Adopted

Pleasant Valley Natural Resources Protection Plan

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City of Gresham
Community & Economic Development Department

City of Portland
Bureau of Planning

Adopted by the Gresham City Council

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INTRODUCTION

The intent of Oregon Statewide Planning Goal 5 is "To protect natural resources and conserve scenic and historic areas and open spaces. Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. These resources promote a healthy environment and natural landscape that contributes to Oregon's livability."[1]

This report consists of the following: a natural resources inventory and determination of resource significance; and an Economic, Social, Environmental, and Energy (ESEE) analysis of the consequences of resource protection. These components provide a basis for the program developed to implement natural resource protection. This work, also known as the Natural Resources Task, is one of the three central elements in the effort to create an urban community in Pleasant Valley through the integration of land use, transportation, and natural resources.

- ***Natural Resource Inventory and Significance Determination –*** The inventory included here is based largely on information collected during the Concept Planning phase of the Pleasant Valley project. The inventory documents the quantity and quality of the characteristic vegetation, wildlife habitat, streamside areas, sensitive species, and other natural features in the Pleasant Valley study area. This inventory also includes a determination of which resources identified in the inventory are significant. Nine basic riparian and upland wildlife habitat functions were selected to provide the foundation for the significance determination. Significance mapping criteria were developed based on these functions, and a GIS computer mapping model was used to assist in the significance determination and mapping process.

- ***ESEE Analysis –*** An ESEE analysis describes the different types of land uses that impact streamside areas, wetlands, and upland forest. Specifically, it analyzes the economic, social, environmental, and energy (ESEE) consequences that could result from a decision to allow, limit, or prohibit certain uses in the significant resource areas and impact areas.

The final element of the Goal 5 process is to develop a program. The program consists of the goals, policies, and action measures adopted into the *Comprehensive Plans* of the cities of Portland and Gresham. The program also includes development code adopted by the cities of Portland and Gresham. The goals, policies, action measures, and development code are available from the City of Portland Bureau of Planning and the City of Gresham Community and Economic Development Department.

[1] OAR 660-015-0000(5)

SECTION 1. NATURAL RESOURCE INVENTORY AND SIGNIFICANCE DETERMIATIONATION

This section describes the Goal 5 inventory and significance determination process for Pleasant Valley. The inventory was conducted by a team of consultants, Metro, cities and counties as part of the Pleasant Valley Planning process (2000-2002). The purpose of the inventory is to identify the location, quality and quantity of significant natural resources within the Pleasant Valley planning area.

SITE LOCATION

The Pleasant Valley resource site (the site) spans the southeast corner of the City of Portland, portions of unincorporated Multnomah and Clackamas Counties, and areas along the western edge of the City of Gresham (See Map 1). The site's western boundary roughly follows SE 162nd Avenue. Its northern boundary follows the edge of developed portions of the City of Gresham and extends north of Foster Road to include portions of Johnson Creek. The eastern boundary of the site extends past SE 190th Drive to Rodlun Road, and the southern boundary generally parallels Sager and Cheldelin Roads.

The Pleasant Valley site is approximately 1,527 acres in size and includes most of the Kelley Creek Basin and a small area along Johnson Creek. To facilitate the inventory and analysis process, seven site subareas were created based on natural subwatershed boundaries.[2] These subareas include: Jenne Creek, Clatsop Creek, Mitchell Creek, the Saddle, Gresham South Slope, Lower Kelley Creek Headwaters, and Powell-Jenne Valley (Johnson Creek) (See Map 1). Each subarea was named for its primary stream, tributary or other distinguishing feature. Analysis at the subarea scale allowed a focused assessment of the resources within the site, including the vegetation and wildlife habitat characteristics of individual Kelley Creek tributaries, associated wetlands and riparian corridors, and upland wildlife resources.

NATURAL RESOURCE INFORMATION

The following information (maps, GIS data, reports) was collected to inventory natural resources within the site:

- **Water Areas:**
  Orthophotos, 1999 (Metro).
  Stream data (Metro; City of Portland Bureau of Planning).
  Wetland data (Metro; National Wetland Inventory) ..
  Floodplain data (FEMA).
  1996 Flood Inundation Area data (Metro).
  Developed Floodplain data (Metro).
  Pleasant Valley Subarea Wildlife Habitat Assessments, Dec. 2000 – Jan. 2001 (City of Portland Bureau of Planning).
  Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2000 (Oregon Department of Fish and Wildlife; City of Portland Bureau of Environmental Services).
  Subwatershed Planning: Evaluation of Aquatic and Upland Habitat for the Kelley Creek Watershed, May 2002 (City of Portland Bureau of Environmental Services; Pleasant Valley project staff).

[2] An eighth subarea, Upper Kelley Creek Headwaters, was also surveyed but is located outside of the Planning Area upstream of the Lower Kelley Creek Headwaters subarea.

Kelley Creek Watershed Stream Habitat Assessment, Sept 2002 (City of Portland Bureau of Environmental Services).
Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation, and Functional Value Assessment, 2002 (City of Portland Bureau of Environmental Services).
Johnson Creek Water Quality Assessment, Feb. 2000 (HARZA Engineering Co.).
"Standard Methods for identifying Channel Migration Zones and Bankfull Channel Features", March 2000 (Washington State Forestry Department).
Stream Classification Maps (Oregon Department of Forestry).

- **Fish Habitat:**

Stream data (Metro; City of Portland Bureau of Planning).
Floodplain data (FEMA).
1996 Flood Inundation Area data (Metro)
Pleasant Valley Subarea Wildlife Habitat Assessments, Dec. 2000-Jan 2001 (City of Portland Bureau of Planning).
Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2000 (Oregon Department of Fish and Wildlife and City of Portland Bureau of Environmental Services).
Subwatershed Planning: Evaluation of Aquatic and Upland Habitat for the Kelley Creek Watershed, May 2002 (City of Portland Bureau of Environmental Services, Pleasant Valley project staff)
Kelley Creek Watershed Stream Habitat Assessment, Sept 2002 (City of Portland Bureau of Environmental Services).
Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation, and Functional Value Assessment, 2002 (City of Portland Bureau of Environmental Services).
Johnson Creek Water Quality Assessment, Feb. 2000 (HARZA Engineering Co.).
"Standard Methods for identifying Channel Migration Zones and Bankfull Channel Features", March 2000 (Washington State Forestry Department).
Stream Classification Maps (Oregon Department of Forestry)

- **Riparian Areas/Riparian Corridors:**

Orthophotos, 1999 (Metro)
10 foot, 5 foot, and 2 foot Elevation Contours
Stream data (Metro; City of Portland Bureau of Planning).
Floodplain data (FEMA).
1996 Flood Inundation Area data (Metro).
Developed Floodplain data (Metro).
Pleasant Valley Subarea Wildlife Habitat Assessments, Dec. 2000-Jan 2001 (City of Portland Bureau of Planning)
Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2000 (Oregon Department of Fish and Wildlife; City of Portland Bureau of Environmental Services)
Subwatershed Planning: Evaluation of Aquatic and Upland Habitat for the Kelley Creek Watershed, May 2002 (City of Portland Bureau of Environmental Services; Pleasant Valley project staff).
Kelley Creek Watershed Stream Habitat Assessment, Sept 2002 (City of Portland Bureau of Environmental Services).
Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation, and Functional Value Assessment, 2002 (City of Portland Bureau of Environmental Services).
Johnson Creek Water Quality Assessment, Feb. 2000 (HARZA Engineering Co.).
Stream Classification Maps (Oregon Department of Forestry)

- **Wetlands:**
  Wetland Data (Metro/National Wetland Inventory).
  Orthophotos, 1999 (Metro).
  Pleasant Valley Subarea Wildlife Habitat Assessments, Dec 2000-Jan 2001 (City of Portland Bureau of Planning).
  Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation, and Functional Value Assessment, 2002 (City of Portland Bureau of Environmental Services)

- **Threatened, Endangered or Sensitive Wildlife Species:**
  Threatened or endangered plants or animals within a 2-mile radius of the site (Oregon Natural Heritage Program).
  Pleasant Valley Subarea Wildlife Habitat Assessments, Dec. 2000-Jan 2001 (City of Portland Bureau of Planning).
  Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2000 (Oregon Department of Fish and Wildlife; City of Portland Bureau of Environmental Services).
  Subwatershed Planning: Evaluation of Aquatic and Upland Habitat for the Kelley Creek Watershed, May 2002 (City of Portland Bureau of Environmental Services; Pleasant Valley project staff).
  Kelley Creek Watershed Stream Habitat Assessment, Sept 2002 (City of Portland Bureau of Environmental Services).
  Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation, and Functional Value Assessment, 2002 (City of Portland Bureau of Environmental Services).

- **Sensitive Bird Site Inventories**
  Pleasant Valley Subarea Wildlife Habitat Assessments, Dec. 2000-Jan 2001 (City of Portland Bureau of Planning)

- **Wildlife Species of Concern or Habitats of Concern:**
  Pleasant Valley Subarea Wildlife Habitat Assessments, Dec. 2000-Jan 2001 (City of Portland Bureau of Planning)
  Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2000 (Oregon Department of Fish and Wildlife; City of Portland Bureau of Environmental Services).
  Subwatershed Planning: Evaluation of Aquatic and Upland Habitat for the Kelley Creek Watershed, May 2002 (City of Portland Bureau of Environmental Services; Pleasant Valley project staff).
  Kelley Creek Watershed Stream Habitat Assessment, Sept 2002 (City of Portland Bureau of Environmental Services).
  Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation, and Functional Value Assessment, 2002 (City of Portland Bureau of Environmental Services).
  Information gathered from landowners at Community Forums (Winter and Spring 2001)

- **Other information:**
  USGS 7.5 minute quadrangle maps
  Soil Conservation Survey information (Multnomah and Clackamas Counties)
  Tax lot data

RESOURCE, QUALITY, QUANTITY, AND LOCATION

The Pleasant Valley site is defined by a series of volcanic buttes surrounding largely agricultural and residential areas. The buttes are typically forested and steep, and are divided by perennial and seasonal streams. The buttes were cleared in the early 1900's but are now covered mostly by mid-successional forest that is 60 to 100 years old. The lowlands were originally forested but were cleared in the late 1800's and early 1900's for farming and timber uses. The majority of the lowland area has remained in agricultural and residential use and has also been tiled in many areas for agricultural drainage. The site contains forest types in the Willamette Valley vegetation zone (Franklin and Dyrness, 1988).

Pleasant Valley Subareas. The subareas contain a variety of aquatic and terrestrial habitats. The size and general characteristics of each subarea are noted below. Table 1 provides additional information on the characteristics of each subarea.

Jenne Creek. The Jenne Creek subarea is 364 acres in size (259 acres within the site) and is located on the south slope of Jenne Butte in the vicinity of McKinley Road. The subarea contains Jenne Creek, at approximately 9,850 feet in length, and a headwater forest and emergent wetlands complex with good connectivity to forested open space to the north. Jenne Creek's riparian corridor is relatively intact, except at Foster Road where the stream enters a long (>100 yard) culvert before discharging to Kelley Creek. Habitat types include conifer, hardwood and mixed forests (42.51 acres), shrub (5.36 acres), meadow (10.35 acres), and wetland (6.82 acres).

Clatsop Creek. The Clatsop Creek subarea is located along the western edge of the site, bordering 162nd Avenue. The Clatsop Creek subarea is 368 acres in size, however only the area along the lowest reach (28 acres) is contained within the site. Along this reach are important riparian and instream habitats, which are located within a well-defined canyon at the confluence with Kelley Creek. The primary habitat type within the subwatershed is mixed forest with western red cedar, Douglas fir, and red alder (13.47 acres); small areas of shrub (0.73 acre) and wetland (0.13 acre) habitat are also present.

Mitchell Creek. The Mitchell Creek subarea contains the largest tributary of Kelley Creek. The basin is 561 acres in size (206 acres within the site) and extends into Happy Valley, Portland, and Clackamas County. Mitchell Creek is approximately 16,425 lineal feet with a forested riparian corridor along much of its length. The basin contains significant habitat for wildlife, and supports state-listed sensitive fish and amphibian populations. Habitat types include conifer and mixed forests (103.83 acres), shrub (3.71 acres), meadow (13.70 acres), and wetland (2.92 acres).

The Saddle. The Saddle subarea is characterized by a broad valley floor along the dividing line between the Johnson Creek and Clackamas River basins. The subarea is 537 acres in size (392 acres within the site) and is located in the southern part of the site in the vicinity of Sager and Cheldelin Roads. This subarea contains the greatest diversity of wetland habitats, linked together by a small tributary to Kelley Creek that is approximately 7,415 feet in length. Habitat types include conifer, hardwood and mixed forests (7.15 acres), shrub (5.32 acres), meadow (7.53 acres), and wetland (39.51 acres).

Gresham South Slope. The Gresham South Slope subarea is dominated by agriculture, with Gresham residential development along the ridgetop. The subarea is 343 acres in size (305 acres within the site) and is located in the northwestern part of the site bordering Gresham. This subarea contains a tributary to Kelley Creek (approximately 6,900 feet in length) that flows through a nursery and forestland. The most significant habitat area within the subarea is located west of 182nd Avenue at the confluence of this tributary and the Kelley Creek mainstream. Habitat types include hardwood and mixed forests (19.17 acres), shrub (1.14 acre), meadow (8.87 acres), and wetland (5.28 acres).

Lower Kelley Creek Headwaters. The Lower Kelley Creek Headwaters subarea contains a narrow riparian corridor along the mainstem of Kelley Creek in the eastern part of the site. Though narrow, the corridor supports state-listed sensitive species (see Table). The forested corridor is bordered by pasture and hayfields and broadens to the east into high quality forest habitat. The subarea is 423 acres in size (201 acres within the site). This reach of Kelley Creek is approximately 8,435 lineal feet in length. Habitat types include hardwood and mixed forests (95.60 acres), shrub (2.48 acres), meadow (4.25 acres), and wetland (3.01 acres).

Powell-Jenne Valley. The Powell-Jenne Valley subarea is located north of the Kelley Creek basin along Johnson Creek in the vicinity of Jenne Lane. This subarea is situated in a narrow valley between Powell and Jenne Buttes. It contains a broad floodplain with varied wetland habitats. The subarea is 298 acres in size (136 acres within the site); this reach of Johnson Creek is approximately 4,170 lineal feet in length. The subarea contains a variety of wetland, riparian, and upland habitats, and provides high quality amphibian breeding sites. Habitat types include conifer, hardwood and mixed forests (115.07 acres), meadow (12.90 acres), and wetland (13.18 acres).

HABITAT SUMMARIES

What follows are summaries of habitat types found within the Pleasant Valley site. Table 1 breaks out this, and other information, by subarea and includes known sensitive species, Wildlife Habitat Assessment and Benthic Index of Biological Integrity ratings, special habitat features, and system stresses and sources.

Upland (Terrestrial) Habitat. Upland, terrestrial habitats within the site consist of meadow, shrub, and coniferous, hardwood and mixed forests. The forests are generally 60 to 100 year-old second growth and are in the mid-succession "conifer topping hardwood" stage. The forests include Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), and red alder (*Alnus rubra*) as dominant tree species. Other common tree species include Oregon ash (*Fraxinus latifolia*), big-leaf maple (*Acer macrophyllum*), and black cottonwood (*Populus balsamifera trichocarpa*). Shrub habitats include Himalayan blackberry (*Rubus discolor*) and Pacific willow (*Salix lasiandra*).

Riparian Habitat. Riparian areas are important because they contain water, cover, and food for aquatic and semi-aquatic species. They are transitional areas between aquatic and upland habitats, and provide habitat for plants and wildlife that exist in both environments. They can also provide migration corridors for wildlife. Riparian corridors generally have high structural diversity, due to the debris and sediment that often collects along streams and, therefore, often support diverse groups of plant and wildlife species.

Riparian habitats within the site consist primarily of mixed forest with some coniferous forest and shrub areas. Forested riparian areas include Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), black cottonwood (*Populus balsamifera trichocarpa*), and red alder (*Alnus rubra*) as dominant tree species. Other common tree species include Oregon ash (*Fraxinus latifolia*) and big-leaf maple (*Acer macrophyllum*). Shrub habitats include Himalayan blackberry (*Rubus discolor*) and Pacific willow (*Salix lasiandra*).

Aquatic Habitat. Aquatic habitats within the site include perennial streams (first and second order), intermittent streams, wetlands, and springs or seeps. Wetland classifications include forested, scrub-shrub, emergent, wet meadows, and open water. Forested wetlands are dominated by western red cedar (*Thuja plicata*), Oregon ash (*Fraxinus latifolia*), Pacific willow, or red alder (*Alnus rubra*). Scrub-shrub wetlands are dominated by Pacific willow, Piper's willow (*Salix hookeriana*), or hardhack (*Spiraea*

douglasii). Emergent wetlands are dominated by common cattail (*Typha latifolia*), colonial bentgrass (*Agrostis capillaris*), reed canarygrass (*Phalaris arundinaceae*), stinging nettle (*Urica dioica*), jewelweed (*Impatiens noli-tangere*), creeping spike-rush (*Eleocharis palustris*), common rush (*Juncus effusus*), or slough sedge (*Carex obnupta*). Wet meadows were dominated by common rush, creeping spike-rush, dagger-leaved rush (*Juncus endifolius*), reed canarygrass, or meadow foxtail (*Alopecurus pratensis*).

Sensitive Species and Habitats. One sensitive fish species was documented in the Pleasant Valley site: Steelhead (*Oncorhynchus mykiss*) is federally listed as threatened. Three other sensitive wildlife species were also documented: American peregrine falcon (*Falco peregrinus annatum*) is listed as endangered by the state of Oregon; and pileated woodpecker (*Dryocopus pileatus*) and red-legged frog (*Rana aurora aurora*) are both listed as sensitive-vulnerable by the state of Oregon. Tall bugbane (*Cimicifuga elata*) , a plant species that is a candidate for state listing in Oregon, also occurs on the site.

Special habitat features were noted during field surveys done in December 2000 and January 2001. These features include high quality forested wildlife habitat; large wetland complexes; important wildlife corridors; confluence habitats, and habitat for sensitive species (including fish, birds, and amphibians). Stresses on sensitive species include fish passage barriers, wildlife access or passage impediments, erosion and sedimentation, native species suppression by invasive species, habitat disturbance, water quality stresses, habitat fragmentation, disrupted hydrology, and disconnected floodplains.

HABITAT RATING

Characteristic vegetation, wildlife habitat, riparian areas and corridors, streams, and other physical features were documented using the Wildlife Habitat Assessment (WHA) survey form. The WHA method has been acknowledged by the Oregon Land Conservation and Development Commission as complying with Goal 5 guidelines. The WHA form allows a "habitat score" to be calculated for each subarea so that relative functional values can be compared. Field surveys were conducted on December 21, 2000, and January 3 and 9, 2001. WHA ratings for individual subareas ranged from 39 to 87 (out of a possible score of 108); these ratings are provided in Table 1. The Pleasant Valley site as a whole received a rating of 63. Generally, sites inventoried previously within the Johnson Creek basin have received WHA scores of 18 to 83.

TABLE 1. SUBAREA HABITAT SUMMARY

Sub Water-shed	Acres	Aquatic Habitats	Terrestrial Habitats	Sensitive, Threatened, Endangered Species	Habitat Value	Macro-inverte-brates (BIBI)	Special Features	Stresses (Sources)
Jenne Creek	259 (364)	Perennial stream (1st, 2nd order); Intermittent stream Emergent wetland: TYLA Wet meadow: JUEF Open water wetland Springs/seeps	Mixed forest: PSME- THPL-ACMA, THPL-PSME, THPL-PSME-ALRU Hardwood forest: FRLA-ALRU, ACMA-ALRU Shrub: RUDI, SALU Meadow	Fish: *Oncorhynchus mykiss* Wildlife: *Dryocopus pileatus* *Rana aurora aurora* Potential species: *Cimicifuga elata* *Empidonax traillii brewsteri* *Onchorhynchus kisutch* *Sidalcea nelsoniana*	68 (of 108)	18 (of 50)	Largest grand fir in study area Headwater wetlands Functional link to Jenne Butte habitats for mammals, birds Pileated woodpecker Red-legged frog and pacific giant salamander Steelhead and cutthroat trout	Fish passage barrier (114 m. culvert, 1 m. step at gas station; steel dam; lower KC dams, steps, culverts) Wildlife access impediment (gas station, Foster Road) Erosion/sedimentation (agricultural runoff, high flows grazing-Kelley Creek Farm, vehicles crossing KC) Native flora/fauna suppression (invasive species)
Clatsop Creek	28 (368)	Perennial stream (1st, 2nd order); Intermittent stream	Mixed forest: THPL-PSME-ALRU	Fish: *Oncorhynchus mykiss*i Wildlife: *Dryocopus pileatus* *Rana aurora aurora* Potential species: *Empidonax traillii brewsteri* *Onchorhynchus kisutch*	50 (of 108) Basin: 72	20 (of 50) mainstem Kelley Creek	Pileated woodpecker Steelhead and Cutthroat trout Red-legged frog and pacific giant salamander	Fish passage barrier (162nd culvert; steel dam; lower KC dams, steps, culverts) Wildlife access impediment (162nd Ave.) High erosion/sediment (Hawthorne Ridge storm discharge; grazing; vehicles crossing stream) Habitat disturbance (invasive species, waste, clearing, housing development)

Sub Water-shed	Acres	Aquatic Habitats	Terrestrial Habitats	Sensitive, Threatened, Endangered Species	Habitat Value	Macro-inverte-brates (BIBI)	Special Features	Stresses (Sources)
Mitchell Creek	206 (561)	Perennial stream (1st, 2nd order); Intermittent stream Forested wetland: THPL Scrub/shrub wetland: SALU Emergent wetland: CAOB Open water wetland Springs/seeps	Coniferous forest: THPL, THPL-PSME Mixed forest: THPL-PSME-ALRU, PSME-THPL-ACMA Shrub: RUDI, SALU Meadow	Wildlife: *Falco peregrinus annatum* *Rana aurora aurora* Potential species: *Dryocopus pileatus* *Empidonax traillii brewsteri* *Montia howellii* *Myotis evotis* *Onchorhynchus kisutch* *Plecotus townsendii* *Sidalcea nelsoniana*	77 (of 108)	16 (of 50)	Highest quality fish habitat in study area (cutthroat trout) High quality forested wildlife habitat (upper basin and confluence) Red-legged frog Peregrine falcon Osprey	Fish passage barrier (162nd culvert; dammed pools, steps) Water quality stresses (nutrient loading-residential discharges; high erosion, sedimentation, waste/ contaminants, *E. coli* mobile home park) Habitat disturbance (invasive species, waste, clearing, fill) Habitat fragmentation (roads, fences, farms, housing)

Sub Water-shed	Acres	Aquatic Habitats	Terrestrial Habitats	Sensitive, Threatened, Endangered Species	Habitat Value	Macro-inverte-brates (BIBI)	Special Features	Stresses (Sources)
The Saddle	392 (537)	Perennial stream (1st, 2nd order); Intermittent stream Forested wetland: FRLA, FRLA-SALU, FRLA-ALRU, ALRU Scrub/shrub wetland: SAHO, SALU, SPDO Emergent wetland: AGCA-PHAR, CAOB, JUEF, PHAR Wet meadow: JUEF Open water wetland Springs/seeps	Coniferous forest: THPL-PSME Mixed forest: PSME-ALRU Hardwood forest: ALRU Shrub: RUDI, SALU Meadow	Wildlife: *Dryocopus pileatus* Potential species: *Empidonax traillii brewsteri Onchorhynchus kisutch Rana aurora aurora Sidalcea nelsoniana*	50 (of 108)	Not sampled	Largest wetland complex in study area, with link to Clackamas River habitats Good wildlife linkages, or potential linkages, to forested buttes east and west Pileated woodpecker	Habitat disturbance (farm and residential uses, roads, clearing, fill) Fish passage barrier (public and private culverts, steps) Water quality stresses (sewage plant discharge-PV Elementary School, erosion) Native flora/fauna suppression (invasive species)
Gresham South Slope		Perennial stream (1st, 2nd order); Intermittent stream Forested wetland: FRLA- ALRU Emergent wetland: CAOB Wet meadow: PHAR-ALPR Open water wetland Springs/seeps	Mixed forest: THPL-PSME-ALRU Hardwood forest: POBA-ALRU; ALRU; FRLA-ALRU Shrub: RUDI Meadow	Potential species: *Dryocopus pileatus Empidonax traillii brewsteri Onchorhynchus kisutch Rana aurora aurora Sidalcea nelsoniana*	39 (of 108)	26 (of 50)	Wet meadow/forested ash wetland complex Diverse confluence habitats	Disrupted hydrology (nursery/cropland irrigation) Water quality stresses (sediments, nutrients, contaminants from agriculture, erosion-impervious surfaces) Fragmented habitat (roads, housing, nursery, fences) Fish passage barrier (nursery, culverts) Native flora/fauna suppression (invasive species)

Sub Water-shed	Acres	Aquatic Habitats	Terrestrial Habitats	Sensitive, Threatened, Endangered Species	Habitat Value	Macro-inverte-brates (BIBI)	Special Features	Stresses (Sources)
Lower Kelley Creek Head-waters	201 (423)	Perennial stream (1st order); Intermittent stream Forested wetland: THPL Emergent wetland: JUEF, PHAR Open water wetland Springs/seeps	Mixed forest: PSME-ALRU; THPL- PSME-ALRU Hardwood forest: ACMA-ALRU, ALRU Shrub: RUDI, SALU Meadow	Wildlife: *Rana aurora aurora* Potential species: *Dryocopus pileatus* *Empidonax traillii brewsteri* *Onchorhynchus kisutch* *Sidalcea nelsoniana*	70 (of 108)	16 (of 50)	Cutthroat trout Red-legged frog	Fish passage barrier (190th culvert, 1.3 m. drop; 2 dammed pools) Low dissolved oxygen (pool sample) Water quality stresses (erosion/sedimentation-grazing; former dump east of 190th) Native flora/fauna suppression (invasive species)
Powell-Jenne Valley	136 (298)	Perennial stream (Johnson Creek); Forested wetland: FRLA; FRLA-THPL Emergent wetland: PHAR; PHAR-URDI; PHAR-IMNO; ELPA (pond edge) Wet meadow: ELPA-JUEN Open water wetland Seeps/springs	Hillslopes Mixed forest: THPL-PSME-ACMA Shrub: RUDI Lowlands Hardwood forest: FRLA; POBA-FRLA Shrub: RUDI; SALU Meadow	Fish: *Oncorhynchus mykiss* Wildlife: *Rana aurora aurora* Plant: *Cimicifuga elata* Potential species: *Dryocopus pileatus* *Empidonax traillii brewsteri* *Myotis evotis* *Onchorhynchus kisutch* *Plecotus townsendii townsendii* *Sidalcea nelsoniana*	61 (of 108)	Not sampled	Amphibian breeding sites; streamside wetlands Wet meadow habitat Largest ash trees within study area (remnant ash wetland) Red-legged and tree frogs; northwestern and long-toed salamanders; chinook, coho salmon; steelhead, cutthroat trout; tall bugbane Travel corridors between Johnson Creek, Powell Butte, and Jenne Butte for birds, mammals, and amphibians	Amphibian/mammal passage (roads/traffic) Disconnected floodplain (rock-lined JC channel) Fragmented habitat (fences, roads, housing, mowed fields) Erosion, soil movement (forest/riparian clearing) Native flora/fauna suppression (invasive species)

Key to Alpha codes:
ACMA: *Acer macrophyllum* (big-leaf maple)
AGCA: *Agrostis capillaris* (colonial bentgrass)
ALPR: *Alopecurus pratensis* (meadow foxtail)
ALRU: *Alnus rubra* (red alder)
CAOB: *Carex obnupta* (slough sedge)
ELPA: *Eleocharis palustris* (creeping spike-rush)
FRLA: *Fraxinus latifolia* (Oregon ash)
IMNO: *Impatiens noli-tangere* (jewelweed)
JUEF: *Juncus effusus* (common rush)
JUEN: *Juncus ensifolius* (dagger-leaved rush)
PHAR: *Phalaris arundinaceae* (reed canarygrass)
POBA: *Populus balsamifera trichocarpa* (black cottonwood)
PSME: *Pseudotsuga menziesii* (Douglas-fir)
RUDI: *Rubus discolor* (Himalayan blackberry)
SAHO: *Salix hookeriana* (Piper's willow)
SALU: *Salix lucida lasiandra* (Pacific willow)
SPDO: *Spiraea douglasii* (hardhack)
THPL: *Thuja plicata* (western red cedar)
TYLA: *Typha latifolia* (common cattail)
URDI: *Urtica dioica* (stinging nettle)

*Score is based on Wildlife Habitat Assessment rating
**BIBI is "Benthic Index of Biological Integrity"

PLEASANT VALLEY SIGNIFICANCE CRITERIA

The determination of resource significance for the Pleasant Valley site reflects the relative quality and quantity, and the location of natural resources within the site. This section presents the significance criteria that were applied to identified natural resources within the Pleasant Valley site.

The natural resource significance criteria are based on fundamental elements (or functions) that must be present for natural systems to work properly. The functional elements selected for this project are based on recent scientific literature, the natural resource information collected for the Pleasant Valley inventory, and the subwatershed assessment conducted as part of the Pleasant Valley inventory. The functional elements are similar to those being evaluated by the City of Portland, Bureau of Planning for its Natural Resource Inventory Update project and by Metro for its Regional Fish and Wildlife Habitat (Goal 5) Protection Program. The significance criteria were tailored to resource data and conditions specific to the Pleasant Valley site.

Riparian and Upland Habitat Functions. The following basic resource functions provide the foundation for the Pleasant Valley significance criteria:

- Water quality
- Channel dynamics and morphology
- Water quantity: stream flow, sources, and storage
- Microclimate
- Fish and aquatic habitat
- Organic inputs
- Riparian and upland wildlife habitat quality
- Upland sensitive species
- Upland interior habitat

Below are brief descriptions of these functions: *:*

Water Quality. The roots, downed wood, and soils in the riparian area help to keep the water clean. Roots and wood help prevent too much dirt and mud from getting in the water by holding soil in place. Riparian vegetation acts as a barrier that slows floodwater or stormwater runoff down so that it does less damage to soil and also acts as a filter for pollutants. Water infiltrating into and through the soils is filtered and kept cool as it flows below ground surface into the stream.

Channel Dynamics and Morphology. Streams move (or meander) and change over time. The location of the channel may change or the amount of water in the channel may change. Scientists call this type of change channel dynamics. These changes help create a variety of habitats in the channel such as pools, cascades, side channels, swift water areas, and slow water areas. The amount and speed of water changes over time and causes flooding in all or part of the riparian area. The area where this flooding occurs over time is called the floodplain. The stream and floodplain relationship is important for maintaining a successful riparian area because the floodwaters not only help cause channel changes they also wash the litterfall and bugs into the stream and improve the riparian area soil.

Trees and other vegetation in the riparian area also help with channel changes. When a tree, or a large

part of it, falls into the stream it helps to create pools and slow water areas and can divert the channel to a new location. Shrubs like willow—with many deep roots—hold some banks in place while nearby sections change. Together, this creates a variety of places for fish and other animals to live, feed, hide, and rest.

Water Quantity: Stream Flow, Sources, and Storage. Floodplains and riparian areas help to moderate and maintain streamflow. Active floodplains provide temporary storage of floodwaters which helps to reduce and delay peak flows throughout a stream system. Vegetated floodplains and riparian areas catch, store, and release water. The leaves, needles, and branches in the canopy and on the ground can block rain or snow and prevent it from reaching the ground, or slow its progress reducing the impact of rainfall. Dense evergreen forests have greater capability to catch and store water than a deciduous forest, shrubland, or grassland. This help controls how much and how quickly water makes its way back to a stream through the riparian area.

Different types of soil also influence the amount of water that gets back to streams over time. Soil with lots of leaves, twigs, bark, and needles will soak up more water and allow less water to run over the surface of the ground. This type of soil allows for more water to soak into the ground, which supports the riparian vegetation. It also provides water for the stream over a longer period of time because the water travels through the soil more slowly than if it had immediately runoff over the surface.

Microclimate.
Small areas that differ in climatic characteristics (such as temperature and humidity) from the general surrounding climate are described by scientists as having a microclimate.. Vegetation can affect a microclimate in riparian areas and uplands. Plants can influence soil moisture and temperature, air temperature, water temperature, wind speed, and relative humidity. An example of this microclimate effect is the difference in temperature and humidity on a hot day between a shady forest and a parking lot in the full sun.

Fish and Aquatic Habitat. In-water habitat structure is important for fish and aquatic species. Certain configurations of pool and riffle sequences in the stream channel, off-channel wetlands, side channels, oxbows, meanders, backwaters, frequently flooded areas (10-year flood or higher frequency), and spawning gravel provide an important diversity of structural habitat. This variety of habitat structure supports species diversity and supports different life stages of individual species.

Organic Materials. Natural material from plants near streams and wetlands that falls into the stream or wetland or onto the ground provides food for fish and other animals. Scientists refer to this as organic inputs. This material is also known as litterfall and is important for riparian area success. Litterfall, such as leaves, twigs, bark, and needles, can fall to the ground or directly into the stream providing an important food source for insects and other bugs. Insects and bugs in the water, and on streamside vegetation, are also an important food source for fish, including young salmon, and other wildlife. Insects from streamside areas are known to make up to half of a young salmon's diet in the summer.

Riparian and Upland Wildlife Habitat Quality. Riparian and upland areas are important to wildlife for a number of reasons. Riparian areas, by definition, are close to the water sources on which wildlife depend. In riparian areas there also tends to be a greater variety of plants which means more places to hide, more places to nest or den, and a greater variety of food. Stream corridors provide a way for wildlife to access other habitat types and, in urban areas, provide places for them to move around safely. More wildlife species occur in and use riparian areas than other types of habitat in Oregon and Washington.

Non-riparian resource areas are also important to wildlife. Upland forests, and other natural areas provide sources for food, cover, nesting and denning. These areas also provide travel corridors and resting places

for species moving between habitats. Edge habitat occurs where one habitat type, such as a forest, meets a meadow, stream, or other habitat type.

Upland Sensitive Species. Habitat areas that provide the life-history requirements for known sensitive animal and plant species are important for maintaining these populations.

Upland Interior Habitat. Large intact habitat patches are important for specific wildlife populations. Long-term trends in wildlife populations are directly related to the area of habitat available—the larger the patch, the longer a population can sustain itself. While edge habitats often contain a high number of species, many sensitive species that need interior habitat are unable to survive in edge areas. The size of a habitat patch, as well as the shape, impact the amount of edge and interior habitat available for wildlife use.

Significance Matrix. Each of the resource functions described above is represented in the criteria developed for determining the relative importance (or significance) of the resource areas identified in the inventory. The Pleasant Valley Significance Matrix (Table 2) identifies the applicable resource functions, the landscape features that contribute to the function, and the criteria used to weigh the quality or relative importance of the function.

The significance criteria (or parameters) are divided into two categories called primary factors and contributing factors. Primary factors are characteristics that, when present, represent significant resource function in and of themselves. Primary factors are highly correlated with resource functionality as described in the scientific literature (e.g., areas of frequent flooding; hydrologically connected wetlands, etc.).

Contributing factors are characteristics that have limited or moderate importance in terms of resource function. Contributing factors are generally associated with riparian landscape features that are farther from streams or wetlands, or have lower habitat quality ratings, but which the scientific studies indicate have an important connection or functional relationship with the resource area. Contributing factors may establish a resource area as significant when considered in combination with other primary or contributing factors.

The significance criteria (and primary and contributing factors) are based on suggested buffer widths and/or other size or distance thresholds recommended in recent scientific literature pertaining to riparian and upland wildlife habitat functions. Table 3 provides a summary of these recommendations by function..

GIS-SUPPORTED SIGNIFICANCE MAPPING

A GIS-supported mapping process was developed to map the significant natural resources within the Pleasant Valley site. This process provides detailed information explaining why natural resources areas are deemed significant. The GIS program can easily and quickly incorporate new or updated data or criteria, and it produces a set of maps that can be easily accessed and distributed. The process also reflects a clear and logical set of steps that can be followed and repeated.

The GIS mapping process begins with the selection of specific data layers. Each GIS data layer represents a landscape feature that contributes to the riparian and upland wildlife functions. All of the natural resource information collected for the Pleasant Valley site (and described previously in this document) was converted into individual GIS data layers for use in the significance mapping process.

After the GIS data layers were created, an automated computer model was developed to automatically search for and maps features from each data layer that meet appropriate spatial parameters. The spatial parameters were based on the factors in the Pleasant Valley Significance Matrix. The GIS search area for features that serve as primary factors generally extends to the lower end of the range of buffer widths, or distance thresholds, found in the literature. However, all areas within the first 50 feet of a water body were deemed significant. The GIS search area for features that serve as contributing factors extend from the outer limits of the search area for a primary factor area out to the greatest distance found in the scientific literature. For example, vegetation, water bodies, and floodplains are essential landscape features for maintaining the Organic Materials function. Vegetation contributes leaf litter, branches, logs, and other organic matter for fish and other wildlife to consume or utilize in other ways. The Pleasant Valley Significance Matrix identifies vegetation within 75 to 170 feet of a stream or water body as important for this function. The GIS mapping program maps all vegetation within 75 feet of a stream or wetland as a primary significant factor for the Organic Materials function, and vegetation between 75 feet and 170 feet of a stream or wetland as a contributing factor for this function.

Significance Determination. Areas with one or more primary factors were determined to be significant natural resources (see Map 12). Areas without any primary factors (i.e. areas with only contributing factors) were not determined to be significant because the number of contributing factors occurring together was not sufficient to warrant a significance determination. In no case did more than four (out of nine) contributing factors occur together at a particular location, and in most cases fewer than four contributing factors occur at a particular location. The area that has been deemed significant by this study is generally consistent with the resource areas that Metro has inventoried as regionally significant as part of the Regional Fish and Wildlife Habitat Protection Program (Goal 5) that is currently under development.

Exception Area. An exception area is an areas that, due to its unique characteristics within the Pleasant Valley Study Area, was not deemed significant even though landscape features exist that would classify the area as having 1 or more primary factor. Map 13 identifies exception areas and provides detail about each circumstance.

TABLE 2. PLEASANT VALLEY SIGNIFICANCE MATRIX

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
Water Quality (including sediment filtering, nutrient/pollutant filtering, erosion control, thermal regulation, and stream bank stability)	Vegetation and streambank areas. Vegetation growing from the streambank can help prevent erosion. Roots and fallen tree trunks may also stabilize stream channel banks. Artificial channelization of stream reaches can lead to additional erosion in other downstream reaches. Vegetation growing in the riparian area filters sediment, excess nutrients, and chemical pollutants from stormwater runoff. This functional value occurs where stormwater is allowed to flow through riparian vegetation before entering the stream channel. Riparian vegetation preserves uncompacted topsoil that is rich in organic materials and allows stormwater to infiltrate into the ground rather than flow over the surface (reduced surface erosion). Wetlands and floodplains. Wetlands and vegetated floodplains help to purify water by removing sediments, excess nutrients, and chemical pollutants.	Vegetation	Wqual_veg	• Concept Plan Habitat[1] (2002) [METRO] • Concept Plan Wetland Inventory (2002) [METRO] • Slope (2001) [BOP] • Concept Plan Streams (2002) [METRO/BOP]	– Vegetation within 50' of stream or wetland – Vegetation within 200' of stream or wetland if slope ≥ 25%	– Woody vegetation within 50'-200' of a stream or wetland if slope < 25% (maximum 860')
		Healthy Soil[2]	Wqual_soil	• Concept Plan Habitat (2002) [METRO] • Concept Plan Wetland Inventory (2002) [METRO] • Slope (2001) [BOP] • Concept Plan Streams (2002) [METRO/BOP]	– Healthy soils within 50' of stream or wetland – Healthy soils within 200' of stream or wetland if slope > 25%	– Healthy soils within 50'-200' of a stream or wetland if slope < 25% (maximum 860')
		Water Bodies	Wqual_wat	• Concept Plan Streams (2002) [METRO/BOP] • Concept Plan Wetland Inventory (2002) [METRO]	– All land within 50' of a stream – All inventoried wetlands	
		Floodplain	Wqual_fld	• Flood Area3 (2002) [METRO/BES] • Developed Floodplain (2002) [METRO]	– All land within the "Undeveloped" floodplain	– All land within the "Developed" floodplain

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
Channel Dynamics	Large trees. Stream channels that have complex "structure" support a larger diversity of wildlife (for example, a variety of features, such as pools, areas of white water, meanders). Large wood that falls into the stream channel can create pools and other complex channel habitat features. Side-channels, oxbows, and off-channel wetlands. These areas provide refuge for fish during flooding, when the current in the main channel may be too fast. The Meander Zone. Low gradient streams tend to "snake" across their floodplain in a series of "S"-curves. This is a natural hydrologic process. Altering this natural flow pattern in one location can cause significant change in another location as the stream seeks a new equilibrium. Human structures built in the meander zone can interfere with natural stream hydrology, and lead to decreased in-stream habitat complexity. Streambank Areas. The landscape in close proximity to a stream is a dynamic place. Pools, small backwaters, meanders, and other important stream channel features will not form if the channel is confined to a narrow space.	Vegetation	Chdyn_veg	• Concept Plan Habitat (2002) [METRO] • Concept Plan Fish Presence Layer (2002) [METRO] • Concept Plan Fish Barriers Layer (2002) [METRO] • Concept Plan Channel Meander Zone (2002) [METRO] • Concept Plan Wetland Inventory (2002) [METRO] • Flood Area (2002) [METRO/BES] • Concept Plan Streams (2002) [METRO/BOP]	– Vegetation within 50' of a stream, stream meander zone, or wetland connected to a stream[4] – Vegetation within the floodplain	– Vegetation within 50-295'of fish-accessible stream
		Water Bodies	Chdyn_wat	• Concept Plan Streams (2002) [METRO/BOP] • Concept Plan Wetland Inventory (2002) [METRO] • Flood Area (2002) [METRO/BES]	– All land within 50' of a stream – Wetlands within the floodplain	

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
Channel Dynamics CONT.		Floodplain	Chdyn_fld	• Flood Area (2002) [METRO/BES] • Developed Floodplain (2002) [METRO]	– All land within the "Undeveloped" floodplain	– All land within the "Developed" floodplain
Water Quantity: Stream Flow, Sources, and Storage	Springs, seeps, and wetlands. These land features supply water to streams (cold water sources are particularly important in an urban area). Floodplains and wetlands. These areas store floodwaters and reduce "flashy" stream hydrology. Forests. Headwaters and riparian forests act as a sponge to hold water, slow stormwater runoff, and maintain stable flow in streams (baseflow). Un-compacted topsoil rich in organic materials can hold water and slow stormwater runoff.	Vegetation	Wquan_veg	• Concept Plan Habitat (2002) [METRO]		– Vegetation within 984' of stream
		Healthy Soil	Wquan_soil	• Concept Plan Habitat (2002) [METRO]		– Healthy soil within 984' of a stream
		Water bodies	Wquan_wat	• Concept Plan Streams (2002) [METRO/BOP] • Concept Plan Wetland Inventory (2002) [METRO	– All land within 50' of streams and isolated wetlands. – All land within 100' of wetlands connected to a stream	
		Floodplain	Wquan_fld	• Flood Area (2002) [METRO/BES]	– All land within flood areas	

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
Microclimate	Stands of trees and shrubs. Stands of trees and other vegetated areas can impact air temperature and humidity within both upland and riparian areas. The local humidity and air temperature can impact water temperature in small streams and impact localized habitat conditions. Topographic features. Localized topography can also impact air temperature and humidity (for example, habitats on a north slope or within a deep gorge may be cooler).	Vegetation	Micro_veg	• Concept Plan Habitat (2002) [METRO] • Concept Plan Wetland Inventory (2002) [METRO] • Concept Plan Streams (2002) [METRO/BOP]	– Woody vegetation within 50' of water body	– Woody vegetation contiguous extent (maximum 984')
		Water bodies	Micro_wbod	• Concept Plan Streams (2002) [METRO/BOP] • Concept Plan Wetland Inventory (2002) [METRO]	– All land within 50' of a stream or wetland	
		Floodplain	Micro_fld	• Flood Area (2002) [METRO/BES] • Developed Floodplain (2002) [METRO]	– All land within the "Undeveloped" floodplain	– All land within the "Developed" floodplain
Fish and Aquatic Habitat	In-water habitat structure. Certain configurations of pool and riffle sequences in the stream channel, off-channel wetlands, side channels, oxbows, meanders, backwaters, frequently flooded areas (10-year flood or higher frequency), known spawning gravel.	Aquatic Habitat	Ahab_hab	• Concept Plan Fish Habitat Rating (2002) [METRO]	– Within 100' of high or medium rated stream segment – Within 50' of low rated stream segment	

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
Fish and Aquatic Habitat CONT.		Sensitive Species	Ahab_sens	• Concept Plan Sensitive Species (2002) [METRO] • Concept Plan Channel Meander Zone (2002) [METRO] • Concept Plan Fish Habitat Rating (2002) [METRO]	– All land within 200' of a channel meander zone of a stream containing aquatic sensitive species or potential habitat for sensitive species[5]	
		Wetlands	Ahab_wet	• Concept Plan Wetland Inventory (2002) [METRO	– All inventoried wetlands	
		Floodplain	Ahab_fld	• Flood Area (2002) [METRO/BES] • Concept Plan Channel Meander Zone (2002) [METRO] • Concept Plan Fish Presence (2002) [METRO] • Concept Plan Fish Barriers (2002) [METRO]	– All land within channel meander zone of accessible reach	– Within channel meander zone of upstream reach – Within flood prone areas
Organic Materials	Vegetation. Trees and other overhanging vegetation are a source of leaf-litter, fallen branches, logs, and other organic matter. This material is an important food source for the organisms that fish eat (aquatic and terrestrial invertebrates). Floodplains. Organic material can enter the aquatic environment by falling into the stream, or when the stream floods and	Vegetation	Orgm_veg	• Concept Plan Habitat (2002) [METRO] • Concept Plan Wetland Inventory (2002) [METRO] • Concept Plan Streams (2002) [METRO/BOP]	– Vegetation within 75' of stream – Vegetation within 75' of a wetland	– Vegetation within 75-170' of stream – Vegetation within 75 - 170' of a wetland

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
	carries away organic material from a vegetated area.	Water bodies	Orgm_wet	• Concept Plan Wetland Inventory (2002) [METRO]	– All land within 10' of a stream – All inventoried wetlands	
		Floodplain	Orgm_fld	• Flood Area (2002) [METRO/BES] • Developed Floodplain (2002) [METRO]	– All land within the "Undeveloped" floodplain	– All land within the "Developed" floodplain
Riparian and Upland Wildlife Habitat Quality	Vegetation or land features that provide food and cover for wildlife. Water and food sources, and structure for nesting, dening, rearing, and cover are important indicators of habitat quality. Corridors and connected patches of native vegetation. Wildlife populations that are connected to each other are more likely to survive over the long term than isolated ones. Many species must migrate seasonally to meet basic needs for food, shelter and breeding, and connections between habitat patches allow this migration to occur. Corridors play an important role in urban areas to provide opportunity for migration and movement, including between upland and riparian habitats.	Vegetation	Uhab_veg	• Concept Plan Habitat (2002) [METRO] • Concept Plan Wetland Inventory (2002) [METRO] • Concept Plan Streams (2002) [METRO/BOP]	– Vegetation within 100' of a stream or wetland	– Vegetation within 100-300' of a stream
		Structure	Uhab_stru	• Concept Plan Habitat (2002) [METRO] • Concept Plan Habitat Sub-watershed WHA Scores (2002) [METRO] • Concept Plan Habitat Corridor (2002) [METRO]	– Within 50' of wildlife habitat areas[6] with WHA score of 45 or more – Wildlife habitat areas within identified habitat corridors	– Within 50' of wildlife habitat areas with WHA >34 and < 45
		Water bodies	Uhab_wat	• Concept Plan Wetland Inventory (2002) [METRO] • Concept Plan Streams (2002) [METRO/BOP]	– All land within 50' of water body	

Resource Functions	Land Features with Functional Value	Land Features	Database Field	Representative GIS Data Layer (*Year*) [*Source*]	Primary Factor	Contributing Factor
		Floodplain	Uhab_fld	• Concept Plan Habitat (2002) [METRO] • Flood Area (2002) [METRO/BES]		– All land within flood prone areas
Upland Sensitive Species	Sensitive species habitats. Areas that provide life-history requirements for sensitive animal and plant species are important for maintaining sensitive species populations.	Vegetation	Usen_veg	• Concept Plan Habitat (2002) [METRO] • Concept Plan Sensitive Species (2002) [METRO]	– Wildlife habitat areas within 100' of terrestrial sensitive species point (including contiguous extent of wildlife habitat area)	– Wildlife habitat areas within 100'-300' of terrestrial sensitive species point (including contiguous extent)
Upland Interior Habitat	Large intact habitat patches. Long-term trends in wildlife populations are directly related to the area of habitat available—the larger the patch, the longer a population can sustain itself.	Vegetation Patches	Uint_veg	• Concept Plan Habitat (2002) [METRO]	– Wildlife habitat areas with an acre or more of interior habitat[7]	

[1] The Concept Plan Habitat layer includes inventoried meadows and low structure vegetation.
[2] Vegetation is used as a surrogate feature for healthy soil (healthy soils are assumed to be vegetated).
[3] The flood area includes the 100-year floodplain; the 1996 flood inundation area and the Concept Plan delineated stream meander zone.
[4] Wetlands that begin within 150' of a stream centerline are considered connected to a stream.
[5] Includes all stream meander zones downstream from a high or medium fish habitat rated stream segment or aquatic sensitive species point.
[6] Wildlife habitat areas include all woody vegetation (forest and/or low structure woody vegetation).
[7] Interior habitat defined as the area of a vegetation patch less a 200' "buffer" from the outside edge.

TABLE 3. BUFFER WIDTHS AND OTHER SPATIAL INDICATORS OF SIGNIFICANT RIPARIAN AND WILDLIFE HABITAT FUNCTION

	FUNCTION	STUDY	MINIMUM WIDTH[3] OR SIZE THRESHOLD
Organic Material	Organic material	FEMAT 1993	100 ft or .5 SPTH
	Organic litter	Spence et al. 1996	.75 SPTH (75-128')
	Large wood (to riparian area)	FEMAT 1993*	1 SPTH of 170 ft.
	Benthic communities	Erman et al. 1977	100 ft
	Benthic communities	FEMAT 1993*	100 ft
			Range of width for function 75-170 ft.
Channel Dynamics			
	Large wood	FEMAT 1993*	1 SPTH or 170 ft.
	Large wood	May 2000	1 SPTH or 197-295 ft.
	Large wood	Pollock and Kennard 1998*	1 SPTH or 105-250 ft
	Large wood	Van Sickle and Gregory 1990	164 ft
	Large wood	Spence et al. 1996	170 ft
	Erosion control	Knutson and Naef 1997*	100-125 ft.
	Bank stability	Spence et al. 1996	.5 SPTH or 50-75"
	Bank stability	Todd 2000*	49 ft.
	Channel morphology	Johnson and Ryba 1992	65-100 ft
	Channel migration zone	Pollock and Kennard 1998*	100-year floodplain
			Range of width for function 49-295 ft/100-year floodplain
Water Quality	Water quality	FEMAT 1993	12-860 ft
	Water quality	Metro 1997*	50-200 ft
	Filter pollution	Knutson and Naef 1997*	13-600 ft.
	Nutrient regulation	Spence et al. 1996	75 SPTH o (75-128'
	Nutrient removal	Todd 2000*	33-98 ft
	Filter sediment	FEMAT 1993	200 ft
	Filter sediments	Knutson and Naef 1997*	26-300 ft
	Filter sediments	Johnson and Ryba 1992 citing Wilson 1967*	10-400 ft
	Capture surface erosion sediments on all but steep slopes	Spence et al. 1996	1 SPTH or 100-170ft
			Range of width for function 10-860 ft.
Microclimate	Shade	Johnson and Ryba 1992(based, in part, on Steinblums et al 1994)	.75 SPTH or 100 ft
	Shade	FEMAT 1993	100 ft
	Stream shading	Spence 1996	.75 SPTH or 75-128'
	Shade-water temperature	May 2000	97—164 ft.
	Shade-Water temperature	Todd 2000*	15-33 ft
	Air temperature, soil, temperature, relative humidity	Brosofske, et al. 1997	148--984 ft.
	Microclimate	Knutson and Naef 1997*	200-525 ft
	Microclimate	FEMAT	.5-3 SPTH or 75-510 ft.
	Microclimate	Pollock and Kennard 1998*	250 ft
			Range of width for function 15-984 ft.
Riparian and Upland Wildlife Habitat	Riparian Wildlife habitat	FEMAT 1993 (citing Roderick and Milner 1991)	100-600 ft
	Riparian Wildlife habitat	Knutson and Naef 1997 (citing others)	25-984 ft
	Riparian Wildlife corridors	Todd 2000*	100-325 ft
	Riparian Wildlife habitat and migration corridors	Fischer et al. 2000*	325 ft

[3] Refers to the width on each side of the stream.
* Based on author's review of literature

	FUNCTION	STUDY	MINIMUM WIDTH[3] OR SIZE THRESHOLD
	Biodiversity	Pollock and Kennard 1998*	200 ft
	General wildlife habitat	May 2000	328 ft
	Willow flycatcher nesting	Knutson and Naef 1997	123 ft
	Full complement of herpetofauna	Rudolph and Dickson 1990	>100 ft
	Belted Kingfisher roosts	USFWS HEP Model	100 – 200 ft
	Smaller mammals	Allen 1983	214 – 297 ft
	Birds	Jones et al. 1988	246 – 656 ft
	Pileated woodpecker	Castelle et al. 1992	450 ft
	Bald eagle nest, roost, perch Nesting ducks, heron rookery and sandhill cranes	Castelle et al. 1992	600 ft
	Pileated woodpecker nesting	Small 1982	328 ft
	Mule deer fawning	Knutson and Naef 1997	600 ft
			Range of width for function 25 - 984 ft.
Fish and Aquatic Habitat	Cutthroat trout	Hickman and Raleigh 1982	98 ft
	Chinook salmon	Raleigh et al. 1986	98 ft
	Cutthroat trout, rainbow trout and steelhead	Knutson and Naef 1997	50 – 200 ft
	Maintenance of benthic communities (aquatic insects)	Erman et al. 1977	100 ft
	Shannon index of macroinvertebrate diversity.	Gregory et al. 1987	100 ft
	Trout and salmon influence zone (Western Washington)	Castelle et al. 1992	200 ft
			Range of width for function 50 - 200 ft.
Upland Interior Habitat	Interior Habitat – Large Patch	Wilcove 1985	
	Interior Habitat – Patch Dynamics	Forman and Gordon 1986	
	Interior Habitat – Large Patch	Soule 1991	
	Interior Habitat – Large Patch	Duerkson et. al. 1997	
	Interior Habitat – Large Patch	Burke and Nol 1998	
	Interior Habitat	Metro 2002	1 acre of interior habitat
			.
Upland Sensitive Species	Pileated woodpecker	Castelle et al. 1992	Woody Vegetation within 100-300 feet of a species siting[4]
	Bald eagle nest, roost, perch Nesting ducks, heron rookery and sandhill cranes	Castelle et al. 1992	
	Pileated woodpecker nesting	Small 1982	
	Connectivity of patches	Adams and Dove 1989	
	Connectivity of patches	Lidicker and Koenig 1996	
	Connectivity of patches	Clergeau and Burel 1997	
			.

[4] This distance reflects principles gleaned from the literature cited.

SIGNIFICANCE MAPPPINGS DATA SOURCES

For more information, contact:

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CONTENTS:

MODEL INPUTS:

Feature:	**Pleasant Valley Streams**
Original Source:	Subset of Metro's regional streams centerline dataset.
Source Path:	c:\aikevin\pleas_valley\sig_model\pv_streams (arc)
Source Format:	Coverage
Source Date:	04/07/2003
Source Description:	Based on updated, re-attributed Metro stream data originally received 1/15/2003. Stream centerlines where revised (where necessary) based on 2'/5' elevation contours and 2002/2001 aerial photos.
Source Notes:	Use chan_type <> 2 to select only surface (non-piped) streams. See coverage metadata for more information.
Metadata Reference:	None currently available – contact Bureau of Planning for more information.

Model Use:	a. To create stream buffers at specified distances. b. To create fish stream (streams with fish presence) buffers at specified distances. c. To create ODFW habitat (low, medium, high) buffers at specified distances.
Processing:	1. Added fish presence information to stream coverage using Metro fish siting and fish barrier data as reference. Refer to the description of these datasets for more information. 2. Added ODFW habitat information to stream coverage using ODFW aquatic habitat data as reference.
Added Database Items:	ISFISHSTREAM – identifies stream centerlines with a known fish presence (based on Metro's Pleasant Valley Concept plan fish siting data.) Includes all upstream and downstream sections of stream accessible to fish (no impassible barriers) (originally based on City of Portland Bureau of Environmental Services fish barriers data.) ODFW_RANK – Oregon Department of Fish & Wildlife ranking (low, med., high) of in-stream aquatic habitat quality.
Distribution Name:	PV_STREAMS.SHP

Feature:	**Pleasant Valley Wetlands**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; Subset of habitat.shp
Source Path:	c:\aikevin\pleas_valley\sig_model\wetlands (poly)
Source Format:	Coverage
Source Date:	05/2002
Source Description:	Subset of the Concept Plan Habitat data – contains only those habitat areas identified as wetland or open water features.
Source Notes:	Originally created by Adolfson Associates based on 1999 Metro aerial photographs, tax lot information, 10' elevation contours, Metro/Northwest Wetland Inventory data, and Soil Conservation Survey data. Adolfson Associated conducted limited field verification of this information.
Metadata Reference:	None – see Concept Plan Habitat Data for more information.
Model Use:	a. To identify wetland areas (including vegetated wetlands). b. To create wetland buffers at specified distances.
Processing:	1. Converted the habitat shapefile (habitat.shp) to coverage format. 2. Removed all areas not representing wetland or open water.
Added Database Items:	ISWETLAND – *boolean*; wetland polygons.
Distribution Name:	PV_WETLANDS.SHP

Feature:	**Pleasant Valley Vegetation**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; Subset of habitat.shp
Source Path:	c:\aikevin\pleas_valley\sig_model\vegetation (poly)
Source Format:	Coverage
Source Date:	05/2002

Source Description:	Subset of the Concept Plan Habitat data – contains only those habitat areas identified as vegetated (meadows, shrub/scrub, forest). Includes vegetated wetlands.
Source Notes:	Originally created by Adolfson Associates based on 1999 Metro aerial photographs, tax lot information, 10' elevation contours, and Metro/Northwest Wetland Inventory data. Adolfson Associates identified and assigned vegetation classifications to vegetated areas within the Pleasant Valley study area. Limited field verification was conducted. Initially, Adolfson Associates identified 10 vegetation types. Bureau of Planning staff consolidated the 10 types into 3 for use in the significance mapping process.
Metadata Reference:	None – see Concept Plan Habitat Data for more information.
Model Use:	a. To identify vegetated areas. b. To create buffers at around vegetated habitat areas at specified distances.
Processing:	1. Converted the habitat shapefile (habitat.shp) to coverage format. 2. Removed all areas not representing vegetated habitat areas. 3. Summarized the habitat data into three general types – meadow, shrub, and forest. 4. Identified wildlife habitat corridors mapped by Metro in the Concept Plan. 5. Intersected the vegetated areas with the subwatersheds to assign each area a wildlife habitat assessment (WHA) score. The highest score that any intersected any part of a contiguous area of vegetation was assigned to that area.
Added Database Items:	VEG_TYPE – *string*; the type of vegetation (Forest, Shrub, Meadow). ISWETLAND – *boolean*; vegetated wetland polygons. ISCORRIDOR – *boolean*; vegetated areas within a wildlife corridor. WHA_SCORE – the WHA score for a vegetated area (based on the subwatershed score as supplied by Adolfson Associates.)
Distribution Name:	PV_VEGETATION.SHP

Feature:	**Pleasant Valley Flood Area**

FIRST SOURCE:

Original Source:	Metro RLIS - 100-year Floodplain (modified version of FEMA 100-year floodplain)
Source Path:	\\cgisfile\data\shapes\hazard\ 100yr_floodplain_metro
Source Format:	Shapefile
Source Date:	12/2001
Source Description:	100-Year Flood Plain as delineated by the Federal Emergency Management Association (FEMA). Digitized by the Portland Office of the Army Corps of Engineers. Updated with local input.
Source Notes:	Members of the Bureau of Planning, Bureau of Environmental Services, the Endangered Species Act Group, the Water Bureau and Metro have agreed that the Metro floodplain is the most accurate information for regional modeling. Metro has modified the data to recent include changes in the Columbia Slough and Johnson Creek.

Metadata Reference:	http://mazama.metro-region.org/metadata/display.cfm?Meta_layer_id=463&Db_type=rlislite#ident

SECOND SOURCE:

Original Source:	Army Corps of Engineers February 1996 Flood Area
Source Path:	\\cgisfile\data\shapes\hazard\96_flood_army
Source Format:	Shapefile
Source Date:	2/1996
Source Description:	A record peak flow in February of 1996 caused the Willamette River and its major tributaries to flood. This map was created to delineate the inundated areas near the mainstream and major tributaries of the Willamette River.
Source Notes:	Complete FGDC metadata is available from US Army Corps of Engineers, Portland District.
Metadata Reference:	http://mazama.metro-region.org/metadata/display.cfm?Meta_layer_id=796&Db_type=rlis#ident
Model Use:	a. To identify frequently flooded areas representing an approximation of the 100-year floodplain.
Processing:	1. Converted all data to coverage format. 2. Union 100-year floodplain (source #1) with 1996 Flood Area (Source #2) and clipped by the Concept Plan boundary to create pleasant valley flood area coverage. 3. Identified and attributed all areas within either the 100-year floodplain, the 1996 flood area, or the stream meander zone. 4. Removed all unneeded database items.
Added Database Items:	ISFLOOD – *boolean*; flood area polygons (either within the 100-year floodplain, the 1996 flood area, or a stream meander zone.)
Distribution Name:	PV_FLOODAREA.SHP

Feature:	**Developed Floodplain**
Original Source:	Metro's Developed Floodplain (from Goal 5)
Source Path:	c:\aikevin\HPS_Project\METRO_Goal5\ Shapefiles\May_2002\devfld.shp
Source Format:	Shapefile
Source Date:	5/2002
Source Description:	Developed floodplain areas identified as part of Metro's Goal 5 project.
Source Notes:	None.
Metadata Reference:	C:\aikevin\HPS_Project\METRO_Goal5\Shapefiles\ Riparian GIS Data FTP.doc
Model Use:	a. To identify developed portions of the 100-year floodplain.
Processing:	1. Converted all data to coverage format. 2. Added field to identify developed floodplain polygons.
Added Database Items:	ISDEVFLOOD – *boolean*; developed floodplain polygons.
Distribution Name:	PV_DEVELOPED_FLOODPLAIN.SHP

Feature:	**Steep Slopes**
Original Source:	Bureau of Planning
Source Path:	x:\maplib\common\dem_2001\slope
Source Format:	Coverage
Source Date:	11/2002
Source Description:	Steep slopes (greater than or equal to 25%) for the Portland metropolitan area.
Source Notes:	Created from 2001 Bureau of Planning 10' DEM (created from July 2001 Metro DTM). Refer to the metadata for a complete description of this dataset.
Metadata Reference:	X:/Maplib/COMMON/DEM_2001/ SLOPE_BOP_Metadata.htm
Model Use:	a. To identify areas where slope >= 25%.
Processing:	1. Added item to identify all slopes >= 25%.
Added Database Items:	ISSLOPE25 – *boolean*; polygons where slope >= 25%.
Distribution Name:	PV_STEEP_SLOPES.SHP

Feature:	**Pleasant Valley Stream Meander Zones**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; ESA_T3 (coverage)
Source Path:	c:\aikevin\pleas_valley\sig_model\meander(poly)
Source Format:	Coverage
Source Date:	4/7/2003
Source Description:	Stream meander zones.
Source Notes:	Originally created by Adolfson Associates for the Pleasant Valley Concept Plan based on 1999 Metro aerial photographs, 10' elevation contours, Soil Conservation Survey information, and NOAA Fisheries standard method for identifying channel migration zones. Updated by Bureau of Planning to include areas missing from the original mapping (see Stream Meander Zones data.).
Metadata Reference:	None.
Model Use:	a. To create stream meander zone buffers at specified distances. b. To create fish stream (streams with fish presence) meander zone buffers at specified distances. c. To create medium/high ODFW habitat stream meander zone buffers at specified distances.
Processing:	1. Added missing stream meander zone areas (to upper Jenny Creek, for example.) Estimated location of meander zone using 2'/5' contours and 2001/2002 aerial photos. 2. Added fish presence information to stream meander zone coverage using Metro fish siting and fish barrier data as reference. Refer to the description of these datasets for more information. 3. Added ODFW habitat information to stream meander zone coverage using ODFW aquatic habitat data as reference.
Added Database Items:	ISMEANDER - *boolean*; stream meander zones. ISFISHMEAN – identifies stream meander zones with a known fish presence (based on Metro's Pleasant Valley Concept plan fish siting and

	aquatic sensitive species data.) Includes all upstream and downstream sections of stream accessible to fish (no impassible barriers) (based on Metro's Pleasant Valley Concept plan fish barriers data.) Also identifies stream meander zones that are downstream of any medium or high ODFW ranked aquatic habitat. ESTIMATED – *boolean*; identifies meander zones added by City of Portland Bureau of Planning (digitized using 2'/5' elevation contours and 2001/2002 aerial photos as reference.) Not field verified.
Distribution Name:	PV_MEANDER_ZONES.SHP

Feature:	**Pleasant Valley Sensitive Species Sittings**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; OBSERVE (coverage)
Source Path:	c:\aikevin\pleas_valley\sig_model\sensspecies (point)
Source Format:	Coverage
Source Date:	06/2002
Source Description:	Sensitive species (upland and aquatic/riparian) sittings.
Source Notes:	Originally created by Adolfson Associates based on lists of sensitive species sittings included in independent studies (Johnson Creek Predesign: Wildlife Habitat Assessments, Wetlands Delineation's, and Functional Value Assessment; Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2000) reporting on sensitive species sittings from local botanists and community members, and field observations.
Metadata Reference:	None – refer to Concept Plan "Resource Management" map for more information.
Model Use:	a. To identify stream meander zones containing aquatic sensitive species (see stream meander zone data.) b. To create sensitive species buffers at specified distances.
Processing:	1. Added field to identify "Aquatic" or "Upland" sensitive species.
Added Database Items:	SPEC_TYPE – identifies AQUATIC/UPLAND sensitive species based on the species code (refer to the Concept Plan "Resource Management" map for an explanation of species codes.
Distribution Name:	PV_SENSITIVE_SPECIES.SHP

Feature:	**Pleasant Valley Concept Plan Boundary**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; subset of PV (coverage)
Source Path:	c:\aikevin\pleas_valley\sig_model\pv_bnd (poly)
Source Format:	Coverage
Source Date:	06/2002
Source Description:	Metro's Concept Plan boundary for the Pleasant Valley area.
Metadata Reference:	None.
Model Use:	a. To limit the model output to the concept plan boundary.

Processing:	1. Selected 3 areas within the Concept Plan boundary; removed all other areas.
Added Database Items:	None.
Distribution Name:	PV_PLAN_BOUNDARY.SHP

Feature:	**Pleasant Valley Fish Presence**
Original Source:	
Source Path:	
Source Format:	Coverage
Source Date:	
Source Description:	Stream reaches where fish could live because no barrier to their passage into and out of the reach exists.
Source Notes:	This Bureau of Planning created this data by identifying stream reaches that are downstream from a barrier (see Pleasant Valley Fish Barrier)
Metadata Reference:	
Model Use:	
Processing:	
Added Database Items:	
Distribution Name:	

Feature:	**Pleasant Valley Fish Barriers**
Original Source:	
Source Path:	
Source Format:	Coverage
Source Date:	
Source Description:	Barriers to fish passage.
Source Notes:	Originally created by the Bureau of Environmental Services based on a study conducted by the Oregon Department of Fish and Wildlife (Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2001). This study identified fish barriers in the study area. Additional fish barrier information was added based on field observations.
Metadata Reference:	.
Model Use:	
Processing:	
Added Database Items:	.
Distribution Name:	

Feature:	**Pleasant Valley Fish Habitat Rating**
Original Source:	
Source Path:	
Source Format:	Coverage
Source Date:	
Source Description:	Aquatic habitat rating.

Source Notes:	Rating were originally created by the Bureau of Environmental Services based on an study conducted by the Oregon Department of Fish and Wildlife (Aquatic Inventories Project: Physical Habitat Surveys—Kelley Creek and tributaries 1999-2001). ODFW provided a rating of high, medium, or low for stream reaches in the study area.
Metadata Reference:	.
Model Use:	
Processing:	
Added Database Items:	
Distribution Name:	

Feature:	**Pleasant Valley Wildlife Habitat Rating**
Original Source:	
Source Path:	
Source Format:	Coverage
Source Date:	
Source Description:	Wildlife habitat rating for each Pleasant Valley subarea.
Source Notes:	Originally created by selecting all woody vegetation within the Pleasant Valley subareas and assigning the vegetation a rank of high or low based on the Wildlife Habitat Assessment score for the subarea. A WHA score of 45 or higher received a wildlife habitat rating of high. A WHA score of less than 45 received a wildlife habitat rating of low. The WHA rating was generated by Adolfson Associates using the standard Wildlife Habitat Assessment form.
Metadata Reference:	.
Model Use:	
Processing:	
Added Database Items:	
Distribution Name:	

Feature:	**Pleasant Valley Wildlife Corridors**
Original Source:	
Source Path:	
Source Format:	Coverage
Source Date:	
Source Description:	Wildlife corridors within the study area.
Source Notes:	Originally created by the project team by looking at the location of vegetation on aerial photographs, reviewing the locations of wildlife sittings and using professional judgement to vegetated corridors between wildlife sittings.
Metadata Reference:	.
Model Use:	
Processing:	
Added Database Items:	
Distribution Name:	

REFERENCE DATA:

Feature:	**Pleasant Valley Fish Sittings**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; FISHSITE (shapefile)
Source Path:	c:\aikevin\pleas_valley\metro_data\ pv_fish_sitings.shp
Source Format:	Shapefile
Source Date:	06/2002
Source Description:	Metro's Concept Plan fish siting data.
Metadata Reference:	None.
Processing:	None.
Added Database Items:	None.
Distribution Name:	PV_FISH_SITINGS.SHP

Feature:	**Pleasant Valley Fish Barriers**
Original Source:	Metro Pleasant Valley Archive: Data Files-1 [06/28/02 - #000436; Disk 2 of 6]; FISHBARRIER (coverage)
Source Path:	c:\aikevin\pleas_valley\metro_data\ pv_fish_barriers.shp
Source Format:	Shapefile
Source Date:	06/2002
Source Description:	Metro's Concept Plan fish barriers and culverts.
Metadata Reference:	None.
Processing:	None.
Added Database Items:	None.
Distribution Name:	PV_FISH_BARRIERS.SHP

REFERENCES

Allen, A.W. 1983. Habitat suitability index models: beaver. U.S. Department of Interior, Fish and Wildlife Service. FWS/OBS-82/10.30.

Adams, L.W. and L.E. Dove. 1989. Wildlife reserves and corridors in the urban environment: a guide to ecological landscape planning and resource conservation. National Institute for Urban Wildlife, Columbia, MD.

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Burke, D.M. and E. Nol. 1998. Influence of food abundance, nest-site habitat, and forest fragmentation on breeding Ovenbirds. Auk 115:96-104.

Castelle, A.J., C. Connolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, T. Erickson, and S.S. Cooke. 1992. Wetland buffers: use and effectiveness. Publication No. 92-10 prepared for the Washington Department of Ecology, Shorelands and Coastal Zone Management Program, Olympia, WA.

Center for Watershed Protection 1998. Rapid Watershed Planning Handbook, Ellicott City, Maryland.

City of Portland Bureau of Environmental Services 2000. Hydrologic Model of Johnson Creek Watershed.

Clergeau, P. and F. Burel. 1997. The role of spatio-temporal patch connectivity at the landscape level: an example in bird distribution. Landscape and Urban Planning 38:37-43.

Duerksen, C.J., D.A. Elliott, N.T. Hobbs, E. Johnson, and J.R. Miller. 1997. Habitat protection planning: where the wild things are. PAS Report Number 470/471. American Planning Association, Chicago, IL.

Erman, D.C., J.D. Newbold, and K.R. Ruby. 1977. Evaluation of streamside bufferstrips for protecting aquatic organisms. Contribution 165, University of California, Water Resource Center, Davis, CA.

FEMAT. 1993. Forest Ecosystems Management: An Ecological, Economic, and Social Assessment. Interagency SEIS Team, Portland, Oregon.

Forman, R.T.T. and M. Godron. 1986. Landscape ecology. John Wiley and Sons, New York, NY.

Graham, Jennifer C. and David L Ward. Distribution of Fish in Portland Tributary Streams; Annual Report 2001-02. Oregon Department of Fish and Wildlife, Clackamas, OR. November 2002

Gregory, S.V., G.A. Lamberti, D.C. Erman, K.V. Koski, M.L. Murphy and J.R. Sedell. 1987. Influence of forest practices on aquatic production. Pages 233-255 in E.O. Salo and T.W. Cundy, editors. Streamside management: forestry and fishery interactions. Coll. Forest Resources Contribution 57. University of Washington, Institute of Forest Resource, Seattle, WA.

Harza Engineering Company 2000. Johnson Creek Water Quality Assessment, Portland, Oregon. February 2000.

Hennings, L.A. 2001. Riparian bird communities in Portland, Oregon: Habitat, urbanization, and spatial scale patterns. Masters' Thesis, Oregon State University Department of Fisheries and Wildlife, Corvallis, Oregon.

Hickman, T., and R.F. Raleigh. 1982. Habitat suitability index models: cutthroat trout. U.S. Department of Interior, Fish Wildlife Service. FWS/OBS-82/10.5.

Horner, Richard R. and Joseph J. Skupien 1994. Aquatic Biological impacts of Urban Land Use. Fundamentals of Urban Runoff Management - Technical and Institutional Issues. Terrene Institute, Washington, D.C.: 43-56.

Horner, Richard R., Derek B. Booth, Amanda Azous, and Christopher W. May 1997. Watershed Determinants of Ecosystem Functioning. Effects of Watershed Development and Management on Aquatic Ecosystems, L.A. Roesner (ed.), American Society of Civil Engineers, New York: 251-274.

Jones, J.J., J.P. Lortie and U.D. Pierce, Jr. 1988. The identification and management of significant fish and wildlife resources in southern coastal Maine. Maine Department of Inland Fish and Wildlife. Augusta, ME.

Kauffman, J.B., M. Mahrt, L. Mahrt, and W.D. Edge. 2001. Wildlife of riparian habitats. Pages 431-463 in: D. Johnson and T. O'Neil, editors. Wildlife habitats and relationships in Oregon and Washington. OSU Press, Corvallis, OR.

Lidicker, W.Z., Jr., and W.D. Koenig. 1996. Responses of terrestrial vertebrates to habitat edges and corridors. Pp. 85-109 in: D.R. McCullough, editor. Metapopulations and wildlife conservation. Island Press, Washington, D.C.

May, Christopher and Richard Horner 1998. Watershed Urbanization and the Decline of Salmon in Puget Sound Streams. Salmon in the City Abstracts, American Public Works Association, Washington Chapter, Mount Vernon, Washington: 19-40.

May, Christopher W., Richard R. Horner, James R. Karr, Brian W. Mar, and Eugene B. Welch 1997. Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion. Watershed Protection Techniques, 2(4): 483-494.

May, C.W. 2000. Protection of stream-riparian ecosystems: a review of the best available science. Pages B2-B51 in Kitsap County. Kitsap peninsula salmonid refugia study. Port Orchard, WA.

Mitsch, William J. and James G. Gosselink 1993. Wetlands, John Wiley and Sons, Inc, New York: 519-522.

Mulvey, Mike, Larry Caton, Rich Hafele 1992. Oregon Nonpoint Source Monitoring Protocols and Stream Bioassessment Field Manual for Macroinvertebrates and Habitat Assessment. Draft, Oregon Department of Environmental Quality Laboratory, Biomonitoring Section.

Pleasant Valley Project Partners, et al. 2002. Pleasant Valley Concept Plan. Portland, Oregon.

Raleigh, R.F., W.J. Miller, and P.C. Nelson. 1986. Habitat suitability index models: chinook salmon. U.S. Department of Interior, Fish and Wildlife Service FWS/OBS-82/10.122.

Rudolph, D.C. and J.G. Dickson. 1990. Streamside zone width and amphibian and reptile abundance. Southwest. Naturalist 35:472-476.

Small, M. 1982. Wildlife management in riparian habitats. Publication of the Maine Agricultural Experiment Station, Orono, ME.

Soulé, M.E. 1991. Land use planning and wildlife maintenance: guidelines for conserving wildlife in an urban landscape. Journal of the American Planning Association 57:313-323.

Soulé, M.E. 1991. Theory and strategy. Pages 91-105 in Landscape Linkages and Biodiversity. Island Press, WA.

Wilcove, D.S. 1985. Nest predation in forest tracts and the decline of migratory songbirds. Ecology 66:1211-1214.

SECTION 2. ECONOMIC, SOCIAL, ENVIRONMENTAL, and ENERGY ANALYSIS

INTRODUCTION

This section presents the third step in the State Goal 5 Planning process: the ESEE Analysis. This step follows the Inventory and Significance Determination steps, which are addressed in the previous section. The ESEE analysis includes the identification of conflicting uses and an analysis of economic, social, environmental, and energy (ESEE) consequences of protecting, partially protecting, or not protecting significant resources.

BACKGROUND

"The Pleasant Valley…area is a beautiful valley surrounded by lava domes in the southeast portion of the Metro region. It has slowly evolved into a rural residential area over the last 30 years, largely displacing the agricultural uses that once occupied the valley. Now urban development has reached the borders of this community, and rapid and substantial change is in this area's immediate future. As the area is planned for urbanization, the primary goal is to create a place rather than a carpet of subdivisions. To accomplish this, the unique attributes of this area need to be identified and protected, and the limits to development in the area respected." (From a 1998 planning process led by local communities)

The goal of creating a community that allows intensive urban development while protecting the area's unique attributes was a central theme of the Pleasant Valley Concept Plan. Critical to the "sense of place" in Pleasant Valley, according to the Plan, is the extensive network of streams, wetlands, and other natural features that define and connect urban neighborhoods. Plan goals highlighted the importance of developing the valley in a way that minimizes impacts on these natural features, while maintaining natural features that enhance the built environment.

As part of the Concept Planning process, natural features and their important functions were identified and mapped. Collectively, this natural system serves as the green framework for the Concept Plan, and was called the Environmentally Sensitive/Restoration Area (ESRA). The area within the ESRA boundaries corresponds to the inventoried significant Goal 5 resource site.

The Concept Plan also included a broad outline for a regulatory program that limits developed within the significant resource site (also called the ESRA), and allows planned, intensive urban development within the remainder of the Pleasant Valley study area. However, the ESEE consequences of "full protection", "limited protection", and "no protection" will be considered in this document, as required by the Goal 5 rule.

IMPACT AREA DETERMINATION

Statewide Planning Goal 5 requires local governments to identify "impact areas" for significant Goal 5 resource sites. In this case, the impact area for the significant resource site is the entire Pleasant Valley planning area outside the site.

Under all three Goal 5 conflicting use scenarios (full protection, limited protection, and no protection), there are strong inter-relationships between the significant resource site and its surrounding impact area. The planned intensive urbanization of Pleasant Valley will have a broad array of potential impacts on significant natural resources and vice versa. For example, full protection of the significant resource site

would mean that public facilities and services necessary to serve planned development could not be extended through the significant resource site. Similarly, unrestricted development within the impact area (i.e., no green development practices) would result in substantial adverse impacts on water quality and fish habitat functions within the resource site. Thus, the level of protection applied to the significant resource site and its impact area will have distinct economic, social, environmental and energy consequences for the site and for the entire Pleasant Valley planning area.

Because of these mutual impacts, the Goal 5 "impact area" for the significant resource site is the remainder of the Pleasant Valley planning area. The ESEE analysis will focus on the consequences of fully protecting, partially protecting, and not protecting significant Goal 5 resources within the resource site and the impact area—in the context of potential urban development within the Pleasant Valley planning area as a whole.

CONFLICTING USE ANALYSIS

Following the significance determination for inventoried Goal 5 resources, local governments must identify conflicting uses for the resource site and its impact area. Under the Administrative Rule for Goal 5, a conflicting use is one that, if allowed, could negatively impact a significant resource site or its impact area. The rule directs local governments to examine existing uses and potential conflicting uses based on applicable zoning:

> *"Local governments shall identify conflicting uses that exist, or could occur, with regard to significant Goal 5 resource sites. To identify these uses, local governments shall examine land uses allowed outright or conditionally within the zones applied to the resource site and in its impact area."*

To determine *"land uses allowed outright or conditionally within the zones applied"* for the Pleasant Valley significant resource site and impact area, current zoning and regulations will be evaluated. The analysis also addresses future zoning as envisioned in the Pleasant Valley Concept Plan and Implementation Plan. The conflicting use analysis is therefore based on uses allowed by existing county zoning and by uses that are envisioned to be allowed in the future. The conflicting use analysis considers uses allowed outright or conditionally. Existing land uses and planned public facilities are also considered.

Agriculture and rural residential are the most widespread existing use within the planning area, and within the significant resource site. Other existing uses include parks, recreational activities, churches, schools, community services, streets and utilities. The following lists detail the current Multnomah and Clackamas County zoning districts that apply to the resource site and impact area. The lists also includes the anticiapted zoning districts that will apply to the area as a result of the Pleasant Valley Implementation Plan:

<u>Multnomah County:</u>

- Rural Residential (RR);
- Retail Commercial (C3);

<u>Clackamas County:</u>

- Rural Residential Farm Forest 5 Acres (RRFF-5);
- Farm Forest 10-Acre District (FF-10); and
- Future Urbanizable 10-Acre District (FU-10).

Pleasant Valley Implementation Plan:

Residential Districts

- Low Density Residential—5.3 to 7.9 dwelling units per net buildable acre
- Medium Density Residential—12.2 to 18.2 dwelling units per net buildable acre
- High Density Residential—20 to 60 dwelling units per net buildable acre

Commercial, Mixed-Use Districts, and Employment Districts

- Town Center
- Neighborhood Center
- Mixed Use Employment
- Employment

The following sections describe the uses permitted within these zones, and the potential conflicts and environmental impacts caused by these uses.

USES PERMITTED BY ZONING

The following discussion identifies allowed land uses in each applicable County base zone and the uses that are anticiapted to be allowed as a result of the Pleasant Valley planning process. Table 1 lists permitted and conditional uses within the existing Multnomah and Clackamas County zones. Following Table 1 is a discussion of the individual zones, their general location within the planning area, allowed uses within each zone, and existing uses within each zone.

Table 1. Uses Permitted by Multnomah and Clackamas County Zoning

Zone	Allowed/Accessory Uses	Prescribed/Conditional Uses	Allowed Density
Multnomah County*			
RR	▪ Rural residential ▪ Limited farm/forest use ▪ Resource conservation uses ▪ Accessory structures and signs ▪ Home occupations and daycare	▪ Rural commercial services ▪ Farm related commercial uses ▪ Intensive animal farming ▪ Produce stand ▪ Planned developments ▪ Public safety and service structures ▪ Mining and geothermal	1 dwelling unit/5 acres
Clackamas County			
RRFF5	▪ Rural residential ▪ Farming and forest operations ▪ Resource conservation uses ▪ Non-profit recreation uses ▪ Utilities and wireless	▪ Public facilities ▪ Community service uses (churches, schools, day care center) ▪ Aircraft land uses ▪ Sanitary landfills	1 dwelling unit/5 acres

Zone	Allowed/Accessory Uses	Prescribed/Conditional Uses	Allowed Density
	telecommunication facilities ▪ Accessory structures and signs ▪ Home occupations and family daycare ▪ Produce stand	▪ Commercial recreational uses ▪ Mining and geothermal ▪ Commercial activities associated with timber and farm uses.	
FF10	▪ Rural residential ▪ Farming and forest operations ▪ Resource conservation uses ▪ Non-profit recreation uses ▪ Utilities and wireless telecommunication facilities ▪ Accessory structures and signs ▪ Home occupations and family daycare ▪ Produce stand	▪ Public facilities ▪ Community service uses (churches, schools, day care center) ▪ Aircraft land uses ▪ Sanitary landfills ▪ Commercial recreational uses ▪ Mining and geothermal ▪ Commercial timber and farm uses. ▪ Dog kennels ▪ Hydroelectric	1 dwelling unit/10 acres
FU 10	▪ Rural residential ▪ Farming and forest operations ▪ Resource conservation uses ▪ Non-profit recreation uses ▪ Utilities and wireless telecommunication facilities ▪ Accessory structures and signs ▪ Home occupations and family daycare ▪ Produce stand	▪ Public facilities ▪ Expansion of community service uses (churches, schools, day care center) ▪ Aircraft land uses ▪ Sanitary landfills ▪ Commercial recreational uses ▪ Commercial activities associated with timber and farm uses. ▪ Dog kennels ▪ Hydroelectric	1 dwelling unit/10 acres

** Multnomah County land includes a single lot zoned commercial (C3), which is addressed as part of the "impact area" discussed later.*

MULTNOMAH COUNTY ZONING

Rural Residential (RR). All of Multnomah County within the Pleasant Valley plan area is zoned RR except for one property (a single lot zoned commercial (C3), which is addressed as part of the "impact area" discussion). The RR zone is intended to provide areas for residential use consistent with desired rural character. Agriculture, forestry, and very low-density single-dwelling residences are the primary allowed uses. The maximum density is one dwelling unit per five acres. Limited rural service commercial uses, community service uses, and mining are permitted with certain limitations or as conditional uses.

Existing conflicting uses within the RR zone include low density residential, agriculture, a community center, church, school, and local service commercial.

CLACKAMAS COUNTY ZONING

Rural Residential Farm/Forest Five Acres (RRFF-5). The portions of Clackamas County within the Pleasant Valley plan area that are east of Foster Road along Cheldelin Road are zoned RRFF-5. The

RRFF-5 zone is intended for rural living that is compatible with the continuation of farm and forest uses. The maximum density is one unit per five acres. Agriculture, forestry, and very low-density single-dwelling residences are the primary allowed uses. Non-profit park and open area uses, utilities, and certain broadcast facilities are permitted by right in the RRFF-5 zone. Churches, schools, cemeteries, for-profit parks and recreation, and broadcast facilities are permitted as conditional uses.

Existing conflicting uses within the RRFF-5 zone are rural residential and agriculture.

Farm Forest 10-Acre District (FF-10) Clackamas County. The portions of Clackamas County within the Pleasant Valley plan area that are west of Foster Road are zoned FF-10 including the northern quarter of an isolated group of properties in the southwest corner of the plan area.[5] The FF-10 zone is intended to provide areas for rural living that are compatible with the continuation of farm and forest uses. The maximum density is one unit per ten acres. The same uses are allowed in the FF-10 zone as are allowed in the RRFF-5 zone with agriculture, forestry, and very low-density single-dwelling residences being the primary uses allowed. Non-profit park and recreation uses, utilities, and certain broadcast facilities are permitted by right in the FF-10 zone. Churches, schools, cemeteries, for-profit park and recreation uses, and broadcast facilities are permitted as conditional uses.

Existing conflicting uses within the FF-10 zone are residential and agricultural uses and a utility substation.

Future Urbanizable 10-Acre District (FU-10) Clackamas County. The FU-10 zone is applied only to two properties isolated in the southwest corner of the Pleasant Valley plan area. The FU-10 zone is intended to preserve land for future development at urban densities. The maximum density is one unit per ten acres. Agriculture, forestry, and very low-density single-dwelling residences are the primary allowed uses. Certain utilities and broadcast facilities are permitted by right in the FU-10 zone. Existing churches and schools are allowed to expand as conditional uses. Cemeteries, and some parks, recreation, and broadcast facilities are permitted as conditional uses.

The existing conflicting use within the FU-10 zone is a manufactured dwelling park.

PLEASANT VALLEY CONCEPT/IMPLEMENTATION PLAN ZONING:

Low Density Residential (LDR). The LDR Sub-District anticipates single-dwelling detached and two-unit attached dwellings on a wide range of lot sizes with an average density of 5.3 to 7.9 dwelling per net residential acre. Development in this district will be arranged to form part of an individual neighborhood, invite walking to gathering places, services and conveniences and a neighborhood park, and connects to the larger community by a pattern of streets, blocks, trails and pedestrian ways and linkages to the significant natural resources area.

Medium Density Residential (MDR). The MDR Sub-District anticipates a range of detached and attached residential development with an average density of 12.2 to 18.2 dwellings per net acre. Development in this sub-district will be arranged to form part of an individual neighborhood, serve as a transition between low density and high density housing types and Subdistricts.

High Density Residential (HDR). The HDR Sub-District is intended to accommodate the highest density housing in Pleasant Valley, with densities ranging from 20 to 60 du/net acre, depending on location. As with the LDR and MDR Sub-District, HDR contributes to completing a variety of housing within, and as part of, individual neighborhoods. Three types of HDR areas, "attached housing" and "town center

[5] These lots have since been annexed to Happy Valley.

housing", and "elderly housing", are provided to a create complete community with housing choices that reflect differing needs and opportunities within Pleasant Valley.

Town Center (TC). The TC subdistrict permits a range of mixed uses including residential, retail, office, and other uses such as civic. The minimum Floor Area Ratio is .50:1 with a maximum building height of 40 feet. The Pleasant Valley capacity estimates for the Town Center are:

Retail—60% of land, 113,000 sq. ft. of floor area.
Office—30% of land, 131,000 square feet of floor area.
Civic—10% of land, 44,000 sq. ft. of floor area.
Residential—39 units estimated on upper levels.

Neighborhood Center (NC). NC subdistricts consist of a mix of smaller scale retail, service and office uses within walking distance or a short bus ride of surrounding single family neighborhoods. Neighborhood Centers are pedestrian oriented as realized by inviting storefronts, comfortably scaled sidewalks and a rhythm of repetitive elements including benches, fountains, planting strips and street trees. The minimum Floor Area Ratio is .35:1 with a maximum building height of 40 feet.

Mixed Use Employment (MUE). The MUE subdistrict is located adjacent to the Town Center. The zone is service-oriented with smaller scale offices and retail uses within an easy drive and walking distance to more vibrant Town Centers. The minimum Floor Area Ratio is .50:1 with a maximum building height of 40 feet.

Employment (EC). The EC subdistrict is primarily intended to provide business/office park and medical and other employment uses. Primary uses shall include knowledge-based industries (graphic communications, creative services, etc.), research and development facilities, office uses, medical facilities and other business park uses. Emphasis is placed on business suited to a high environmental quality setting. The minimum Floor Area Ratio is .40:1 with a maximum building height of 40 feet.

CONFLICTING USE ENVIRONMENTAL IMPACTS

This section describes potential adverse environmental consequences of allowing development within the significant resource site or its impact area. Where the same impacts are identified for different conflicting uses, the initial discussion of impacts is referenced and not repeated.

Rural Residential Uses. Housing is permitted in the four rural residential zones in the planning area (RR, RRFF-5, FF-10, FU-10). Rural residential uses in Pleasant Valley generally consist of 5 to 10 acre lots, although both larger and smaller lots exist. In addition to the construction of homes, rural residential development may include the construction of garages, storage sheds, and other accessory buildings, driveways, parking areas, lawns and managed landscaped areas, septic systems and drain fields, and related development.

Preparing land for housing commonly includes excavation and removal of vegetation, or "ground disturbing activities." Excavation and removal of vegetative cover eliminates habitat for native wildlife and increases the likelihood of erosion. Lost habitat includes feeding, nesting, perching and roosting places for birds, and loss of feeding, nesting and refuge areas for mammals, reptiles, amphibians, fish, and insects. Clearing also removes important structural habitat elements of the forest such as multiple layered canopies, snags and downed logs, and large trees. These habitat components are removed and replaced with large lawns and ornamental landscape areas or, particularly in Pleasant Valley, pastures or small

field crops such as berries. Impervious surfaces such as buildings, long driveways, and large vehicle parking and maneuvering areas also may permanently replace native habitats.

Landscape trees, shrubs, and groundcover plants often include invasive, non-native species that escape into natural areas and compete aggressively with natives. For example, English ivy and holly are commonly used in residential landscapes and have escaped into nearby natural habitats in some parts of the valley.

Forest fragmentation caused by the clearing of vegetation for residential uses increases the isolation of one habitat area from another, particularly in the study area where the valley lowlands have been largely cleared, isolating habitat remnants on the surrounding hills and buttes. The lack of habitat connectivity (except along stream corridors) limits wildlife migration opportunities. Roads (and roadway traffic) and fences can form barriers to wildlife migration. As the range of habitat for indigenous wildlife becomes restricted and isolated, opportunities for recruitment from other areas are limited and wildlife populations become vulnerable to disease, predation and local extinction.

The construction of homes, outbuildings, roads and other impervious surfaces, and the replacement of native vegetation with lawns and landscaped areas has adverse consequences on watershed function. Increased impervious surface and loss of vegetation leads to increased storm runoff and peak flows in streams, resulting in erosion, bank failure, flooding, and significant loss of fish and aquatic habitat function. The increase in impervious surface and storm runoff also leads to reduced groundwater recharge and altered volumes of water in wetlands and streams contributed by groundwater. This can alter an area's hydrology by lowering surface water levels or groundwater tables and removing a local source of water essential to the survival of fish, amphibians and aquatic organisms as well as terrestrial animals. Clearing and grading activities can reduce the capacity of soil to support vegetation and absorb groundwater by reducing soil fertility, microorganisms, and damaging soil structure.

Pollution associated with rural residential development such as oil, gasoline, tar, antifreeze, and other contaminants from vehicles, heating and cooling systems, and roofs degrade habitat and water quality. Heated runoff from roads and vehicle maneuvering areas impacts water quality in streams by raising temperatures and stressing local fish runs. Pesticides, herbicides, and fertilizers used on rural residential landscaping and fields can pollute ground and surface waters and degrade habitat.

Urbanized residential. The Pleasant Valley Implementation Plan anticipates that the rural residential nature of the valley will transition, in part, to higher density residential (ranging from 5.3 units per acre to 60 unit per acre). Several of the Pleasant Valley subdistricts will allow residential (LDR, MDR, HDR, TC). In addition to the construction of homes, this higher density residential development may include the construction of garages, storage sheds, and other accessory buildings, driveways, parking areas, lawns and managed landscaped areas, infrastructure (roads and utilities), and related development. The environmental impacts of this type of development are similar to those that will occur with rural-residential development, however the impacts will be on a much greater scale due to the increased density.

Agricultural Uses. Except for a few large farming operations that have been in the Pleasant Valley area since it was settled in the late 1800's, agricultural uses in the study area mainly consist of small farms. Agricultural uses associated with small farms can have detrimental impacts similar to those described for residential uses, but these are generally concentrated in the area of the farm buildings (where they exist). Additionally, agricultural uses often require plowing fields and exposing bare soil causing erosion that degrades water quality and can adversely impact aquatic habitat. The conversion of forest to farmland replaces diverse forest plant communities with a few, cultivated species. Vegetation acts as a filter, cleansing runoff before it reaches streams or wetlands. Tilling of the soil and removal of vegetation for

agricultural uses reduces these water quality benefits. Agriculture typically (but not always) involves the use of pesticides, herbicides, and fertilizers. These chemicals can contaminate surface and groundwater areas and harm fish and wildlife.

Agriculture may draw irrigation water from wells or directly from streams. Extensive use of groundwater can result in draw down of the water table, which in turn can reduce groundwater discharge to streams and degrade fish and wildlife habitats. Use of water from streams directly reduces flow. These surface water reductions are most common during the summer growing season when natural stream flows are low and the potential adverse impacts to fish are the greatest.

Limited commercial activities accessory to agriculture uses are allowed and generally have all of the detrimental effects described for residential uses. Parking lots may be more common with such commercial uses and may increase the detrimental impacts of impervious surfaces (e.g., reduced infiltration and higher runoff, lower groundwater levels, interference with the transfer of air and gases from the soil). Commercial uses may also involve increased risk from pollution from oil, gasoline, and vehicle related contamination.

Existing agricultural uses are likely to continue in the valley until the farm properties are subdivided for urban use. Under certain urban zones anticipated in the valley, agricultural uses may be allowed conditionally. As a practical matter, however, new agricultural uses are not anticipated upon conversion to urban land after annexation. Agricultural uses will gradually be phased out as urbanization occurs.

Forestry Uses. Historical timber harvest cleared almost the entire Pleasant Valley plan area. Forestry uses have most recently been practiced on the steeper hillsides of the buttes surrounding the plan area. Forestry uses can have major impacts on watershed health. Timber harvest and particularly clear-cutting increases the rate of runoff to streams. Increased runoff to streams has all of the same effects described for rural residential uses including soil loss and erosion, channel down-cutting, bank undercutting and failure, and increased risk of landslides and floods. Removal of vegetation eliminates habitat for native wildlife. Clearing also removes important structural features of the forest and creates fragmented patches of forest. Forest fragmentation increases the isolation of one habitat area from another. As the range of habitat for indigenous wildlife becomes restricted and isolated, opportunities for recruitment from other areas are limited and wildlife populations become vulnerable to disease, predation, and local extinction.

The forestry impacts on watershed hydrology are not generally permanent since harvested areas are replanted with trees or allowed to naturally recover—although recovery is slow. Impacts to wildlife habitat can be permanent when diverse native forest is replaced with intensively managed single-species tree farming. Herbicides and fertilizers may be used and the tree stands grow to be more dense and even-aged than natural forest conditions with little or no understory structure. Such commercial forests have limited value for wildlife.

No commercial forest operations exist in Pleasant Valley and existing development patterns generally preclude such uses. Upon conversion to urban land after annexation, no future commercial forest uses are anticipated.

Commercial and Employment Uses. Commercial and Employment uses, including retail, service, and office/office park, are anticipated for the Pleasant Valley area. The environmental impacts of these uses are generally similar to the impacts related to residential uses. However, Commercial and Employment uses generally have a greater impact than residential due to the greater amount of impervious surface and larger size of buildings.

Park and Recreation Uses. Park and recreation uses focus on public and private parks, recreational grounds, hiking and horse trails, and other similar uses. These lands tend to have few structures and facilities. Parks and recreation construction and maintenance practices can cause erosion and damage vegetation and habitat. Removal of vegetation, creation of impervious surfaces such as roads, parking lots, and construction of buildings are activities associated with development of parks. These activities normally require less impervious surface coverage than residential uses and have fewer environmental impacts. Most park and recreation developments include facilities for maintenance of normal hydrologic relationships and control of erosion. Recreational trails can have very few impacts of natural resources depending on their location, design, and construction.

Park and recreational use are allowed under existing zoning. As annexation and urbanization of Pleasant Valley occurs, recreational use and demand is expected to increase. The Concept Plan identifies specific locations for recreational trails within significant resource areas and for active recreational parks outside these areas.

Community Service Facilities. Community service facilities are limited or conditional uses in the rural residential zones. These uses generally provide a local service to people of the community, such as community centers, schools, daycare centers, religious institutions, and the Grange Hall in Pleasant Valley. These uses have similar impacts as those described for residential uses, but usually with greater impervious surface impacts (e.g., reduced infiltration and higher runoff, lower groundwater levels, interference with the transfer of air and gases from the soil), related to larger buildings and parking areas. Schools may have significant impacts for this reason. By contrast, daycare uses are normally small in size and often contained within other buildings (e.g., religious institutions or community centers). Grounds maintenance for community service uses has the same effects as those described for parks and recreation.

There is one existing school within Pleasant Valley and two new schools are anticipated in the concept Plan. There are currently two churches and one grange hall in Pleasant Valley. New community service facilities in Pleasant Valley are planned within the neighborhoods outside of the significant resource site.

The Pleasant Valley Implementation plan envisions that community service or civic uses will be allowed outright in the Town Center and Neighborhood Center districts. These uses will have similar impacts as those described for the residential uses.

Public Facilities. Public facilities are allowed in all zones and include roads, water, sewer, and other public utilities infrastructure services such as water and sewer pump stations, and water towers. Although operation of existing facilities may have limited adverse environmental effects, the effects from construction and maintenance practices for new facilities typically are greater. These activities may create cleared corridors that increase wind and light penetration into adjacent habitats, providing opportunities for the establishment of invasive, non-native plant species. Construction may fragment wildlife habitat areas, degrade wetlands and streams, increase stormwater runoff and erosion, and reduce forest cover. Construction of public facilities that include structures generally has the same effects as those described for residential uses. Certain types of facilities can have few environmental effects if located with minimal disruption to existing resources. Vegetated bio-swales, constructed wetlands, and similar stormwater facilities can have minimal impacts. Similarly, road crossings of streams, when minimal in number and done by bridge, can limit impacts to a certain extent.

Aircraft Land Uses. Aircraft land uses are allowed within the plan area only as conditional uses in the RRFF-5, FF-10, and FU-10 zones in Clackamas County. These uses involve only light plane operations serving local or agricultural needs and have impacts comparable to those for commercial uses described above.

The small, partially developed lots in the Clackamas County portion of the plan area generally preclude development of aircraft land uses. No such uses exist and none would be allowed after annexation.

Mining. Mining is a conditional use in the RR, RRFF-5 and FF-10 zones within the planning area. Mining generally has the most severe environmental impacts of all uses allowed within the plan area. All resources are normally eliminated. Once a mining operation is closed, some restoration of soil, vegetation and other resources may be possible but resources will remain permanently degraded.

As a practical matter, RR, RRFF-5 and FF-10-zoned lands within the planning area are either developed or too small to mine. Furthermore, mineral or aggregate resources are considered Goal 5 resources and no existing or potential mineral or aggregate resource mining operations have been identified within the planning area and mining uses would not be allowed after annexation.

Wireless Communication and Other Broadcast Facilities. Most low powered transmitters such as for cordless telephones and citizen band radios are allowed in all zones. More powerful and wireless communication facilities are allowed subject to limitations or as conditional uses within Pleasant Valley. Their effects can be similar to residential uses, but with less impervious surface and greater adverse visual impacts. Broadcast facilities can be built very high, with towers and guy wires that can be deadly to birds, which are attracted by the tower lights. Some facilities require cables to be laid in the ground, with significant potential impacts to wetlands, streams, and vegetation, and associated fauna.

These uses are allowed under existing zoning, and are expected to continue and expand within Pleasant Valley with urbanization, though outside of the significant resource site.

ESEE CONSEQUENCES ANALYSIS

The Pleasant Valley planning area has existing and allowed conflicting uses, as outlined before. To weigh the consequences of alternative methods of managing these conflicts, the next step in the Goal 5 process is to conduct an economic, social, environmental, and energy (ESEE) consequences analysis. The following section presents this ESEE analysis, which is based on the Goal 5 inventory, significance determination, and conflicting use impacts described in this document.

Approach. As discussed before, the significant Goal 5 resource site corresponds to the Environmental Sensitive/Restoration Areas (ESRA) outlined in the Concept Plan. The impact area for the significant resource site is the remainder of the Pleasant Valley planning area.

The Goal 5 rule requires that the ESEE consequences of "full protection," "limited protection," and "no protection" of the resource site and its impact area be considered. The starting point for this ESEE analysis is the existing rural zoning which generally allows one dwelling unit per five acres, while offering a fairly low level of natural resource protection. However, the Pleasant Valley Concept Plan envisions much greater residential and employment densities, while offering a much more comprehensive and effective level of natural resource protection. Table 2 summarizes key elements of the decision options used in this analysis.

Table 2. Summary of Goal 5 Decision Options[6]

	Within Resource Site	Within Impact Area
Full Protection This option would nullify the Pleasant Valley Concept Plan by prohibiting all conflicting uses within the significant resource site and the impact area	No conflicting uses allowed (e.g., no ground-disturbing activity, no expansion of existing uses, no new impervious surface area, no new public facilities or trails).	No conflicting uses allowed (e.g., no ground-disturbing activity, no expansion of existing uses, no new impervious surface area, no new public facilities, no green development practices).
Limited Protection This option carries out the policies outlined in the Pleasant Valley Concept Plan, and achieves a balance between intensive urbanization and resource conservation.	Allows for limited ground-disturbing activities for planned public facilities (roads and utilities) and trails. Allows development of one single-dwelling unit on existing, vacant lots. Requires mitigation for all development. Allows density transfer from resource site to impact area at one dwelling unit/acre. Existing agricultural operations may continue.	Provides for intensive urban development outside the significant resource site, subject to green development practices. Existing agricultural operations may continue.
No Protection This option would allow marginal increases in planned housing and job potential, but would eliminate two central organizing principals of the Pleasant Valley Concept Plan by allowing unrestricted development within and outside the significant resource site.	All conflicting uses allowed (e.g.., ground-disturbing activity, unrestricted expansion of existing uses, unrestricted impervious surface area, unmitigated public facilities).	All conflicting uses allowed without green development practices.

Conclusion. The ESEE analysis supports limited protection for the significant resource site and the impact area in accordance with the Pleasant Valley Concept Plan. This conclusion is based on the fact that the economic, social, environmental and energy consequences of the limited protection option are generally positive, while the consequences of "no protection" and "full protection" are overwhelmingly negative.

The Concept Plan was the result of an extensive community planning process that achieved a balance between resource protection and intensive urbanization. The goal of the Concept Plan is to maintain and restore significant riparian, wetland, and upland habitats in the Pleasant Valley planning area (the ESRA concept), while allowing intensive urban development outside of the significant resource area subject to green development practices.

The ESRA concept and the associated green development practices serve as central organizing features of the Concept Plan. Intensive urban residential and employment development using green development practices is encouraged on buildable land outside the significant resource site while the significant

[6] The Oregon DLCD confirmed that this approach to the decision options is consistent with Goal 5 and its associated administrative rule in a letter dated December 27, 2002.

resource site is protected from most conflicting uses. A limited amount of development (e.g. roads and utilities) will be allowed on land within the significant resource site.

Green development practices refer to a toolbox of stormwater management techniques. The techniques involve landscape features that treat and infiltrate stormwater on the development site rather than utilizing a traditional piped collection and conveyance stormwater system. The benefits of green development practices include.

- Reduced stormwater runoff. Traditional development practices clear entire areas for development, add large amounts of impervious surfaces, and compromise the ability of soils to absorb stormwater. Through better site design, soil disturbance can be minimized, unnecessary impervious surfaces can be eliminated, and tree canopy protected, resulting in reduced generation of stormwater runoff.

- Reduced damage from unregulated stormwater flow. Traditional stormwater management techniques convey runoff quickly to management facilities. Without any prior management, these facilities are quickly overwhelmed and release water into streams at rates, volumes, and duration's that compromise stream habitat. Green development practices infiltrate stormwater close to the source, give it an opportunity to evaporate, and attenuate its progress towards streams so that the release of runoff into streams more closely mimics the natural hydrology of the area.

- Increased tree canopy. Green development practices promote the conservation of existing trees and forests and providing tree-planting opportunities in order to create an urban forest. In a forested environment rainfall is intercepted by vegetation, reducing its impact by slowly allowing it to infiltrate and saturate in the soil thus promoting infiltration, minimizing erosion and enhancing water quality. Trees also consume many different types of stormwater-linked pollutants through update from the root zone. Forested areas along stream banks provide stability by holding soil in place and slow runoff velocities.

ECONOMIC CONSEQUENCES ANALYSIS

Introduction. To provide a consistent economic analysis covering the most critical factors, each parcel within the plan district was analyzed according to both existing and potential conflicting uses. The economic analysis for each parcel—the comparison of impacts on development and on resource values—was repeated for three development level scenarios: allowing conflicting uses fully; limiting conflicting uses; and prohibiting all conflicting uses.

Through the economic analysis, a determination is made on the type and quantity of functions that are at risk with the loss of these resources, as well as the type and quantity of conflicting uses that may be affected.

It is important to carefully separate the economic consequences on conflicting uses that exist due to physical constraints and those associated with protecting significant resources. There are increased costs incurred in the design and construction of structures and roads where slopes, certain soil types, streams, wetlands, or floodplains exist.

In determining the economic consequences of protecting significant resources, it is first necessary to define value with respect to a significant resource. Many of the benefits of environmental policies are not readily apparent in the form of immediate monetary gains. The benefits are found more in an increase in the quality of life than in any increment to a region's economic output. Environmental features have been

shown to increase property values as they provide aesthetic and recreational pleasure and a more livable environment. As a result, properties next to these features have higher property values and produce greater tax revenues.

An parcel by parcel database (developed using GIS) provides the basis for this analysis. The database includes information on tax lots, including size and characteristics (e.g., current use, building size, slope, resource type), current zoning, allowed units, Metro Title 3 and 11 lands, public facilities (e.g., planned water, sewer, stormwater, streets, trails, parks), buildable lands data, significant resource area, units allowed under density transfer, units allowed by Plan District (outside ESRA, by zone), and planned jobs. The database, and associated GIS map of the planning area, are available from the City of Portland Bureau of Planning.

Analysis. The economic analysis considers the impact of allowing, prohibiting, or limiting conflicting uses within the significant resource site and the impact area. The analysis addresses lots with no significant resource area, lots with partial significant resource area, and lots with substantial significant resource area. In this context, "substantial" is defined as when the non-resource portion of a lot is insufficient in size to accommodate the total number of units transferred out of the resource area of the lot. Density within the significant resource area is based on one unit per acre. The amount of area outside of the resource that is required to accommodate each unit is 3000 square feet. "Partial" coverage means that the lot has some resource area but not enough to quality as "substantial".

Lots with no significant resource area may have conflicting uses that produce off-site impacts on the significant resource area. These uses include residential and community service uses, which have significant potential off-site impacts due to the removal of vegetation, creation of impervious surfaces, construction of stormwater facilities that discharge into streams and wetlands, and similar activities. Conflicting uses within significant resource areas have direct impacts on resources and resource functions as described earlier. Conflicting uses with the greatest potential impacts are the residential and community service uses. Broadcast facilities may have similar impacts, though generally concentrated in a smaller area. Public facilities also can have significant impacts, but may also have important siting constraints (such as the need for roads and utilities to cross-streams and other natural resources). As noted above, some public facilities, including certain stormwater facilities and road and utility crossings (e.g., via bridges) can have fewer localized resource impacts. Park and recreation uses also range in impact, with natural open space and recreational trails generally having the fewest impacts.

Existing development patterns and small lot sizes preclude development of certain conflicting uses such as mining and aircraft land uses. Similarly, existing development patterns, the absence of current commercial forest production, and the planned urbanization of Pleasant Valley make commercial forestry uses untenable. Additionally, while existing agricultural uses may continue, once the land is annexed and converted to urban lots, farmland will be replaced with urban development.

For the following analysis, conflicting uses are organized in three classes or groups, based broadly on degree of impact. One class includes residential, community service facilities (CSF), and broadcast facilities. The second class is public facilities. The third class is park and recreation uses.

Economic Consequences of Allowing Conflicting Uses Fully. Table 3 summarizes the economic consequences of allowing conflicting uses fully.

Table 3. Economic Consequences of Allowing Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts on ESRA)**	▪ Increase in housing and jobs beyond the planned increase (an estimated 5,048 homes and 4,935 new jobs) on parcels within the ESRA, will increase traffic and pollution, but will provide no open space benefit for this class of properties ▪ No restrictions placed on building coverage, impervious surface area or construction methods ▪ Loss of economic values associated with accessible scenic and recreational areas	**Negative:** Increase in neighboring densities and traffic, accompanied by loss of economic (amenity) values associated with community open space, clean water, groundwater recharge, recreation, wildlife habitat and scenic views
Lots with partial significant resource area (ESRA)	All	▪ Lots with partial ESRA coverage would have unrestricted development potential under this option, although development costs are greater because some lands are highly constrained ▪ Loss of economic value associated with adjacent community open space, scenic, recreational amenities ▪ Economic impacts resulting from potential destabilization of slopes and stream banks, and increase in flood and landslide hazards through vegetation removal, increased impervious surfaces ▪ Adverse economic impact resulting from decreased amenity values for homes and businesses adjacent to water features and upland forests	**Neutral to Negative:** On the one hand, the land area that can be devoted to development is increased, but densities will be greater than allowed under existing zoning. On the other hand, the economic value of adjacent open space, water features and forested areas would be lost.
Lots with substantial significant resource area (ESRA)	**All**	▪ Parcels that are substantially covered by the ESRA would now be able to develop without restriction, although development costs may be substantially greater because of highly constrained land area ▪ Loss of economic value associated with on-site community open space, scenic, recreational amenities ▪ Economic impacts resulting from potential destabilization of slopes and stream banks ▪ Increase in flood and landslide hazards through vegetation removal, impervious surfaces ▪ Adverse economic impact resulting from decreased amenity values for homes and businesses adjacent to water features and upland forests	**Negative to Mixed:** On the one hand, the land area that can be devoted to development is increased substantially; on the other hand, the economic value of adjacent open space, water features and forested areas is lost. For most property owners in this category, ESRA restrictions would probably be viewed as a negative, although the development potential under the Concept Plan is generally the same or greater than allowed under existing zoning.

Allowing conflicting uses fully within the impact area of Pleasant Valley will provide major economic benefits as the area urbanizes. Both urban housing densities and employment opportunities will increase dramatically, and be supported by parks and open space, community services, and urban infrastructure. As the area urbanizes, however, there is the potential for substantial "off-site" degradation of the natural and open space values of the community within the ESRA. New buildings and roads, for example, will bring a dramatic increase in impervious surfaces within the impact area. This can lead to reduced infiltration and higher runoff, increased flooding, degradation of aquatic habitat, and the potential stress or loss of salmon and trout in the Kelley Creek watershed. Urbanization in the watershed will include a critically important feature, however, that can mitigate these potential off-site impacts. This feature is the Plan District provision for Green Development Practices, which include facilities to infiltrate, clean, and slowly release stormwater before it reaches significant resource areas.

There are significant economic costs associated with allowing conflicting uses fully within the ESRA (allowing significant stream, wetland, and forest resources to be eliminated). These resources collectively provide the community's natural and open space system, a unique and highly valued feature for the Pleasant Valley community. The amenity values of the ESRA, including its natural, open space, recreational (local parks and trails), and scenic values, are expected to grow as the valley urbanizes. These amenity values will be capitalized into local property values. These resources also provide community services with economic benefits, such as flood reduction, clean water, and slope stabilization. For example, Kelley Creek, its tributaries and associated wetlands, and Johnson Creek and its broad floodplain provide pollution assimilation/water purification, flood attenuation and storage functions. The damage costs associated with flooding and landslide hazards increase with development activities and increased soil disturbance in resource areas. Vegetation loss can have additional economic costs in the form of lost air conditioning, erosion control, stormwater management, and air pollution control services. Any potential increment of additional housing in the ESRA, if "allowed fully" without controls, must be weighed against the unique and highly valued attributes of the community, many of which are embodied in the ESRA. Other considerations, such as physical (e.g., steep ravines, broad floodplains and wetlands, shallow water tables) and regulatory constraints (e.g., wetlands, water quality, listed species) may further limit the "buildable" land within the ESRA.

This analysis strongly favors allowing conflicting uses fully only within the impact area, outside of significant resource areas. At risk are the unique natural resource attributes of Pleasant Valley, identified by the community and expressed in the Pleasant Valley Concept Plan, which include the community's open spaces and its natural, scenic, and recreational values. The Pleasant Valley Plan District proposes urban levels of housing and employment for the area once annexed, resulting in an estimated 5,048 housing units and 4,935 new jobs. These housing and employment goals can be satisfied within the impact area, as designated in the Plan District, without significant impacts or loss to the community's unique resources.

Economic Consequences of Limiting Conflicting Uses. To determine the consequences of "limiting" conflicting uses, it is helpful to define what limiting means, at least in broad terms. The basis for these limits comes in large part from the Pleasant Valley Concept Plan. The ESRA (significant resource area) is a central organizing element of the Concept Plan. The valley's streams, wetlands, and forests were highly valued community assets. Urban housing and employment needs were met outside the ESRA, and these unique assets were preserved and restored. Certain conflicting uses were envisioned within the ESRA, including limited road and utility crossings, parks and trail uses, as shown on the Concept Plan map. In formulating a "limit program," with input from the Pleasant Valley TAC, Advisory Group, and the public, it was recognized that while properties with partial ESRA would receive substantial economic benefits (an average of 15 housing units), some properties had greater ESRA coverage than others. To provide additional economic value for these properties, a density transfer provision was developed that

would permit the equivalent of at least five times the current base densities for lands within ESRA (one unit per acre) to be transferred out of the ESRA onto the same or adjoining properties. These provisions were incorporated into the "limit" program for Pleasant Valley.

Table 4 summarizes the economic impacts conflicting uses resulting from limiting conflicting uses in accordance with the Pleasant Valley Concept Plan, consistent with the program outlined above.

Table 4. Economic Consequences of Limiting Conflicting Uses Consistent with Pleasant Valley Concept Plan

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	All (off-site impacts on ESRA)	▪ Provide for significant increase in housing and jobs beyond what is allowed under current zoning (an estimated 5,048 homes and 4,935 new jobs). ▪ Some increased long-term costs associated with green development practices (i.e., increased maintenance versus reduced initial construction costs). ▪ Restrictions placed on building coverage, impervious surface area or construction methods. ▪ Maintain economic values associated with community open space, and accessible scenic and recreational benefits. ▪ Avoid adverse economic impact resulting from decreased amenity values for homes and businesses near water features and upland forests.	**Positive:** Manyfold increase in development potential over existing zoning, while maintaining economic values of community open space, clean water, wildlife habitat, scenic views and groundwater recharge. Some long-term maintenance costs increase for green development practices, although short-term costs are usually less.

Lot Type	Conflicting uses	Consequences	Assessment
Lots with partial significant resource area (ESRA)	**Residential, CSF, Other**	▪ Significant increase in allowed density through upzoning and density transfer from ESRA ▪ Since the remaining portions of parcels outside ESRA are from building constraints, development costs are reduced ▪ Maintain economic value associated with adjacent community open space, scenic, recreational amenities ▪ Avoid adverse economic impacts resulting from potential destabilization of slopes and stream banks ▪ Decrease in flood and landslide hazards through vegetation removal, increased impervious surfaces ▪ Avoid adverse economic impact resulting from decreased amenity values for homes and businesses adjacent to water features and upland forests ▪ Some increase in long-term construction costs resulting from green development practices	**Positive:** Significant increase in development potential over existing zoning, while maintaining economic values of community open space, clean water, wildlife habitat, scenic views and groundwater recharge. Some long-term increase for green development practices, although short-term costs typically are less.
	Public facilities	▪ Limited new and redeveloped roads provide connections through resource areas as designated in the Plan District ▪ Limited utilities and green stormwater facilities link and serve local neighborhoods within community, located within planned road crossings, or along the outer edge of resource areas	**Positive:** Allows roads and other public facilities that are essential to an integrated urban community; resource impacts controlled and mitigated through development standards.
	Parks and recreation uses	▪ Parks and trail system located in and along resource areas (as designated in the Plan District) bring residents close to area's unique features ▪ An integrated network of trails, parks and open space is an essential part of a successful urban community	**Positive**: An integrated (natural resource-oriented) parks and trail system provides a major community asset.

Lot Type	Conflicting uses	Consequences	Assessment
Lots with substantial ESRA coverage (and limited transfer-ability)	**Residential, CSF, Other**	▪ Comparable allowed density through to that which is allowed under existing zoning ▪ However, may not be sufficient area for density transfer from ESRA ▪ Maintain economic value associated with adjacent community open space, scenic, recreational amenities ▪ Avoid adverse economic impacts resulting from potential destabilization of slopes and stream banks, and increase in flood and landslide hazards through vegetation removal, increased impervious surfaces ▪ Avoid adverse economic impact resulting from decreased amenity values for homes and businesses adjacent to water features and upland forests ▪ Decrease in short-term construction costs, but increase in long-term maintenance costs, resulting from green development practices	**Neutral:** Development potential approximately the same, but lower increase than properties largely or completely outside ESRA. For this reason, **recommend adjustments to ESRA boundary to allow for full density transfer**. Economic values associated with significant resources protected.
	Public facilities	▪ 14 of the 27 highly constrained properties may be impacted by planned roads allowed under Limited Protection option ▪ New and redeveloped roads provide an integrated transportation system within the valley ▪ Slight increase in construction mitigation costs	**Neutral to Positive:** Allows roads that are essential to an integrated urban community with mitigation for impacts on natural resources.
	Parks and recreation uses	▪ No existing or planned parks or recreation uses will impact these properties.	**Not applicable**.

This analysis supports limiting conflicting uses within significant resource areas of the site. Housing and employment opportunities are dramatically increased within non-resource areas (by an estimated 5,048 housing units and 4,935 new jobs). Additional housing and employment options are permitted through transfers from resource areas to more suitable locations in the impact area, which protects the community's unique natural, scenic, and open space resources. Approximately 27 highly constrained properties would not be able to transfer densities on site. Additional development flexibility for these properties should be considered (see Conflict Resolution section).

Economic Consequences of Prohibiting Conflicting Uses. Table 5 on the following page summarizes the impacts on both significant resources and on conflicting uses of prohibiting conflicting uses.

Table 5. Economic Consequences of Prohibiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts on ESRA)**	▪ Loss of development potential for all parcels in this category. ▪ Pleasant Valley Concept Plan could not be implemented.	**Negative:** No new development allowed; substantial economic costs; housing and employment goals cannot be achieved.
Lots with partial significant resource area (ESRA)	**Residential, CSF, Other**	▪ Loss of development potential and density transfer options. ▪ Although protects community open space, scenic, and recreational amenities, the economic value of these amenities will be lower, because fewer people will enjoy them ▪ Although stabilization of slopes and stream banks, and reduction in flood and landslide hazards would occur, there would be no new development ▪ Amenity values of open space would be of questionable value, since no new housing or jobs to enjoy these values	**Negative**: Significant loss of development potential from existing zoning, without corresponding increase in amenity value to existing homes.
	Public facilities	▪ No new roads or public facilities would be allowed ▪ Loss of connectivity and services provided by public facilities and roads	**Negative:** Road and public facility connectivity is essential to an integrated urban community and could not be provided.
	Parks and recreation uses	▪ Loss of integration of parks and trail system with the community's natural, scenic, and open space resources	**Negative:** An integrated parks and trail system is a vital part of a successful community.
Lots with substantial significant resource area (ESRA)	**Residential, CSF, Other**	▪ Same as above, with conflicting uses prohibited on an estimated 27 highly constrained lots	**Negative:** Comparable or lower development potential than allowed under existing zoning, without density transfer or economic value associated with natural resource amenities.
	Public facilities	▪ Loss of connectivity provided by planned roads (on 14 properties)	**Negative**: Road connectivity is essential to an integrated urban community.
	Parks and recreation uses	▪ No existing or planned parks or recreation uses will impact these properties	**Not applicable.**

The economic consequences of prohibiting conflicting uses are generally negative for both resource and impact areas. New housing and employment opportunities would be eliminated, and prohibiting all conflicting uses within the impact area would essentially preclude further growth or urbanization of the valley. By prohibiting conflicting uses, the community's unique natural, scenic, and open space resources are preserved. Arguably, however, these resources have considerably fewer economic amenity values if the community is not able to grow.

Conclusion. The economic analysis supports limiting conflicting uses within significant resource areas and allowing them fully within the impact area. The analysis assumes that within the impact area, potential adverse effects on nearby resource areas can be mitigated by Plan District provisions for Green

Development Practices. For the highly constrained lots where housing density transfer may not be feasible, some additional flexibility may be warranted in the "limit" program (see Conflict Resolution section).

SOCIAL CONSEQUENCES ANALYSIS.

This section considers the social consequences of allowing, limiting, or prohibiting conflicting uses within Pleasant Valley. The discussion focuses on the following topics: recreational and educational opportunities; housing and employment opportunities; historic, heritage, and cultural values; screening and buffering of land uses; and health, safety, and welfare.

Allowing, limiting, or prohibiting conflicting uses may have a variety of potential social effects, including the following:

- Changes to the value of the site for recreation and education;
- Changes to the quantity of housing units;
- Changes to the quantity of jobs;
- Changes in an area's scenic qualities;
- Changes to the historic and cultural values of the site;
- Changes to the health, safety, and welfare benefits provided by resources; and
- Changes in the ability of natural resources to function as an edge or buffer between different land uses.

The characteristics of these potential social consequences are outlined in the following discussion. The social analysis focuses on how conflicting uses may create positive or negative social consequences within resource and impact areas.

Recreational and Educational Opportunities. Existing public recreational and educational opportunities are limited in Pleasant Valley. They include the limited open space areas, such as Pleasant Valley school, local roads (e.g., biking use), and the Springwater Trail (part of the 40-Mile Loop). The Springwater Trail, located in the northern part of the site, provides recreational and educational opportunities for pedestrians, bicyclists, and wildlife enthusiasts. Proximity to Powell Butte Nature Park and to Gresham makes this a popular section of the trail. Additional open space in and adjacent to the Pleasant Valley planning area was recently purchased allowing for recreational and educational opportunities. Metro is strategically acquiring open space on the buttes surrounding Pleasant Valley in an effort to provide a system of continuous trails, open space, and wildlife habitat. Pleasant Valley will provide a critical link in the system.

Housing Opportunities. The Pleasant Valley Plan District proposes urban levels of density for the area once annexed resulting in an estimated 5,048 housing units.

Employment Opportunities. Employment opportunities in Pleasant Valley are currently very restricted: those associated with the school, nurseries, and the potential use of one commercially zoned lot at SW 172nd and SW Foster (currently undeveloped) provide an estimated 50 jobs (primarily at the school).

The Pleasant Valley Plan District proposes new employment areas that will substantially increase in job opportunities within the area once annexed resulting in an estimated 4,935 new jobs.

Historic, Heritage, and Cultural Values. The floodplains and upland areas of the Johnson Creek basin are believed to have been used by Native Americans. Although no archeological sites are known in Pleasant Valley area, early Native Americans used the valley as a travel route and for hunting and other subsistence activities likely took place there.

Euro-American settlement in the area began in the mid 1800s. Foster Road is a historic farm-to-market road in the Portland region. Pleasant Valley has many historic structures along the road that provide a historic context and an insight into an earlier era. The Grange stands between Kelley Creek and Foster Road and provides a focal point for the community. The Richey House is another historic or socially significant structure in Pleasant Valley.

The Springwater Division Line, located along the northern boundary of the planning area, was developed for rail service in 1903. The line reached its peak usage in 1906, under the joint ownership with Portland General Electric and the Portland Railway Light and Power Company. By 1910, the company had six electric plants and 161 miles of rail, carrying 16,000 passengers each year within the Portland area. Destination parks along the line, such as Oaks Amusement Park in Sellwood, became major attractions, drawing thousands of passengers each weekend. In addition to passengers, the rail hauled farm produce to Portland markets. Many communities developed along the Springwater Line including Sellwood, Waverley Heights, Eastmoreland, Woodstock, Errol Heights, Lents, Powellhurst-Gilbert, and Pleasant Valley. During the peak of the railroad era, the Springwater Line was the linkage between these communities. Passenger service was discontinued in 1958. Nearly 40 years later, in 1996, the railroad line between Gresham and Portland was redeveloped as the Springwater Trail.

In the 1930s, flooding along Johnson Creek prompted the Works Progress Administration (WPA) to clean and line the creek channel in an attempt to reduce flooding. Their efforts to control flooding along the creek failed, and some of the hardened and channelized reaches of the creek (including a reach bordering the northern planning area) are now being restored to more natural conditions. One of the WPA's other project within the planning area was the construction of the Pleasant Valley Elementary School in 1938.

Screening and Buffering. Natural resources, such as those in Pleasant Valley, can function as an edge to different land uses, separating and buffering them from each other both visually and physically. Forest vegetation can serve as a buffer between residential, institutional, commercial, and open space uses. Similarly, Johnson Creek, Kelley Creek, and their associated ravines, wetlands, and vegetation are major defining elements of the community that also provide buffering and other important watershed health functions.

Health, Safety, and Welfare. Erosion and flooding are natural phenomena in Pleasant Valley, but when aggravated by the alteration or removal of vegetation, or increased stormwater runoff, it can lead to damage, injury, or displacement of people and property, and significantly impact aquatic habitats. For example, the area's vegetation helps to stabilize stream banks and hill slopes, and its soils infiltrate rainwater and reduce the frequency and severity of flood events. These functions contribute to the health, safety and welfare of community residents.

There are several other health and welfare benefits provided by forest and riparian vegetation. For example, studies have shown that vegetation in urban or urbanizing areas may reduce stress-related impacts on health. Exposure to natural environments has significant "restorative" benefits (Ulrich 1984). In addition, such forests help reduce air pollution problems and the resulting health impacts (City of Portland 1993).

Social Consequences of Allowing Conflicting Uses Fully. Table 6 summarizes the consequences of allowing conflicting uses to occur in the Pleasant Valley. These consequences are discussed in the context of the social functions or benefits described above. As with the economic analysis, conflicting uses are addressed together or in groups where appropriate, while some uses (e.g., mining and aircraft land uses) are not considered feasible due to existing development patterns or plan designations.

Table 6. Social Consequences of Allowing Conflicting Uses Fully

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts)**	▪ No increase in the number of jobs or housing units for these parcels ▪ Loss of nearby community open space and associated social values ▪ Allows for provision of public facilities for area residents	**Negative:** Marginal increase in jobs and housing opportunities, but at expense of community open space, degraded water quality and decreased quality of life
Lots with partial significant resource area (ESRA)	**All**	▪ Increase in potential damage, injury, and displacement caused by erosion, landslides, and flooding along Johnson and Kelley Creeks ▪ Loss of scenic and open space values of ESRA ▪ Decrease in screening and buffering benefits ▪ Potential loss of historic features ▪ Marginal increase in housing, employment opportunities on constrained lands, through these goals are met outside of ESRA	**Negative:** Unique social values of community and multiple resources highly degraded or lost.
Lots with substantial significant resource area (ESRA)	**All**	▪ Increase in potential damage, injury, and displacement caused by erosion, landslides, and flooding along Johnson and Kelley Creeks ▪ Loss of scenic and open space values of ESRA ▪ Decrease in screening and buffering benefits ▪ Potential loss of historic features ▪ Marginal increase in housing, employment opportunities on constrained lands, through these goals are met outside of ESRA	**Negative:** Unique attributes of community and multiple resources highly degraded or lost

This analysis supports allowing conflicting uses fully within the impact area, outside of significant resource areas. The resource areas provide important social values, and include many of the attributes that make Pleasant Valley unique. The Pleasant Valley Plan District proposes a mix of housing and employment opportunities within the non-resource areas that satisfies planning goals, without the higher costs associated with development on constrained lands and without loss of the community's unique resources.

Social Consequences of Limiting Conflicting Uses. Table 7 summarizes the consequences of limiting conflicting uses in the Pleasant Valley site. These consequences are discussed in the context of the social functions or benefits described previously.

Table 7. Social Consequences of Limiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts)**	▪ Maintain most social values or nearby protected open space areas ▪ Maintain housing and employment objectives of Pleasant Valley Concept Plan ▪ Allow for public facilities and streets necessary to support housing and jobs ▪ Maintain social values associated with clean water and aquatic habitat by implementing Green Development Practices	**Positive:** Social values of community open space maintained for new residents and employees. Green Development Practices minimize off-site impacts.
Lots with partial significant resource area (ESRA)	**All**	▪ Decrease in potential damage, injury, and displacement caused by erosion, landslides, and flooding along Johnson and Kelley Creeks ▪ Maintain scenic and open space values of ESRA ▪ Maintain screening and buffering benefits ▪ Maintain historic features ▪ Allow for housing, employment opportunities through density transfer provisions	**Positive**: Social values of community open space and natural resources conserved.
Lots with substantial significant resource area (and limited transfer-ability)	**All**	▪ Decrease in potential damage, injury, and displacement caused by erosion, landslides, and flooding along Johnson and Kelley Creeks ▪ Maintain scenic and open space values of ESRA ▪ Maintain screening and buffering benefits ▪ Maintain historic features ▪ Allow for housing, employment opportunities through density transfer provisions	**Positive**: Social values of community open space and natural resources conserved.

This analysis supports limiting conflicting uses within significant resource areas of the site. Housing and employment opportunities are dramatically increased within non-resource areas (by an estimated 5,048 housing units and 4,935 new jobs). Additional housing and employment options are permitted through transfers from resource areas to more suitable locations in the impact area, which protects the community's unique resources and avoids higher costs associated with development on constrained lands. Limiting conflicting uses in resource areas preserves a variety of important social values including recreational and educational values, soil stabilization, flood management, land use buffering, and scenic and open space values.

Social Consequences of Prohibiting Conflicting Uses. Table 8 summarizes the consequences of prohibiting conflicting uses in the Pleasant Valley site. These consequences are reviewed in the context of the social functions or benefits described previously.

Table 8. Social Consequences of Prohibiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts)**	▪ Prohibiting conflicting uses on non-resource (impact) areas would preclude new housing and employment options ▪ Social benefits of community open space and natural resource preservation would be limited, because fewer people to enjoy these benefits	**Negative:** No further growth in community; social benefits associated with community open space and natural resource preservation lost.
Lots with partial significant resource area (ESRA)	**All**	▪ Most social benefits of resources preserved, including health, safety and welfare values, screening and buffering, scenic amenities ▪ Recreational and educational opportunities limited by lack of people to enjoy resources and open space ▪ Livability degraded by prevention of transportation and infrastructure connections.	**Negative:** Unique attributes of community open space preserved, but few people to enjoy, and most access and use precluded.
Lots with substantial significant resource area (ESRA)	All	▪ Same as above, with housing limited on an estimated 27 highly constrained lots.	**Negative** Unique attributes of community open space preserved, but few people to enjoy, and most access and use precluded.

The social consequences of prohibiting conflicting uses are generally negative, except in certain resource areas where social benefits roughly balance the costs. New housing and employment opportunities would be eliminated, and prohibiting all conflicting uses within the impact area would essentially preclude further growth or urbanization of the valley.

Conclusion. The social analysis supports limiting conflicting uses within significant resource areas and allowing them fully within the impact area. The analysis assumes that within the impact area, potential adverse effects on the social values of nearby resource areas can be mitigated by Green Development Practices and Transition Area Design Standards that are part of the Plan District. For the highly constrained lots where housing density transfer may not be feasible, some additional flexibility may be warranted in the "limit" program (i.e., ESRA standards).

ENVIRONMENTAL CONSEQUENCES ANALYSIS.

This analysis outlines the environmental consequences of allowing, limiting, or prohibiting conflicting uses within the Pleasant Valley planning area. The inventory of natural resources in the Pleasant Valley planning area describes the environmental functions and values at this resource site. The basis for determining the significance of various types of natural resources also is provided in a separate

memorandum. The natural resource significance rating criteria are based on fundamental elements, or "functions" that must be present for natural systems to work properly, and for long-term sustainability. The functional elements included are based on recent scientific literature, the inventory, and the subwatershed assessment conducted as part of the inventory.

The following resource functions are those identified for the Pleasant Valley site:

- Water quality
- Channel dynamics and morphology
- Water quantity: stream flow, sources, and storage
- Microclimate
- Fish and aquatic habitat
- Organic inputs
- Riparian and upland wildlife habitat quality
- Upland sensitive species
- Upland interior habitat

Environmental Consequences of Allowing Conflicting Uses Fully. Table 9 summarizes the consequences of fully allowing conflicting uses in the Pleasant Valley site. Basically, the resource functions listed above would be highly degraded or lost in the absence of an environmental protection program. Allowing conflicting uses in resource areas without limits or controls results in the loss of significant environmental functions and values identified in the Pleasant Valley natural resources inventory. The environmental consequences, therefore, are extremely negative.

Table 9. Environmental Consequences of Allowing Conflicting Uses Fully

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts)**	▪ Degradation of water quality and aquatic habitat functions from off-site impacts ▪ Reduction or disruption of groundwater recharge, stream flow, and hydro-period	**Negative:** Lack of Green Development Practices means that water quality and aquatic habitat values of streams and wetlands are lost; probable reduction in groundwater discharge and hydro-period.
Lots with partial significant resource area (ESRA)		▪ Reduction of water quantity function ▪ Degradation or loss of fish and aquatic habitat functions ▪ Reduction of water quality, slope stabilization, microclimate amelioration functions ▪ Disruption or loss of vegetation and organic materials function ▪ Reduction of floodplain and channel dynamics functions ▪ Loss of wildlife habitat functions in wetlands, riparian areas, and uplands	**Extremely Negative:** Community natural resources and functions highly degraded or lost.

Lot Type	Conflicting uses	Consequences	Assessment
Lots with substantial significant resource area (ESRA)	**All**	▪ Disruption or elimination of all functional values listed above	**Extremely Negative:** Community natural resources and functions highly degraded or lost.

Environmental Consequences of Limiting Conflicting Uses. The decision to limit conflicting uses as indicated in the Pleasant Valley Concept Plan conserves most of the environmental resources and functional values identified in the natural resource inventory. Limiting conflicting uses allows the development goals of the Concept Plan to be met, by preserving most of the ESRA and providing reasonable mitigation for impacts resulting from planned public facilities and limited development. Although impacts are mitigated (i.e., reduced), there will be still be limited degradation and loss of some functional values. Provisions for restoration potentially will increase functional values. The environmental consequences are generally positive under the Concept Plan objective where development impacts are limited to areas generally outside the ESRA and mitigated through Green Practices and restoration within the ESRA.

Table 10 summarizes the consequences of limiting conflicting uses in the Pleasant Valley site.

Table 10. Environmental Consequences of Limiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**Residential, CSF, Other**	▪ Degradation of water quality and aquatic habitat functions from off-site impacts mitigated through Green Practices ▪ Reduction or disruption of groundwater recharge, stream flow, and hydro-period mitigated through Green Practices	**Positive:** Potential off-site impacts on resource functions mitigated by Green Practices.
	Public facilities	▪ Potential degradation of water quality and aquatic habitat functions from off-site impacts, particularly streets, mitigated through Green Practices.	**Positive:** Potential off-site impacts on resource functions mitigated by Green Practices.
	Parks and recreation uses	▪ Potential increase in some functional values outside ESRA.	**Positive:** Potential increase in some functional values.
Lots with partial significant resource area (ESRA)	**Residential, CSF, Other**	▪ Protection of functional values through avoidance and density transfer ▪ Potential increase in some functional values with restoration	**Positive:** Degradation of some resource functions but potential overall increase throughout the community through restoration.
	Public facilities	▪ Limited disruption resulting from construction of planned public facilities. ▪ Mitigation for most impacts through required restoration.	**Neutral to Slightly Negative:** Limited loss of some resources and functions but adverse impacts limited through required mitigation and restoration.

Lot Type	Conflicting uses	Consequences	Assessment
	Parks and recreation uses	▪ Limited disruption of functional values. ▪ Mitigation for most impacts through required restoration	**Neutral to Slightly Negative:** Limited loss of some resources and functions but adverse impacts limited through required mitigation and restoration.
Lots with substantial significant resource area (and limited transfer-ability)	**Residential, CSF, Other**	▪ With recommended adjustments to ESRA boundary to allow for full density transfer, minor reduction of ESRA area ▪ However, with required mitigation, potential increase in some functional values with restoration	**Neutral to Slightly Negative:** Limited loss of some resources and functions but adverse impacts limited through required mitigation and restoration.
	Public facilities	▪ Limited disruption of some functional values ▪ Potential increase in some functional values with restoration	**Positive:** Potential off-site impacts on resource functions mitigated by Green Practices.
	Parks and recreation uses	▪ No park or recreational uses planned for these parcels	**Not Applicable**

Environmental Consequences of Prohibiting Conflicting Uses. The environmental consequences of fully protecting the ESRA resource site are, of course, positive. However, as noted in previous sections, the economic and social consequences are extremely negative. Table 11 summarizes the environmental consequences of prohibiting conflicting uses in the Pleasant Valley site.

Table 11. Environmental Consequences of Prohibiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**Residential, CSF, Other**	▪ No adverse impacts from off-site development on all nine resource functions.	**Positive:** No off-site impacts on resource functions.
	Public facilities	▪ No adverse impacts from public facility construction on all nine resource functions.	**Positive:** No off-site impacts on resource functions.
	Parks and recreation uses	▪ No adverse impacts from park construction on all nine-resource functions.	**Positive:** No off-site impacts on resource functions.
Lots with partial significant resource area (ESRA)	**Residential, CSF, Other**	▪ No adverse impacts from residential or commercial construction on all nine resource functions.	**Positive:** No on- or off-site impacts on resource functions.
	Public facilities	▪ No adverse impacts from public facility construction on all nine resource functions.	**Positive:** No impacts from public facility construction on resource functions.
	Parks and recreation uses	▪ No adverse impacts from park construction on all nine-resource functions.	**Positive:** No on- or off-site impacts from parks on resource functions.

Lots with substantial significant resource area (ESRA)	**Residential, CSF, Other**	▪ No adverse impacts from residential or commercial construction on all nine resource functions.	**Positive:** No on- or off-site impacts on resource functions.
	Public facilities	▪ No adverse impacts from road construction on all nine resource functions.	**Positive:** No public facilities construction impacts on resource functions.
	Parks and recreation uses	▪ No park or recreational uses planned for these parcels	**Not Applicable**

Conclusion. This environmental consequences analysis supports either prohibiting conflicting uses or limiting conflicting uses to planned public facilities and limiting incursion into the ESRA to allow for full density transfer for substantially affected parcels, and using Green Practices. Impacts from limited residential and public facility development within the ESRA can be reduced and mitigated through restoration. The resource areas provide important functional values and the opportunity of greatly improving resource function through restoration in the ESRA. The Pleasant Valley Plan District proposes a mix of housing and employment opportunities outside ESRA while maintaining and restoring significant riparian, wetland, and upland areas within the ESRA with limited intrusion.

ENERGY ANALYSIS

This analysis outlines the energy consequences of allowing, limiting, or prohibiting conflicting uses. The energy discussion focuses on three topics: transportation; infrastructure; and the heating and cooling of structures. A general discussion of these topics is presented first, followed by an analysis applying these topics in the context of allowing, limiting, and prohibiting conflicting uses.

Transportation. Energy expenditures for transportation relate primarily to travel distance from origin to destination, and mode of transportation used. Both variables can be affected by natural resource protection.

Transportation in the Pleasant Valley area involves moving people between homes, employment, commercial areas, and other services. The site is located within five miles of major employment and service areas in Southeast Portland and Gresham. Automobiles are the primary means of transportation in and out of the area and though convenient, they generally are not energy efficient. Roads are generally narrow and lack sidewalks, thus discouraging walkers and bicyclists. The Springwater Trail, which passes through the northern part of the site, provides alternative transportation options. Mass transit currently does not serve the valley.

A town center and employment areas are planned for the Pleasant Valley community. Locating homes, jobs, and services within the valley means that residents may not need to travel outside the community to work or for basic services.

The availability of natural resources at the Pleasant Valley site, such as the streams, wetlands and riparian areas, provide opportunities for wildlife observation, education, and recreation for area residents. A growing system of public open space is being developed within and adjacent to the valley, as noted in the social analysis. Because these open space resources are close to users, limited transportation energy is used in reaching them. In addition, the system of trails envisioned in the Pleasant Valley Plan District

will provide walking routes to local services, schools, and civic amenities, potentially decreasing dependence on the automobile.

Infrastructure. Locating housing and other development outside of natural resource areas in a planned and efficient manner normally results in less infrastructure needed to serve sewer, water, transportation, and other needs. Development located away from flood and slope hazard areas can reduce or eliminate the need for additional construction considerations, hazard control structures, or emergency repairs. In general, urbanization that is carefully planned and performed efficiently adjacent to existing urban centers can help to reduce and manage energy consumption within the region.

Heating and Cooling of Structures. Energy consumption for the purpose of heating and cooling structures is impacted by resource protection in two ways: building form and presence of vegetation.

Protection of Pleasant Valley's trees and forested stream corridors, and other resource areas, can help reduce energy costs for heating and cooling. Trees and riparian vegetation at the Pleasant Valley site reduce energy demands for cooling in the summer by providing shade on nearby structures. Plants also absorb sunlight and transpire during growing seasons, thus reducing ambient air temperatures. This moderating effect can reduce energy needs for cooling of nearby development. Trees and large shrubs can also act as a windbreak during winter. By slowing or diverting cold winter winds, heat loss in structures from convection is reduced, resulting in lower energy needs.

Planned urban densities will generally result in an efficient compact development form, which includes greater common wall construction and reduced building surface areas, reducing heat loss and energy consumption.

Energy Consequences of Allowing Conflicting Uses Fully. Table 12 summarizes the energy consequences of allowing conflicting uses to occur in the Pleasant Valley. These consequences are discussed in the context of the energy functions or benefits described above. As with the preceding analyses, conflicting uses are addressed together or in groups where appropriate, while some uses (e.g., mining and aircraft land uses) are not considered feasible due to existing development patterns or plan designations.

Table 12. Energy Consequences of Allowing Conflicting Uses Fully

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts)**	▪ Proximity of housing, jobs, and services reduces energy needs for transportation, but this would occur under the "limited option" in any case ▪ Infrastructure development on unconstrained land reduces energy expenditures, but this, too, would occur under the "limited option" in any case ▪ Without green development practices, energy benefits related to heating and cooling will be lost.	**Slightly Negative:** The Pleasant Valley Concept Plan provides for clustering of housing and jobs, served by a grid street system than reduces energy needs. These benefits are also found under the "limited option." However, without green development practices, energy consequences are slightly negative.

Lot Type	Conflicting uses	Consequences	Assessment
Lots with partial significant resource area (ESRA)	**All**	▪ Transportation and infrastructure energy consumption increases as development extends into constrained lands ▪ Loss of nearby open spaces, increasing transportation energy demand for recreation ▪ Energy benefits related to heating and cooling of structures lost as vegetation removed	**Negative:** Energy benefits of resources lost, less energy-efficient use of land.
Lots with substantial sig. resource area (ESRA)	**All**	▪ Same as above; ▪ Building on highly constrained lots increases energy expenditures.	**Negative:** Energy benefits of resources lost, less energy-efficient use of land.

This analysis supports the clustering of housing and jobs served by an energy efficient transportation system, such as envisioned in the Concept Plan. However, these benefits are also realized in the "limited option." However, allowing conflicting within the ESRA has negative energy consequences, as does the lack of green development practices. The ESRA resource areas provide important energy benefits for nearby development and for the community as a whole.

Energy Consequences of Limiting Conflicting Uses. Table 13 summarizes the energy consequences of limiting conflicting uses in the Pleasant Valley site. These consequences are discussed in the context of the energy functions or benefits described above.

Table 13. Energy Consequences of Limiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no significant resource area (ESRA)	**All (off-site impacts)**	▪ This option includes the benefit of energy efficient development through density and clustering of jobs near housing ▪ Energy benefits related to heating and cooling preserved ▪ Green development practices conserve energy	**Positive:** Energy benefits accrue from density transfer and heating and coloring effects of natural resource preservation and green development practices
Lots with partial significant resource area (ESRA)	**All**	▪ Transportation and infrastructure energy expenditures reduced through avoidance of constrained lands; ▪ Open spaces conserved, reducing transportation energy demand for recreation; ▪ Supports energy benefits related to heating and cooling of structures.	**Positive:** Energy benefits accrue from density transfer and heating and coloring effects of natural resource preservation and green development practices.

Lot Type	Conflicting uses	Consequences	Assessment
Lots with substantial sig. resource area (and limited transfer-ability)	**All**	▪ Same as above; ▪ Lack of density transferability may lead to greater energy expenditures.	**Positive:** Energy benefits accrue from density transfer and heating and coloring effects of natural resource preservation and green development practices. However, because not all density may be transferable for substantially covered parcels, limited incursion into the ESRA is recommended.

This analysis supports limiting conflicting uses within significant resource areas of the site, implementing density transfer, and employing green development practices. Urban housing and employment opportunities can be provided in an energy-efficient manner within non-resource areas. Additional housing and employment options are permitted through transfers from resource areas to more suitable locations in the impact area, which protects the community's unique natural resources and avoids higher energy costs associated with development on constrained lands. Limiting conflicting uses in resource areas preserves a variety of important energy values related to transportation, infrastructure, and the heating and cooling of structures.

Energy Consequences of Prohibiting Conflicting Uses. Table 14 summarizes the energy consequences of prohibiting conflicting uses in the Pleasant Valley site. These consequences are reviewed in the context of the social functions or benefits described previously.

Table 14. Energy Consequences of Prohibiting Conflicting Uses

Lot Type	Conflicting uses	Consequences	Assessment
Lots with no sig. resource area (ESRA)	**All (off-site impacts)**	▪ Precludes new housing and employment options, potential forcing them outside the UGB with high energy costs from increased vehicle miles traveled.	**Negative:** No further growth in community, growth outside UGB would have high energy costs.
Lots with partial sig. resource area (ESRA)	**All**	▪ Loss of transportation and infrastructure connectivity within valley would lead to significant inefficiencies and energy costs; ▪ Loss of recreational and educational opportunities in resource areas could increase energy costs.	**Negative:** No further growth in community, growth outside UGB would have high energy costs. Local access and recreational use precluded.
Lots with substantial sig. resource area (ESRA)	**All**	▪ Same as above; ▪ Lack of density transferability may lead to greater energy expenditures.	**Negative:** No further growth in community, growth outside UGB would have high energy costs. Local access and recreational use precluded.

The energy consequences of prohibiting conflicting uses are negative, creating the potential for urban sprawl into more remote parts of the region, outside of established urban growth boundaries. Prohibiting all conflicting uses within the impact area would essentially preclude further growth or urbanization of the valley. Prohibiting conflicting uses within resource areas would prevent efficient, connected transportation and infrastructure systems, increasing energy costs. It would also limit access to open spaces for recreational use, increasing travel costs.

Conclusion. The energy analysis supports limiting conflicting uses within significant resource areas and allowing them fully within the impact area.

The retention of natural resources at the Pleasant Valley site can reduce heating and cooling related energy needs both within the site and in the surrounding community. Conservation of resources can also reduce infrastructure related energy use and enhance the attractiveness of local walking and bicycle routes, including the Springwater Trail. This can decrease transportation-related energy use. Locating homes, jobs, and services in close proximity to one another can significantly reduce transportation energy demand.

ESEE RESULTS

After review of the ESEE impacts on individual property owners within Pleasant Valley, several conclusions can be drawn. First, the Pleasant Valley Plan District will allow much greater residential and employment densities within the community. The economic benefits of urbanization are substantial, and this is true for lands throughout the Pleasant Valley planning area, including lands adjacent to the ESRA. The analysis indicates that most properties located partially within the ESRA will experience substantial increases in development potential and economic value as a result of Plan District implementation. For example, an average of 15 new residential homes can be built on these affected properties outside the ESRA.

Clearly, however, some properties have greater ESRA coverage than others. For landowners with highly constrained property in and along the ESRA, the economic impacts are varied and could be marginal or negative. The proposed ESRA Subdistrict addresses these impacts in a number of ways. Through the analysis process, and with input from the TAC, Advisory Group and the public, a program was developed to provide additional economic value from lands within the ESRA: the equivalent of at least five times the current base densities for County lands. This additional density is a transfer allowance that increases the net development potential of lands outside the ESRA. Consolidation of properties in common ownership or as part of a larger development package may effectively increase the overall development potential of lands adjacent to the ESRA. Additional value accrues to local landowners from the proximity of these properties to the community's natural, scenic, and open space amenities. As discussed below, the ESEE analysis suggests that some additional development flexibility is warranted for lands with "substantial ESRA coverage" where there is insufficient land to transfer these units on site. This additional provision would allow construction of homes within the ESRA under prescribed conditions.

Conflict Resolution. Table 15 summarizes the conclusions for each of the four ESEE factors considered. In the table, "prohibit" indicates an analysis conclusion to prohibit conflicting uses, "limit" refers to limiting conflicting uses, and "allow" refers to allowing conflicting uses fully. The final column lists the aggregated assessment for the site.

Table 15. Conflict Resolution Summary Table

Property	Economic	Social	Environmental	Energy	Conclusion*
Lots with no ESRA coverage	Limit	Limit	Limit	Limit	**Limit**
Lots with partial ESRA coverage	Limit	Limit	Prohibit	Limit	**Limit**
Lots with substantial ESRA coverage (and limited transfer-ability)	Limit**	Limit**	Prohibit	Limit	**Limit****

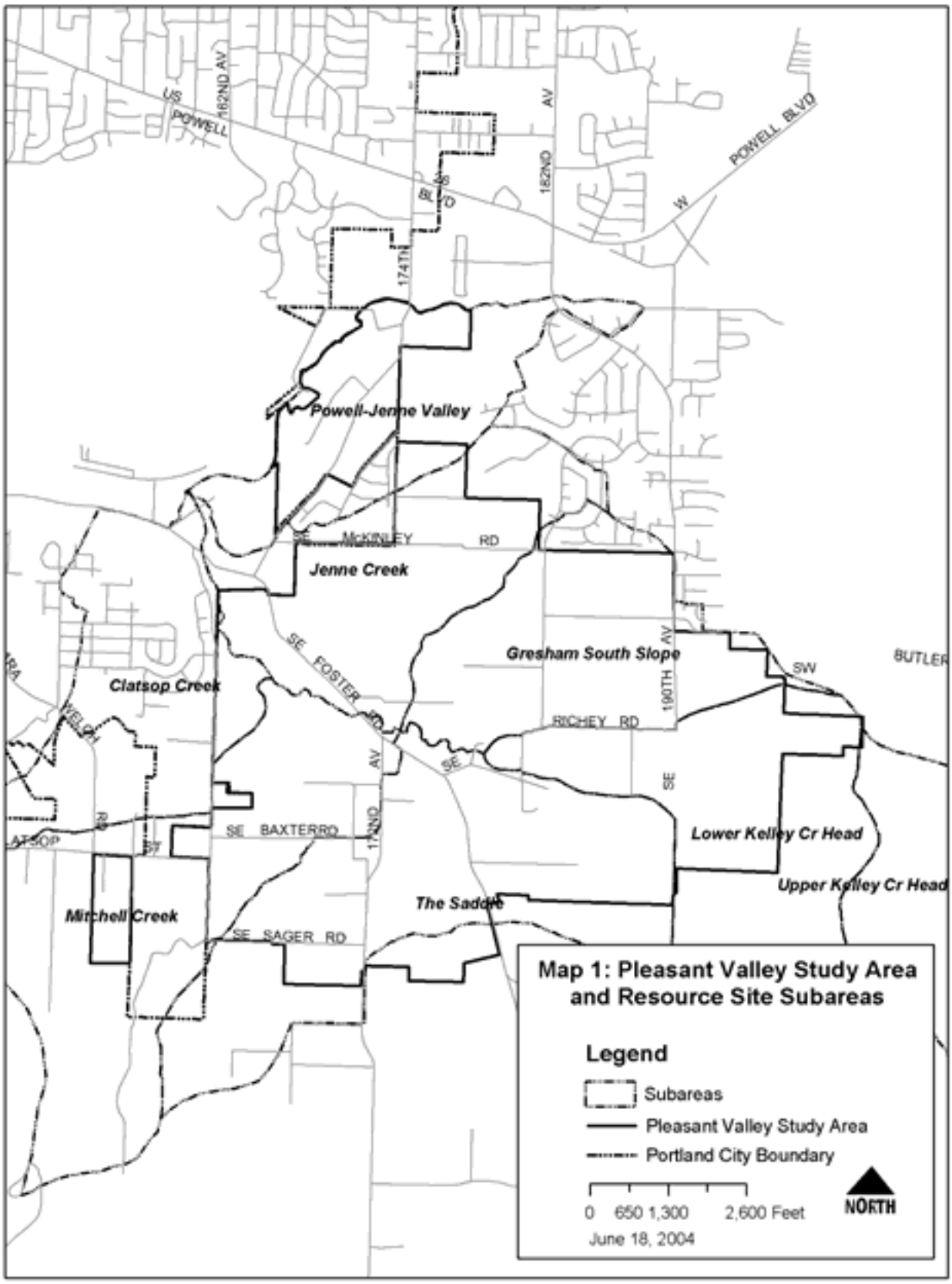
** Green Development Practices standards that will apply throughout the Plan District will minimize impacts on nearby/downstream significant resources and resource functions.*
*** In certain cases, on-site density transfers are not possible, with potential loss of economic and social values. Therefore, this analysis recommends limited incursions into the ESRA to allow full density transfer potential to be realized.*

Most properties containing significant resources will experience substantial increases in development potential and economic value as a result of Plan District implementation. Allowing conflicting uses fully (i.e., allowing unrestricted development within the ESRA) fails to meet the goals and objectives of the Concept Plan, fails to protect the unique attributes of the community, and would result in major impacts and loss of significant natural resources and resource functions. Prohibiting conflicting uses altogether would preclude urbanization of the valley, and similarly fail to meet the goals of the community, as expressed in the Concept Plan.

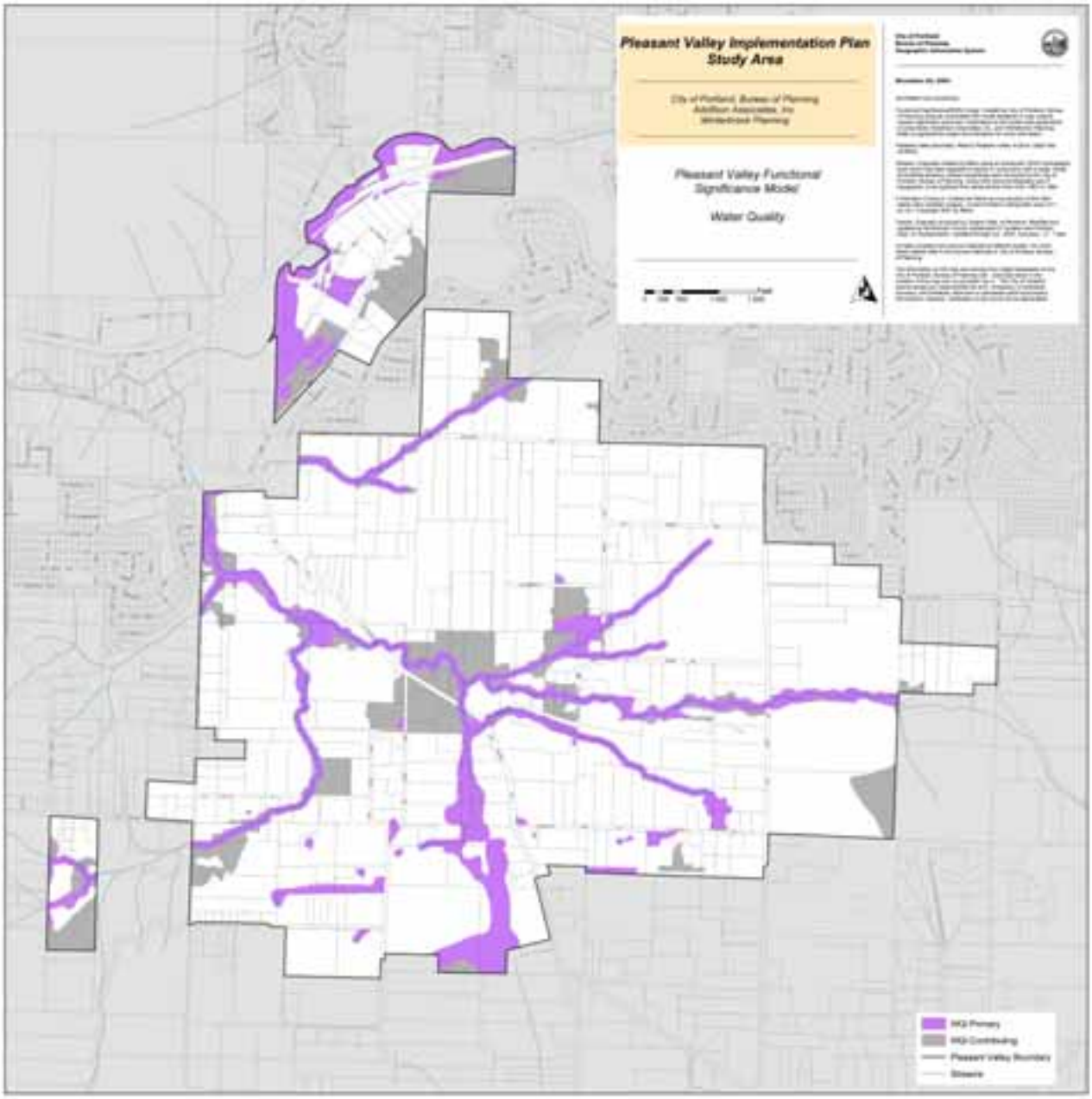
Limiting conflicting uses (through proposed ESRA land use regulations) has positive economic, social, environmental and energy implications for the landowners, resources, and the larger community – so long as existing uses can be maintained, planned streets, utilities, and pedestrian trails are allowed to pass through the ESRA in a manner that minimizes impacts, and residential units within the ESRA can be transferred to more suitable buildings sites outside the ESRA.

Some properties with "substantial ESRA coverage" do not have sufficient area outside the ESRA to fit all of the allowed transfer units on site. As a result of the economic and social analysis, the ESEE recommendation is to create a provision that permits these 27 highly constrained properties to build into the ESRA, after available non-ESRA land has been used, in a manner that minimizes impacts.

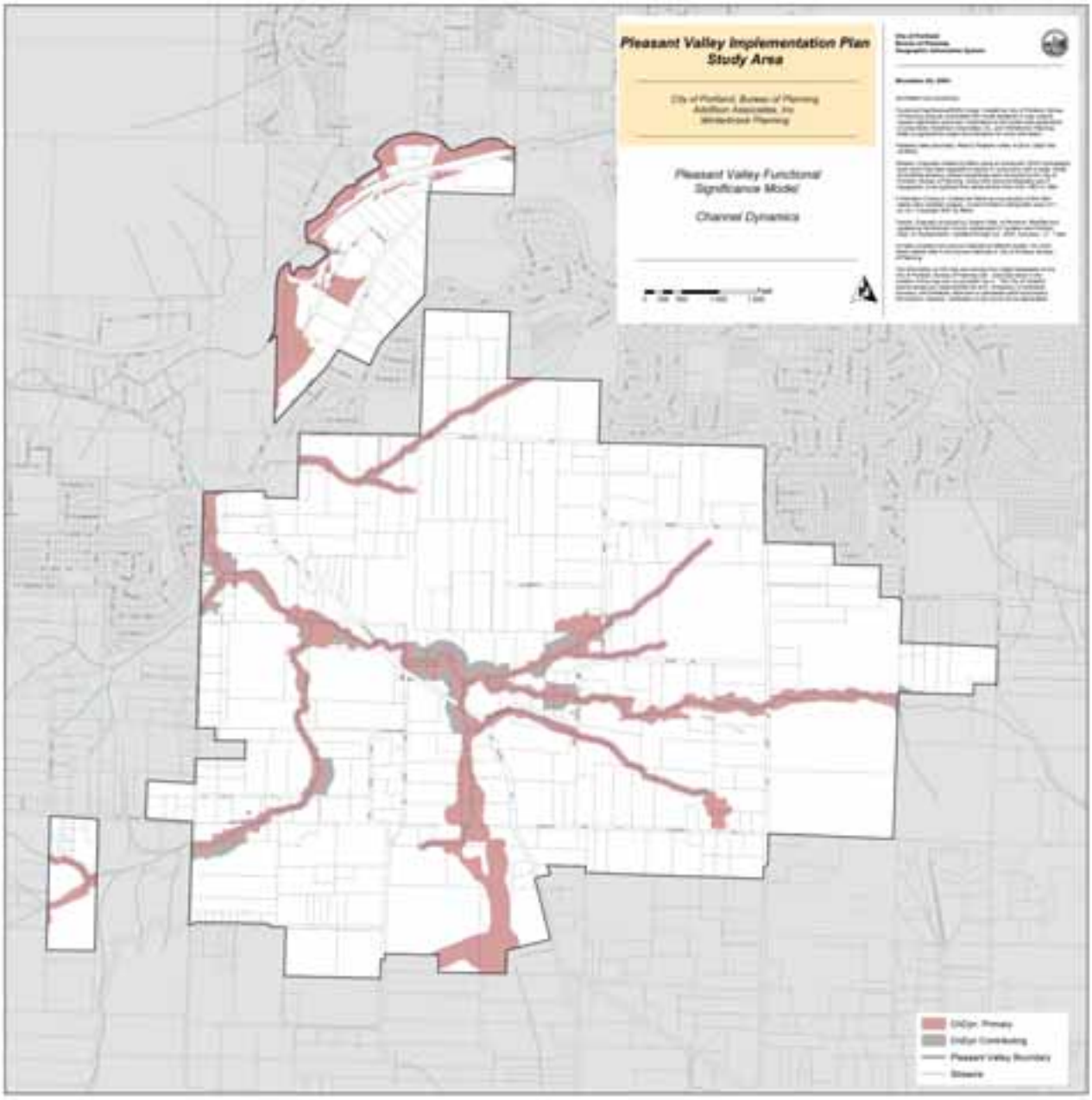
With this additional ESRA disturbance allowance, the ESRA program is able to meet the community's natural resource conservation goals (as expressed in the Concept Plan) while preserving the important economic, social, environmental, and energy benefits of urbanization for landowners throughout the Pleasant Valley Plan District.


US POWELL
162ND AV
174TH
BLVD
182ND AV
W POWELL BLVD
Powell-Jenne Valley
SE McKINLEY RD
Jenne Creek
Gresham South Slope
190TH AV
SW
BUTLER
SE FOSTER RD
Clatsop Creek
RICHEY RD
SE
SE BAXTER RD
Lower Kelley Cr Head
Upper Kelley Cr Head
The Saddle
Mitchell Creek
SE SAGER RD
Map 1: Pleasant Valley Study Area and Resource Site Subareas
Legend
Subareas
Pleasant Valley Study Area
Portland City Boundary
0 650 1,300 2,600 Feet
June 18, 2004
NORTH

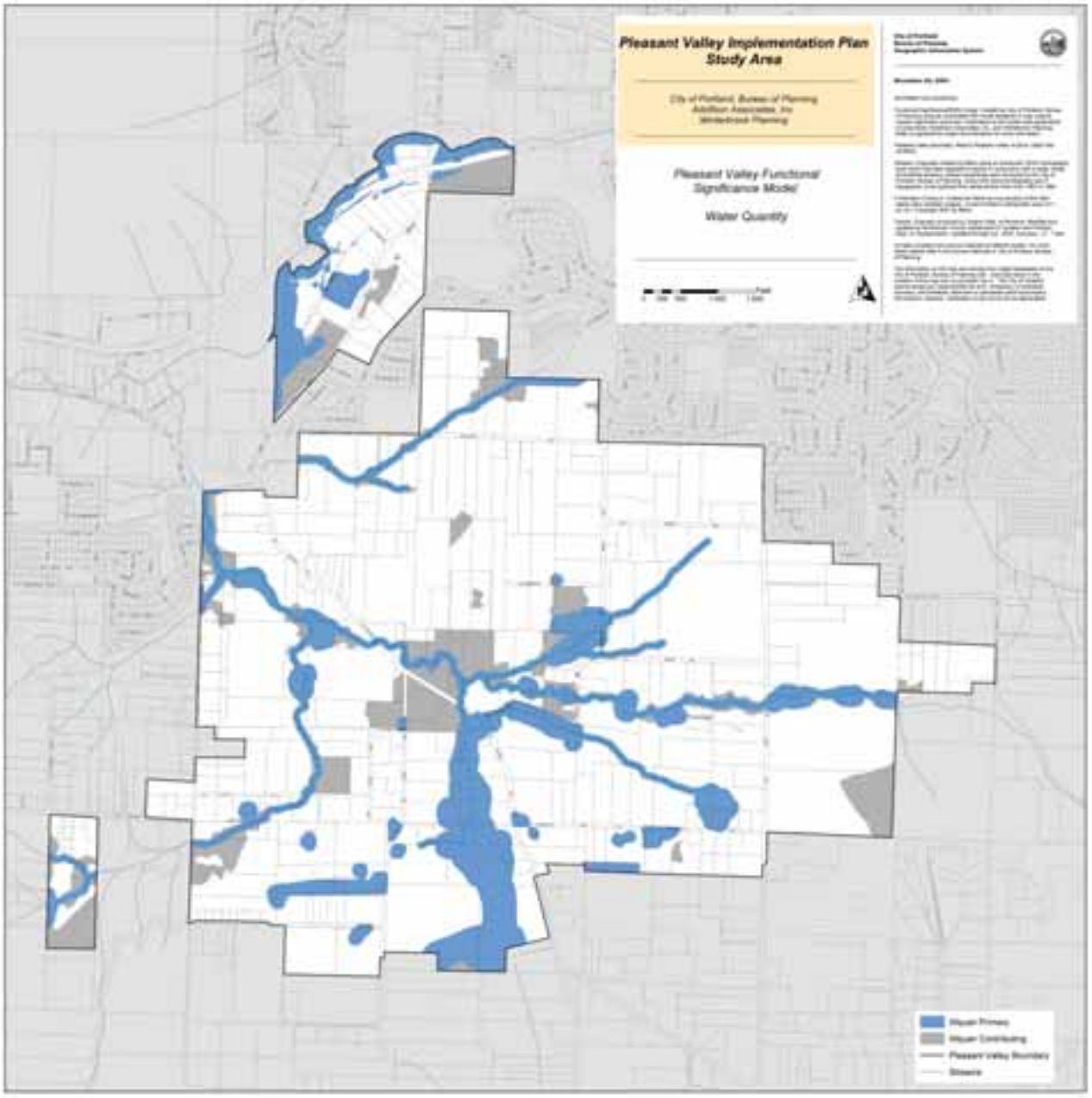
Map 2. Water Quality Function



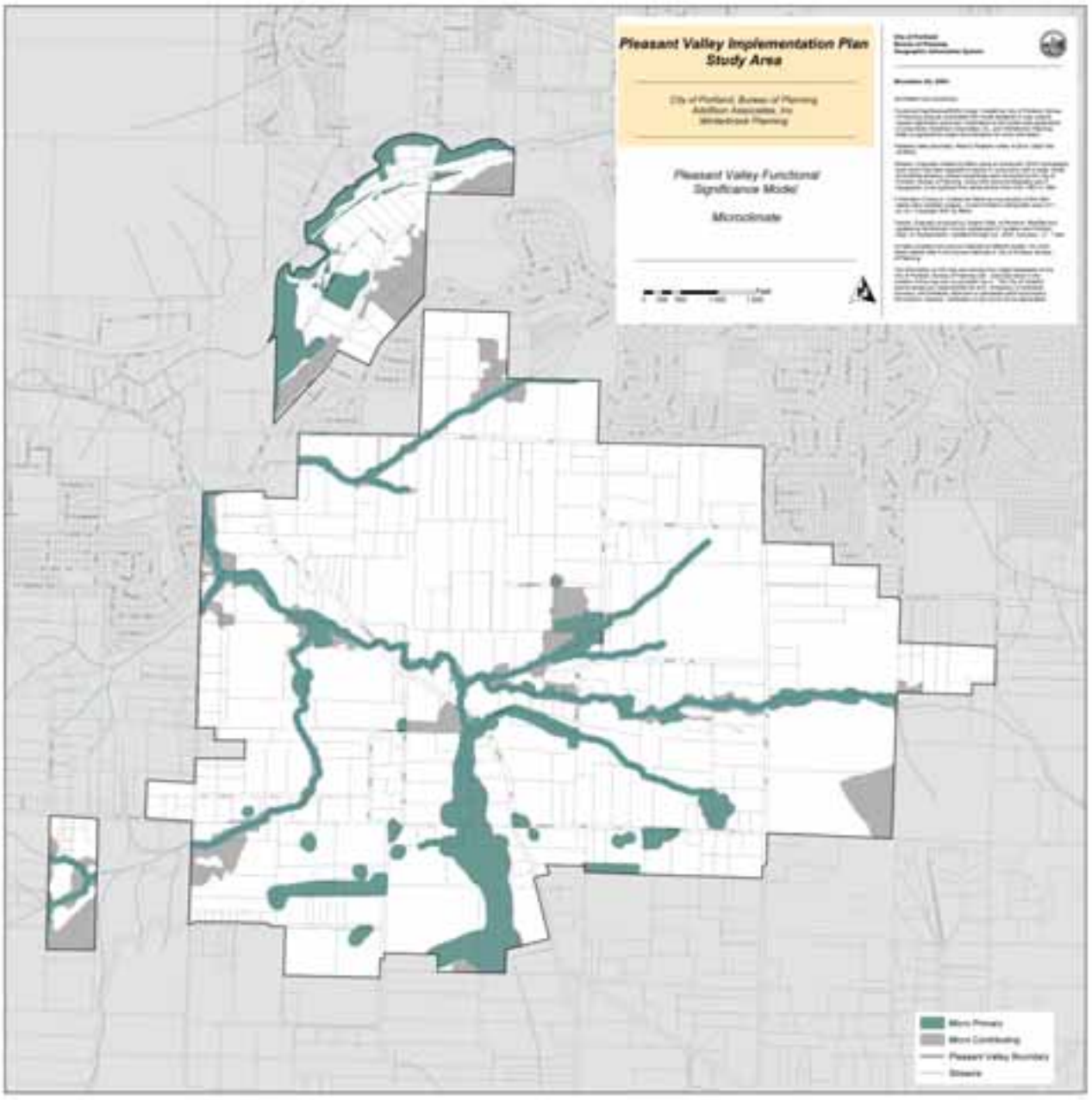
Map 3. Channel Dynamics Function



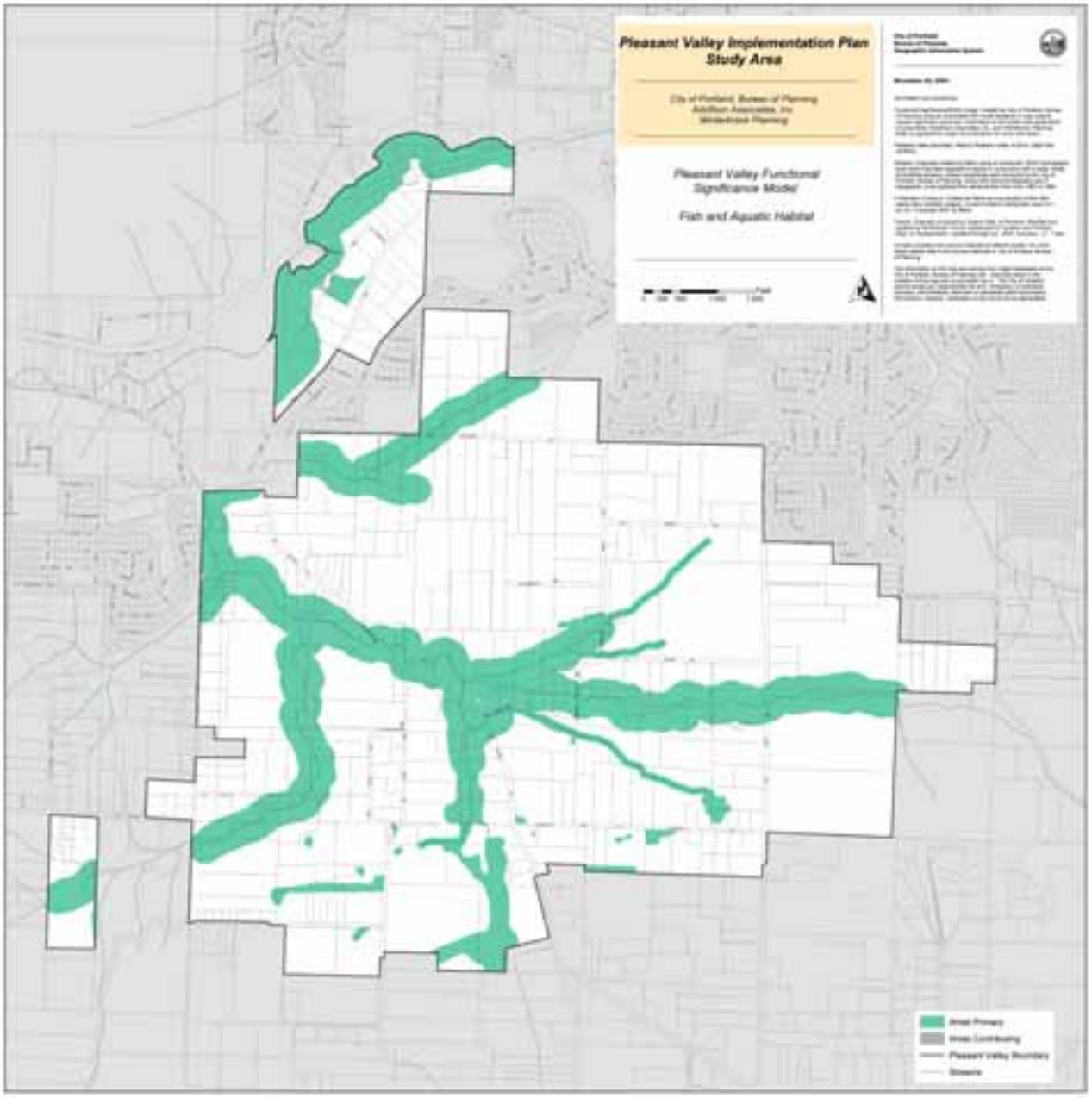
Map 4. Water Quantity



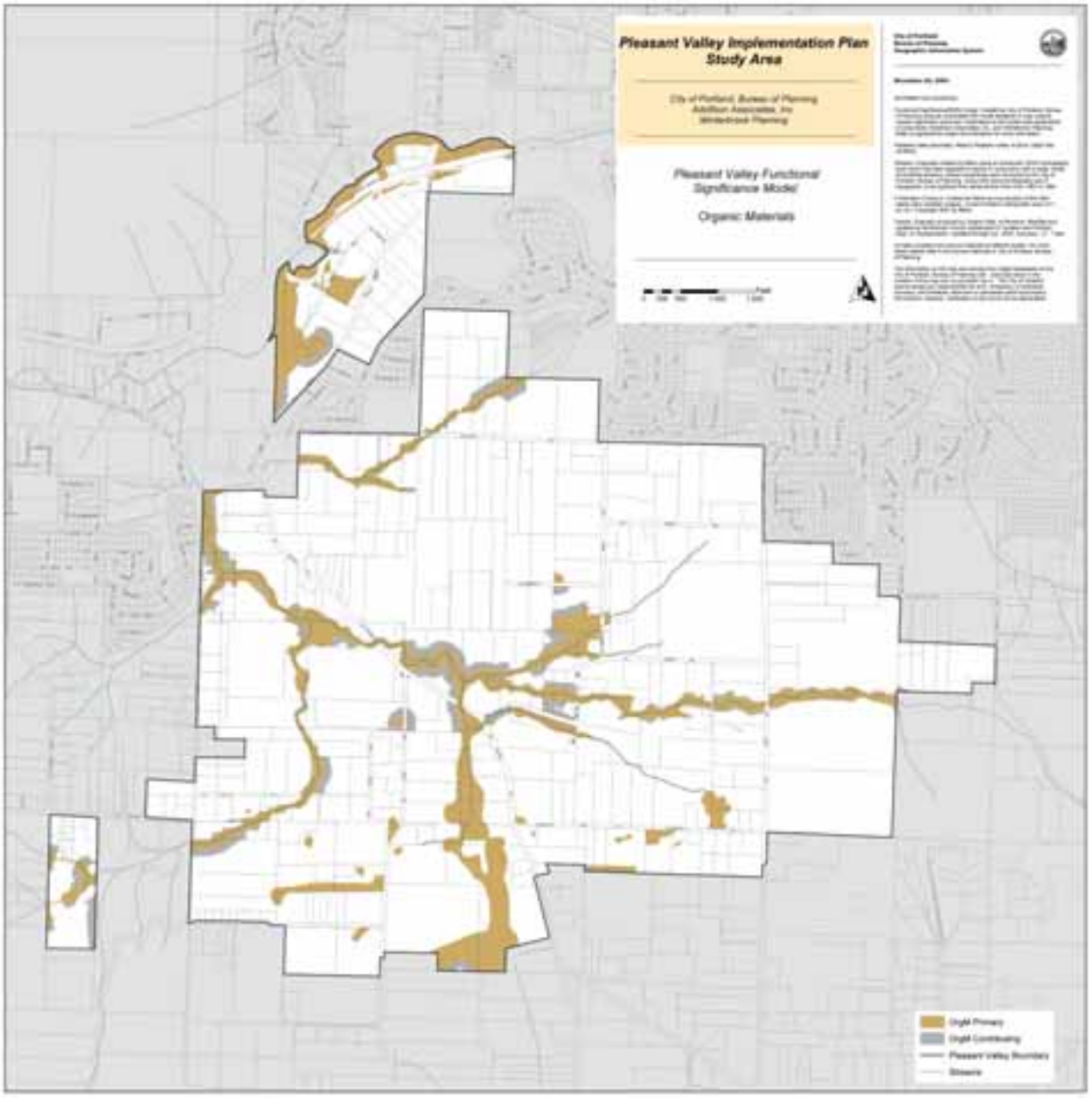
Map 5. Microclimate Function



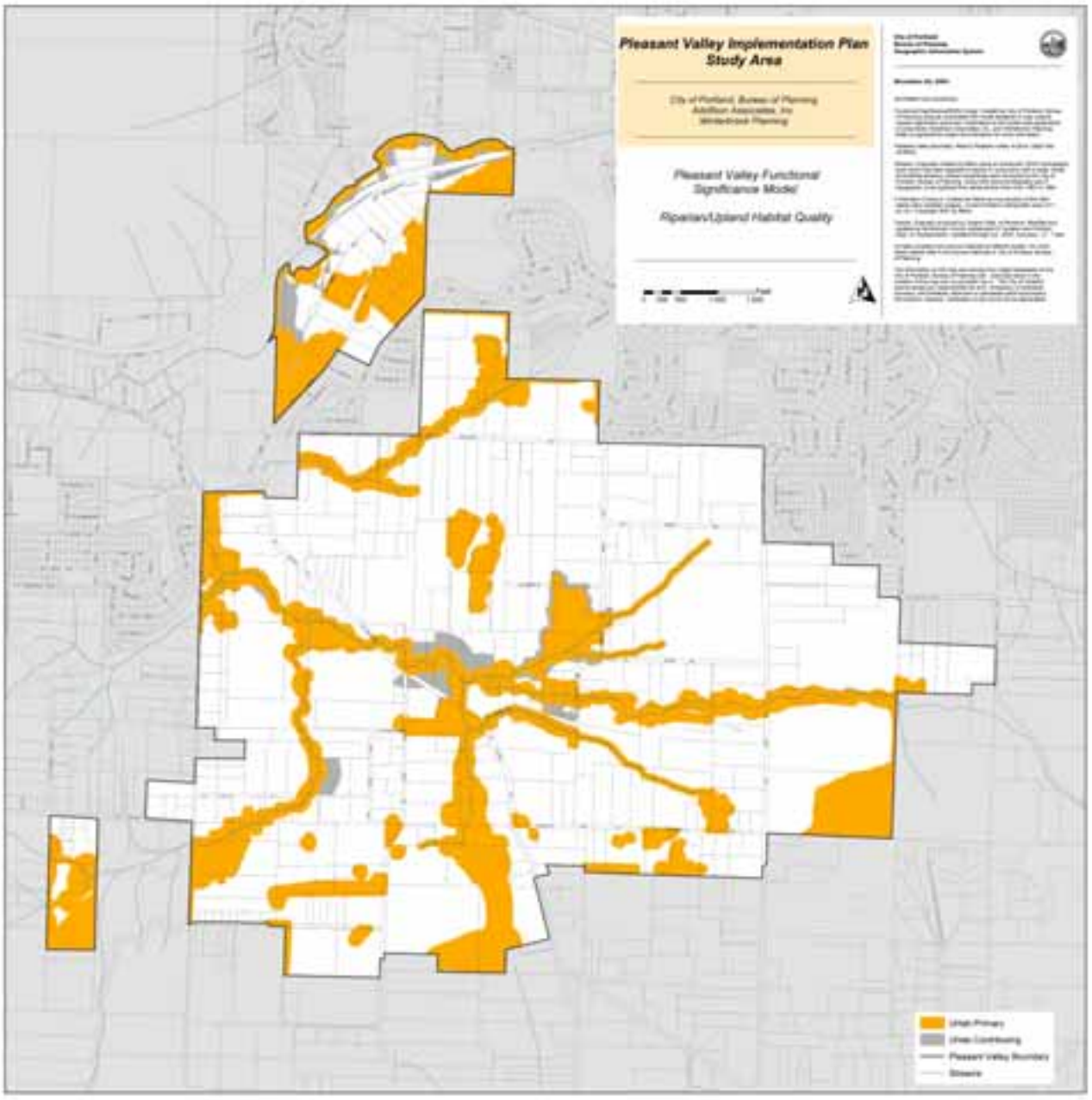
Map 6. Fish and Aquatic Habitat Function



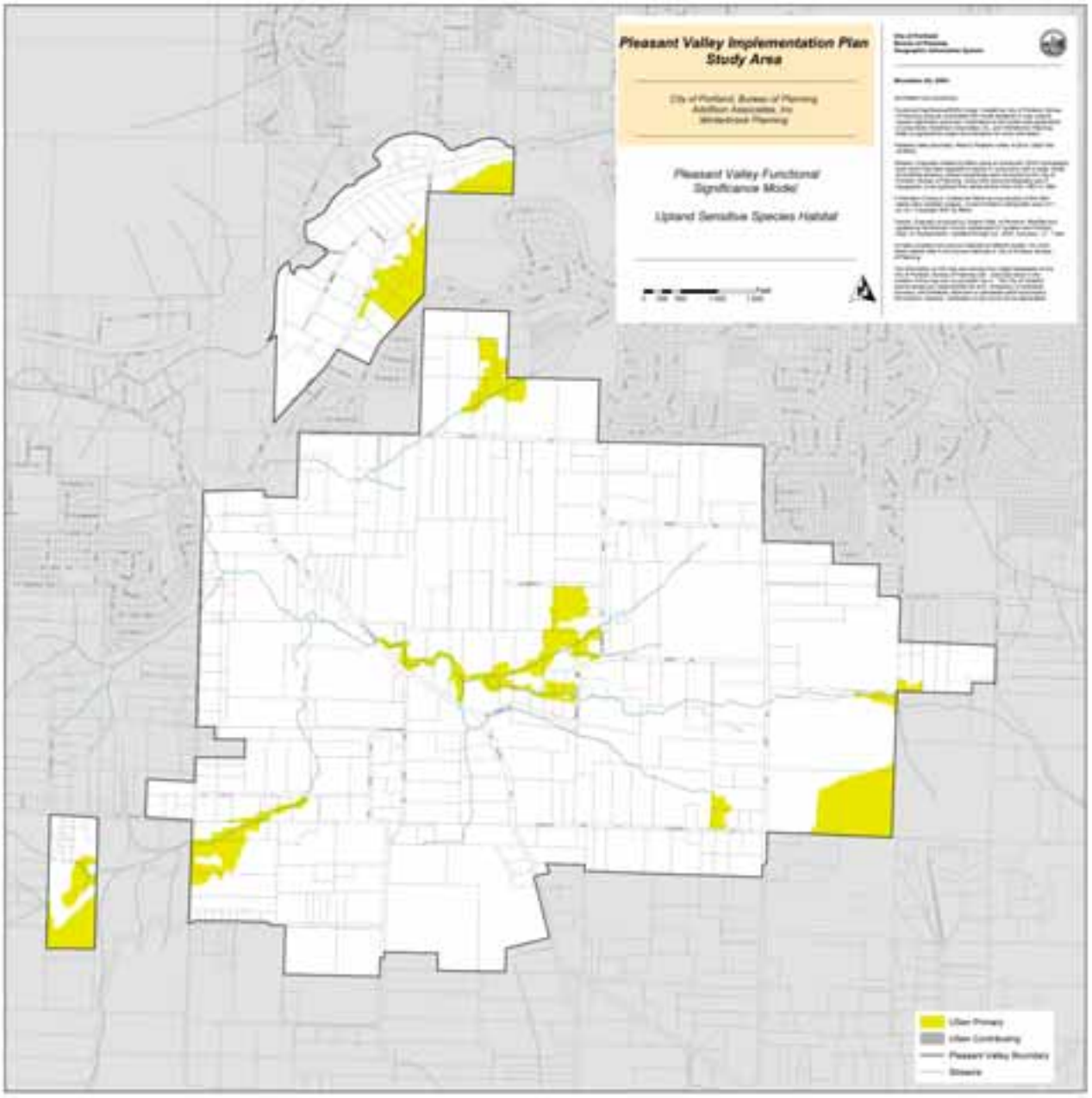
Map 7. Organic Materials Function



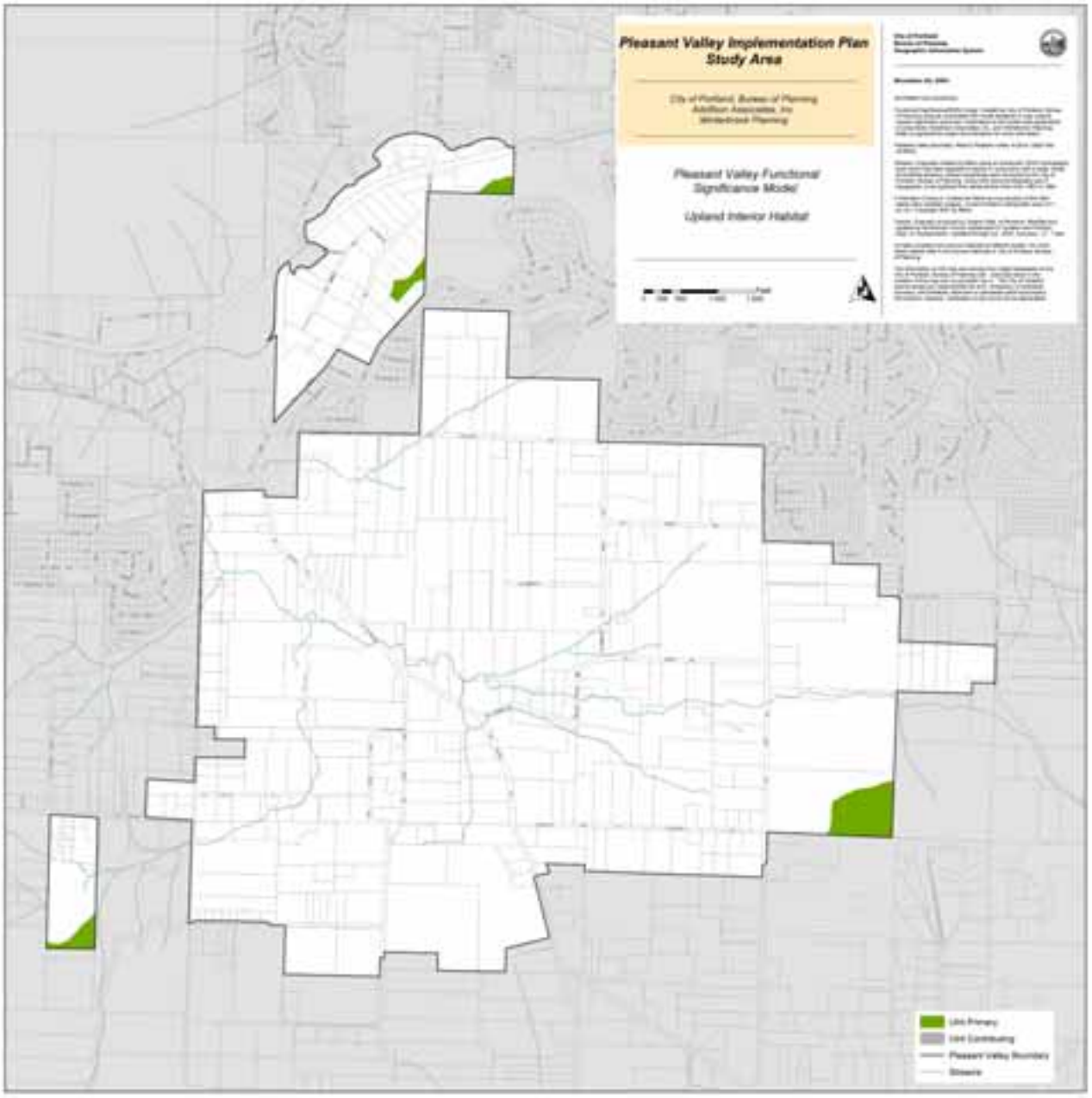
Map 8. Riparian/Upland Habitat Quality Function



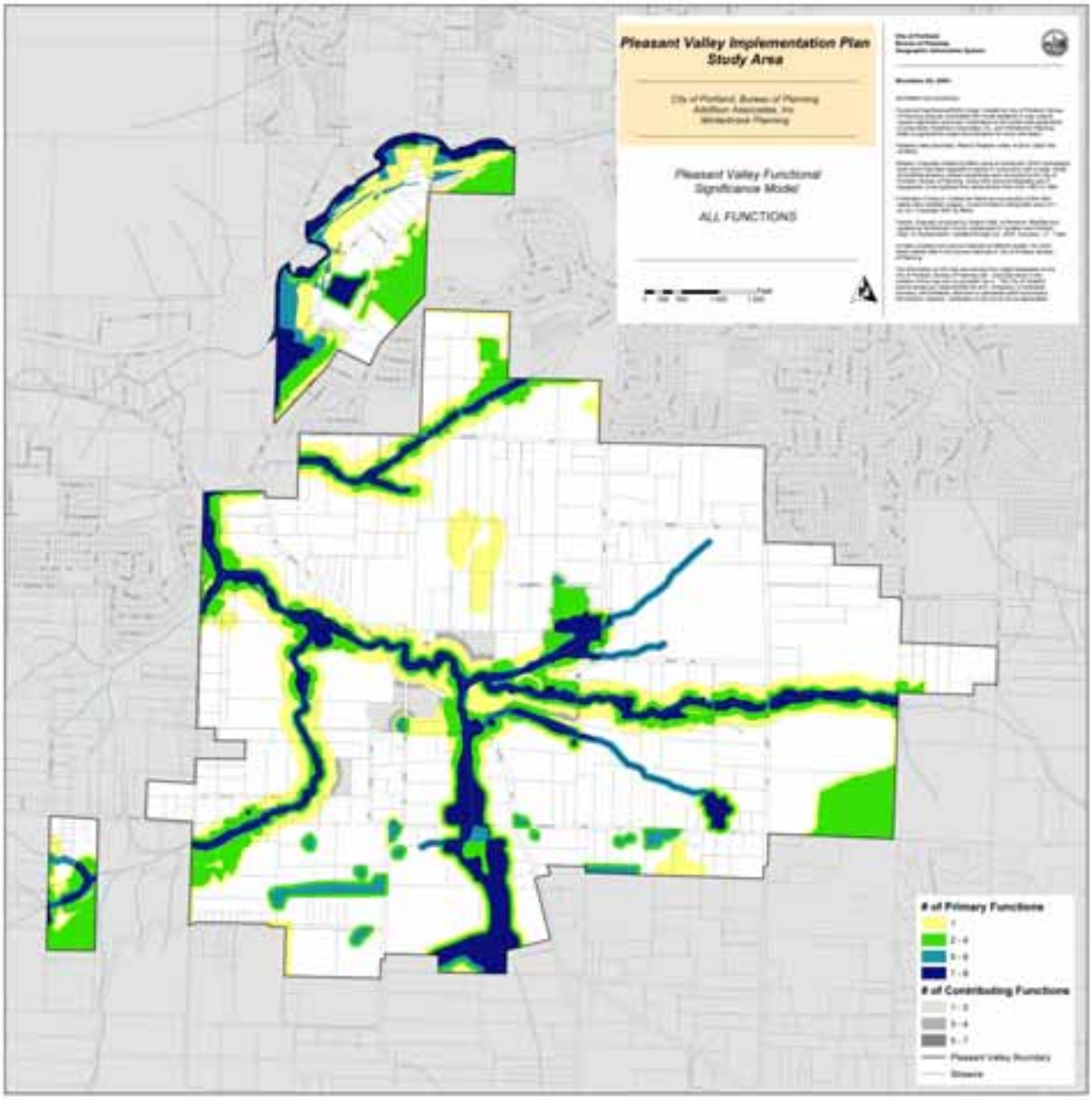
Map 9. Upland Sensitive Species Function



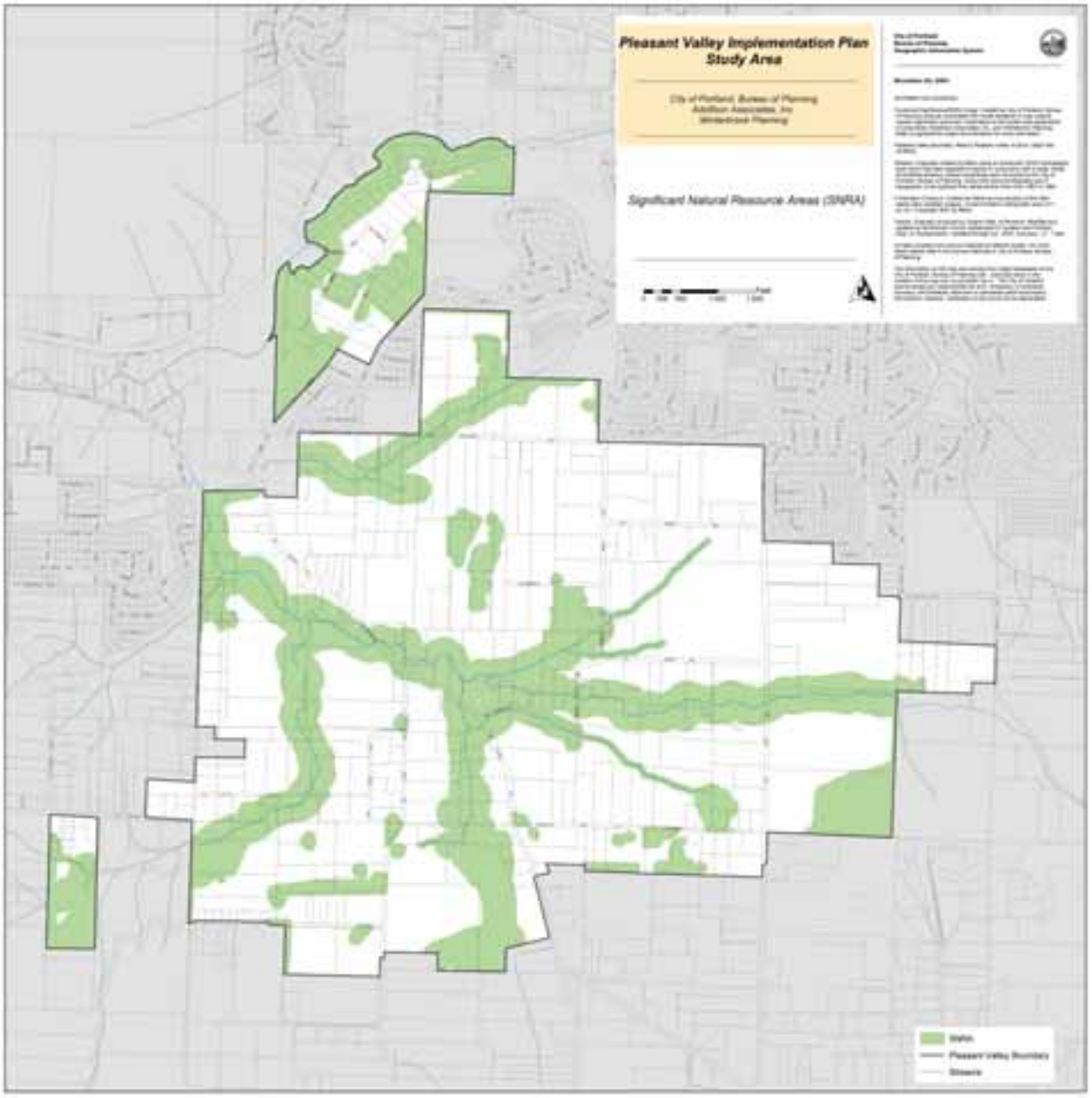
Map 10. Upland Interior Habitat Function



Map 11. All Functions Combined



Map 12. Pleasant Valley Significant Natural Resource Areas



The note on the above map reads as follows: The shrub/scrub habitat in this location is marginal wildlife habitat therefore it acts as a contributing factor rather than a primary factor. This habitat is not include in the Significant Natural Resource Area (SNRA). This is a unique situation within the Pleasant Valley project area.

Map 13. Significant Natural Resource Exception Areas