend geotechnical studies for those structures exempt from the provisions of the Alquist-Priolo Earthquake Fault Zoning Act to demonstrate feasibility of construction where buildings for human occupation are proposed.

POLICY ER-6.5-2B: Establish voluntary lot merger, conservation easement, and financial incentive programs to encourage the consolidation of lots that are characterized by steep slopes (40% or greater), or are not geotechnically or seismically suitable for development.

Standard of Significance

The CEQA Guidelines indicate that a project, such as the implementation of a Specific Plan, normally would have a significant geologic effect if it exposed people or structures to major geologic hazards. The potential geologic, soils and seismic effects of the proposed Brooktrails Township Specific Plan are considered from two points of view: construction impacts and hazards to people or structures. The basic

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POLICY ER-6.5-1C: Establish guidelines and criteria for development of areas with steep slopes and areas having soil limitations.

SOILS AND GEOLOGY GOAL ER-6.5-2: Avoid construction in areas that are not geotechnically or seismically suitable for development.

POLICY ER-6.5-2A: Within the Maacama Alquist-Priolo Earthquake Fault Zone, require geotechnical studies to demonstrate feasibility of construction where buildings for human occupation are proposed. Prohibit new building sites within the Earthquake Fault Zone, unless appropriate geological investigations demonstrate sufficient and suitable land area for development.

POLICY ER-6.5-2B: Establish voluntary lot merger, conservation easement, and financial incentive programs to encourage the consolidation of lots that are characterized by steep slopes (30% or greater), or are not geotechnically or seismically suitable for development.

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The CEQA Guidelines indicate that a project, such as the implementation of a Specific Plan, normally would have a significant geologic effect if it exposed people or structures to major geologic hazards. The potential geologic, soils and seismic effects of the proposed Brooktrails Township Specific Plan are considered from two points of view: construction impacts and hazards to people or structures. The basic

criteria applied to the analysis of construction impacts are whether or not implementation of the Plan's goals as proposed would create substantial changes in the geologic environment at Brooktrails, would exacerbate erosion, or would create unstable slope conditions that would last beyond the short-term construction period. The analysis of hazards involves determining the degree to which implementation of the Plan's goals could endanger residents, visitors or structures through exposure to seismically induced groundshaking or other potentially hazardous geologic or soil conditions.

For the purposes of this EIR, significant geologic hazards are defined as rock, soil or seismic conditions so unfavorable that they could not be overcome by site-specific design, using reasonable construction and maintenance practices. While it is recognized that human activities may have other, nonhazardous, effects on geotechnical conditions, except as such changes relate to the protection of life or to the preservation of ecological values, they are not considered significant in the context of the proposed Specific Plan.

Impacts would be considered *unavoidable significant* effects of the proposed Specific Plan, if they could not be a) reduced to an acceptable level of risk, b) eliminated, or c) avoided by using existing techniques, generally recognized by geotechnical consultants working in northern California to be applicable and feasible.

Each impact identified in the following discussion is indicated as a *significant* (S), *potentially significant* (PS), or *insignificant* (I) impact of the Specific Plan. Mitigation measures to reduce each impact to an insignificant level are listed and described. One unavoidable hazard is identified: fault rupture along the Maacama fault zone. However, the effects of this hazard can be reduced through the application of mitigation measures.

Impact 3.2.1-1

Grading and excavation on, or adjacent to, existing steep slopes, whether underlain by bedrock or alluvial deposits, could create or exacerbate unstable slope conditions at the construction site. (PS)

The surface alteration necessary at individual lot sites to accommodate the construction permitted under the Specific Plan is not considered a significant geologic change in itself. However, the changes to topography for the addition of structures raises issues of slope stability at most sites in the Township. The creation of cuts in alluvium, and the placement of fill as road support or building pad terraces have the potential to create unstable slopes if the cuts and fills are not specifically engineered for stability.

Substantial amounts of material could be needed to fill low areas, or deep cuts could be proposed if structural designs are not adapted to the specific sites, rather than attempting to adapt the sites to the designs.

An acceptable degree of cut-slope or fill-slope stability at these sites can be achieved only by adapting slope design (inclination, compaction, drainage control, etc.) to site-specific geologic conditions. Site-specific stability analysis is the basis of slope design in areas where instability is suspected. Such slope stability analyses contain recommendations for ground preparation, earthwork, foundations, etc., specific to the site, that become an integral part the construction design.

Before approving construction projects in the geologically constrained areas (Alquist-Priolo zone, landslides, slopes steeper than 40%), the County should have a completed report of soil and rock conditions at the project site, provided by the Project Sponsor, that evaluates potential slope instability conditions. The evaluations must be conducted by registered professionals, and measures to reduce or eliminate slope instability must be applied to the project site. The site-specific measures needed to achieve satisfactory slope performance cannot be determined until the soil and rock evaluations are complete and at least conceptual designs for the project have been prepared.

Detailed evaluation of geotechnical and seismic conditions at the sites of proposed structures and slope modifications within the Township are required to be prepared by California-licensed geologists and engineers, as part of the site-design for any proposed project. At a minimum, the investigations must provide information and recommendations for the following items:

1. The characteristics of the fill, soil and rock materials at the site.
2. The most appropriate type of foundations for the proposed structures, and support systems for the proposed slopes.
3. The design criteria for the recommended foundation type or support system, including necessary seismic considerations for the proximity of the Maacama fault.
4. The estimated ground settlement rate beneath the foundation or support system.
5. The necessary subgrade preparation for the foundations or support systems.
6. The lateral pressures for retaining walls.
7. The drainage conditions at the site.
8. The design slopes for cut and fill sections.
9. The suitability of on-site soils for use as backfill.

The recommendations of the foundation, slope and structural reports prepared for the construction of buildings or slopes at the specific project site are required to be incorporated in the Plans and Specifications for the design of the project. The minimum earthquake-resistant design that each project

must include, must meet the current seismic engineering standards of the California Uniform Building Code for Seismic Zone 4. The appropriate standards to be met for near-field conditions (sites within one mile of a known active fault) are determined by the geotechnical and engineering professionals on the basis of the site-specific evaluations.

Mitigation Measure 3.2.1-1

In response to Soils and Geology Policies ER-6.5-1A, -1B and -2A, require site-specific minimal grading concepts, stability analysis and stabilization procedures, and design criteria for cut-slopes and fill-slopes, as recommended by a California Certified Engineering Geologist and Geotechnical Engineer during the design phase for each site inclusive of geologically constrained areas of the Alquist-Priolo zone, landslide areas and steep slopes.

Implementation of this mitigation measure, in a way similar to the following outline, would reduce this impact to an insignificant level. (I)

A. During the design phase for each site where construction is to occur or where substantial amounts of cutting or filling are to occur, the developer's registered geotechnical engineering consultant shall provide documentation that:
   1. site-specific stability analyses has been conducted in the area proposed for grading to establish the design criteria for proposed cut or fill slopes, and
   2. the recommended criteria have been incorporated in the design of cut and fill slopes.

B. During grading for these sites, the registered geotechnical professional shall be on the site:
   1. to supervise the implementation of slope stability designs,
   2. to observe areas of potential instability,
   3. to supervise slope repairs, as necessary, and
   4. to supervise compaction testing.

C. The registered geotechnical engineering consultant should prepare an "as built" map, to be filed with the County, showing details of the site geology, the location of foundations, retaining walls, sub-drains and cleanouts, the results of stability analyses and compaction tests, and documenting the following requirements.
   1. The CUBC Seismic Zone 4 standards shall be the minimum acceptable standards for stability of new or altered slopes.
   2. Only the minimum amount of grading necessary for obtaining fill material, stabilizing slopes, and installing structures or access shall be performed in areas where slopes are steeper than 20 percent, to avoid the creation of potentially unstable slopes in borrow areas or at the construction sites.
   3. Cut-slopes in alluvium, and fill-slopes shall be no steeper than 3:1 (horizontal to vertical) unless the design-level geotechnical investigation can demonstrate the satisfactory stability of a steeper configuration.
   4. Cut-slopes in bedrock shall be no steeper than 2:1 (horizontal to vertical) unless the design-level geotechnical investigation can demonstrate the satisfactory stability of a steeper configuration.
   5. Side-hill fills, if used, shall be keyed, provided with surface and subsurface drainage, and compacted according to the design specifications of the slope stability analyses for the site provided by the geotechnical professional.

Impact 3.2.1-2

Grading, excavation and construction activities would have the potential to increase erosion of soil from building sites, and to cause subsequent deposition of particles in drainage ways, creeks, or reservoirs. (PS)

During the grading and construction period, the potentially erosive effects of water leaving the construction areas would be of concern. Runoff during the grading period could carry particles of soil or fill from the grading or construction sites, or could erode soil down-gradient, if the flow were not controlled. In some cases the loss of the material by erosion may not be a significant impact in itself. However, the re-deposition of eroded material in water courses or lakes could create turbidity (endangering aquatic life), reduce wildlife habitat, and reduce the water-carrying capacity of streams and drainage ways, thereby potentially aggravating flood conditions (see Section 3.2.2, Hydrology). Erosive conditions uncontrolled during the grading period can persist into the occupation period of a building project.

The single most effective method to counteract the potential for water erosion, is to complete as much of the grading and construction as possible during the dry season. However, if portions of these phases extend into the wet season, sediment can be prevented from leaving the construction sites through the use of silt fences, straw bales, perimeter ditches, water bars, temporary culverts and swales, sediment traps, minimal grading concepts, and similar techniques appropriate for the site. These erosion and sediment transport control structures need to be in place prior to the onset of seasonal rains.

General grading activities, including those related to construction, are regulated by the California Uniform Building Code. Because Brooktrails contains a variety of slope gradients and of soil and rock materials, plans to control erosion and sediment transport must be suited to the sites where grading and construction is to occur. The concepts to be incorporated (as appropriate) in such plans have been published by the Association of Bay Area Governments and are reproduced in Mitigation Measure 3.2.1-2 below.[23]

Mitigation Measure 3.2.1-2

In response to Soils and Geology Policies ER-6.5-1A and -1B, during design review, require an Erosion and Sediment Transport Control Plan, designed by an erosion control professional, or landscape architect or civil engineer specializing in erosion control, that would meet the following

23. Association of Bay Area Governments (ABAG), *Manual of Standards for Erosion and Sediment Control Measures*, Berkeley, revised, June 1981.

objectives for the grading and construction period of building projects in the Township, and throughout the lifetime of each project.

The implementation of this mitigation measure, in a way similar to the following outline, would reduce this impact to an insignificant level. (I)

A. The Erosion and Sediment Transport Control Plan shall be submitted, reviewed, implemented and inspected as part of the approval process for the grading plans for each project.

B. The Plan shall be designed by the developers' erosion control consultant, using concepts similar to those developed by the Association of Bay Area Governments, as appropriate, based on the specific erosion and sediment transport control needs of each area in which grading and construction is to occur. Those concepts include, but are not necessarily limited to the following items.

Confine grading and activities related to grading (demolition, construction, preparation and use of equipment and material storage areas, staging areas, preparation of access roads,) to the dry season, whenever possible.

If grading or activities related to grading need to be scheduled for the wet season, ensure that structural erosion and sediment transport control measures are ready for implementation prior to the onset of the first major storm of the season.

Locate staging areas outside major streams and drainage ways.

Keep the lengths and gradients of constructed slopes (cut or fill) as low as possible.

Discharge grading and construction runoff into small drainages at frequent intervals to avoid buildup of large potentially erosive flows.

Prevent runoff from flowing over unprotected slopes.

Keep disturbed areas (areas of grading and related activities) to the minimum necessary for demolition or construction.

Keep runoff away from disturbed areas during grading and related activities.

Stabilize disturbed areas as quickly as possible, either by vegetative or mechanical methods.

Direct runoff over vegetated areas prior to discharge into public storm drainage systems, whenever possible.

Trap sediment before it leaves the site with such techniques as check dams, sediment ponds, or siltation fences.

Make the contractor responsible for the removal and disposal of all sedimentation in retention ponds, that is generated by grading and related activities of the project.

Use landscaping and grading methods that lower the potential for down-stream sedimentation. Modified drainage patterns, longer flow paths, encouraging infiltration into the ground, and slower storm-water conveyance velocities are examples of effective methods.

Control landscaping activities carefully with regard to the application of fertilizers, herbicides, pesticides or other hazardous substances. Provide proper instruction to all landscaping personnel on the construction team.

C. During the installation of the erosion and sediment transport control structures, the erosion control professional shall be on the site to supervise the implementation of the designs, and the maintenance of the facilities throughout the demolition, grading and construction period.

D. The erosion control professional shall prepare an "as built" erosion and sediment control facility map, to be filed with the Township, showing details of the biological and structural elements of the plan, and providing an operating and maintenance schedule throughout the operational period of the project.

Impact 3.2.1-3

Use of weak soils for foundation support without prior treatment could create unstable soil conditions at the construction site. (PS)

The existence of impermeable, expansive, compressible and corrosive soils in Brooktrails make it necessary to ensure the soils used for foundation support are sound. The creation of cut or fill building pad terraces in unsuitable soils has the potential to create future problems of foundation settlement and utility line disruption if the soils are not specifically engineered for stability.

An acceptable degree of soil stability can be achieved by adopting soil treatment programs (grouting, compaction, drainage control, etc.) and foundation designs (grade beams, drilled piers, driven piles, etc.) that address site-specific soil conditions. Site-specific analysis is the basis of foundation design in areas where unsuitable conditions are suspected. Such analyses contain recommendations for ground preparation, earthwork, foundations, etc., specific to the site, that become an integral part the construction design.

Before approving a project in Brooktrails, the County should have a completed report of soil conditions at the project site, provided by the Project Sponsor, that identifies potentially unsuitable soil conditions. The evaluations must be conducted by registered soil professionals, and measures to eliminate inappropriate soil conditions must be applied to the project site. The site-specific measures needed to achieve satisfactory soil performance cannot be determined until the soil evaluations are complete and at least conceptual designs for the project have been prepared.

Mitigation Measure 3.2.1-3

In response to Soils and Geology Policies ER-6.5-1A and -1C, during design review, require site-specific soil suitability analysis and stabilization procedures, and design criteria for foundations, as recommended by a California-registered soil engineer during the design phase for each site where the existence of unsuitable soil conditions is known or suspected.

Implementation of this mitigation measure, in a way similar to the following outline, would reduce this impact to an insignificant level. (I)

A. During the design phase for each site where the existence of unsuitable soil conditions is known or suspected, the developer's registered soil engineering consultant shall provide documentation to the Township that:

   1. site-specific soil suitability analyses has been conducted in the area of the proposed foundation to establish the design criteria for appropriate foundation type and support, and
   2. the recommended criteria have been incorporated in the design of foundation.

B. During grading for these sites, the registered soils professional shall be on the site:

   1. to observe areas of potential soil unsuitability,
   2. to supervise the implementation of soil remediation programs, and
   3. to verify final soil conditions prior to setting the foundations.

C. The registered soils engineering consultant shall prepare an "as built" map, to be filed with the County, showing details of the site soils, the location of foundations, sub-drains and cleanouts, the results of suitability analyses and compaction tests.

Impact 3.2.1-4

The northeast corner of the Plan Area is subject to the damaging effects of surface rupture along traces of the Maacama fault during the useful economic life of the Specific Plan. (S)

Surface rupturing along the trace of a fault affects all types of material; however, it does not always show clearly in unconsolidated soils or alluvium. Damage caused by surface rupturing is limited to the actual location of the fault-line break, unlike damage from groundshaking which can occur at great distances from the fault. Even a moderate earthquake can be accompanied by enough surface rupturing to damage foundations and buried utility lines that have not been adequately protected where they cross fault traces.

Under the Alquist-Priolo Earthquake Fault Zoning Act of 1972, the State is required to delineate "Earthquake Fault Zones" along known active faults, with the intent of regulating development near active

faults in order to mitigate the hazard of surface fault-rupture.[24] An Earthquake Fault Zone has been delineated in the Township along the Maacama fault zone.

Mitigation Measure 3.2.1-4

In response to Soils and Geology Policy ER-6.5-2A, secure the recommendations of a site-specific fault trace location and activity level investigation, performed by a California Certified Engineering Geologist, a California Registered Geologist or California Registered Geotechnical Engineer, to be incorporated in the design of all structures intended for human occupancy within the Earthquake Fault Zone that crosses the Township.

Implementation of this mitigation measure, in a way similar to the following outline, would not prevent rupture of the Maacama fault, but would reduce the effects of this hazard to an insignificant level for new structures in the Earthquake Fault Zone. (I)

A. The minimum setback from an active fault trace should be 50 feet, unless the site-specific fault investigation can demonstrate satisfactory safety conditions closer to the trace.

B. Additional seismic-resistant earthwork and construction design criteria shall be incorporated in the project as necessary, based design review and on the site-specific recommendations of a California Certified Engineering Geologist in cooperation with California Registered Geotechnical and structural engineering professionals.

C. During site preparation, the registered geotechnical professional shall be on the site to supervise implementation of the recommended criteria.

D. The geotechnical consultant shall prepare an "as built" map/report, to be filed with the County, showing details of the site geology, the location and activity level of fault traces, and the type and location of seismic-restraints used in the project facilities.

Impact 3.2.1-5

Brooktrails will be subject to damaging seismically induced groundshaking during the useful economic life of the Specific Plan. (S)

From the review of regional and local geo-seismic conditions, it is apparent that Brooktrails will be subjected to at least one major earthquake during the useful economic life of the Township Specific Plan.[25] The design earthquake for the Brooktrails area is estimated to be about an M7 earthquake on

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24. Hart, 1991, *op. cit.*

25. Working Group on California Earthquake Probabilities, *Probabilities of large earthquakes in the San Francisco Bay region, California*, United States Geological Survey Circular 1053, 1990, 51 pages. The United States Geological Survey projected a 67 percent chance of at least one M7+ earthquake within the San Andreas Fault System in the San Francisco Bay area during the 30 year period 1990 - 2020. The probability is considerably lower (by an unspecified amount) north of the Bay area, but remains significant.

the Maacama fault, creating peak horizontal ground accelerations as high as 0.7g. The resulting vibration could cause damage to structural members of proposed commercial and residential facilities (primary effects), and could cause ground failures in alluvium and poorly compacted fill (secondary effects).

In Mendocino County, buildings constructed for human occupancy are required to reduce the exposure to potentially damaging seismic vibrations through seismic-resistant design, in conformance with the CUBC Seismic Zone 4 requirements. The CUBC Seismic Zones (1 through 4) roughly correspond to peak accelerations from the maximum credible earthquake expected within a given area (10 percent through 40 percent of the force of gravity). Because the parameters of the CUBC Seismic Zone 4 would be exceeded by the design earthquake for Brooktrails it is necessary to review the seismic protection requirements for all new or modified structures in more detail.

The geologic conditions at the construction sites, the criteria for determining the design earthquake for the specific project site, and the seismic-restraint criteria for areas in which new structures will be located need to be reviewed by a California Registered Geologist or Certified Engineering Geologist in consultation with the geotechnical and structural engineers for the project. The review would produce recommendations regarding seismic restraints that would be incorporated in the design of projects in Brooktrails to increase the chances of survival for residents and visitors to the Township during a major earthquake.

Mitigation Measure 3.2.1-5

In response to Soils and Geology Goal ER-6.5-2 and Policy ER-6.5-2B, require site-specific seismic-restraint criteria, as recommended by a California-registered geotechnical or structural engineer, to be incorporated in the design of slopes, foundations and structures for projects in the Township.

Implementation of this mitigation measure, in a way similar to the following outline, would reduce this impact to an insignificant level. (I)

A. The minimum seismic-resistant design standards for all proposed facilities shall conform to the CUBC Seismic Zone 4 Standards.

B. Additional seismic-resistant earthwork and construction design criteria shall be incorporated in the project as necessary, based on design review and the site-specific recommendations of a California Certified Engineering Geologist in cooperation with California-registered geotechnical and structural engineering professionals.

C. During site preparation, the registered geotechnical professional shall be on the site to supervise implementation of the recommended criteria.

D. The California Certified Engineering Geologist consultant shall prepare an "as built" map/report, to be filed with the County, showing details of the site geology, the location and type of seismic-restraint facilities, and documenting the following requirements, as appropriate.

1. Engineering analyses shall demonstrate satisfactory performance of bedrock, alluvium and fill where they form part or all of the support for structures.

2. Analysis of soil expansion potential and appropriate remediation (compaction, removal, etc.) shall be completed prior to using expansive soils for foundation support.

3. Roads, foundations and underground utilities in fill or alluvium shall be designed to accommodate settlement or compaction estimated by the site-specific investigations of the geotechnical consultant.

Impact 3.2.1-6

The Specific Plan would increase the number of dwelling units in an area subject to seismic groundshaking with its attendant secondary effects of ground failure. (S)

If the Specific Plan is implemented, the establishment of a total of approximately 3800 dwelling units in an area subject to geological hazards could not be avoided. These hazards, previously discussed in this section, can be reduced to a great extent through properly applied engineering design, and management procedures, but they cannot be entirely eliminated. To offset the effects of these hazards, the Specific Plan proposed the implementation of the above listed Soils and Geology Goals and Policies, in addition to the County's requirement of the use of the current CUBC standards for all new structures. Appropriate site-specific investigation of geologic conditions for new structures intended for human occupancy are necessary to the safety of development projects in the Township.

Mitigation Measure 3.2.1-6

Implement Mitigation Measures 3.2.1-1 through 5. In addition, this EIR should remain available at the Township for potential builders and/or lot purchasers. This would reduce this impact to an insignificant level. (I)

Impact 3.2.1-7

The dam for the proposed water-supply reservoir could be vulnerable to damage in an earthquake. (PS)

Damage to the proposed water-supply reservoir dam in a very severe earthquake is unlikely because the dam would be designed to meet the stringent requirements of the California Department of Water Resources, Division of Safety of Dams (DSOD). The dam is required to be built to withstand the forces produced by the maximum credible earthquake (M8.3) likely to occur on the San Andreas fault.

The dam itself would not lie on an active or potentially active fault. The nearest fault trace in the vicinity of the proposed dam is about 2 miles to the northeast, with no evidence of Holocene (last 11,000 years) displacement. As such, it is not considered to pose a greater threat to the proposed dam than the design earthquake on the San Andreas fault.

No dams in California have failed as a result of earthquakes; however, at least two dams of inadequate structural design have been so damaged by seismically induced secondary ground failures that they had to be abandoned. In 1971, the Lower Van Norman Dam was damaged by a severe landslide on the reservoir side of the dam during the San Fernando earthquake. Prior to World War II, the Scheffield Dam near Santa Barbara was damaged by earthquake-generated liquefaction. According to the DSOD, there was no substantial water loss in either case. Residents in the potential inundation zone were evacuated successfully and the dams eventually were abandoned as structurally unsafe. Under increasingly stringent DSOD regulations, the risk of earthquake-induced dam failures is reduced to a reasonable level.

The dam would be designed and constructed to meet the current static load and seismic load standards of the DSOD. The structure would be inspected periodically by DSOD for static and dynamic stability.

Mitigation Measures 3.2.1-7

In response to Soils and Geology Goal ER-6.5-1 and -2, require a detailed Earthquake Preparedness Plan to be prepared by the dam operations personnel and submitted for review and approval by the County.[26]

26. Red Cross Disaster Resource Center, *Corporate Disaster Planning Guide*, Golden Gate Chapter, American Red Cross, San Francisco, 1986.

Implementation of this mitigation measure, in a way similar to the following outline, would reduce this impact to an insignificant level. (I)

A. The specific language of earthquake preparedness plans varies, but should include the following items:

1. Ensuring existing and proposed seismic designs meet current County, State and Federal standards, where applicable.
2. Making structural and non-structural elements secure from the effects of expected levels of groundshaking.
3. Assigning specific personnel primary and backup responsibilities to be carried out during a seismic emergency.
4. Providing supplies of emergency water, food and shelter for project personnel to remain on-site for at least three days.
5. Providing training for personnel in First Aid, CPR and other emergency response procedures.
6. Carrying out practice drills of emergency response procedures.
7. Preparation of an inundation zone map and evacuation plan.

B. Township public safety and maintenance facilities should be located out of the dam failure inundation zone.

*

3.2.2 HYDROLOGY AND WATER QUALITY

3.2.2-1 SETTING

This section describes the local and regional hydrologic conditions in the Brooktrails Township area, and evaluates the way in which the proposed Specific Plan could affect surface water hydrology and water quality, erosion and sediment transport, and groundwater resources.

Regional Hydrologic Setting

Brooktrails Township is near the upper end of the Eel River watershed. The Eel River drains an area of approximately 3,684 square miles in the Coast Ranges, emptying into the Pacific Ocean about 15 miles south of Eureka. The watershed is about 120 miles long, averages 30 miles in width, and trends northwest, almost parallel to the Mendocino Coast. Elevations in the generally rugged terrain range to over 7,500 feet above mean sea level.[1] Figure 3.2.2-1 is a map of the Eel River watershed.

The climate of the Eel River watershed is one of the wettest in California, with annual average precipitation ranging from 35 inches along the coast to more than 110 inches in the mountainous areas. The average for the watershed is about 59 inches. Most of the precipitation falls in the form of rain during large storms that move into the area from the northwest in the late autumn and winter months. Snow falls at the higher elevations, but its quantity and contribution to runoff usually are inconsequential. Although the watershed covers only about 2 percent of the land area of California, its average annual runoff constitutes about 9 percent of the runoff from the State.

1. United States Geological Survey (USGS), *Sediment Transport and Turbidity in the Eel River Basin, California, Water-Supply Paper # 1986, 1971.*

Figure 3.2.1-1: Eel River Watershed

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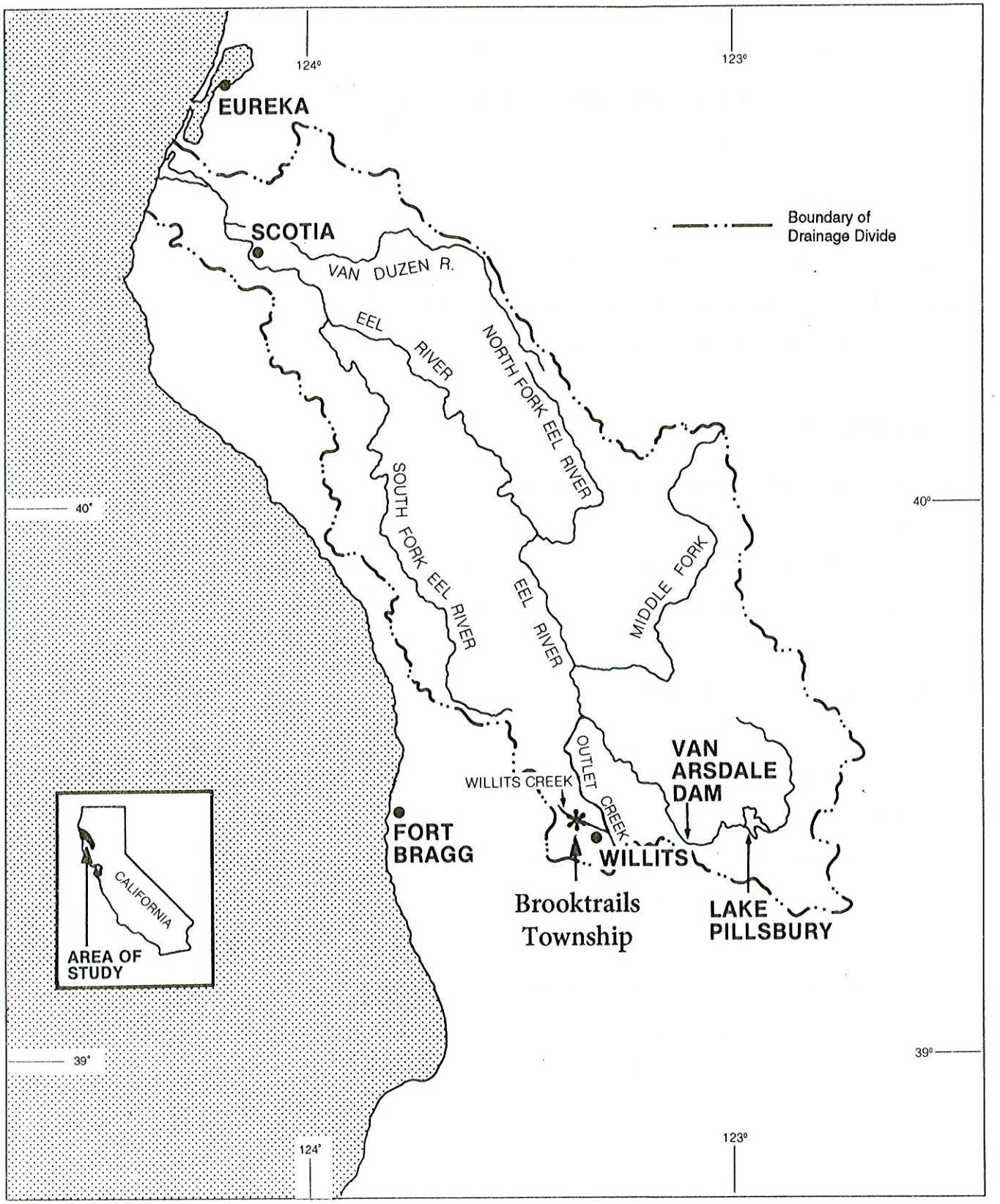
1. United States Geological Survey (USGS), *Sediment Transport and Turbidity in the Eel River Basin, California, Water-Supply Paper # 1986, 1971.*



Source: EIP Associates

BROOKTRAILS TOWNSHIP SPECIFIC PLAN EIR

Figure 3.2.2-1

Eel River Watershed

The average annual runoff from the Eel River watershed is about 6.8 million acre-feet (AF).[2] Precipitation and runoff follow a seasonal pattern, with the majority of the precipitation and runoff occurring between November and March. Because of the lack of snow and storage, streamflow is highly responsive to precipitation, and high flows diminish quickly in the absence of sustaining rainfall.

The Eel River has the highest recorded average annual suspended sediment yield per square mile of drainage area of any river of its size or larger in the United States.[3] The combination of geology, soil types, steep slopes and heavy precipitation produces slumps and landslides that contribute heavily to the sediment yield of the watershed. In places where the landslides are adjacent to stream channels, sediment production is consistently higher than in other areas. Landslides occur most frequently in the Middle Fork Eel River basin and along the slopes of the main reach of the Eel River in the central part of the watershed. Erosion may become severe in other areas that have been subjected to heavy grazing or to deforestation by fires or lumbering practices.

The major surface water features in the watershed are Lake Pillsbury (storage capacity 93,700 AF) impounded behind Scott Dam near the upper end of the watershed, and Van Arsdale Reservoir, located just downstream of Lake Pillsbury. An average of about 147,000 AF per year (one-third of the Eel River flow at this point) is diverted to the Russian River basin at Van Arsdale Reservoir, through the Potter Valley Tunnel and Powerhouse. However, these structures involve only about 10 percent of the total drainage area of the Eel River and, therefore, have little effect on the natural runoff pattern in the lower Eel River.

Locally, Morris Reservoir, on Davis Creek, has a storage capacity of about 600 AF and has provided water supply for the Town of Willits for a number of years; recently, Willits constructed a new 700 AF reservoir upstream of Morris reservoir. Two reservoirs in the

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2. USGS, 1971, *op. cit.*

3. USGS, 1971, *op. cit.*

Willits Creek watershed provide 265 AF and 135 AF for the municipal water supply to Brooktrails Township.[4]

Regional Water Quality

A water quality investigation was conducted for the Eel River basin in the 1970s.[5] The study conducted water quality sampling for more than three years, and analyzed water quality data that have been collected since the 1950s. It was determined that the water quality of Eel River watershed generally is quite good. The concentrations of major inorganic chemical constituents (calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride and nitrate) were correlated to discharge rates; that is, the concentrations of these constituents tended to increase with higher flow rates. Concentrations of ammonia nitrogen, organic nitrogen, nitrate, phosphorus and total organic carbon tended to increase with increasing distance downstream. Concentrations of trace elements were low, generally at or below the limits of detection. Pesticides were not detected in any water or sediment samples.

Brooktrails Township Hydrology

There are actually several small watersheds in Brooktrails Township, all of which are tributary to Outlet Creek, a major tributary to the main reach of the Eel River above its confluence with Middle Fork Eel River. Willits Creek watershed is, by far, the largest at approximately 5.55 square miles, draining to Mill Creek, which flows through the Town of Willits to Outlet Creek in Little Lake Valley. The other watersheds are Upp, Bull and Rowes creeks, all of which, together, drain less than one square mile of Brooktrails, along the northeast boundary of the Township directly to Outlet Creek. Other local tributaries to Outlet Creek include Baechtel, Broaddus, Davis and Haehl creeks. The majority of the Outlet Creek watershed is

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4. Wetmore and Rice, Inc., Brooktrails Township Water System and Wastewater Collection System Management Plan, February 1981.

5. USGS, Water Quality Investigation, Eel River, California, Water Resources Investigation 76-5, April 1976.

characterized by lower elevations, more gentle slopes and generally less erodible materials than those in the Willits Creek watershed.

The Willits Creek watershed contains two prominent creeks: Willits Creek and its main tributary, Dutch Henry Creek which joins Willits Creek at Lake Emily. Several small tributaries flow into Willits Creek. One unnamed creek flowing through the old Brooktrails Ranch headquarters joins Willits Creek at Lake Ada Rose. The average annual precipitation over these watersheds is about 52 inches, with an average annual runoff estimated at about 86 percent, yielding about 8,500 AF. The remainder of the precipitation is lost to direct evaporation or is taken up by vegetation.[6]

Two domestic water-supply reservoirs in the Willits Creek watershed provide municipal water supply to Brooktrails. Lake Emily at the confluence of Willits and Dutch Henry creeks has a capacity of about 265 AF (including 75 AF of storage provided by flashboards) and drains an area of about 4.91 square miles. Lake Ada Rose at the confluence of an unnamed tributary and Willits Creek has a drainage area of about 0.64 square miles, and has a storage capacity of 135 AF. The total existing storage capacity for the Township is about 400 AF.[7]

A water quality analysis of the raw water used by Brooktrails determined that the water is generally of high quality, and that following the treatment provided by the Township, adequately protects public health and is suitable for domestic use. The raw water is low in total dissolved solids, relatively low in alkalinity, has a low pH, and is soft. The raw water does exceed the recommended limit for manganese and iron (corrected during treatment), and at certain times of the year has odor and color resulting from the high levels of turbidity.

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6. Brooks and Vogel, *Watershed Sanitary Survey for Brooktrails Township Community Services District*, January 1996.

7. Brooks and Vogel, 1996, *op. cit.*

Turbidity is normally low, except during high runoff periods, and filtration as well as settlement is used to correct this effect.[8]

Drainage and Flooding

The Federal Emergency Management Agency has zoned Mill Creek, downstream from its confluence with Willits Creek, with respect to its flooding potential.[9] The 100-year flood is contained within a well-defined channel upstream from Highway 101 (Main Street), with expected flood depths between 3 and 5 feet. A wide area of shallow flooding (less than 1 foot) and a narrow zone of 100-year flooding (up to 3½ feet) between Main Street and the old Southern Pacific tracks are confined by the highway and railroad embankments. East of the old SP right-of-way Mill Creek enters the 100-year floodplain of Little Lake Valley where broad areas of shallow flooding (up to 1 foot) occur during major storms, at least once a year. The City of Willits maintains three 12 X 8 foot culverts under Mill Creek Drive which pass the 100-year storm event in Mill Creek with sufficient freeboard to accommodate much larger storms by metering the flow downstream through the City. In the recent very heavy storm event of 1992/93 tree trunks had to be removed from one of the culverts to restore free flowing conditions, but sufficient freeboard remained to prevent flooding of Mill Creek Drive, 8 feet above the culverts, and to prevent flooding downstream. Although the Mill Creek drainage system capacity is adequate for the foreseeable future, Outlet Creek, into which Mill Creek flows, experiences shallow floods during every major storm event. The culverts under Highway 101, three miles north of Willits, act as meters for Outlet Creek to the north and back up water into Little Lake Valley to the south.[10]

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8. Brooks and Vogel, 1996, *op.cit.*

9. Federal Emergency Management Agency (F.E.M.A.), *Flood Insurance Rate Map, City of Willits, California, Mendocino County*, prepared by the Federal Insurance Administration, F.E.M.A., Department of Housing and Urban Development, effective date: 30 September 1988, Community-Panel Number 060187 0001 C, scale approximately 1:4800.

10. R. Seanor, CE, Willits City Engineer, telephone conversation with G.J. Burwasser, geologist, EIP Associates, 03 April 1996.

Because of the preponderance of steep slopes and thin soils in Brooktrails Township, the runoff factor is high, even in undeveloped areas. In flatland areas or areas with gentle slopes, typical runoff factors for woodlands range from 5 to 25 percent of rainfall. For barren slopes steeper than about 30 percent, the runoff factor is between 70 percent and 90 percent of rainfall; about the same as for a heavy industrial area or a paved road.[11] As previously stated, it is estimated that 86 percent of rainfall in Brooktrails becomes runoff, despite the extensive forest cover.[12] This is explained by the soil and rock conditions in the Township. The soils are fairly thin (that is to say, the underlying bedrock is close beneath the ground surface) and loamy (about 30 percent clay) so they become saturated rapidly. Additional rain simply flows over the surface of the saturated soil without sinking in. The rocky slopes are quite steep (in many areas steeper than 40 percent) so rainfall does not remain on a given hillside long enough to soak in, unless the storm is prolonged. Even then, rainfall often penetrates the thin soil only to flow down the bedrock surface to a nearby seep at a lower elevation and re-appear as runoff. Consequently, the existing developed areas in the Township, even if they were as impermeable as paved roads, would be only slightly more impermeable than the average for the entire watershed, and they represent less than 9 percent of the land surface. Even if the developed area were double to nearly 18 percent of the land area, the average runoff for the Township would increase by less than ½ of 1 percent,[13] still within the capacity of the existing drainage system,[14] and not enough to be considered a significant impact on potential downstream flooding.

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11. Chow, V.T., "Runoff", Section 14 in *Handbook of Applied Hydrology*, McGraw-Hill, San Francisco, 1964, 54 pages.

12. Brooks and Vogel, 1996, *op. cit.*

13. If the average runoff factor for the entire watershed is 0.86, and the factor for the developed 9 percent of the watershed is 0.90, the remaining undeveloped 91 percent of the watershed would have a runoff factor of 0.856. Doubling the developed area to 18 percent, as a rough estimate for projected development, would give the following equation for the post-development runoff factor: (.18% developed x 0.90) + (.82% undeveloped x 0.856) = 0.86392. This represents an increase of about 4 tenths of a percent in the average runoff of the watershed.

14. R. Seanor, CE, Willits City Engineer, telephone conversation with G.J. Burwasser, geologist, EIP Associates, 03 April 1996.

Sediment Transport

Every stream transports sediments that have eroded from the watershed. Sediment transport consists of bedload and suspended load. *Bedload* refers to that portion of the total sediment load that moves along the bottom by rolling or sliding, and generally is composed of sand and coarser particles, greater than 1.0 mm in diameter. *Suspended load* refers to that portion of the total sediment load carried in suspension by the flowing water, generally particles smaller than 0.5 mm. Erosion rates within the watershed vary from storm to storm, depending on rainfall intensity and soil particle size. Sediment eroded from the watershed during one storm may be deposited in the stream channel, but remain there until a subsequent storm washes it downstream.

Sediment transport rates are strongly correlated with river flow rates: the higher the stream flow, the higher the rate of sediment transport. This is because the energy necessary to move the sediment load is provided by the flowing water. Higher flow rates provide more energy with which to move the sediment load. Sediment transport fluctuates from near zero during low flow periods to extremely large quantities during major floods.[15]

The total amount of sediment that passes any point of a stream is referred to as the sediment yield, often expressed in terms of tons per square mile of drainage area per year. While no specific data are available, the sediment yield of Willits Creek is estimated to be on the order of 1,000 tons per square mile per year. This estimate is based on both general hydrologic information and specific studies done on the Eel River basin. Erosion rates along Willits Creek are considerably below average for the Eel River basin as a whole, which generally has a quite high sediment yield.[16]

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15. Dunne, T., and L.B. Leopold, *Water in Environmental Planning*, 1978.

16. a) United States Department of Agriculture, Soil Conservation Service, *Soil Survey of Mendocino County, Eastern Port, and Trinity County, Southwestern Port, California*, R.F. Howard and R.H. Brown, Principal investigation, Table 15, 1991.
    b) USGS, 1976, *op. cit.*

Groundwater

A study of the groundwater resources of Mendocino County indicates that most of the County, including Brooktrails Township, is underlain by consolidated rocks of the Franciscan assemblage: rocks usually are dry and generally provide well-yields of less than 5 gallons per minute (gpm).[17] Little Lake Valley, east of the Town of Willits, contains unconsolidated soil materials consisting of gravel, sand, silt and clay, and is the area nearest to Brooktrails that has important groundwater resources. Well-yields in the valley range from less than 50 gpm to over 1,000 gpm, depending on the porosity and permeability of the unconsolidated fill. The main source of groundwater recharge for Little Lake Valley is precipitation as rainfall. Generally, precipitation of 60 to 75 percent of normal fills these groundwater basins to capacity, and no long-term overdraft is occurring. The groundwater level is less than 15 feet below the valley floor; however, high salinities and small pockets of gas prevail at depth, making extraction of water from deeper areas infeasible.[18]

Regulatory Setting

Protection of water quality within California is the responsibility of the State Water Resources Control Board. The State Board acts jointly with the nine Regional Water Quality Control Boards (RWQCBs) to provide State-level coordination and regional familiarity with local needs and conditions. The North Coast RWQCB has regulatory authority over the waters in the Brooktrails area. A general permit for Storm Water Discharges Associated with construction Activities is required for any construction project disturbing more than five acres from the State Water Resources Control Board. The permit requires the development of a plan to prevent deleterious erosion and sedimentation impacts.

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17. USGS, Groundwater Resources in Mendocino County, California, Water Resources Investigations Report 85-4258, July 1986.

18. USGS, 1986, *op. cit.*

Comprehensive water quality planning is set forth in the Water Quality Control Plan or "Basin Plan" for the North Coast Region.[19] The basin plan lists a total of 14 beneficial uses of the Eel River that must be protected against water quality degradation. These beneficial uses include municipal and domestic supply, agricultural supply, industrial service supply, groundwater recharge, navigation, hydropower generation, water contact recreation, non-contact water recreation, warm freshwater habitat, cold freshwater habitat, wildlife habitat, preservation of rare and endangered species, fish migration and fish spawning.

19. California Water Resources Control Board, North Coast Region, Water Quality Control Plan for the North Coast Region, September 1989.

The State Water Resources Control Board, Division of Water Rights, is a quasi-judicial body that administers water rights within California. The Township must obtain a Permit to Appropriate Water in order to allow the diversion of water from Willits Creek. The SWRCB establishes the right of the applicant to use water, and the priority of that right. In addition, the SWRCB is concerned that permittees prevent waste, practice water conservation, and use the water to the fullest beneficial use.

3.2.2-2 IMPACTS AND MITIGATION MEASURES

Brooktrails Township Specific Plan Policies. Plan policies specifically related to protection of the Township's water supply appear in the Environmental Resources chapter of the Plan as HYDROLOGY AND WATER QUALITY GOAL ER-6.4. The Policies for implementing this Goal are so central to the control of turbidity in the Plan area that they are reiterated here to allow the reader easy reference to the actual language in the Plan.

HYDROLOGY AND WATER QUALITY GOAL ER-6.4: Ensure existing and future development does not degrade Township water quality or cause sedimentation of Township waterways and reservoirs.

> POLICY ER-6.4A: Protect the Township's water supply by controlling future construction around lakes, creeks and other water supply sources.
>
> POLICY ER-6.4B: Protect the Willits Creek watershed from erosion and sedimentation. Stabilize stream banks with vegetation and other low impact restoration techniques as necessary.

Standards of Significance

The CEQA Guidelines indicate that a project normally will have a significant adverse impacts to water quality or hydrology if it will cause 1) substantial flooding, 2) substantial degradation of water quality (including siltation from erosion), or 3) substantial interference with groundwater recharge. For the purpose of this document, the potential hydrologic effects of the Brooktrails Township Specific Plan are considered from two points of view: the short-term effects of construction and the long-term effects of operation. Based on these criteria, implementation of the Specific Plan would not have significant adverse impacts on hydrology and water quality, either short term and long term, because the Specific Plan contains mitigation measures in the form of water quality protection policies.

Impact 3.2.2-1

Grading and excavation on, or adjacent to, existing steep slopes, whether underlain by bedrock or alluvial deposits, could create or exacerbate erosion conditions at the construction site, and to cause subsequent deposition of particles in drainage ways, creeks, or reservoirs. (PS)

Mitigation Measure 3.2.2-1

In response to Hydrology and Water Quality Policies ER-6.4A and B, require site-specific minimal grading concepts, stability analysis and stabilization procedures, and design criteria for cut-slopes and fill-slopes, as recommended in Soils and Geology Mitigation Measure 3.2.1-1, and an Erosion and Sediment Transport Control Plan, as required in Soils and Geology Mitigation Measure 3.2.1-2.

Implementation of this mitigation measure would reduce this impact to an insignificant level. (I)

3.2.3 BIOLOGICAL RESOURCES

3.2.3.1 INTRODUCTION

This section of the EIR includes an assessment of biological resources in Brooktrails Township and the potential for adverse effects to sensitive habitats and species from lot development. This section describes existing conditions and evaluates current land use in relation to vegetation and wildlife, evaluates special-status species and potential habitat, and evaluates the affects to biological resources of lot development.

3.2.3.2 METHODS

Baseline Information

Background materials and information were gathered from several sources. To determine whether sensitive animal or plant species occur in the study area, EIP consulted California Natural Diversity Data Base (CNDDB) 1996 records (Rarefind Report).[1] Additional information on sensitive plants was obtained from the California Native Plant Society's (CNPS) Electronic Inventory and *Inventory of Rare and Endangered Vascular Plants of California*.[2] The *Timber Inventory & Management Plan* prepared for the Brooktrails Township Community Services District (Township) Greenbelt Area was reviewed for information on plant communities in Brooktrails Township. Aerial photographs were used to delineate habitat types based on the dominant vegetation observed through field reconnaissance.

The DEIR for the proposed Willits Creek Reservoir was reviewed for information on plant and animal species and habitat present in the vicinity of Willits Creek. The Environmental Assessment, prepared by EIP in fall 1993, inventoried, described, and analyzed the environmental characteristics of the Township. Existing environmental conditions were mapped by environmental issue areas, including vegetation and wildlife, to assist in identifying opportunities and constraints for future development.

1. California Department of Fish and Game, Natural Heritage Division, California Natural Diversity Database Rarefind Report, February 1996.

2. Skinner, M.W. and Bruce M. Pavlik, 1994. California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California - Fifth Edition.*

Information from the Environmental Assessment provides background material to assist with preparation of the Specific Plan EIR.

Claire Wheeler, a contributor to the *Flora of Mendocino County* was counseled regarding her knowledge of sensitive plant species in the vicinity of Brooktrails Township.[3]

Field Surveys

EIP biologists analyzed habitat during general field surveys of Brooktrails Township conducted for the Environmental Assessment in July 1990 and October 1993. Wildlife resources of Willits Creek and its headwaters, tributaries, riparian corridor, and channel were surveyed on foot between July 27 to 29, 1993. During field surveys, special emphasis was placed on identifying the presence of any State- or Federally-listed or proposed threatened or endangered plant or animal species, candidates for such listing, or plants or animals in various categories of sensitivity. A list of all plant and wildlife species observed during EIP's field surveys is contained in Appendix B.

In addition to daylight searches for wildlife and their artifacts (tracks, nests, scats, etc.), a small number (40) of Sherman-type live traps, 3 x 3 x 10 inches in size, were set along Willits Creek and in woodland and grassland habitats to obtain information on small mammal species present in the area on July 27 and 28, 1993. In the evenings of July 27 and 28, areas along roadways were searched from a vehicle using a hand-held 1 million-candle-power lamp.

A series of systematic searches for the northern spotted owl during daylight hours and through nocturnal calling surveys were conducted for two days and nights during the period of July 27 to 29, 1993, according to survey protocol provided by the U.S. Fish and Wildlife Service and the U.S. Forest Service.[4,5,6] Additional field reconnaissance was conducted by EIP in August 1993.[7]

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3. Claire Wheeler, telephone conversation with Lee Ellis, Eip Associates, March 12, 1996.

4. Terry Simon-Jackson, U.S. Forest Service, personal communication, July 23, 1990.

5. U.S. Forest Service, 1988. *May 25, 1988 Addendum to Spotted Owl Inventory and Monitoring Handbook of February 16, 1988.*

6. Steven Spangle, U.S. Fish and Wildlife Service, Sacramento, personal communication, July 20, 1990.

7. Norma Jellison, Senior Associate, EIP Associates. Letter to Mr. Paul Williams, General Manager, Brooktrails Township Community Services District, November 5, 1993.

3.2.3.3 SETTING

Regional Biological Setting

Brooktrails Township is located northwest of Willits in the coast ranges of northern California. Willits and Little Lake Valley mark the approximate boundary between the drier Inner North Coast Range and the moister Outer North Coast Range. The climate of the outer range is largely influenced by its proximity to the Pacific Ocean (Willits is about 20 air-miles from the Pacific). A number of resulting environmental factors determine the distribution of vegetation and wildlife in the area. These factors include more rainfall than occurs in areas to the east; the moderating effect of summer fog from the Pacific; generally cooler temperatures than in areas to the east, especially during the summer; and more moderate temperatures during the winter than in the interior portions of the range.

The elevation of the Brooktrails area ranges from just over 1,500 feet to about 2,700 feet above sea level. Slopes along the ridgetops and in valley bottoms are gentle to moderate, but slopes in some of the major drainages, such as along Willits Creek, are very steep, approaching 45 degrees or more. These slopes have the potential for severe erosion.

Willits Creek and Dutch Henry Creek provide the main drainage from the Brooktrails area. Several unnamed drainages associated with these two creeks flow east into Outlet Creek in Little Lake Valley and then north to the Eel River.

Most of the area has been extensively logged. Existing vegetation is dominated by trees in the 20- to 150-year-old range, where age is dependent on the time of logging and the history of fire.[8]

Soils and Topography

Soils on the site are derived from Franciscan sandstone or Franciscan melange. A small serpentinite outcrop occurs along a road cut near the intersection of Crawford Road and Daphne Way, in the northeast corner of the subdivision. Serpentinite forms magnesium-rich soils which are favored by a characteristic suite of rare plants. It is likely that other serpentine areas occur elsewhere within the Specific Plan area.

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8. Camp, L.D. 1984. *Management Plan for the Brooktrails Community Services District Greenbelt Area Located in Mendocino County.* Lawrence D. Camp & Associates. Memo, October 25, 1984.

Over most of the Township, the topography is composed of moderately to steeply sloping hillsides with gently sloping to flat-lying ridge crests and valleys. Between 25 and 30 percent of the Township contains slopes of 40 percent and greater.

Habitat

Wildlife Habitat

Habitat is the type of environment in which a plant or animal normally lives or grows, and in which all essentials for development and existence are present. Habitats differ in species composition and in their value to wildlife.

High quality habitat includes most or all of the resource values such as complex structure, shade, water, soils, lack of disturbance, or other resource characteristics that are necessary to function as habitat for plant or wildlife species.

Moderate quality habitat has many, but not all, of the resource values that are necessary to function as habitat for wildlife species.

Low or marginal habitat has only a few of the resource values that are necessary to function as habitat for wildlife species.

Suitable (or potential) habitat is defined as an area which contains most or all of the resources necessary for species use, and which is accessible, useable, and within the range of a species, whether or not the species has been observed to occur in the area.

Habitats are usually characterized either by physical features or by dominant plants, or both. Habitat types referred to in this EIR correspond to the plant communities present based on descriptions developed by Holland.[9] This classification generally corresponds to the Wildlife Habitat/Relationships (WHR) system developed by Cheatham and Haller for the CDFG.

9. Holland, Robert F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California, Resources Agency - Department of Fish and Game.

A delineation of habitat types is based on the dominant vegetation observed through field reconnaissance of the site and review of aerial photography. Habitat types occurring in Brooktrails Township are shown on Figure 3.2.3-1.

The following twelve habitat types/communities have been identified in Brooktrails Township:

Aquatic Habitat

Riverine/Fisheries Habitat

The majority of Brooktrails Township lies within the Eel River drainage basin, which is tributary to the Pacific Ocean. West of Sherwood Road, two perennial streams, Willits Creek and Dutch Henry Creek, flow southeasterly, traverse the central and eastern areas of the Township, and drain into Lake Emily, a potable water supply reservoir created by damming Willits Creek.

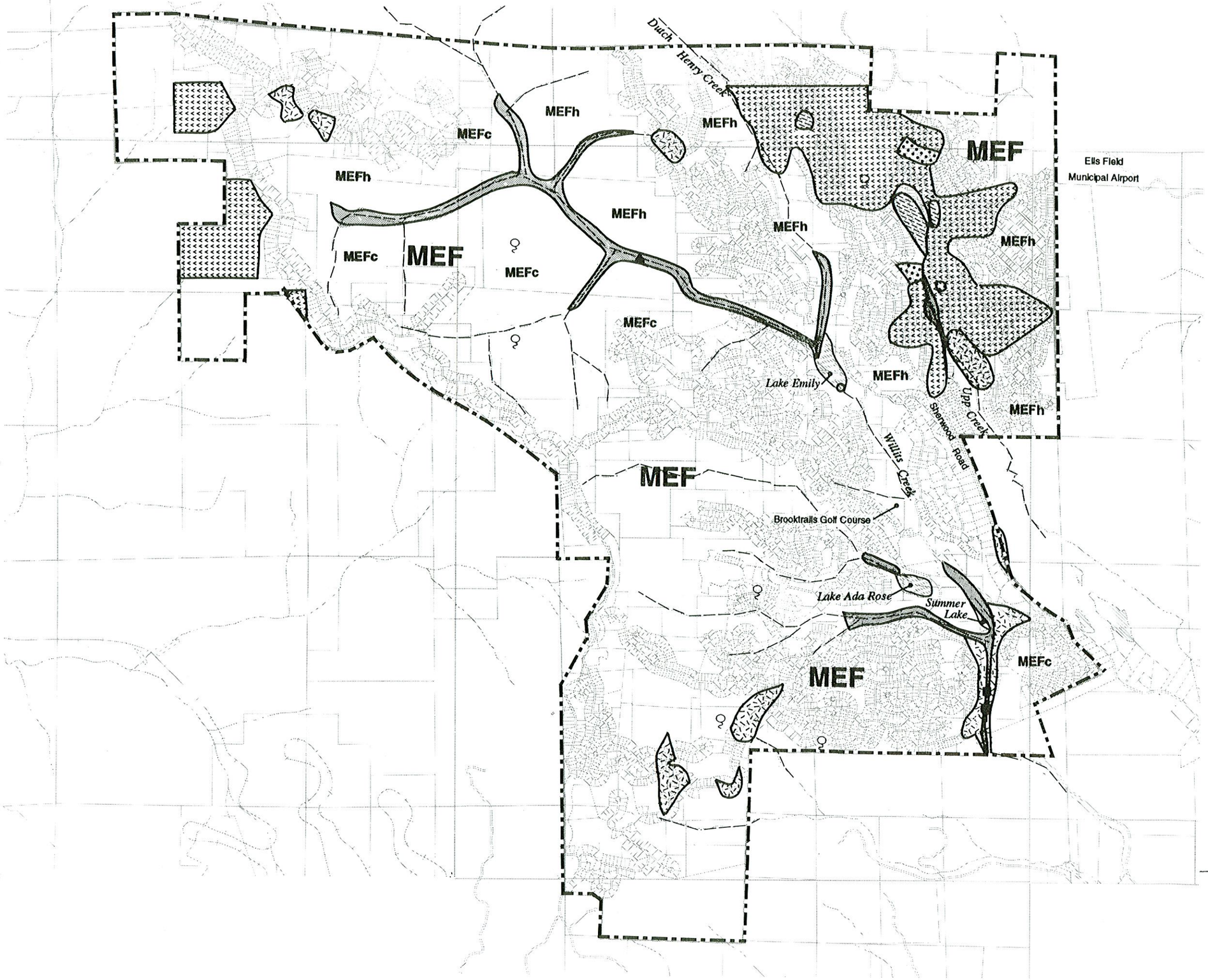
East of Sherwood Road, Upp Creek, an intermittent southeasterly drainage, collects runoff from the small area of Brooktrails township. Upp Creek bends sharply to the northeast after crossing Highway 101, and flows northward into Outlet Creek.

Flows in creeks are subject to seasonal rainfall patterns and are highly variable. The on-site streams have a rocky substrate and contain pools formed from water scouring or debris dams.

Downstream of Lake Emily, Willits Creek is used as a migration corridor by salmon and steelhead, anadromous forms of trout which spend their adult lives in salt water, some returning to freshwater creeks each year to spawn. Fish species known to occur in the Willits Creek drainage system within Brooktrails Township, include Sacramento sucker, California roach, brown bullhead, Pacific lamprey, green sunfish, bluegill, largemouth bass, Sacramento squawfish, rainbow trout winter steelhead trout, and fall-run chinook salmon; wood ducks, black phoebe, California towhee, spotted towhees and red-shouldered hawks occur in riparian creek corridors.

Lacustrine Habitat

In Brooktrails Township, lacustrine habitat includes the open water area of Lake Emily, Lake Ada Rose, and Summer Lake. Lake Emily has a surface area of approximately 17 acres and drains about 4.9 square miles. Lake Emily drains southeasterly into Summer Lake, which is not part of the potable water



Legend:

- Riparian Corridor
- Grassland
- Chaparral/Scrub
- GWS — Oak Woodland/Savannah Dominated by Garry Oak
- MEF — Mixed Evergreen Forest
- MEF_h — Mixed Evergreen Forest Hardwood Dominated
- MEF_c — Mixed Evergreen Forest Conifer Dominated
- Serpentine Outcropping
- Western Pond Turtle
- Fall-Run Chinook Salmon
- Winter Steelhead Trout
- Foothill Yellow-legged Frog
- Springs

SOURCES:

1. *California Dept. of Fish and Game, California Natural Diversity Data Base*
2. *Vegetation and Wildlife Section of the Willits Creek Reservoir Draft.*
3. *Burbeck and Willits 7.5 minute and Willits 15 minute USGS quadrangle maps, no date.*
4. *1992, 1"=500' Aerial Photograph of a Portion of the Project Area.*
5. *Field Reconnaissance July 27-29, 1990, July 30-31,1993 and February 28, 1996.*
6. *Aerial Reconnaissance, July 31, 1993.*

N

0 2000

Scale in Feet

BROOKTRAILS TOWNSHIP SPECIFIC PLAN EIR

Figure 3.2.3-1
Biological Resources

collection system. EIP's wildlife biologist observed bullfrogs and northwestern pond turtles in Lake Emily on October 7, 1993. Fish species known to occur in the Willits Creek drainage would be expected to occur in Lake Emily.

Lake Ada Rose is a second potable water supply reservoir located approximately 4/5 mile southeast of Lake Emily. It has a surface area of approximately 7 acres. Lake Ada Rose receives flow from an unnamed intermittent tributary to Willits Creek and runoff from approximately 0.7 square mile in the southwestern portion of the Township. Release from Lake Ada Rose passes through the water treatment plant and empties into Summer Lake.

When Lakes Emily and Ada Rose were created by damming existing drainages, surrounding riparian vegetation was inundated by rising waters. Under present conditions, mixed evergreen forest extends to the high water levels of the reservoirs. The fluctuating nature of water levels in the two reservoirs has prevented the establishment of wetland or riparian vegetation along most of the shorelines. At the upper end of Lake Emily, a small area of cat-tails has become established in the sandy delta formed by the confluence of Dutch Henry and Willits Creeks. Small, scattered areas of cat-tails also occur along the shoreline of Lake Ada Rose. The area of cat-tails would be expected to decrease with rising water levels and increase with falling water levels. The lakes provide habitat for resident waterfowl such as American Coot and Pied-Billed Grebe, and migratory waterfowl which are present in the winter months, such as ringed-neck duck and bufflehead.

Summer Lake drains into a tributary of Mill Creek, which continues southeasterly. Approximately two blocks west of Highway 101, Mill Creek bends sharply to the northeast, flows northward through the west central portion of Little Lake Valley, and joins Outlet Creek east of Brooktrails Township and Highway 101.

Wetlands Habitats - Springs, Ponds, and Marshes

A number of localized springs occur throughout the Township. In the northern section, there are also a few naturally occurring ponds and lakes, and wetlands at and surrounding Swamp Gulch. These wetland areas were not delineated or surveyed for plant or wildlife species because they occur in areas included in the Greenbelt area or other areas not included in residential lots. These wetlands provide an important year round source of water to wildlife.

Terrestrial Habitat

Due to the complexity of environmental factors and the nature of past and present disturbance, vegetation in Brooktrails Township is composed of a complex mosaic of plant communities and vegetation types. Forest communities are formed by an overstory of conifers and/or evergreen hardwoods, with a mid-story of shrubs, and an understory of herbs, ferns, and grasses. Conifers typically occur on the steeper, moister north- and east-facing slopes. Evergreen hardwoods occur on the drier south- and west-facing slopes. In Brooktrails Township, conifers and hardwoods are generally second or young-growth trees ranging in age from approximately 30 to 160 years. Both forest types contain a mixture of other species. Locations of plant communities in Brooktrails Township are shown on Figure 3.2.3-1. The following plant communities are components of the vegetation in Brooktrails Township:

Coniferous Forest

Coast Redwood/Douglas Fir Forest. This is a dominant plant community in Brooktrails Township. It is composed of Douglas fir and coast redwood in approximately equal numbers. Small numbers of residual or old-growth conifers are scattered throughout the Greenbelt area of Brooktrails Township. Some Douglas fir exceeding 42" dbh (diameter at breast height) were recorded in the timber harvest report. Most conifers do not exceed 28" dbh because of previous cutting in the Greenbelt. Snags (standing dead trees) and downed logs are very scarce throughout the forest, but are likely to increase in numbers with forest age. Snags provide habitat for cavity-nesting birds, including the northern spotted owl.

Coast redwoods (occurring as second-growth trees originating from sprouting stumps) are widely scattered throughout the Township. Most redwoods occur in drainage bottoms and on cooler north facing slopes. This may be indicative of coast redwood's natural density at the eastern limits of the coast redwood range (the eastern edge of the summer coastal fog belt) where it occurs as an element in the Douglas Fir Forest.

Douglas fir and coast redwood occur occasionally in the stream bottoms, however, they are more common at the outer edges of the riverine habitat in an abrupt up-slope transition to Douglas Fir Forest habitat.

The current structure and composition of the Redwood/Douglas Fir Forest habitat within Brooktrails Township is heavily influenced by logging, road construction, fire, and fire management activities. Following intense fire or logging, tanbark oak sprouts grow faster than Douglas fir seedlings and initially

become the dominant species. Tanbark oak can form a nearly solid canopy for 60 to 100 years until natural mortality allows Douglas fir to become dominant. In the present post-disturbance state, widely spaced Douglas fir overtops tanbark oak but does not yet form a closed overstory canopy. Where second-growth forest clearing has occurred within the Township to accommodate the area's internal circulation system and residential sites, dense close-spaced, even aged stands of Douglas fir occur adjacent to Township roads. Some areas within the Douglas fir forest are dominated by dense stands of madrone which are similar in structure to the pure stands of tanbark oak.

Understory vegetation consists primarily of huckleberry, manzanita, and snowberry. Fire management, in the form of brush removal and controlled burns within the Brooktrails Township, has reduced or eliminated dense stands of understory shrubs from the site. This has resulted in a more open understory than would occur naturally. Actively managed areas are dominated by a complete canopy closure of tanbark oak and madrone. The open understory contains small amounts of manzanita.

Upland Coast Range Ponderosa Pine Forest. Scattered pockets of ponderosa or yellow pine and incense cedar occur on drier slopes and ridges. This forest type intermixes with Mixed Evergreen Forest on moister sites and Oak Woodland on drier sites. Black oak, Pacific madrone, tanbark oak, canyon live oak, and Douglas fir, are common associates.

Broadleaved hardwood forest

Mixed Evergreen Forest. Mixed Evergreen forest, composed of a mixture of broad-leaved evergreen and deciduous trees, is the predominant hardwood forest type in Brooktrails Township. The composition of the Mixed Evergreen Forest is similar to the Redwood/Douglas Fir forest, except the number of coniferous trees is substantially lower. Douglas fir, and coast redwood occur in varied densities within this forest type. Dominant evergreen hardwood trees are tanbark oak, Pacific madrone, canyon live oak, California bay, and golden chinquapin.

Deciduous hardwoods such as big-leaf maple and black oak, are associated with Mixed Evergreen Forest and also occur as components of other communities. Understory shrubs include California huckleberry, snowberry, and species of manzanita. Ferns and a number of perennial and annual species make up the herbaceous understory.

Canyon Live Oak Forest. This is a dense evergreen hardwood forest type dominated by canyon live oak. It is transitional between low elevation broadleaved hardwood forest and higher elevation coniferous forest.

Riparian Woodland/Red Alder Forest. Riparian (streamside) Woodland occurs in a narrow linear corridor adjacent to creeks and drainages, typically extending to the limits of the ordinary high water mark of streamcourses within the bottoms of steep canyons. Riparian habitat is not well developed in Brooktrails Township. In the reach of Willits Creek downstream from Summer Lake, the areas in the vicinity of the fenced playing field and the tennis courts, and downstream between Birch Terrace on the east and Primrose Drive on the west is greatly disturbed and eroded. Through this area, there is some riparian habitat with high wildlife values, but much of the Creek had been degraded by human disturbances. EIP observed that some alders and tanbark oaks had been cut and cleared from some sections of the riparian corridor. This may have been done for flood control. Where trees were cut, the creek has been completely exposed and siltation has occurred in the Creek.

On-site, riparian habitat is characterized by open medium- to small-sized trees, a minimum amount of thicket-forming vegetation, and low growing ground cover. Tree species associated with Mixed Evergreen Forest, especially coast redwood, Douglas fir, and big-leaf maple, tend to grow down steep slopes and onto canyon bottoms. Where the canyon bottoms are narrow, riparian species are often limited to red alder. Where canyon bottoms flatten out, a number of other riparian species may be present, including yellow willow and arroyo willow. Willows form intermittent thickets, and varied amounts of big leaf maple occur along the streams.

Riparian understory shrubs include several species of blackberry, snowberry, and poison oak. Riparian herbaceous (non-woody) ground cover, including native grasses such as blue wildrye, occurs in openings in the riparian understory or adjacent to creek banks. Small marshy and meadow-like areas occurring on islands or ledges along the streams are dominated by herbaceous species such as horsetail, rushes, sedges, and grasses.

Chaparral. Chaparral is a shrub-dominated vegetation type that occurs on dry, rocky sites where the soil is too thin to support forest or woodland. In Northern California, chaparral commonly occurs in patches within other plant communities. At Brooktrails it occurs on steep, dry slopes associated with Mixed Evergreen Forest, Ponderosa Pine Forest, and Oak Woodland. Wrentits and western fence lizards occur in chaparral.

Oak Woodland/Savannah. Oak woodland may be dominated by one or more oak species. Oak woodlands tend to be more open and have less canopy cover than nearby forest vegetation. Black oak, interior live oak and Oregon oak may be present. Chaparral species commonly form parts of the understory, and grasses may be common in more open places. Oak Woodland occurs on drier sites, ridge tops, and valley bottoms. Oak woodlands/savannah represent a habitat which is diminishing in California due to agriculture and urban development.

Along the Sherwood Road corridor, oak woodland and annual grassland habitats occur as a mosaic. This area consists of a varied mixture of woodland or open grassland areas containing residences and pastures. The oak woodland component may occur as single trees or as dense stands of canyon oak with annual grassland occurring in open treeless areas as an herbaceous understory.

Grassland

In Brooktrails Township, Grassland habitat is composed of mostly non-native annual grasses and broad-leaf herbaceous species that have become dominant and eliminated or reduced the extent of native perennial species. Common grassland forbs include native perennial species such as blue-eyed grass, Ithuriel's spear, and annual non-native species such as cat's ear and microseris. Annual grassland occurs on serpentine soils in the vicinity of the intersection of Crawford Road and Daphne Way. Slender oatgrass is the dominant non-native grass in this community. Native perennial grasses occurring in grassland in Brooktrails Township include California oat grass, blue wildrye, and fescues.

Landscape Habitat

This habitat type applies to the Brooktrails golf course, which is vegetated primarily with irrigated turf grasses. Many native trees, including mature coast redwood, have been retained as landscape features.

WILDLIFE

The wide variety of vegetation, soils, and topographic forms present in Brooktrails Township has resulted in diversity among the plant and wildlife species present. Sixteen mammal, six amphibian, five reptile, forty-two bird, and eleven fish species were observed in Brooktrails Township during the survey period. A number of mule deer were observed during EIP's field surveys, in addition to many of the smaller mammals and birds expected to occur near human development. A list of wildlife species observed

during the field surveys, including scientific names of animals referred to in this report, is contained in Appendix B.[10,11]

Many wildlife species utilize on-site habitats in Brooktrails Township for breeding, foraging, cover, and migration corridors. Other wildlife species require special habitat features such as cliffs, caves, or various stages of woody vegetation for breeding, resting, and escape cover which are not present in the Township. The use and value of habitat to a specific species can be affected by a number of physical characteristics. The value of nesting and foraging habitat for predators can be affected by the size of the habitat area, distance to foraging areas from nesting territories, density of the prey base, and the presence of elements that may disturb species using the habitat.

Fire management within forested areas and the distribution of residences and roads throughout Brooktrails Township reduce the general wildlife values of the area. Remote areas connected with undisturbed habitat outside the Township, steep forested hillsides, and perennial creek corridors provide the most valuable wildlife habitat within Brooktrails Township.

Riverine and Lacustrine habitats available along Willits Creek, Dutch Henry Creek, Upp Creek, and Lakes Emily and Ada Rose provide critically important water sources for wildlife. The small perennial creeks maintained good flows of high-quality water even in recent drought years. Populations of several species of fish occur in most of the creeks, and larvae of Pacific giant salamanders and rough-skinned newts are common in larger pools in creeks. Adult foothill yellow-legged frogs occur in the upper reaches of Willits creek. The diversity of aquatic vertebrates present attests to the high quality of creek habitats in the Brooktrails area.

The dense growth of Coniferous and Mixed Evergreen Hardwood Forest that covers most of Brooktrails Township is low in structural diversity. Where tree canopy is dense, insufficient sunlight penetrates to the forest floor to support growth of understory vegetation. As a result, animal species diversity and abundance are relatively low. During field surveys (an effort of 80 trap nights), no small mammals were

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10. Grenfell, W.E., Jr., and W.F. Laudenslayer, Jr., eds. *The Distribution of California Birds.* California Wildlife/Habitat Relationships Program. Publ. #4, California Department of Fish and Game, Sacramento, and USDA Forest Service, San Francisco, CA, 1983.

11. Laudenslayer, W.F., Jr., and W.E. Grenfell, Jr., *A List of California Vertebrates Except Fishes*, California Wildlife/Habitat Relationships Program, California Department of Fish and Game, Sacramento, and USDA Forest Service, San Francisco, CA, 1983.

captured in forested habitats. Nevertheless, the mixed conifer and oak ecosystems are valuable to wildlife due to the food value of their seeds. Pine seeds are included in the diets of more wildlife species than are seed of any other genus of trees except the oak. Conifer bark and foliage serve as important food sources for animals such as Douglas's squirrel, dusky-footed woodrat and mule deer. Conifers provide vital nesting cover for several bird species, such as white-breasted nuthatch, brown creeper, chestnut-backed chickadee, Steller's jay, and owls. Responses to nocturnal calls conducted by EIP biologists along preset transects in forested areas in July 1993, confirmed the presence of the western screech owl and flammulated owl. A flammulated owl was also observed near Buckeye Court during a night spotlighting search.

Openings in forested areas, near roadsides, and in clearings along creek banks are important wildlife habitat features. Small grassy areas with shrubby marginal growth are used heavily by larger mammals, especially mule deer. The opportunity for wildlife species to retreat from this open habitat into nearby forested areas further enhances its value. The value of this "edge effect" is reflected in the diversity of wildlife observed in these areas, which included most of the birds and mammals observed in Brooktrails Township by EIP biologists.

Plant species occurring in the riparian area provide high quality cover, nesting, and foraging habitat for wildlife. Riparian habitats are valuable for wildlife because of their vegetative structural and species diversity, abundant food resources, proximity to water, and linear cover conducive to wildlife and fish movement.

Considering the encroachment of urbanization, with its disturbance of habitats and wildlife species and the introduction of domestic and feral pets that harass and destroy many wild animals, the Township is well-used by wildlife. In general, the natural plant communities of Brooktrails Township provide good wildlife habitat value.

Fisheries

The Willits Creek system has been altered by prior dam construction at Lake Emily and Lake Ada Rose. These dams have created impassable barriers which impede the normal upstream and downstream movement of fish, particularly trout and other salmonids.

Minimum fish flow release requirements have been established by the California Department of Fish and Game for reaches between upper Willits Creek between the proposed reservoir and Lake Emily, and Willits Creek below Lake Emily. Between the proposed Willits Creek reservoir and Lake Emily, minimum November through June flows are set at 5 cfs (cubic feet per second); between July and October, the flows are 1 cfs. Minimum flows in Willits Creek below Lake Emily after construction of a new dam would be 1 cfs. The adequacy of these flows to provide for enhanced fisheries habitat in Willits Creek and Lake Emily is currently being evaluated in conjunction with the California Department of Fish and Game.

In October 1993, an EIP biologist observed hundreds of 3-5 inch fingerling largemouth bass migrating downstream from Summer Lake. As largemouth bass prey heavily on newly hatched fry, their presence precludes successful spawning by salmon or steelhead. Largemouth bass also prey on foothill yellow-legged frogs and newly hatched pond turtles.

SENSITIVE SPECIES

The California Natural Diversity Data Base Rarefind report lists occurrences of five sensitive plant species within the Burbeck USGS quadrangle and five adjacent quadrangles. The CDFG has concerns about the presence of potential habitat for north coast semaphore grass in Brooktrails Township. A list giving the scientific names, status, periods of bloom, and habitats of these species is contained in Table 3.2.3-1. Locations of sensitive species observed in Brooktrails Township are shown on Figure 3.2.3-1.

- Milo Baker's lupine occurs in roadside ditches, dry gravelly areas along roads, and in small streams, at approximately 1,500 feet in elevation. The CNDDB considers its occurrence in 1986 along Highway 101, approximately 3.5 miles south of Longvale, to be an inadvertent introduction. It is unlikely that this species occurs in Brooktrails Township because there are no nearby native populations to provide a seed source.

- Showy Indian clover is known historically from the vicinity of Brooktrails. Much of its habitat has been lost to agriculture and urbanization. For years, showy Indian clover was thought to be extinct. In 1993, a single plant was found in Sonoma County. Only limited or marginal habitat for showy Indian clover: rich swales, grasslands, and ditches, is present on the Brooktrails site. The occurrence of showy Indian clover in Brooktrails Township is unlikely.

- Baker's meadowfoam is a vernal pool species known from several locations in Little Lake Valley. It grows in large colonies in seasonally moist or saturated sites within grassland, and in swales, roadside ditches and margins of marshy areas. Vernal pools and suitable habitat for Baker's meadowfoam are not present on the Brooktrails site.

- Baker's navarretia grows in vernal pools of low meadows, flats, and swales in adobe or alkaline soils. A single collection from the vicinity of Willits was made in 1902. Baker's navarretia was last seen in the vicinity of Rocktree/Little Lake Valleys, northeast of Willits, in 1983. It was collected twice in Sherwood Valley, northwest of Willits in 1899 and 1900. Vernal pools and suitable habitat for Baker's navarretia are not present on the Brooktrails site.

TABLE 3.2.3-1
SENSITIVE PLANT AND WILDLIFE SPECIES AND SENSITIVE HABITATS REPORTED TO OCCUR IN THE PROJECTS REGION

Common Name	Scientific Name[1]	Status[2] (Fed/CA/CNPS)	Season[3]	Primary Habitat[4]	Present on Site[5]	Comments
AMPHIBIANS						
Foothill Yellow-legged Frog	*Rana boylii*	C2/-/CSC	R	O	O	Rocky streams in a variety of habitats in the Coast Ranges from the Oregon border south to Los Angeles County. Rarely encountered far from permanent water. Often bask on streamside rocks. Adults recorded along a Willits Creek tributary during EIP's field surveys in July 1990 and October 1993.
REPTILES						
Northwestern pond turtle	*Clemmys marmorata marmorata*	C2/-/-	R	Associated with permanent or nearly permanent water in a wide variety of habitats. Requires basking sites. Nest sites may be found upt to 0.5 km from water.	O	Observed at Lake Emily, fed by Willits and Dutch Henry Creeks in 1993.
FISH						
Winter Steelhead Trout	*Oncorhyhchus mykiss*	PT/-/-	Winter	Anadromus. Adults live in the Pacific Ocean, swim upstream to spawn in freshwater.	O	Observed in Willits Creek.
Fall-run Chinook Salmon	*Oncorhynchus tshawytsha*	PT/-/-	Fall	Anadromus. Adults live in the Pacific Ocean, swim upstream to spawn in freshwater.	O	Observed in Willits Creek.

TABLE 3.2.3-1
SENSITIVE PLANT AND WILDLIFE SPECIES AND SENSITIVE HABITATS REPORTED TO OCCUR IN THE PROJECTS REGION

Common Name	Scientific Name[1]	Status[2] (Fed/CA/CNPS)	Season[3]	Primary Habitat[4]	Present on Site[5]	Comments
PLANTS						
Milo Baker's Lupine	*Lupinus milo-bakeri*	C2/CT/List 1B	June - September	Along roadsides and ditches	U	There are taxonomic problems with this taxon. It is known from Round Valley near Covello and Bear Valley in Colusa County and also occurs 3.5 miles south of Longvale along Highway 101.
Showy Indian Clover	*Trifolium amoenum*	C2/-/List 1B	April - June	Grassland (swales, rich fields)	U	Historic localities occur southwest of Willits on the Burbeck quad and 7 miles south of Willits.
Baker's Meadowfoam	*Limnanthes bakeri*	C2/CR/List 1B	April-May	Oak Woodland (vernally moist places, pools, marshes)	U	Known from north of Willits in Little Lake Valley.
Baker's Navarretia	*Navarretia leucocephala* ssp. *bakeri*	3/-/List 1B	May - July	Grassland (marsh)	U	
Roderick's Fritillary	*Fritillaria roderickii*	3B/CE/LIST 1B	March - May	Grassland, dry hard-packed clay	U	
North Coast Semaphore Grass	*Pleuropogon hooverianus*	C2/CR/1B	May	Meadows and moist areas in mixed evergreen forest	S	Jack Booth, CDFG, is of the opinion that habitat for this species could be present in Brooktrails, although none has been observed.

TABLE 3.2.3-1
SENSITIVE PLANT AND WILDLIFE SPECIES AND SENSITIVE HABITATS REPORTED TO OCCUR IN THE PROJECTS REGION

Common Name	Scientific Name[1]	Status[2] (Fed/CA/CNPS)	Season[3]	Primary Habitat[4]	Present on Site[5]	Comments
BIRDS						
Sharp-shinned Hawk	*Accipiter straitus*	-/CSC	R	Open woodlands and wood margins	Yes	Widespread forest and woodland species.
Spotted Owl	*Strix occidentalis caurina*	FT/-/ABL	R	Conifer, dense redwood, old growth, multilayered mixed and Douglas fir habitats from sea level to approximately 7,600 ft. elevations.	No	Known to occur in the Brushy Mountains and Laughlin Range areas. Locational information suppressed.
Yellow Warbler	*Dendroica petechia brewsteri*	3-/-/CSC	S	Associated with riparian communities.	U	Last observed in savannah dominated by valley oak, Little Lake Valley, north of Willits in 1977.
Yellow Breasted Chat	*Icteria virens*	3-/-/CSC	S	Uncommon summer resident and migrant along the coast of northern California, occurring only locally south of Mendocino County. Requires dense bushy tangles and riparian thickets near water courses.	U	Last observed in savannah dominated by valley oak, Little Lake Valley north of Willits in 1977.

NOTES:

[1] Scientific names are based on the following sources: AOU 1983, Jennings 1983, Hickman 1993, Zeiner *et al.* 1990.

[2] Status = Status of species relative to the Federal and California State Endangered Species Acts and Fish and Game Code of California.

- Fed = Federal status.
- E = Federally listed as endangered.
- T = Federally listed as threatened.
- PE = Proposed endangered.
- PT = Proposed threatened.
- C1 = Category 1 comprises taxa for which the USFWS currently has substantial information on hand to support the biological appropriateness of proposing to list as endangered or threatened. Proposed rules have not yet been issued because they have been precluded at present by other listing activity.
- C2 = Category 2 comprises taxa for which information now in possession of the USFWS indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules. Further biological research and field study may be needed to ascertain the status of taxa in this category, and it is likely that many will be found not to warrant listing.
- C3C = Subcategory 3C comprises taxa now considered more abundant and/or widespread than previously thought. Should new information suggest that any such taxon is experiencing a numerical or distributional decline, or is under a substantial threat, it may be considered for transfer to Category 1 or 2.
- C3b = Taxonomically invalid.
- CA = California status.
- E = Endangered; Species whose continued existence in California is jeopardized.
- T = Threatened; Species that although not presently threatened in California with extinction, is likely to become endangered in the foreseeable future.
- CSC = California Department of Fish and Game "Species of Special Concern". Species with declining populations in California.
- FP = Fully protected against take pursuant to the Fish and Game Code Section 3503.5.
- CP = Fully protected against take pursuant to the Fish and Game Code Section 3511.
- FSS = Bureau of Land Management and U.S. Forest Service "Sensitive Species".
- ABL = Audubon Society Blue List of Birds of Special Concern.
- -- = No California or federal status.
- CNPS = California Native Plant Society Listing (does not apply to wildlife species).
- 1B = Plants, rare, threatened or endangered in California and elsewhere and are rare throughout their range. Plants constituting List 1B meet the definitions of Section 1901, Chapter 10 (Native Plant Protection) of the California Department of Fish and Game Code and are eligible for state listing.
- 2 = Plants rare, threatened or endangered in California but more common elsewhere.
- 3 = Plants about which we need more information-a review list. List 3 is an assemblage of taxa that have been transferred from other lists or that have been suggested for consideration. Information that would allow an assignment to one of the other lists or to reject them is lacking.
- 4 = Plants of limited distribution-a watch list. Plants in this category are of limited distribution in California and their vulnerability or susceptibility to threat appears low at this time. However, they are uncommon enough that their status should be monitored regularly.

[3] Season = Blooming period for plants. Season of use for animals. RES=Resident; SUMR=Summer; WNTR=Winter.

[4] Primary habitat = Most likely habitat association.

[5] Present on-site:

- O = Observed on-site.
- R = Recorded on-site.
- S = Suitable habitat on-site.
- U = Unsuitable habitat on-site. (Habitat to support the species does not occur.)
- ? = Suitability of habitats unknown.

Sources: California Natural Diversity Data Base (CNDDB). Computer printout for Burbeck and five surrounding 7.5 minute quadrangle USGS maps in the project region (Longvale, Greenough Ridge, Willis Ridge, Willits, and Laughlin Range). June 1990.

California Department of Fish and Game, Bird Species of Special Concern in California No. 78-1 (June 1978).

_____, Mammalian Species of Special Concern in California, Report 86-1 (June 1986).

_____, Special Animals List, APril 1990.

- Roderick's fritillary grows in dry hard-packed clay soil on grassy slopes and mesas. It was observed along the trail around Leonard Lake, southwest of Walker Valley, in 1991. Suitable habitat for Roderick's fritillary is not present on the sandstone or serpentine soils underlying grassy slopes in Brooktrails Township.
- North coast semaphore grass is known from approximately twelve occurrences. None of these occurrences are located within the Burbeck USGS quadrangle, nor within the five surrounding quadrangles included in the CNDDB search conducted for this report. However, the CDFG is of the opinion that moist meadows in mixed evergreen forest in Brooktrails Township provide potential habitat for the species.

No plant surveys directed toward rare plant species have been conducted in Brooktrails Township. However, none of these sensitive plant species is reported by the CNDDB to occur in Brooktrails Township, none were observed during surveys conducted for the Timber Inventory nor EIP's field surveys, and no occurrences in Brooktrails of these or other sensitive plant species are noted in the Flora of Mendocino County.[12] None of the sensitive plant species known to occur in the region would be expected to occur in Brooktrails Township because their specific habitats, such as vernal pools or clay soils, are not present.

Sensitive Animal Species

The California Natural Diversity Data Base Rarefind report lists occurrences of five special-status animal species: 3 birds, 1 amphibian, and 1 reptile, within the Burbeck USGS quadrangle and five adjacent quadrangles. In addition, 2 fish species observed in Willits Creek are proposed for Federal listing as Threatened. Hawks and owls observed in Brooktrails Township are considered species of special concern to the CDFG. A list giving the scientific names and status of these species is contained in Table 3.2.3-1.

Birds

- Northern spotted owl. Brooktrails Township is within the range of the northern spotted owl, a Federally-listed Threatened subspecies. Because the CNDDB records nesting occurrences in the Redwood Creek drainage within approximately 2-5 miles from Willits Creek, EIP biologists conducted nocturnal call surveys for northern spotted owls, as described in the Methods Section. No northern spotted owls were observed or heard during daytime or nocturnal calling surveys. Therefore, the presence of northern spotted owls in Brooktrails Township at present appears unlikely.

  Although this species was previously thought to be an exclusively old growth forest species, conversations with representatives of the U.S. Fish and Wildlife Service (USFWS) and CDFG have indicated that it also occupies second growth forests. Second growth areas occupied by the

12. Smith, Gladys 1992.

spotted owl typically have an established upper canopy of conifers, suitable nest substrate (snags and holes in trees), and an understory that supports an abundance of prey species (primarily woodrats). In the absence of the required habitat elements, spotted owl occupation is unlikely.

The most likely on-site habitat for the northern spotted owl is the early successional stage of Douglas Fir Forest composed predominantly of dense stands of tanbark oak with widely spaced conifers. A comprehensive conifer canopy closure, prey base, and nesting substrate analysis has not been conducted. Preliminary analysis based on general surveys of the area indicates that the necessary conifer canopy closure and nesting substrate are lacking or extremely limited.

Discussions with the CDFG and the USFWS have indicated that without a detailed habitat suitability analysis, they consider the project site to represent suitable nesting and/or foraging habitat within the range of the northern spotted owl. Even if the site is not currently occupied, it may become occupied by spotted owls at a later date as the on-site habitats mature.

- Yellow warbler. The yellow warbler is a summer visitant which has a distributional range that includes the Brooktrails area. It is considered a species of special concern by the CDFG. Breeding yellow warblers are associated with riparian habitats where there is dense growth of willows. This species has not been observed during general field reconnaissance of Brooktrails Township. As very limited habitat of this type is available in Brooktrails Township, it is unlikely that breeding yellow warblers occur.

- Yellow-breasted chat. The yellow-breasted chat is a large warbler which requires dense thickets and brush adjacent to riparian areas for breeding. It is considered a species of special concern by the CDFG. This species has not been observed during general field reconnaissance of Brooktrails Township. As very limited habitat of this type is available in Brooktrails Township, it is unlikely that breeding yellow-breasted chats occur.

- Hawks and owls. Resident red-shouldered, and red-tailed hawks, and sharp-shinned hawks, winter visitants, were observed in Brooktrails Township during EIP's field surveys; Cooper's hawk would be expected to be resident in riparian woodland and forest communities. Western screech and flammulated owls were heard during EIP's nocturnal calling surveys. The sharp-shinned hawk is considered a species of special concern by the CDFG. Nesting hawks, owls, and their nest sites are fully protected under Section 3503.5 of the Fish and Game Code of California. Although no hawk or owl nests were observed during EIP's surveys, suitable nest sites exist in tall trees within Brooktrails Township.

Amphibians

- Foothill yellow-legged frog. During EIP's wildlife surveys, 6 adult foothill yellow-legged frogs were observed basking on sunlit rocks in small pools in the upper reaches of Willits Creek. Disruption of creek habitats and the introduction of the bullfrog, several of which were observed in the lower reaches of Willits Creek by EIP biologists, threaten the continued existence of foothill yellow-legged frogs in the area. Bullfrogs out compete yellow-legged frogs in habitats in which they both occur. Adult bullfrogs prey directly upon yellow-legged frogs.

Reptiles

- Northwestern pond turtle. The northwestern pond turtle, a Category 1 candidate for Federal listing as Endangered, requires pools and basking areas for summer habitat. During the rainy season, pond turtles may retreat into upland areas to avoid being swept away by flooding during