

ENVIRONMENTAL OVERLAY ZONE MAP CORRECTION PROJECT

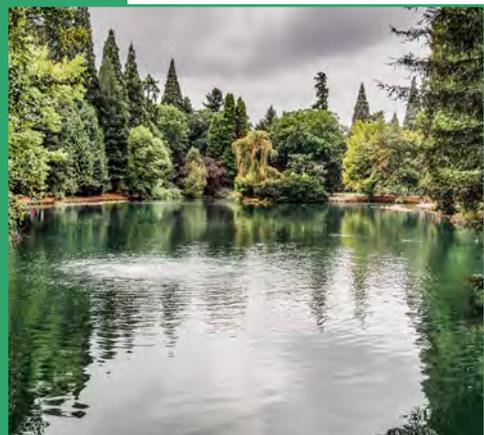


VOLUME 3, PART A2: Forest Park & Northwest District, Natural Resources Inventory and ESEE Decisions

(Resource Sites 21-41)



Discussion Draft
November 2019



How to Comment

You may submit comments to Bureau of Planning and Sustainability staff on the Environmental Overlay Zone Map Correction Discussion Draft by:

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Bureau of Planning and Sustainability
1900 SW 4th Avenue, Suite 7100
Portland, Oregon 97201
Attention: Ezone Map Correction Project

For more information

Visit the project website: <https://www.portlandoregon.gov/bps/e-zone>
Contact the project team: 503-823-4225

COMMENTS DUE: January 31, 2020

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This plan is the culmination of three years of work across the City of Portland. Many thanks to the thousands of stakeholders, property owners, renters, business owners and interested people who attended dozens of neighborhood and community meetings and invited staff to their homes and businesses to perform site visits.

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B. How to Use this Document

Below is a description of how to use the information found in this volume during quasi-judicial reviews.

Significant Natural Resource Feature and Functions Descriptions and Maps

Natural resource features include rivers, streams, wetlands, flood area, vegetation (forest, woodland, shrubland and herbaceous), steep slopes and Special Habitat areas. These features are factual data that are mapped following the in the natural resources inventory. The descriptions are based on supplemental inventories, reports and site visits. Natural resource functions are the riparian corridor and wildlife habitat benefits provided by the features. The methodology uses to map and identify the natural resource features and function is documented in the Natural Resources Inventory and Wetland Inventory Project (Appendix C).

The natural resource features maps can be updated at any time based on more current and accurate data, such as a wetland delineation. The environmental overlay zone boundaries may be corrected based on new topographic feature data through 33.885.070, Correction to the Official Zoning Maps, or through 33.430.250.D, Modification of Zone Boundaries.

Economic, Social, Environmental and Energy Analysis

The general ESEE analysis and recommendations are found in Volume 2. For each resource site, the general ESEE analysis and recommendations are affirmed, clarified or modified based on resource site-specific information. An ESEE decisions is made for each resource site. The ESEE decision describes which significant natural resource features and functions should be protected from the impacts of conflicting uses.

Implementation

The results of the inventory and ESEE decision for each resource site are implement by updates to the zoning code and maps found in Volume 1.

C. Natural Resources Definitions

Additional details can be found in Volume 4, Appendix B: Natural Resources Inventory, and Appendix C: Updated Wetland Mapping Protocol.

Waterbodies

Stream: A stream is a channel that has a defined bed and bank and carries water continuously for a week or more during at least the wet season (October through April). Streams may be naturally occurring or may be a relocated, altered or created channel. Streams may contribute water into another waterbody or the water may flow into a pipe or culvert. Streams may flow for some distance underground. Streams are also referred to as *drainageways*, *ditches*, or *drainages* in other City of Portland reports, codes and rules or by other agencies including but not limited to Oregon Department of State Land or US Army Corps of Engineers. Streams include:

- the water itself, including any vegetation, aquatic life or habitat;
- the channel, bed and banks located between the top-of-bank; the channel may contain water, whether or not water is actually present;
- intermittent streams, which flow continuously for weeks or months during the wet season and normally cease flowing for weeks or months during dry season;
- sloughs, which are slow-moving, canal-like channels that are primarily formed by tidal influences, backwater from a larger river system, or groundwater;
- oxbows and side channels connected by surface flow to the stream during a portion of the year; and
- drainage from wetlands, ponds, lakes, seeps or springs, which may or may not form a defined bed and bank.

Drainage: A drainage is an area on the land that conveys flowing water for only hours or days following a rainfall. If a drainage drains water from a wetland, pond, lake, seep, or spring even if it does not have a defined bed and bank, then it is classified as a stream.

Roadside Ditch: A roadside ditch is a constructed channel typically parallel and directly adjacent to a public or private road. A roadside ditch is designed to capture and convey stormwater runoff from the road and is routinely cleaned (i.e., mechanically scoured or scraped of vegetation and debris) to maintain water conveyance capacity. Naturally occurring streams and drainages that have been relocated due to the construction of a road are not considered a *roadside ditch*.

Wetlands: Areas where shallow water is present long enough to create hydric soils and could support hydrophilic vegetation, although due to landscaping, seeding, mowing or grazing hydrophilic vegetation may not be present.

Flood area: Areas with a 1% or greater chance of flooding in any given year and areas that were inundated with water during the 1996 floods.

Vegetation

Vegetation Patch: An area of contiguous vegetation greater than ½ acre in size containing a distinct pattern, distribution, and composition of vegetation relative to surrounding vegetated and non-vegetated areas.

Forest: Trees with their crowns overlapping, generally forming 60-100% of cover.

Woodland: Open stands of trees with crowns not usually touching, generally forming 25-60% of cover. Tree cover may be less than 25% in cases where it exceeds shrubland and herbaceous vegetation.

Shrubland: Shrubs generally greater than 0.5 m tall with individuals or clumps overlapping to not touching, generally forming more than 25% of cover with trees generally less than 25% of cover. Shrub cover may be less than 25% where it exceeds forest, woodland, and herbaceous vegetation. Vegetation dominated by woody vines (i.e., blackberry) is generally included in this class.

Herbaceous: Herbs (graminoids, forbs, ferns and shrubs less than 0.5m tall) dominant, generally forming at least 25% of cover. Herbaceous cover may be less than 25% where it exceeds forest, woodland and shrubland vegetation. This includes shrubs less than 0.5 m tall.

Steep slopes: Land with a 25% or greater slope.

Riparian Corridors: Rivers, streams, wetlands and flood areas plus the areas bordering the waterbodies; the width of the riparian corridor varies by waterbody as well as the vegetation and slopes surrounding the waterbody.

Wildlife Habitat: Waterbodies, flood areas, land, vegetation and other features that support fish and wildlife during one or more life cycle phase; manmade features may provide wildlife habitat.

Special Habitat Areas: Designated by the City of Portland in accordance with Metro's Urban Growth Management Functional Plan Title 13, Nature in Neighborhoods, areas that contain or support special status species, sensitive/unique plant populations, or other unique natural or manmade habitat features.

D. Resource Site Boundaries

Statewide Land Use Planning Goal 5 requires local jurisdictions to establish resource sites within which the natural resources are inventoried and the ESEE analysis is performed. OAR 660-023-0010 defines resource site, or site, as “a particular area where resources are located. A site may consist of a parcel or lot or portion thereof or may include an area consisting of two or more contiguous lots or parcels.”

Portland established resource sites through the previously adopted conservation and protection plans. This project is remapping resource site boundaries to be more consistent and easier to implement.

The resource sites were remapped in the following way:

1. The previous resource site boundaries were used to the maximum extent practicable. The intent is to maintain consistency between the past plans and this project.
2. Resource site boundaries were expanded to capture contiguous or similar and adjacent natural resource features.
3. Resource site boundaries were expanded to eliminate unnecessary gaps between resource sites.
4. Very small resource sites, with similar natural resource features and functions, were consolidated into one single larger resource site.
5. Resource site boundaries were adjusted to include entire properties within a single resource site. In some cases, adjacent lots under the same ownership may be in different resource sites; however, in these situations the resource site boundary follows lot lines.
6. Centerlines of streets, bridges, railroad tracks or other transportation facilities are often used to delineate resource site boundaries.
7. The City Boundary or Urban Service Boundary is used along the edges of Portland to provide the outer edge of resource sites.

E. Results

The results begin with a description of the Johnson Creek natural resources generally. The general description is applicable to each resource site. Following the general description are results for the resource sites. For each resource site the following information is provided:

1. Inventory of Natural Resources – The quantity and quality of natural resource features, such as streams miles or acres of forest, based on the Natural Resources Inventory methodology , Wetland Inventory Project (Appendix C) and site visits is presented. A description of the natural resources is also provided.
2. Determination of Significance – Statement of which natural resources are significant for purposes of State Land Use Planning Goal 5.
3. Resource Site-Specific ESEE – Additional analysis addressing site-specific conditions resulting in a decision for the resource site. The decision may confirm, clarify or modify the general ESEE recommendation found in Volume 2.
4. Maps
 - A. Zoning – base zones
 - B. Water Features – rivers, streams, wetlands and flood areas
 - C. Land Features – forest, woodland, shrubland and herbaceous vegetation, steep slopes, Special Habitat Areas
 - D. Riparian Corridors – natural resource features providing one or more riparian corridor functions
 - E. Wildlife Habitat – natural resource features providing one or more wildlife habitat functions
 - F. Determination of Significance – Goal 5 significant natural resources
 - G. ESEE Decision – where to strictly limit, limit and allow conflicting uses in areas of significant natural resources

Forest Park and Northwest District Natural Resources

The Northwest Hills forest protects and conserves important resources such as watersheds and soils. Forest vegetation moderates the effects of winds and storms, stabilizes and enriches the soil, and slows runoff from precipitation, thereby minimizing erosion and allowing the forest floor to filter out sediments and nutrients as the water soaks down into groundwater reserves or passes into streams. By decreasing runoff and increasing groundwater infiltration, the forest protects downstream neighborhoods from flooding. Also, by stabilizing the soil and reducing runoff and erosion, the forest protects the community from landslides and other land hazards.

By protecting watershed resources in this manner, the forest also protects habitat for terrestrial and aquatic organisms. The different layers of tree tops, branches, trunks, shrubs and plants on the forest floor provide breeding, feeding and refuge areas for many species of insects, birds and mammals. The forest canopy helps to maintain stream flows, filter out potential pollutants and moderate stream temperatures, thereby sustaining viable habitat for fish, amphibians and aquatic organisms as well as providing an important upland water source for terrestrial wildlife. Also, by filtering out water pollutants, the forest maintains good quality drinking water for local residents who use wells. The ability of these diverse and interdependent elements of the forest community to function properly is an important measure of the general health and vitality of the local environment. A healthy forest ecosystem is crucial to the forest's value as a scenic, recreational and educational resource, and to its continued contribution to Portland's high quality of life.

The forest provides additional values which accrue to local landowners and broader segments of society. The dense, coniferous and deciduous forest acts as a buffer from the sights and sounds of the large urban metropolis. The forest mutes the noise of highways and nearby industrial activities and absorbs some air pollutants caused by auto and industrial emissions. The forest also moderates climate extremes. The microclimate of the forest, created in part by the shade of the vegetation and the transpiration of water from the leaves, keeps surrounding air at an even temperature. The forest thus acts as a natural "air conditioner" for adjacent residential areas, cooling the air during the day and warming it at night.

Geology

Information on the geologic history of the Northwest Hills was compiled from three principle sources: *Forest Park: One City's Wilderness* (Houle 1988), *Portland's Changing Landscape* (Price 1987), and *Portland Physiographic Inventory* (Redfern 1976).

Portland has been the site of a series of spectacular geologic events dating back 22 million years. These events have included some of the largest lava and water floods on the face of the earth (Price 1987).

The major events leading to the formation of the Portland Hills (Tualatin Mountains) began sixteen million years ago during the Miocene period. Volcanic fissures far to the east of Portland began discharging hundreds of cubic miles of molten lava which flowed through an ancient Columbia River Gorge, flooding the Willamette River Basin region. The solidified lava, known today as Columbia River Basalt, covered the Scappoose Formation, a siltstone and shale deposit which had formed 22 million years ago when the Portland area was submerged under marine waters. Today, after millions of years of weathering, the basalt measures roughly 700 feet in depth below the West Hills (Houle 1988).

Geologic disturbances continued through the late Miocene period, when the present-day Cascade and Coast Ranges were formed. At the same time, a large upheaval of Portland's basalt base created the Tualatin Mountain ridge and simultaneously formed the Portland and Tualatin valleys. The valley floors settled over the course of several million years until, in the Pliocene period, their basins breached, forming eddies in the Columbia River into which large quantities of quartzite and granite river rock were deposited. Today these deposits, known as the Troutdale Formation, cover the original basalt layer along the lower half of the West Hills and provide an excellent aquifer (Price 1987). Later in the Pliocene period, the West Hills became volcanically active. Small volcanoes along the Tualatin Mountain ridge began erupting Boring Lava, evident today in the form of a grey basalt found at several sites along the West Hills.

The last major activity affecting The soils of the Northwest Hills area were formed through the deposition of up to 100 feet of Portland Hills Silt at elevations above 600 feet. This silt was eroded from the Columbia River flood plain, carried down the gorge, and finally wind-deposited on the West Hills. In the more recent geological past, silt and sand (alluvium) deposits formed along the Willamette River flood plain.

The presence of Portland Hills Silt along the Tualatin Mountains has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. Landslides, mud slides, and slumps are common on steep areas in the West Hills. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Soils

Soils in Northwest Hills belong to the Goble-Wauld series as identified in the Multnomah County Soil Survey (Soil Conservation Service 1983). This soil group is comprised predominantly of silt and gravel loams high in volcanic ash weathered from the parent material, Columbia River Basalt.

Approximately 75 percent of the study area is made up of Goble soils. The soil is dark, greyish brown silt loam to a depth of about 14 inches, below which a silty clay loam mixes with silt loam forming a yellowish brown, mottled fragipan at a depth of 30 to 48 inches. This fragipan is a hard, brittle soil layer with low permeability: a hardpan that impedes percolation of groundwater causing a thin groundwater table to develop, perched above the regional water table.¹ The fragipan restricts rooting depth for plants to 30 to 48 inches. The Goble silt loams have severe limitations for building site development and sanitary facilities.² According to the Soil Conservation Service (SCS), this means: "Soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, major soil reclamation, special designs, or intensive maintenance is required." (SCS 1983:98)

The Wauld soils are made up of gravelly loams and commonly occur on steep slopes along the larger drainages in the planning area. The top six inches of the soil are dark brown gravelly loam. Below the surface layer is a gravelly clay loam 24 inches thick, which overlies basalt bedrock at a depth of 30 inches. Soil permeability is moderate and effective rooting depth is 20 to 40 inches. The Wauld soils also have severe limitations for building site development and sanitary facilities.

¹ Perched water tables in the West Hills normally develop during the fall, winter and spring seasons.

² Public sewers only serve properties along St. Helens Road; most areas rely on on-site septic systems.

The soils along the broad, rolling slopes of the Tualatin Mountain ridge are classified as Cascade silt loam, an associate of the Goble-Wauld soils. The soil's top layer is a dark brown silt loam which overlies a dark brown, mottled, silt loam fragipan at a depth of 20 to 30 inches. Permeability is slow and effective rooting depth is limited by the fragipan layer.

The Willamette River lowlands are dominated by silty alluvium deposits and are largely urbanized (i.e., covered by structures, paved, or otherwise altered). Sauvie silt loam occurs at the north end of the study area, near the mouth of the Multnomah Channel. The Sauvie soils are hydric and are subject to frequent flooding between the months of December and June. During May and June, the water table is within 12 inches of the soil surface. This area is identified in the National Wetlands Inventory as palustrine wetlands of varying classes: emergent, scrub/shrub and forested wetlands.

Topography and Slopes

The eastern face of the Tualatin Mountain range is highly dissected by creeks (and creek channels) flowing northeast to the Willamette River. The lowland area between the Willamette River and St. Helens Road is flat with elevations ranging from 30 to 40 feet mean sea level (msl). Climbing southwest from St. Helens Road, the hillside slopes become steep before leveling off near the ridgetop along Skyline Boulevard. Elevations range between 900 and 1,180 feet msl along the crest of the Tualatin Mountains.

The principle creeks and secondary ridges descend from the main Tualatin Mountain ridge northeast to the Willamette River lowlands, creating a marked dichotomy between northwest- and southeast-facing slopes which can reach a gradient of 50 percent or more locally.

A physiographic inventory of Portland (Redfern 1976) classified slopes in excess of 30 percent as generally having "severe landslide potential."3 Between 90 and 95 percent of the upland slopes within the study area exceed 30 percent. Slopes of only 15 percent have been known to fail in the West Hills, particularly during the saturated soil conditions in mid-winter (Redfern 1976). In determining areas with "severe landslide potential," Redfern included slopes of less than 30 percent which had a history of failures (e.g., major slumps and landslides).

Surface Water

Surface water resources within the study area were identified using USGS topographic and National Wetlands Inventory maps, aerial photos, and field reconnaissance. The "Portland Storm Drainage Study" (BSE 1982) was consulted for information on drainage systems and flood history. Drainage basin areas were calculated using a planimeter.

There are approximately 25 miles of perennial and intermittent creeks within the project study area. All but one of the creeks drain east/northeast into the Willamette River; Miller Creek drains into the Multnomah Channel near the channel's juncture with the Willamette. The largest three of the creeks, Saltzman, Doane and Miller, have drainage areas of 972, 770 and 763 acres, respectively.

Most of these creeks as intermittent riverine systems; portions of Saltzman, Doane and Miller Creeks however are classified as upper perennial (high gradient, fast water velocity, year round flow). As described earlier, all the creek channels have steep to moderately steep gradients which result in high flow velocities and a relatively large capacity for sediment transport and erosion.

Associated with the creeks are several palustrine wetlands formed principally as a result of mining and roadway excavations, beaver damming activity, and natural depressions in the uplands and along the Willamette River flood plain. The NWI mapping identifies a large forested wetlands and smaller emergent and scrub/shrub wetlands near the juncture of the Multnomah Channel and the Willamette. Four miles south, a remnant of Doane Lake (the lake was bisected by railway embankments) is also identified as a palustrine wetland. Three additional palustrine wetlands were identified through field reconnaissance: an emergent and scrub/shrub wetland at the abandoned Rivergate quarry site on St. Helens Road and two small emergent and forested wetlands near the Newton Road parking lot off of Skyline Boulevard.

Surface water drainage between the crest the Tualatin Mountains and St. Helens Road is primarily through natural channels. Small sewers located in the Linnton area are exceptions. Most of the creeks pass through culverts under St. Helens Road and the Burlington Northern Railroad and from there enter natural channels, ditches, concrete flumes or sewers, or a combination of these systems before flowing into the Willamette River.

Most recorded flood events in the plan area have occurred along St. Helens Road. Flooding of Doane and Saltzman Creeks, and near N.W. 35th and N.W. 105th Avenues occurs on a regular, if not annual, basis.

Aquatic Environment

Data on aquatic habitat resources were gathered on field visits between February, 1990, and January, 1991. On August 9, 1990, two biologists assisted Planning Bureau staff with a survey of aquatic habitats in several creeks within the study area. On August 15, 1990 a fisheries biologist from the Oregon Department of Fish and Wildlife (ODFW) and planning staff conducted fish sampling surveys in Saltzman and Miller Creeks using a backpack electro-fisher. Additional data was collected from relevant published sources.

The palustrine wetlands at the mouth of the Multnomah Channel support an abundance of aquatic and terrestrial fauna. Most of the creeks and creek tributaries flowing through the study area are cool, well-shaded, and well-aerated freestone aquatic systems. Miller and Saltzman Creeks, and at least three smaller unnamed creeks, were found to have persistent flows during August, 1990, after 40 days without measurable rainfall. Of the creeks with persistent flow, Miller was found to support the greatest variety of aquatic life. The data on aquatic habitat resources for Miller Creek are described in the resource sites.

Vegetation

Information of plant communities, successional patterns and general vegetation resources was compiled from several sources. Data on vegetation types, distribution and resource values was gathered through aerial photointerpretation and on-site reconnaissance. Field surveys were conducted throughout the study area between February, 1990, and January, 1991. Current scientific literature on the subject was consulted during this time, with primary sources including *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness 1973), *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), "Forest Park--One City's Wilderness: Its Wildlife and Habitat Interrelationships" (Houle 1982), and "Portland Bureau of Planning Goal Five Study: West Hills" (Lev 1986).

The eastern slopes of the Tualatin Mountains are clothed by coniferous forest of the *Tsuga heterophylla* (western hemlock) vegetation zone.¹⁰ This zone extends throughout the wet, mild, maritime climate of British Columbia, western Washington and Oregon. A vegetation zone, as defined by Franklin and Dyrness (1973), delineates a region of essentially uniform macroclimatic conditions with similar moisture and temperature gradients where one plant association predominates. The lowlands immediately adjacent to the forest are part of the more prairie-like Willamette Valley Zone.³ Emergent, scrub-shrub and forested wetland plant communities reside along some of the creeks and in the palustrine wetlands that occur within the study area.

Western hemlock and western red cedar (*Thuja plicata*) are considered climax species within the Western Hemlock Zone based on their potential as dominants. The subclimax Douglas fir (*Pseudotsuga menziesii*), however, tends to dominate large areas within this region. Historically, Douglas fir has dominated forest regeneration over much of the zone in the last 150 years (Munger 1930, 1940).

While virtually all of the plants characteristic to the Western Hemlock Zone occur in the Tualatin Mountain forests, two less common hardwood species, bigleaf maple and red alder, have become widely established as a result of repeated disturbance to the natural vegetation caused by intensive logging and brush fires. Over time, these events have depleted nutrients from the soil. The depletion of nutrients, coupled with the depletion of mycorrhizal fungi which help to process nutrients for plant uptake and are particularly important to conifers, has given the hardwoods an edge over the firs, cedars and hemlocks. Pioneer species such as red alder, a species common only in riparian areas under natural conditions, quickly colonize these disturbed areas and are now widely established on the upland slopes.⁴ Thus, past disturbances have strongly influenced the composition of the plant communities in the Northwest Hills.

The *Tsuga heterophylla/Polystichum munitum* (western hemlock/sword fern) association generally characterizes the herb-rich community found in the Northwest Hills forests.⁵ Overstory species of this association typically include Douglas fir, western red cedar and western hemlock. The understory is dominated by a lush growth of herb species including sword fern, wild ginger, inside-out flower, Oregon oxalis, trillium, Smith's fairybells and deerfern. Shrubs occurring in the understory include red huckleberry, Oregon grape, trailing blackberry, Wood's rose and salmonberry (Franklin and Dyrness 1973:58).

While factors such as soils, slope aspect, moisture and topography have an important influence on plant associations within the Northwest Hills forest, the composition and distribution of most forest types can most clearly be traced to past logging activities and fires. Logging of the forests began with the arrival of

³ Differences in vegetation composition of the lowlands and uplands are pronounced; Douglas fir, for instance, a prominent component of the upland forest, is uncommon on the lowlands, where red alder, cottonwood, and willow species predominate. Because of the relatively small lowland area included in this study, inventories of lowland vegetation are presented in the resource site descriptions.

⁴ Red alder helps to heal degraded land by replenishing the soil with nutrients: they can provide 40-150 kg/ha of nitrogen per year. Alders also colonize sites that are plagued by laminated root rot and facilitate regeneration of the pre-existing plant community. Recent studies have shown that alders serve as hosts to mycorrhizal fungi, the same fungi which colonize Douglas fir roots, process nutrients and enable the trees to grow (Norse 1990).

⁵ Related West Hills plant associations include *Tsuga heterophylla/Berberis nervosa/Polystichum munitum*, *Tsuga heterophylla/Athyrium filix-femina*, *Tsuga heterophylla/Tiarella trifoliata*, *Tsuga heterophylla/Holodiscus discolor*, and *Tsuga heterophylla/Gaultheria shallon*.

the area were also recorded during this time. The last major fire, in August of 1951, burned some 1,200 acres of what had only three years earlier been dedicated as "Forest Park."

Early observations of Portland's Tualatin Mountains point to the dynamic pattern of successional stages active within the forest community over the past two centuries. The predominantly old growth coniferous forest that William Clark, of Lewis and Clark, recorded in 1806 has been transformed through logging and fire into a younger, mixed hardwood/coniferous forest (Munger 1960). Despite these disturbances, signs of a returning Western Hemlock climax forest community are widely apparent. A significant portion of the forest (over 60 percent) is presently composed of later seral vegetation stages, where young to mid-aged conifers rise above the maturing hardwood canopy (Houle 1982).

Thus, the forest types occurring in the Northwest Hills can be seen as a sequence of successional stages of forest regeneration following logging and fire. These stages closely parallel those of the Western Hemlock Zone as described by Franklin and Dyrness (1973) and Hall (1980). Six distinct successional stages are evident within the study area; their patchwork distribution reflects the location, degree and chronology of past disturbances.

Houle (1982) describes the stages of the West Hills forest succession as: grass-forb, shrub, hardwood with young conifer, hardwood topped by conifer, mid-aged conifer and old growth vegetation types (see Figure 2 below). One additional vegetation type, mature hardwood, is also recognized but is not related to the Western Hemlock Zone successional sequence. This type, making up ten percent of the study area, typically occurs in moist to wet areas at lower elevations although occasionally it is found on dryer, upland sites. The distinguishing characteristics of the mature hardwood type are the dense stands of bigleaf maple and red alder and the near absence of conifers.

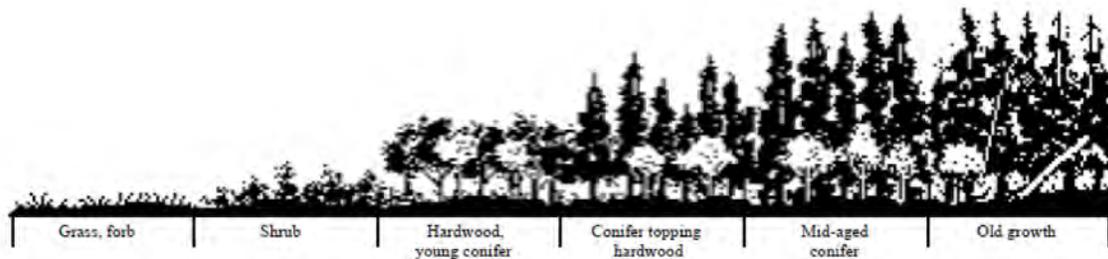


Figure 2. Stages of Northwest Hills forest succession

The grass-forb stage is comprised of low, herbaceous plants such as fireweed, bracken fern and Canadian thistle which initially colonize an area after removal of vegetation. This stage (two percent of the study area) lasts approximately two to five years and occurs along firelanes, power-line rights-of-way and in open fields along the crest of the hills and in lowland areas.

The early seral shrub stage often develops as a thicket of such species as thimbleberry, salmonberry, blackberry, red huckleberry, salal and Indian plum. This stage (5.5 percent of the study area) typically lasts between three and ten years, but will persist as long as 30 years in the absence of conifer regeneration.

The hardwood with young conifer stage is a young, vigorous broadleaf forest predominantly made up of red alder and big-leaf maple, though often includes bitter cherry, black cottonwood and juvenile Douglas fir. Understory species include sword fern, Oregon grape and red elderberry. This young, second growth forest usually occurs ten to 35 years following a disturbance and covers approximately 20 percent of the study area.

The fourth stage of succession, conifer topping hardwood, is still a vigorous, though now mixed, hardwood and conifer forest. While the alders and maples approach 100 feet in height during this stage, conifers, primarily Douglas fir, break through the hardwood canopy and grow to heights of 180 feet or more. Characteristic conifer species also include young western red cedar and western hemlock. This mixed stage of second growth forest follows 30 to 80 years after disturbance and is the most widely distributed vegetation type within the study area, covering approximately 38 percent.

The next successional stage, mid-aged conifer, occupies approximately 23 percent of the study area and is dominated by Douglas fir. Young, shade-tolerant western hemlock, western red cedar and pacific yew are gradually making their way up through the understory, while some of the older hardwoods such as alder and cherry are beginning to fall to the forest floor. Sword fern, salal, Oregon grape, red huckleberry and vine maple thrive as the older trees begin to fall. Eighty to 250 years have passed since the last major disturbance.

If the forest is left undisturbed following the *mid-aged conifer* stage, it progresses into an old growth forest community. The *old growth* stage is self-perpetuating and will continue indefinitely unless fire, logging or other disturbance sets back the forest to an earlier stage of succession. Though western hemlock and western red cedar are climax species, long-lived seral species can remain a component of the community for several hundred years. Remnant old growth stands in the Northwest Hills, for example, are dominated by Douglas fir. In addition to large trees of 250 or more years of age, the old growth stage is characterized by the presence of large snags and downed logs in various stages of decay. Old growth stands within the study area are rare; remnant stands occur in small isolated pockets, three to twelve acres in size, near Germantown, Newton and Newberry Roads. These old growth stands make up 0.5 percent of the study area.

Special Habitat Areas

The Tualatin Mountain forest is home to several special or unique flora features. The following discussion illustrates some of these features, others are described later in the report in connection with wildlife, scenic and educational resources.

The pacific yew (*Taxus brevifolia*), is an exceptionally slow growing climax tree species most abundant in ancient forests of the Pacific Northwest. In recent years, a cancer fighting substance known as "taxol" was discovered in the bark of the yew. Taxol has proven effective in fighting ovarian cancer and early results indicate that the substance may also prove effective for treating leukemia and colon, lung, mammary, prostrate and pancreatic cancers (Wood 1990, Norse 1990). In September, 1990, a petition was filed with the U. S. Fish and Wildlife Service to list the pacific yew as a threatened species under the Endangered Species Act.

Though virtually all of the forest clothing the Northwest Hills is second growth, a substantial proportion of it is mature enough to support rare saprophytic orchids such as the phantom orchid (*Eburphyton austiniae*), fairy slipper (*Calypso bulbosa*), rattlesnake-plantain (*Goodyera oblongifolia*), and three coral

root species (*Corallorhiza maculata*, *C. striata* and *C. mertensiana*). The western wahoo (*Euonymus occidentalis*) inhabits moist, creek side habitats in the Northwest Hills. The wahoo was placed on the “1976 Provisional List of Rare and Endangered Plants in Oregon.” Its populations have now substantially recovered.

The forest as a whole represents a unique urban amenity. The West Hills provide a fine example of the Pacific Northwest’s western hemlock forest community, unique among all temperate forests in the world (Waring and Franklin 1979).⁶ A large forested peninsula reaches into the center of Portland providing a biological link to the natural areas of the Coast Range. Located within this peninsula is one of the country’s largest city parks: Forest Park. In addition to its value as a recreational, educational and scenic resource (discussed later in this report), the forested hills help to define Portland as a place and contribute to the identity of the region.

Wildlife

Resource experts and current scientific literature on the subject were consulted during this time, with primary sources including “Forest Park--One City’s Wilderness: Its Wildlife and Habitat Interrelationships” (Houle 1982), “Portland Bureau of Planning Goal Five Study: West Hills” (Lev 1986) and *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington* (USDA Forest Service 1985). Information on rare, threatened and endangered species was obtained from resource agencies.

Wildlife use different portions of the Northwest Hills forest habitat to complete different portions of their life cycle such as mating, feeding and denning. The vegetative structure of the habitat (e.g., owned logs, snags, herb, shrub and tree layers) is a key factor in determining the distribution and abundance of wildlife (Thomas 1979). Each stage of forest succession in the Northwest Hills has its own specific structure. Wildlife species have known preferences for structural components found in distinct successional stages and use these vegetative types to meet all or part of their life cycle requirements (Maser and Thomas 1978, Harris 1984). This map is based on information on vegetation types and surface water features which are described in previous sections of this chapter.

A broad range of terrestrial vertebrates use the forested riparian and upland habitats found in the Northwest Hills. At least eight different kinds of salamanders use the creekside habitat and moist uplands, where they feed on insects and other invertebrates such as slugs, and are prey to other amphibians (frogs), reptiles (snakes), birds (hawks), and mammals (weasels, raccoons). These local salamanders are dependent on a moist forested environment and cool water of good quality. The rare Cope’s giant salamander is listed as a sensitive species in Oregon.

Five frog species are also dependent on the moist forested environment found in the Northwest Hills. These species feed on salamanders, insects and other invertebrates and are prey to many local snakes, birds and mammals. Significantly, both spotted and red-legged frogs have been identified along several of the creeks. These species are listed as threatened and sensitive, respectively. The presence of these native amphibians is of further significance because of the decline of amphibian populations worldwide

⁶ The western hemlock forest of the Pacific Northwest has the greatest biomass accumulation of any plant community in the temperate zone and in it are found the largest and (usually) longest lived species of conifers within the zone.

due in part to predation (e.g., by bullfrogs) and to ultra-violet radiation. The spotted frog, for example, is believed to be close to extinction in Oregon (Lev 1986).

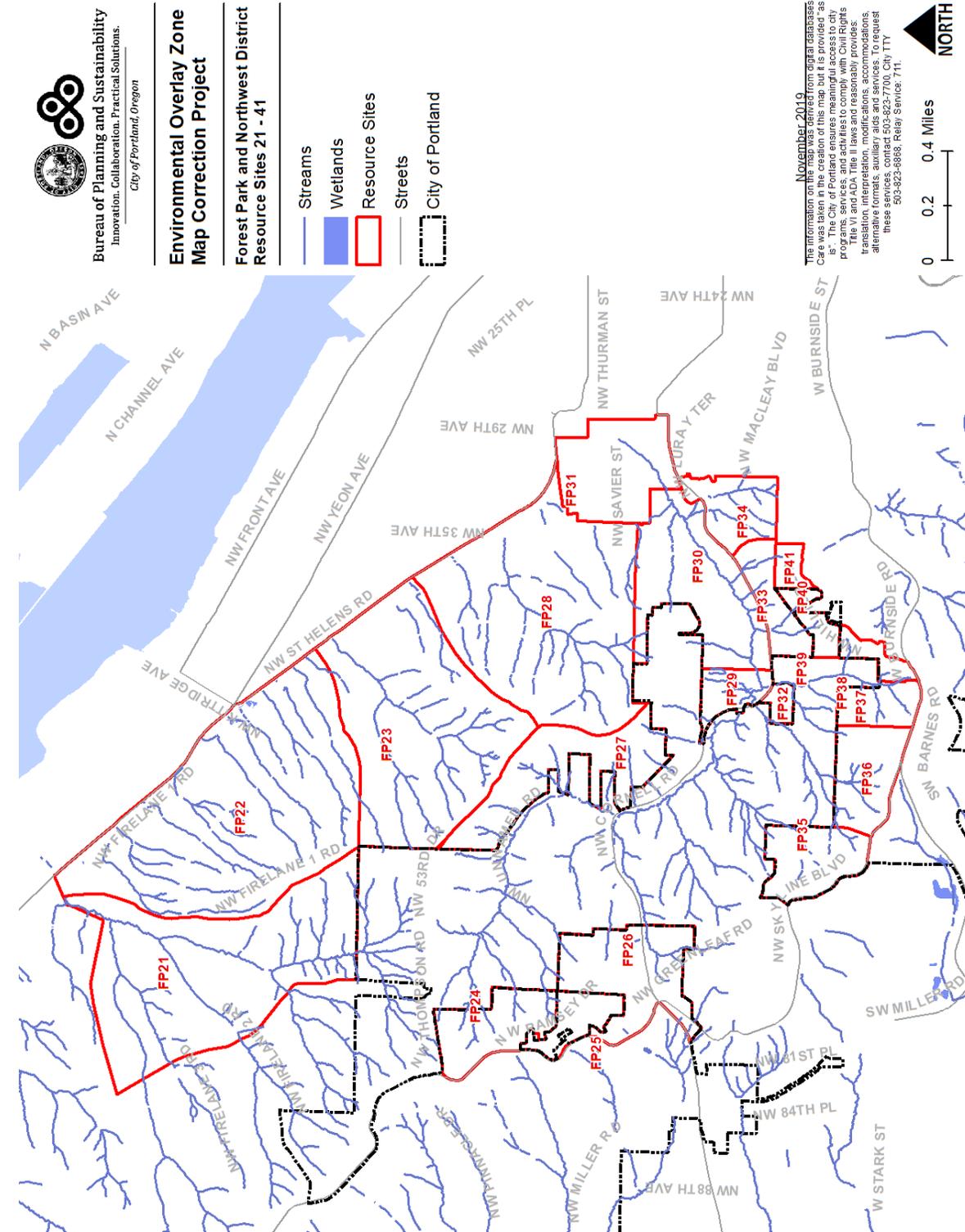
Several species of snakes and lizards are also found in the area. Undeveloped forest areas provide good breeding grounds for these non-poisonous, beneficial reptiles, serving as a source of replenishment to developed areas. Snakes are also an important source of food for birds of prey and carnivorous mammals. The study area is on the western edge of the northwestern fence lizard's range. This species and the northern alligator lizard are likely to be found in woodlands and open places in the area.

Over 80 species of birds have been identified in the study area. Many of these species are year-round residents of the Northwest Hills forest. The mature conifer, conifer topping hardwood and old growth stages of the forest described in the previous section support the highest populations of breeding birds. The greater diversity of species in the later successional stages is generally due to the greater vegetation complexity found there. At least two sightings of adult bald eagles have been made in the study area. Other birds of prey include accipiter hawks such as Cooper's hawk and sharp-shinned hawk which rely on tall conifers for nest sites. Several nocturnal avian predators including screech, sawwhet and northern pygmy owls also occur in the Northwest Hills. These owls are cavity-nesters that rely on snags with holes excavated by pileated woodpeckers or flickers. The pileated woodpecker is an important indicator species for the retention of a complete community of hole nesting birds and small mammals (McClelland 1979). Most of these cavity-nesters are beneficial insectivores which help to control insect populations in the area; similarly, the birds of prey noted above help to control rodent populations. The pileated woodpecker, and the saw-whet and pygmy owls are all listed as sensitive species in Oregon. The Lewis woodpecker is uncommon and is considered threatened in Oregon.

Wildlife biologists and forest managers often use the presence or absence of one or more "indicator species" to predict whether an area of habitat is suitable for a variety of species having similar habitat requirements (USDA Forest Service 1985). Several species serve as indicators of the health of the Northwest Hills ecosystem. The pileated woodpecker is one such species; other indicator species in the Northwest Hills are sharp-shinned hawk, Roosevelt elk, white-footed vole and red-legged frog.

Several migratory bird species, which typically nest at higher elevations or further north, use the Northwest Hills forest as an over-wintering ground due in part to the area's mild climate. Still other species, which migrate from Central and South America, use the forest as a stop-over and resting place on their journey along the Pacific Flyway. These birds (e.g., flycatchers, warblers, vireos, etc.) use prominent geographic landforms such as the western terminus of the Columbia Gorge and the confluence of the Willamette and Columbia Rivers to orient themselves when migrating. Many of these species are "forest-interior" birds that only use large forested areas, and the Northwest Hills provides the largest forest near the river confluence.

As many as 62 mammal species use the Northwest Hills forest habitat. These species include northern flying squirrel, Townsend's chipmunk, blacktailed deer, mountain beaver, bobcat, coyote and long tailed weasel. Tracks and droppings of black bear and cougar have also been observed in recent years. Many of the species found in the area are also found in the natural areas of the Oregon Coast Range. In addition to its habitat functions, the forested hills extend northwest from Portland toward the coast and serve as a travel corridor for wildlife, facilitating the seasonal and longer-term dispersal of individuals, thus maintaining genetic and biological diversity.



Map 2: Forest Park and Northwest District Resource Sites 21 - 41



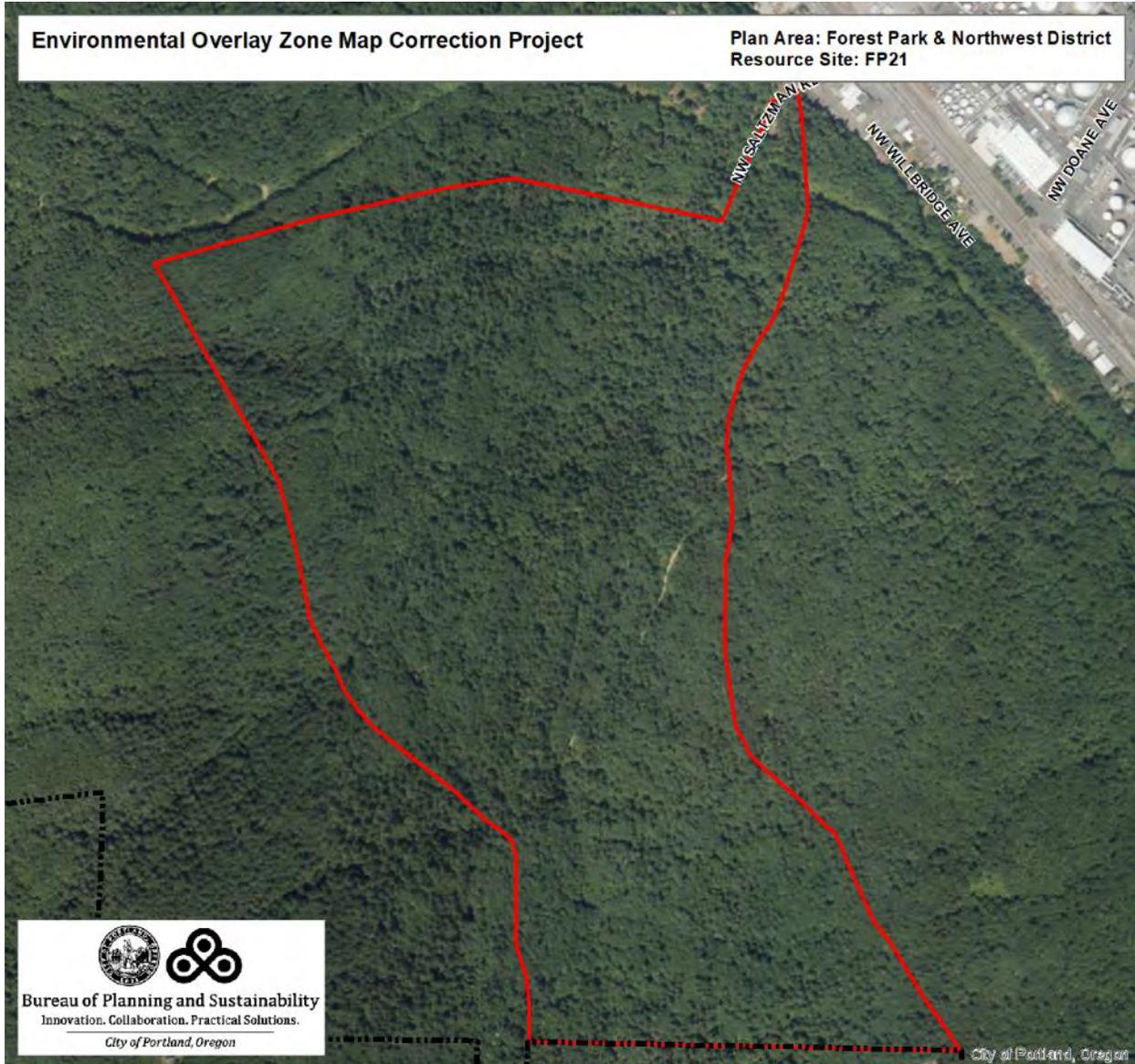
**Environmental Overlay Zone
Map Correction Project**
**Forest Park and Northwest District
Resource Sites 21 - 41**

- Streams
- Wetlands
- Resource Sites
- Streets
- City of Portland

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Resource Site No.: FP21 **Resource Site Name:** Lower Saltzman Creek
Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 89



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP21
		Study Area
Stream (Miles)		0.9
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		302.0
	Forest (acres)	301.8
	Woodland (acres)	0.2
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		297.2
Impervious Surface (acres)		17.0
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

This site forms the lower half of the Saltzman Creek watershed. The lower basin is clothed in a predominantly deciduous second growth forest, with well-developed riparian vegetation including western wahoo and galleries of alder along the creek bed. The two most common vegetation types are mature hardwood and conifer topping hardwood, the former typical of the riparian areas and the latter common on the upland slopes. Forest cover provides open space, scenic and recreational resources; serves as habitat for resident and migratory wildlife; and helps to balance the local water regimen. Snags, downed logs and woody debris found at the site are critical structural and functional components of the watershed ecosystem. Invasive species such as ivy, holly, morning glory and laurel threaten the vitality of the native plant community, particularly around Saltzman Road.

Saltzman is a year-round creek which provides high quality habitat for macroinvertebrates and amphibians. The site also provides food, water and cover habitat for birds (e.g., pileated woodpecker, great horned and pygmy owls, red-tailed hawk and a variety of songbirds) and mammals (e.g., shrew mole and coyote). The site's interspersion with adjacent forest permits wildlife migration in all directions except east. St. Helens Road and industrial development to the east impede wildlife movement between the forest and the Willamette River. The site's aquatic habitat has been adversely impacted by the dumping of household garbage and by spread of Himalayan blackberry.

Table B: Quality of Natural Resource Functions in Resource Site FP21				
Resource Site (acres) = 302.090929				
	High	Medium	Low	Total
Riparian Corridors*				
acres	115.5	94.2	92.4	302.1
percent total inventory site area	38.2%	31.2%	30.6%	100.0%
Wildlife Habitat*				
acres	301.9	0.0	0.0	301.9
percent total inventory site area	99.9%	0.0%	0.0%	99.9%
Special Habitat Areas**				
acres				301.7
percent total inventory site area				99.9%
Combined Total⁺				
acres	301.9	0.1	0.0	302.1
percent total inventory site area	99.9%	0.0%	0.0%	100.0%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP21 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status wildlife species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the R10 base zones. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP21, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP21 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of wetlands.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. Outside public parks, *limit* conflicting uses between 25 and 50 feet from stream top-of-bank and within areas of forest or woodland vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank or wetlands.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	301.8
Limit	0.2
Allow	0.0

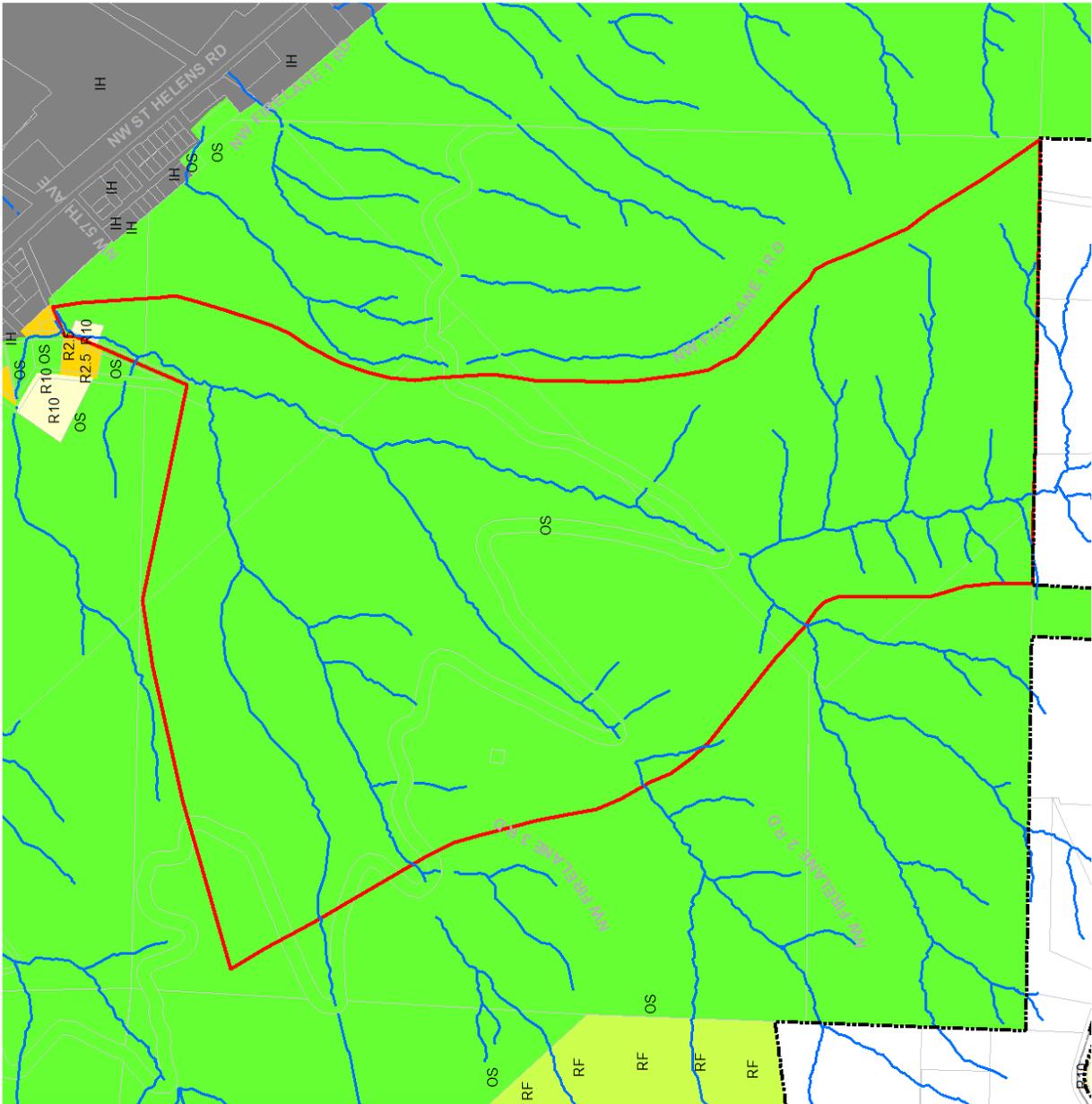


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**Resource Site: FP21
Lower Saltzman Creek**

Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland



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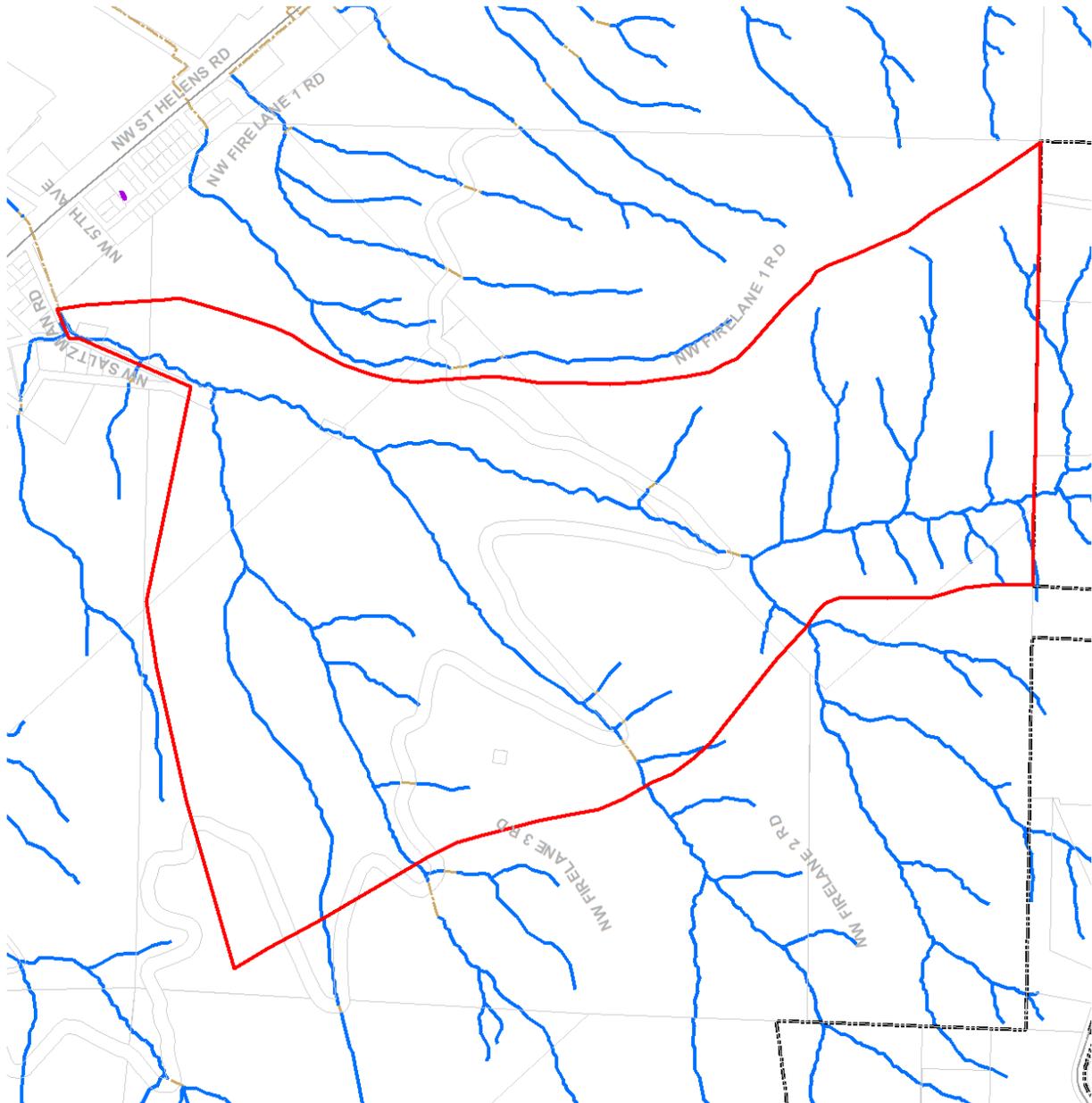




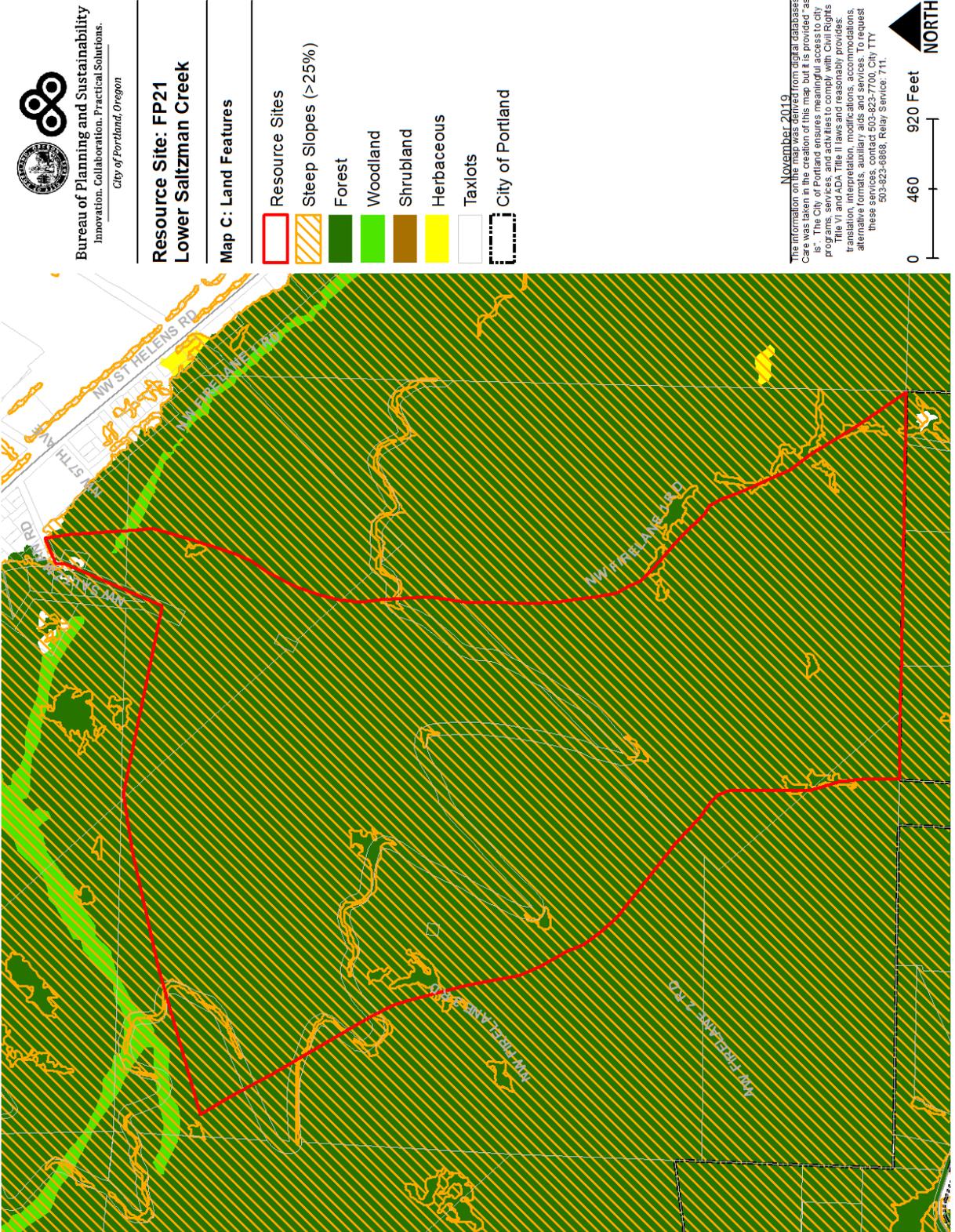
**Resource Site: FP21
Lower Saltzman Creek**

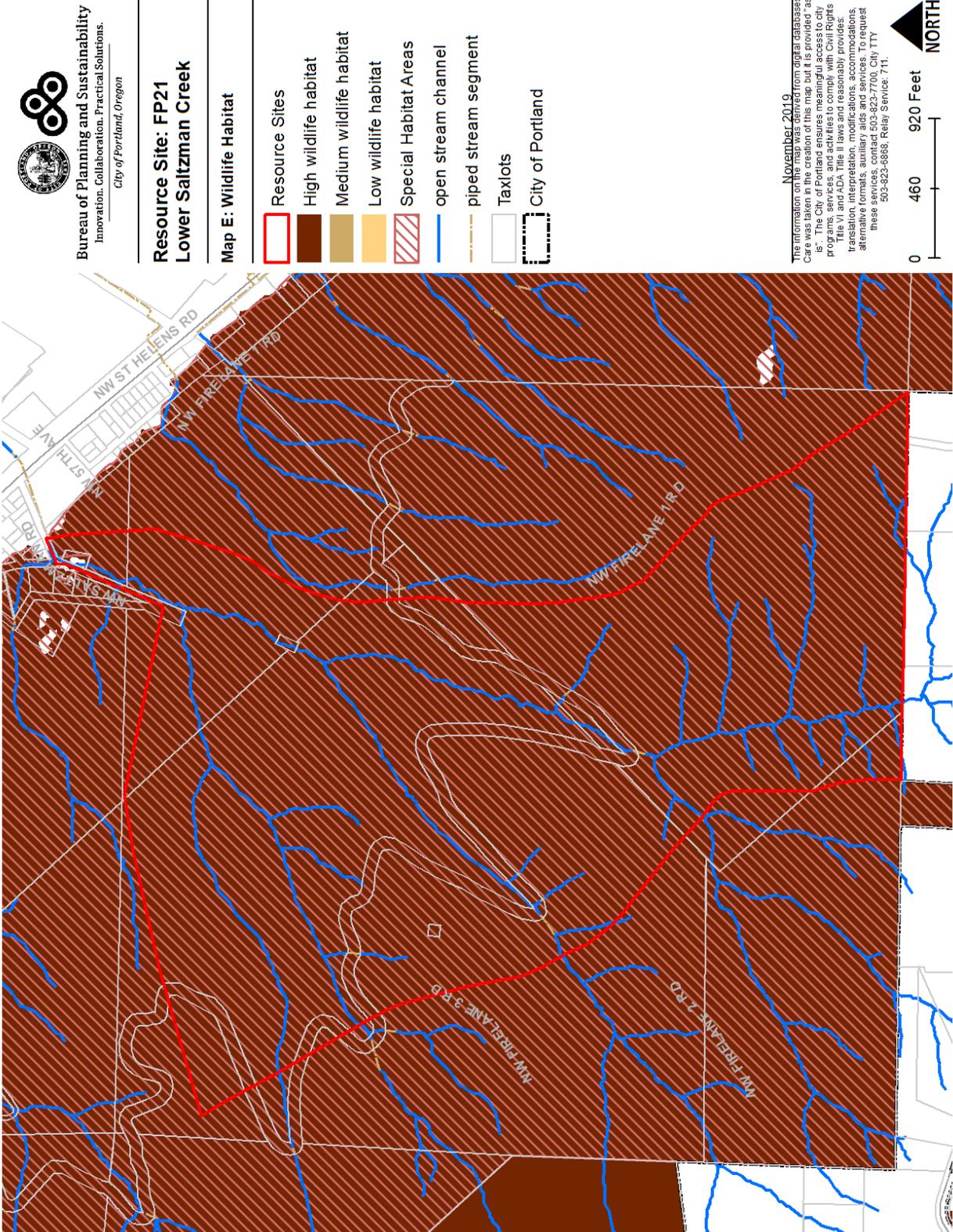
Map B: Water Related Features

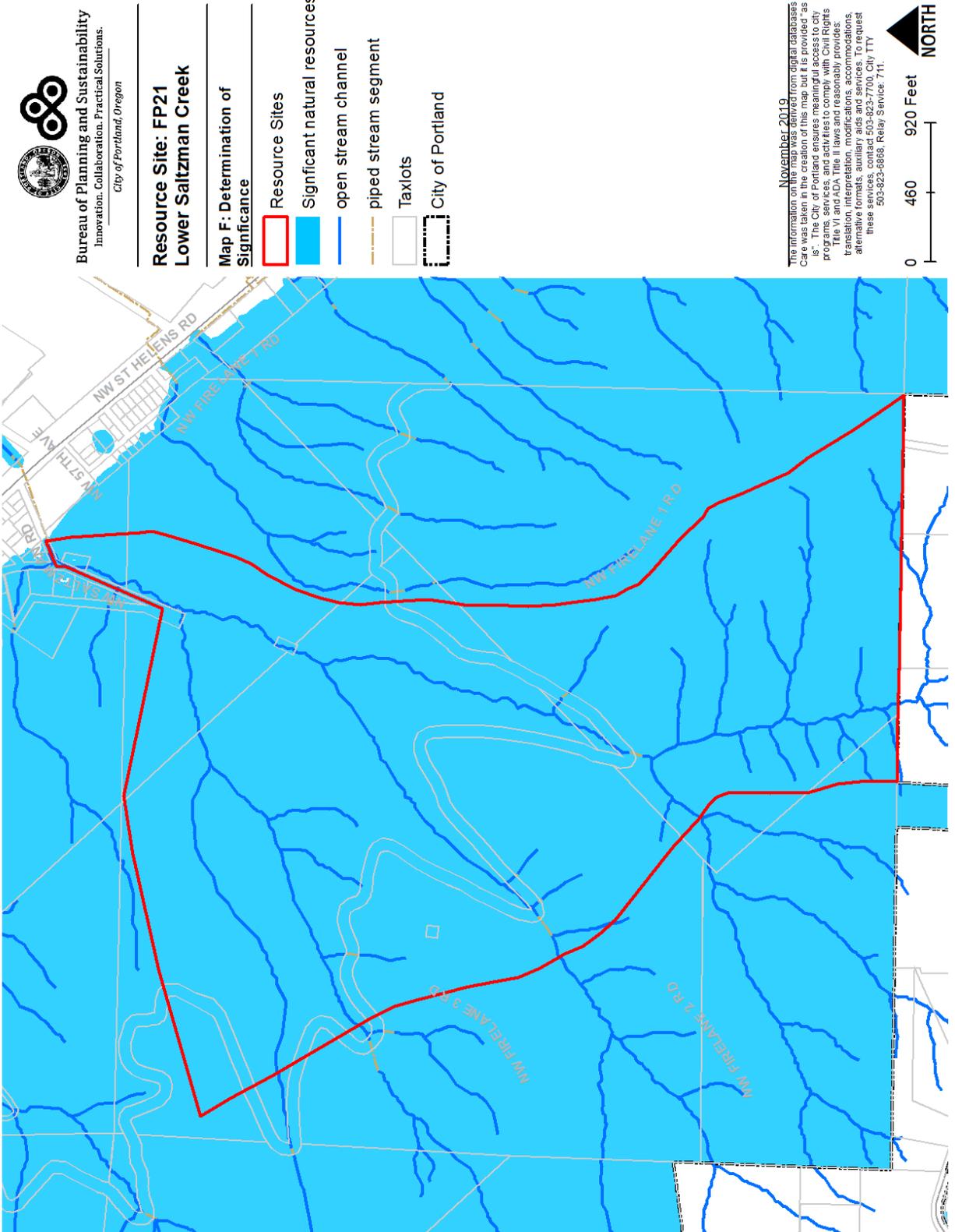
-  Resource Sites
-  Open stream channel
-  Piped stream segment
-  Wetlands
-  Floodplain
-  Taxlots
-  City of Portland



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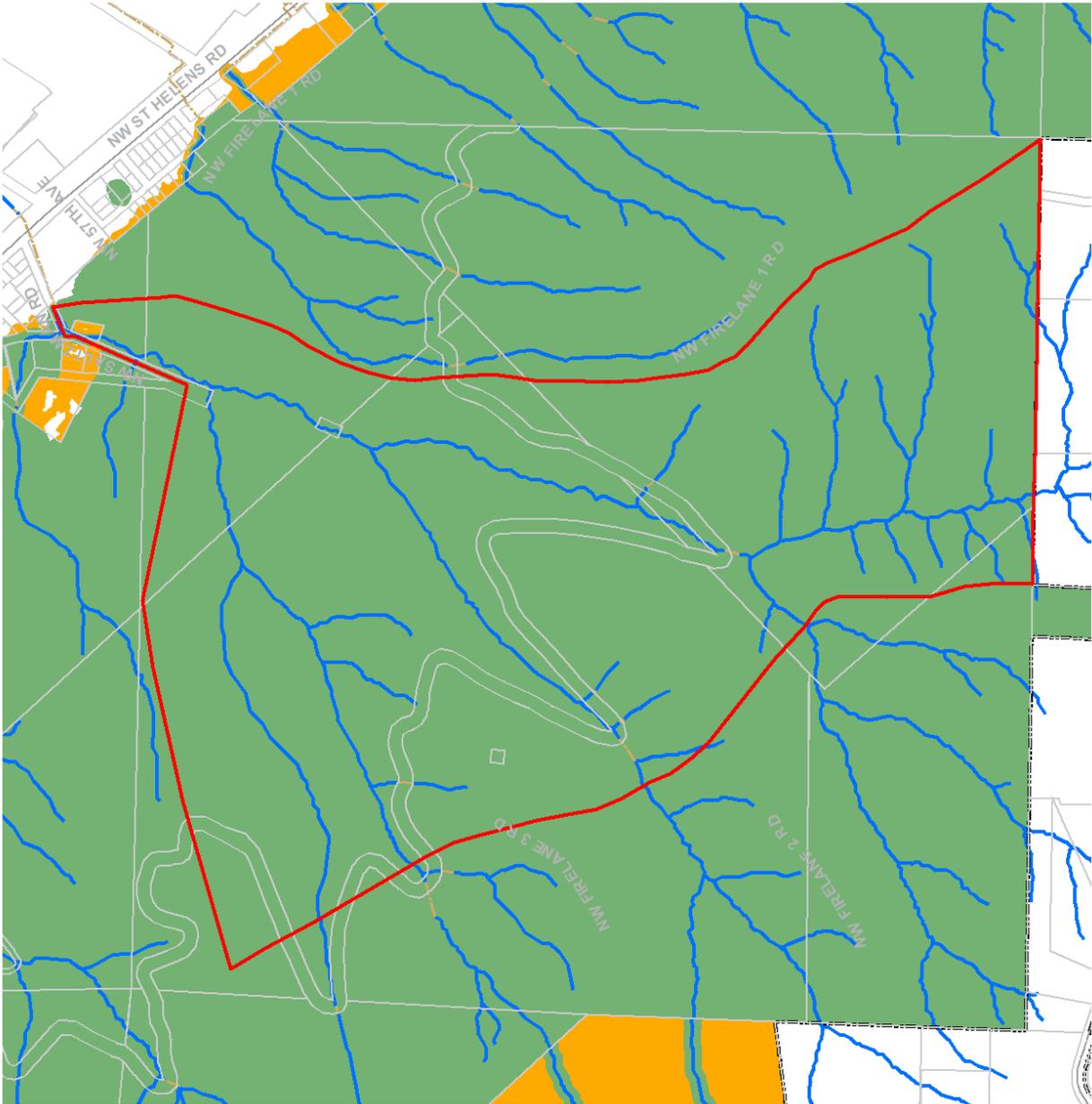


**Resource Site: FP21
Lower Saltzman Creek**

Map G: ESEE Decision

- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP22 **Resource Site Name:** Firelane 1 – East Bluff
Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 88



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP22
		Study Area
Stream (Miles)		0.4
Wetlands (acres)		0.8
Vegetated Areas >= 1/2 acre (acres)		359.5
	Forest (acres)	348.0
	Woodland (acres)	10.1
	Shrubland (acres)	0.0
	Herbaceous (acres)	1.4
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		356.4
Impervious Surface (acres)		20.8
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The largest stand of mature hardwood within the study area exists in a wide band across the central portion of the hillside. Conifers are underrepresented throughout much of this area and are altogether absent along some of the drainages. Smaller stands of young to mid-aged second growth western hemlock forest exist along the base of the hillside and along the ridge. Forest cover protects watershed resources, serves as habitat for wildlife and provides open space, scenic and recreational values. The structure of the forest community is limited by the lack of tall conifers, large snags and herbaceous cover. Downed logs and woody debris found at the site, however, are critical structural and functional components of the watershed ecosystem. English ivy is spreading into the site near St. Helens Road.

This site provides moderate to high quality food and cover habitat for wildlife. Sources of water are limited to several small, seasonal drainages. In 1984, black bear was sighted near the ridge in the southwest corner of this site. This is the closest known sighting to Portland within the study area. In 1990, signs of black bear were found at three locations in the Northwest Hills, all of them north of Germantown Road. Birds observed at this site include great horned owl, pileated woodpecker, pygmy owl, red-tailed hawk and ruby crowned kinglet. Interspersion with surrounding habitat increases the site's value as habitat. St. Helens Road forms a barrier along the site's eastern boundary.

Table B: Quality of Natural Resource Functions in Resource Site FP22				
Resource Site (acres) = 387.398023				
	High	Medium	Low	Total
Riparian Corridors*				
acres	171.0	129.4	63.6	364.1
percent total inventory site area	44.1%	33.4%	16.4%	94.0%
Wildlife Habitat*				
acres	358.3	0.0	0.0	358.3
percent total inventory site area	92.5%	0.0%	0.0%	92.5%
Special Habitat Areas**				
acres				359.6
percent total inventory site area				92.8%
Combined Total⁺				
acres	361.2	4.0	0.5	365.7
percent total inventory site area	93.2%	1.0%	0.1%	94.4%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP22 the following significant features and functions are present:

Significant Natural Resource Features: open stream; wetland; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status wildlife species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site industrial uses are allowed in the IH base zone. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP22, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP22 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank.
3. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
4. Outside public parks, *limit* conflicting uses between 25 and 50 feet from stream top-of-bank.
5. Outside public parks, *limit* conflicting uses within areas of forest or woodland vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
6. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank or wetlands.
7. *Allow* conflicting uses within all other areas containing significant natural resources.

Table C: ESEE Decision for Resource Site FP22	
ESEE Decision	Acres
Strictly Limit	350.1
Limit	12.8
Allow	24.5

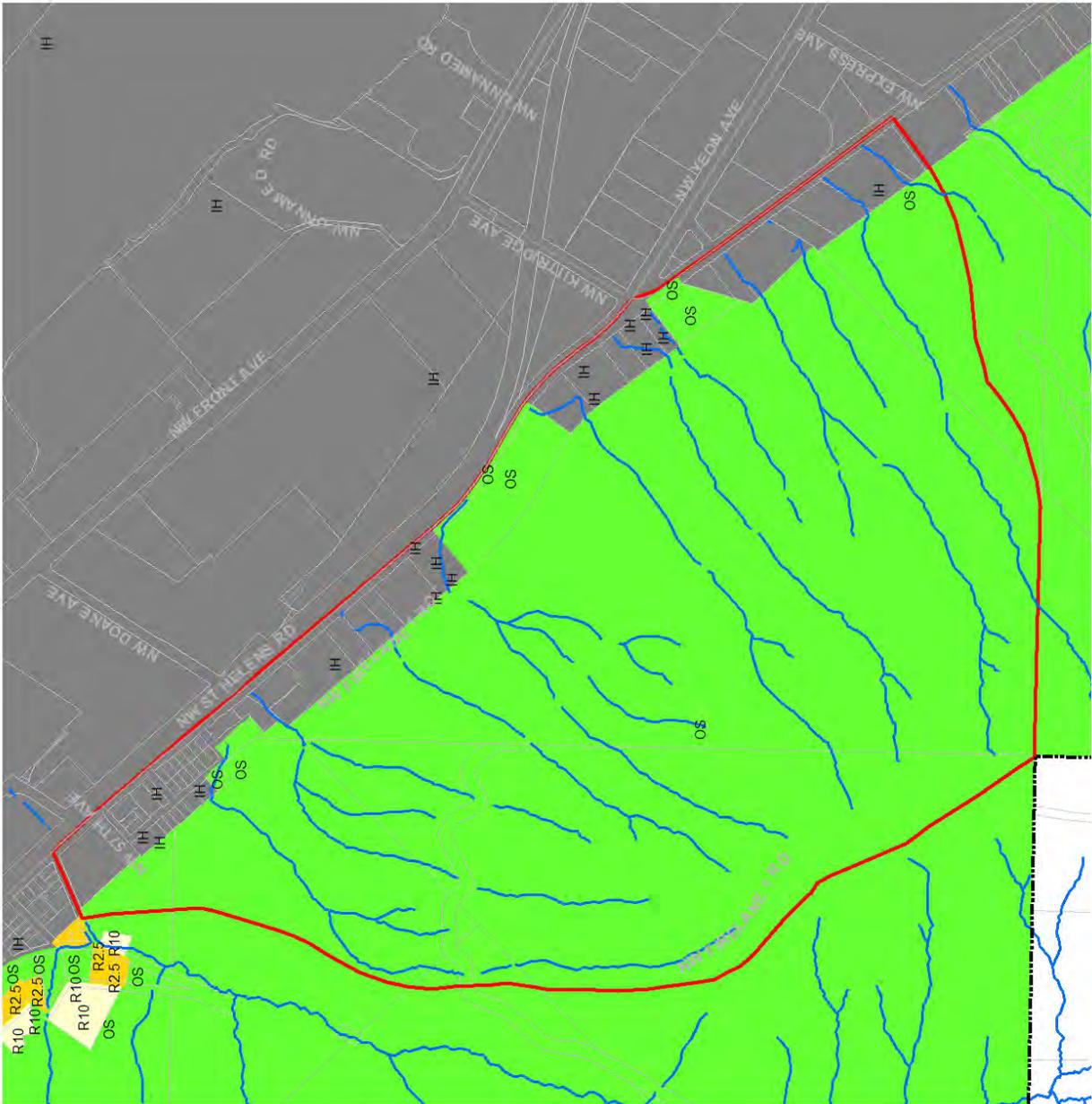


**Resource Site: FP22
Firelane 1 - East Bluff**

Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland

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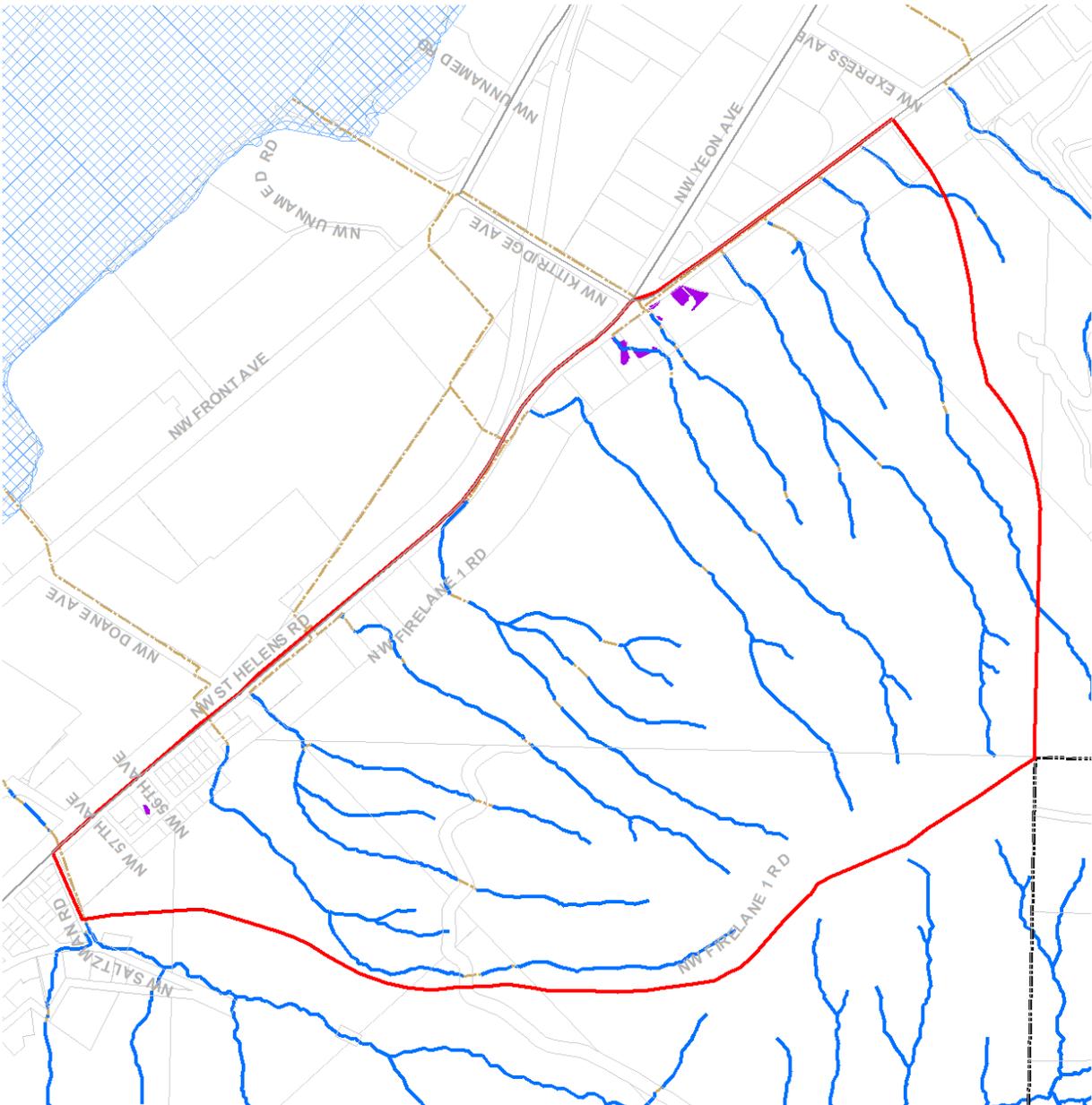
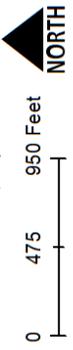


**Resource Site: FP22
Firelane 1 - East Bluff**

Map B: Water Related Features

-  Resource Sites
-  Open stream channel
-  Piped stream segment
-  Wetlands
-  Floodplain
-  Taxlots
-  City of Portland

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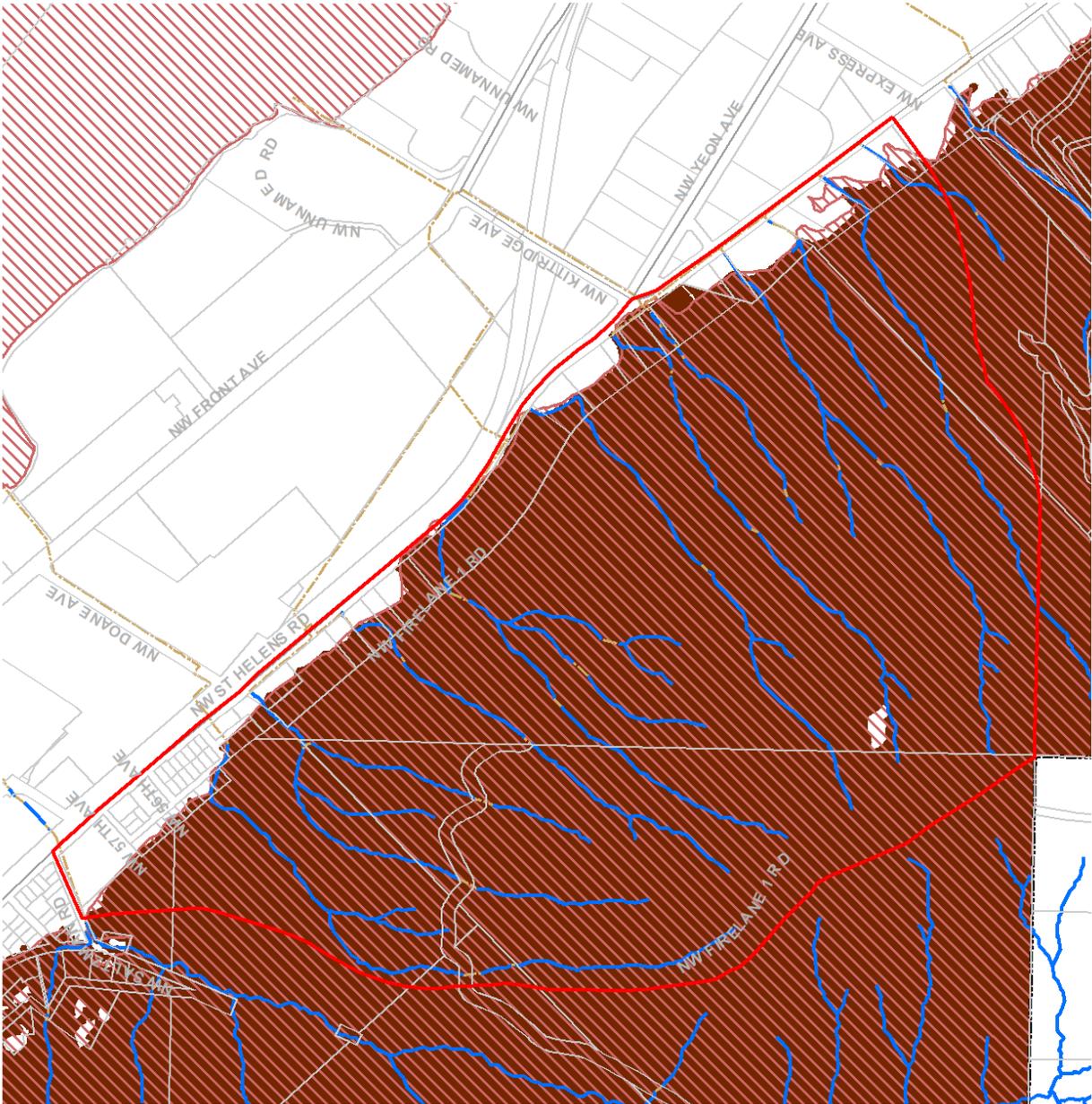


**Resource Site: FP22
Fireland 1 - East Bluff**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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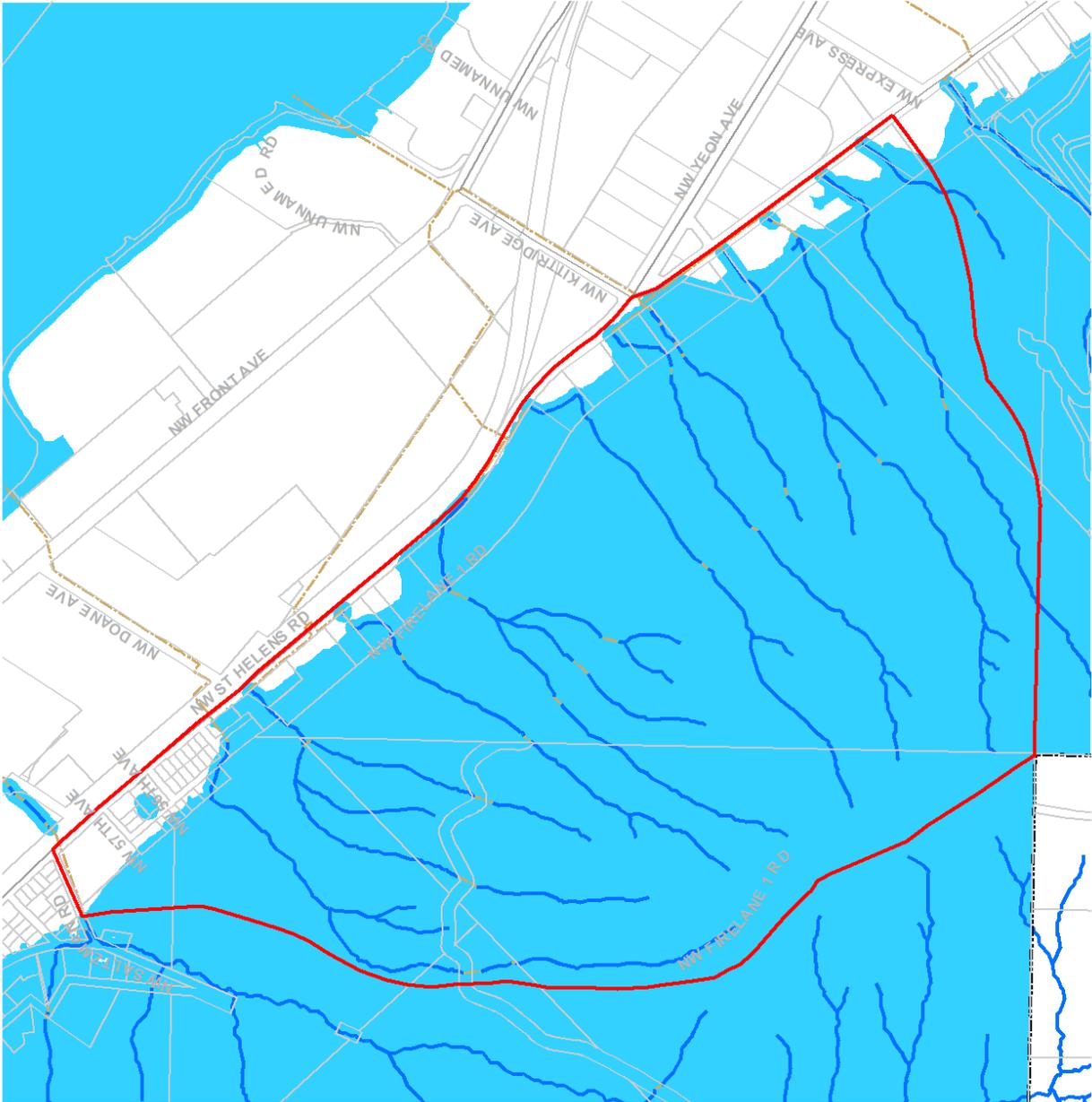




**Resource Site: FP22
Fireland 1 - East Bluff**

**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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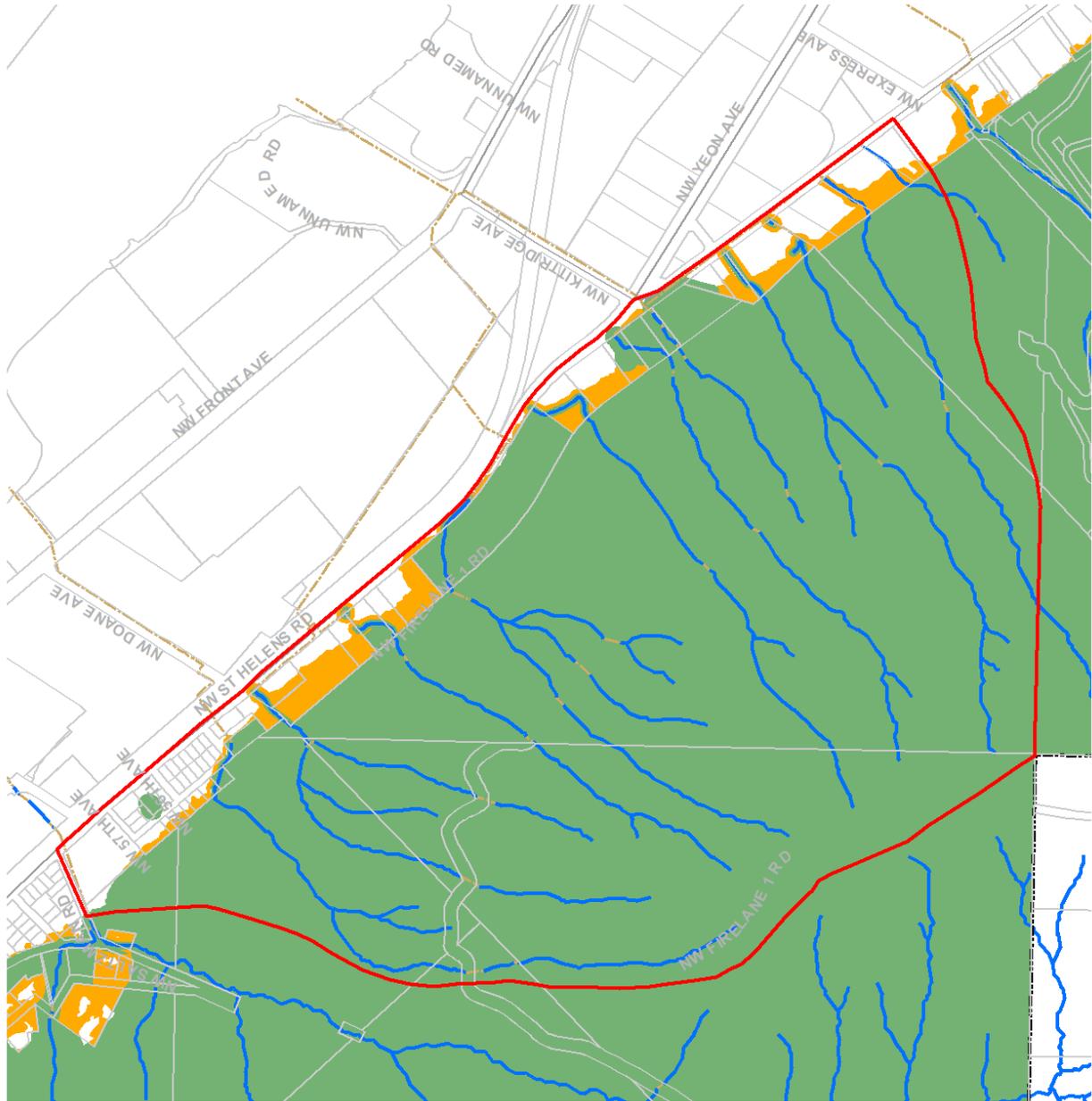


**Resource Site: FP22
Fireland 1 - East Bluff**

Map G: ESEE Decision

- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP23 **Resource Site Name:** Express Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 87



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP23
		Study Area
Stream (Miles)		0.2
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		269.4
	Forest (acres)	269.4
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		265.7
Impervious Surface (acres)		33.6
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The 'Express Creek' watershed is clothed in a mosaic of vegetation types ranging from the *hardwood with young conifer* to the *mid-aged conifer* stage of secondary succession. The older forest contains mature grand fir, western hemlock and Douglas fir specimens. Forest cover protects watershed resources, serves as habitat for wildlife and provides open space, scenic and recreational resources. Snags, downed logs and woody debris found at the site are critical structural and functional components of the watershed ecosystem. The rare phantom orchid (*Eburophyton austinae*) also occurs in the older forest. Invasive species such as ivy and holly are proliferating in the lower parts of the site, near St. Helens Road.

The primary creek at the site supports a healthy population of macroinvertebrate species. The creek and the site's forest cover provide food, water and cover for a variety of birds including pileated woodpecker, Oregon junco, robin, Wilson's warbler, house finch and golden-crowned kinglet. The site's interspersed with surrounding habitat permits wildlife to migrate through the site to Holman and Macleay Parks to the south and to the rest of Forest Park to the north. Industrial activities and traffic on and along St. Helens Road impede wildlife migration to the east.

Table B: Quality of Natural Resource Functions in Resource Site FP23				
Resource Site (acres) = 285.76808				
	High	Medium	Low	Total
Riparian Corridors*				
acres	108.8	88.7	73.3	270.7
percent total inventory site area	38.1%	31.0%	25.6%	94.7%
Wildlife Habitat*				
acres	269.4	0.0	0.0	269.4
percent total inventory site area	94.3%	0.0%	0.0%	94.3%
Special Habitat Areas**				
acres				270.2
percent total inventory site area				94.6%
Combined Total⁺				
acres	270.6	1.2	0.0	271.8
percent total inventory site area	94.7%	0.4%	0.0%	95.1%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP23 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status wildlife species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Industrial uses are allowed in the IH base zone. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP23, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP23 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank, and land within 50 feet of wetlands.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. Outside public parks, *limit* conflicting uses between 25 and 50 feet from stream top-of-bank and within areas of forest or woodland vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	262.6
Limit	8.0
Allow	15.2



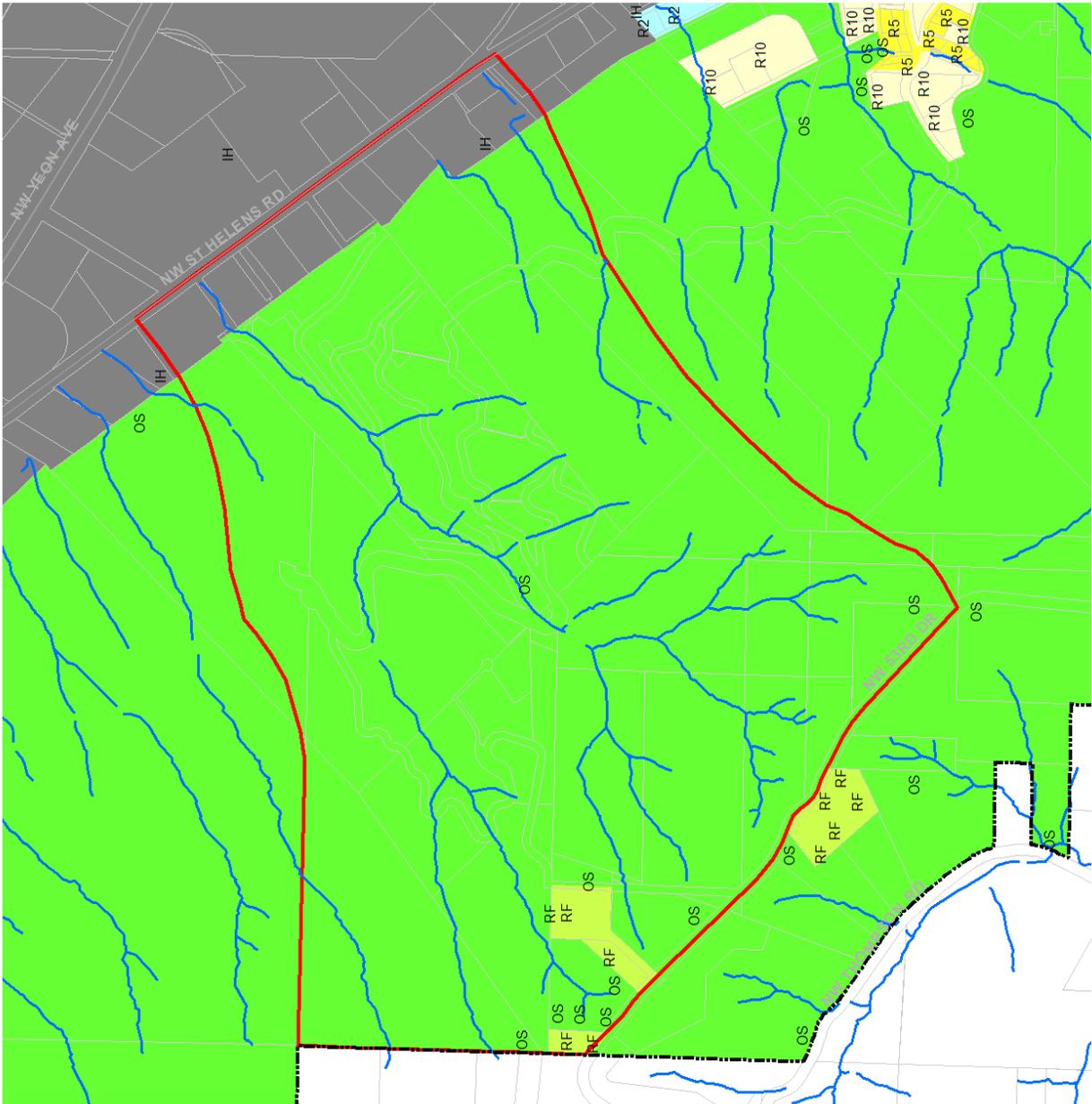
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**Resource Site: FP23
Express Creek**

Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland

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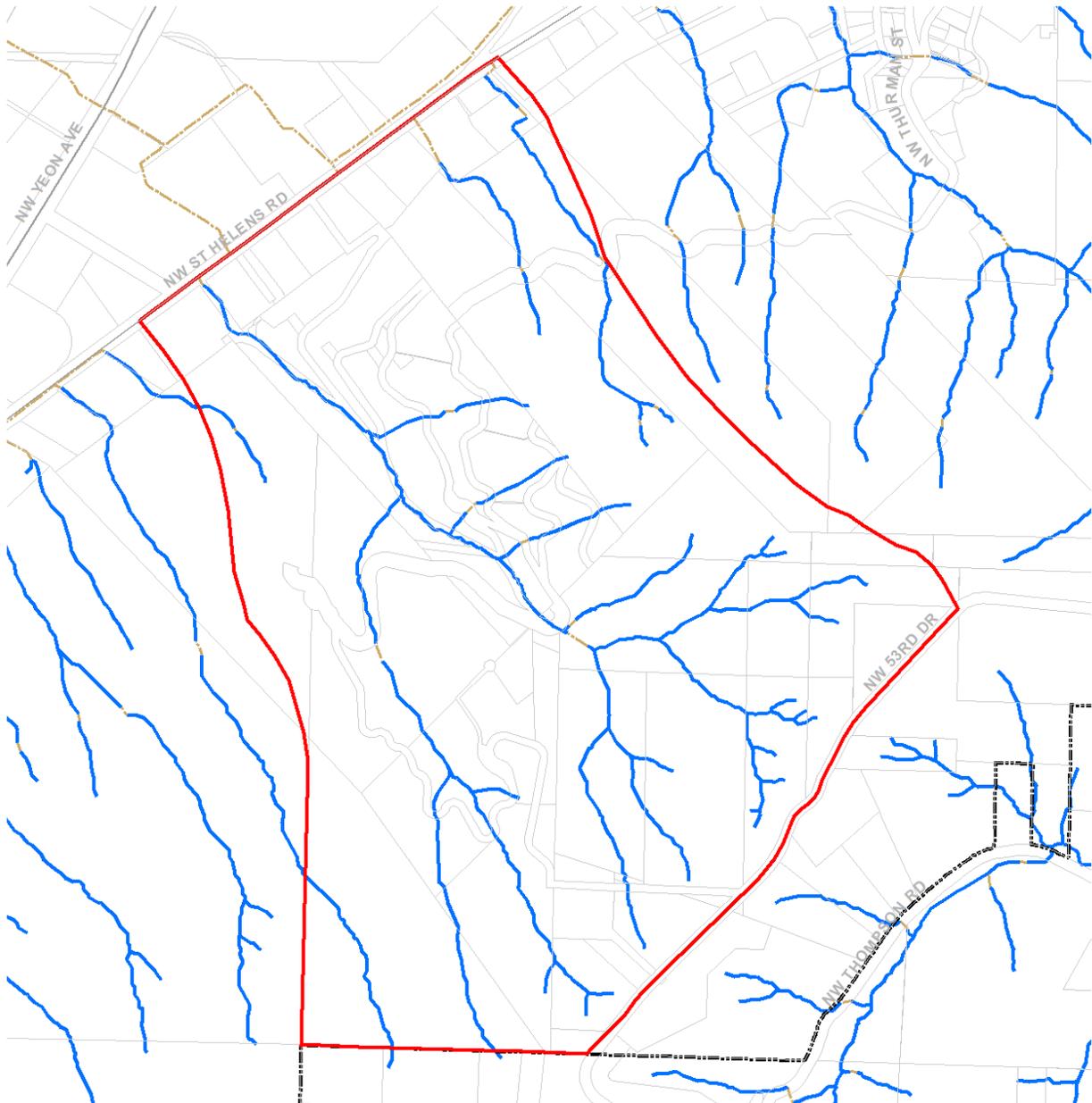




**Resource Site: FP23
Express Creek**

Map B: Water Related Features

- Resource Sites
- Open stream channel
- Piped stream segment
- Wetlands
- Floodplain
- Taxlots
- City of Portland



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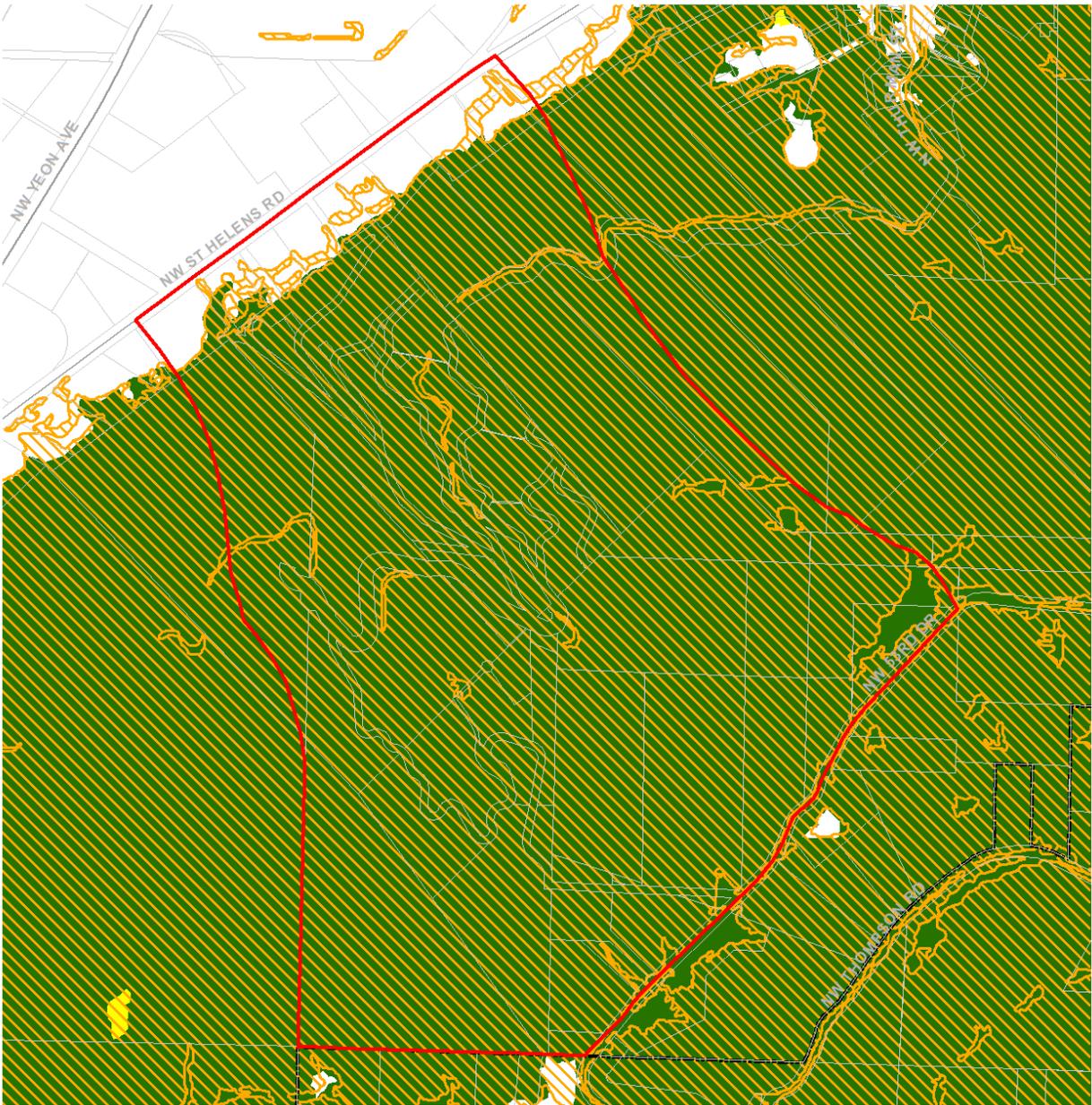


**Resource Site: FP23
Express Creek**

Map C: Land Features

- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

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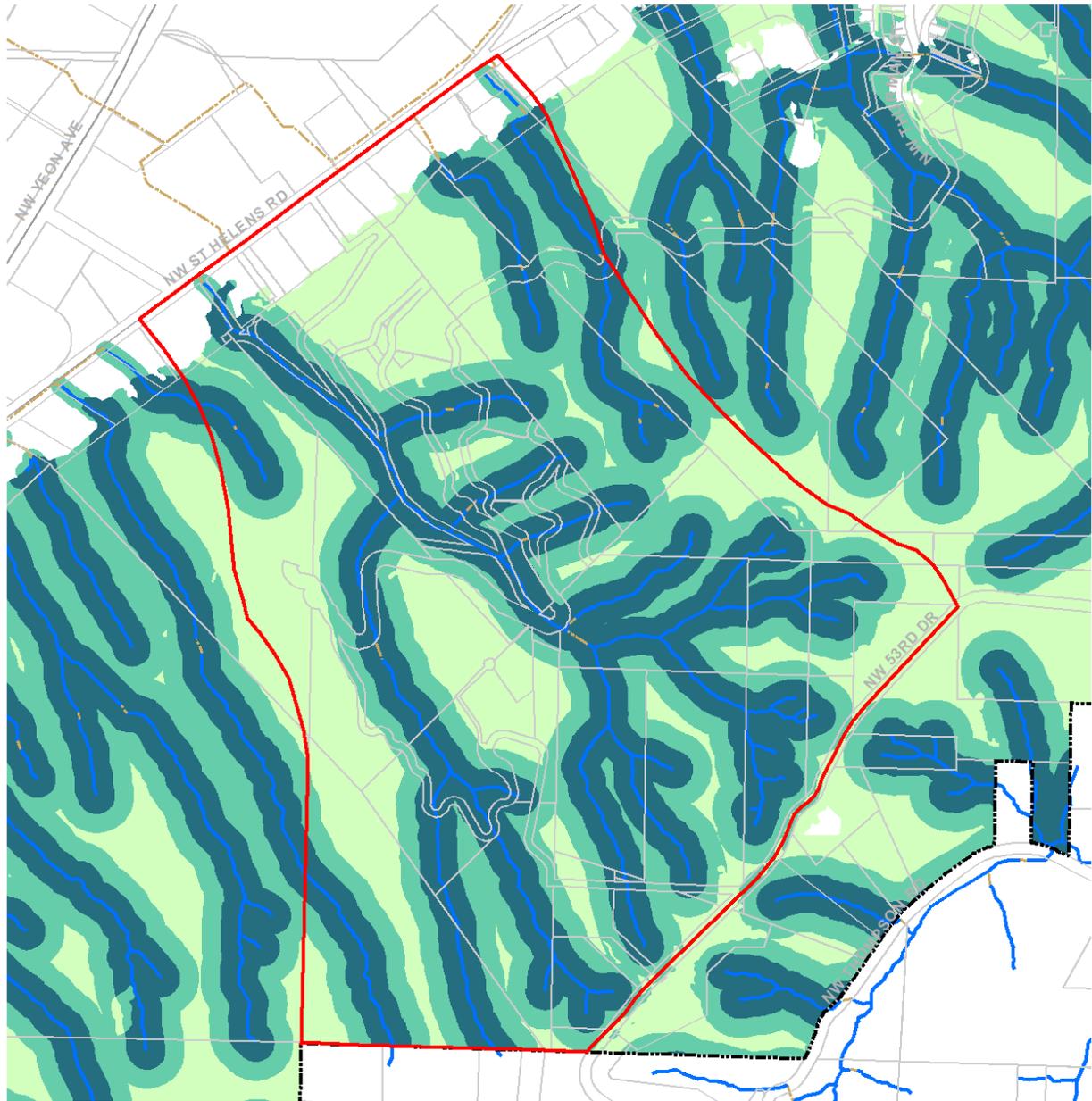


**Resource Site: FP23
Express Creek**

Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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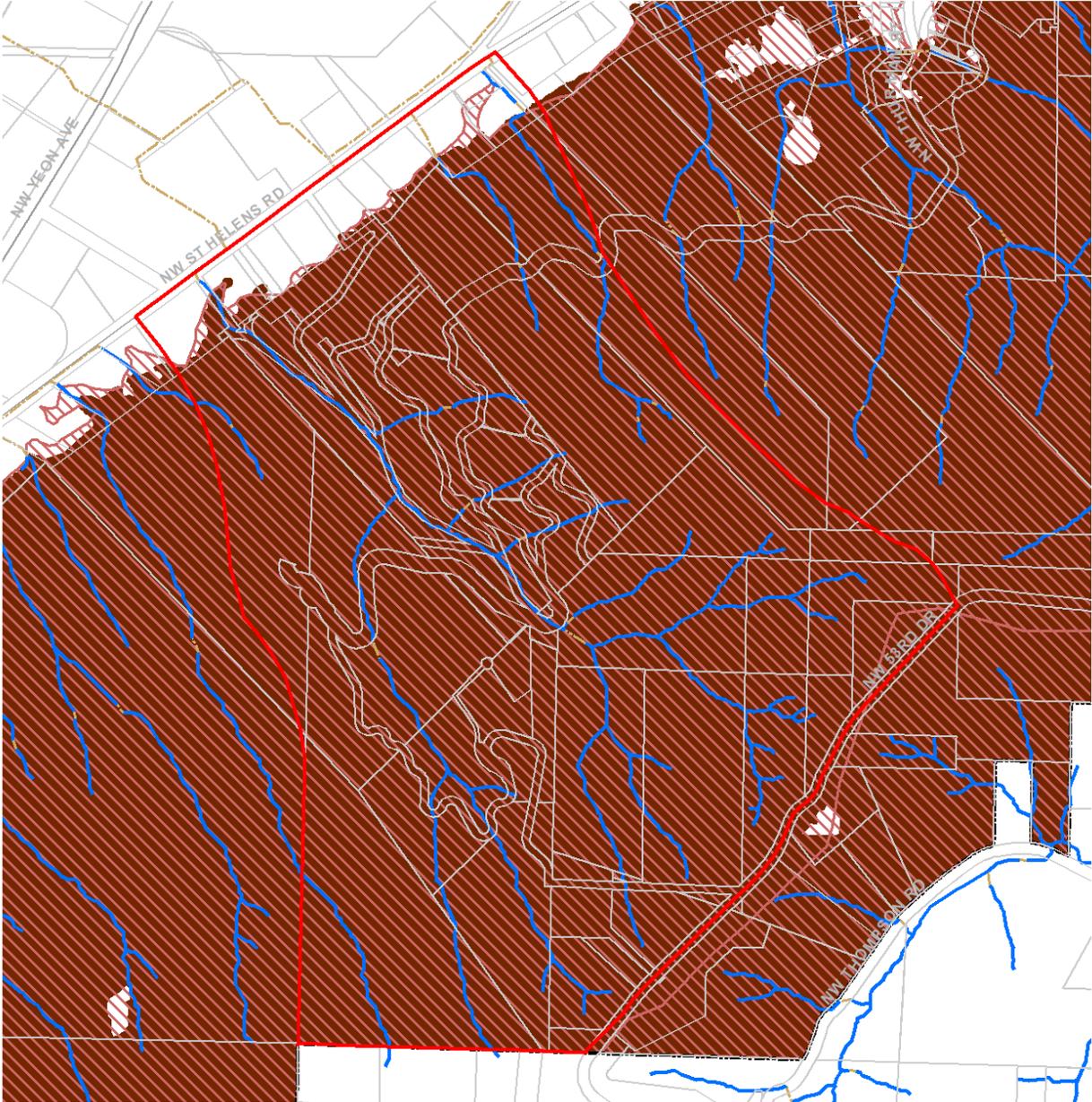
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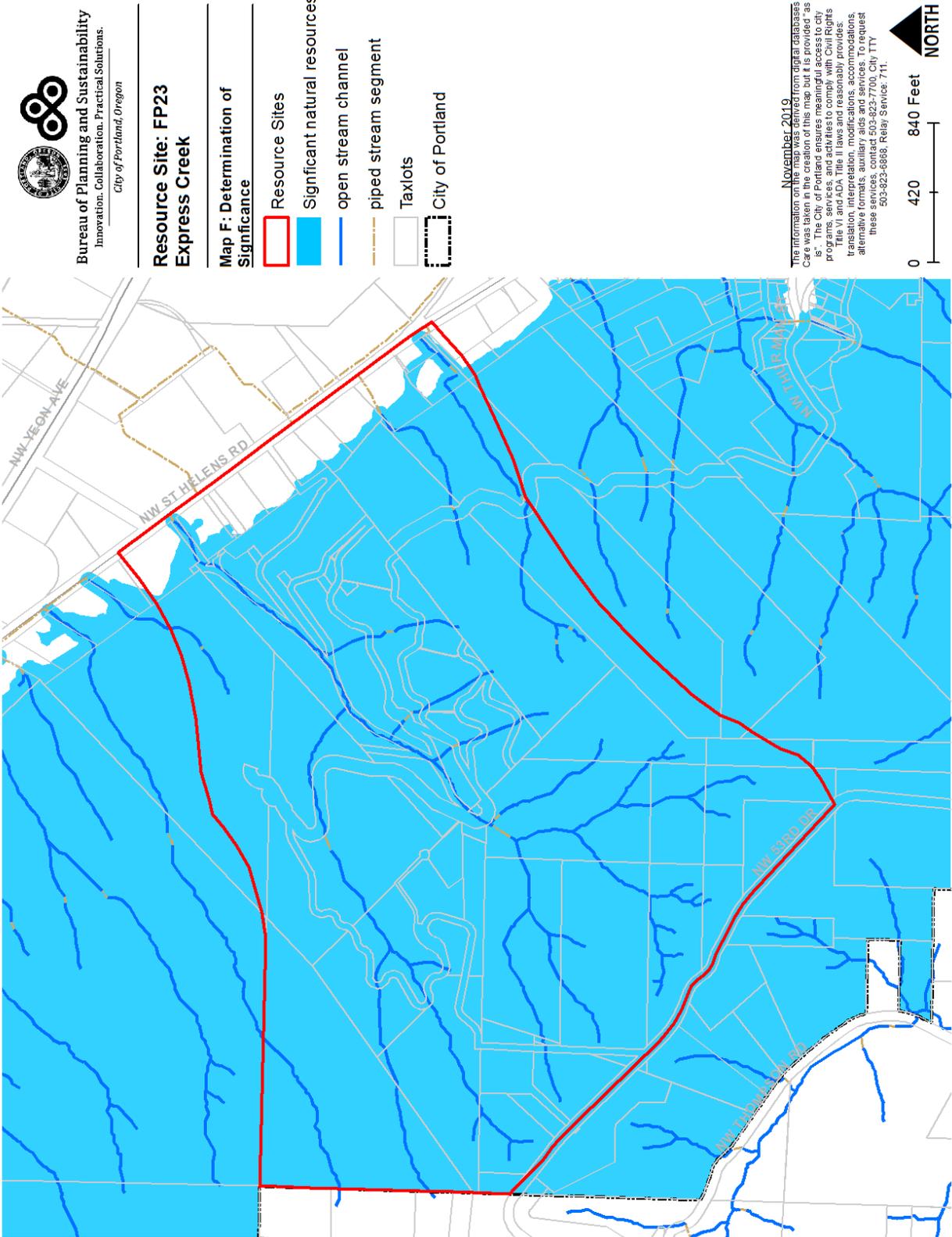
**Resource Site: FP23
Express Creek**

Map E: Wildlife Habitat

-  Resource Sites
-  High wildlife habitat
-  Medium wildlife habitat
-  Low wildlife habitat
-  Special Habitat Areas
-  open stream channel
-  piped stream segment
-  Taxlots
-  City of Portland

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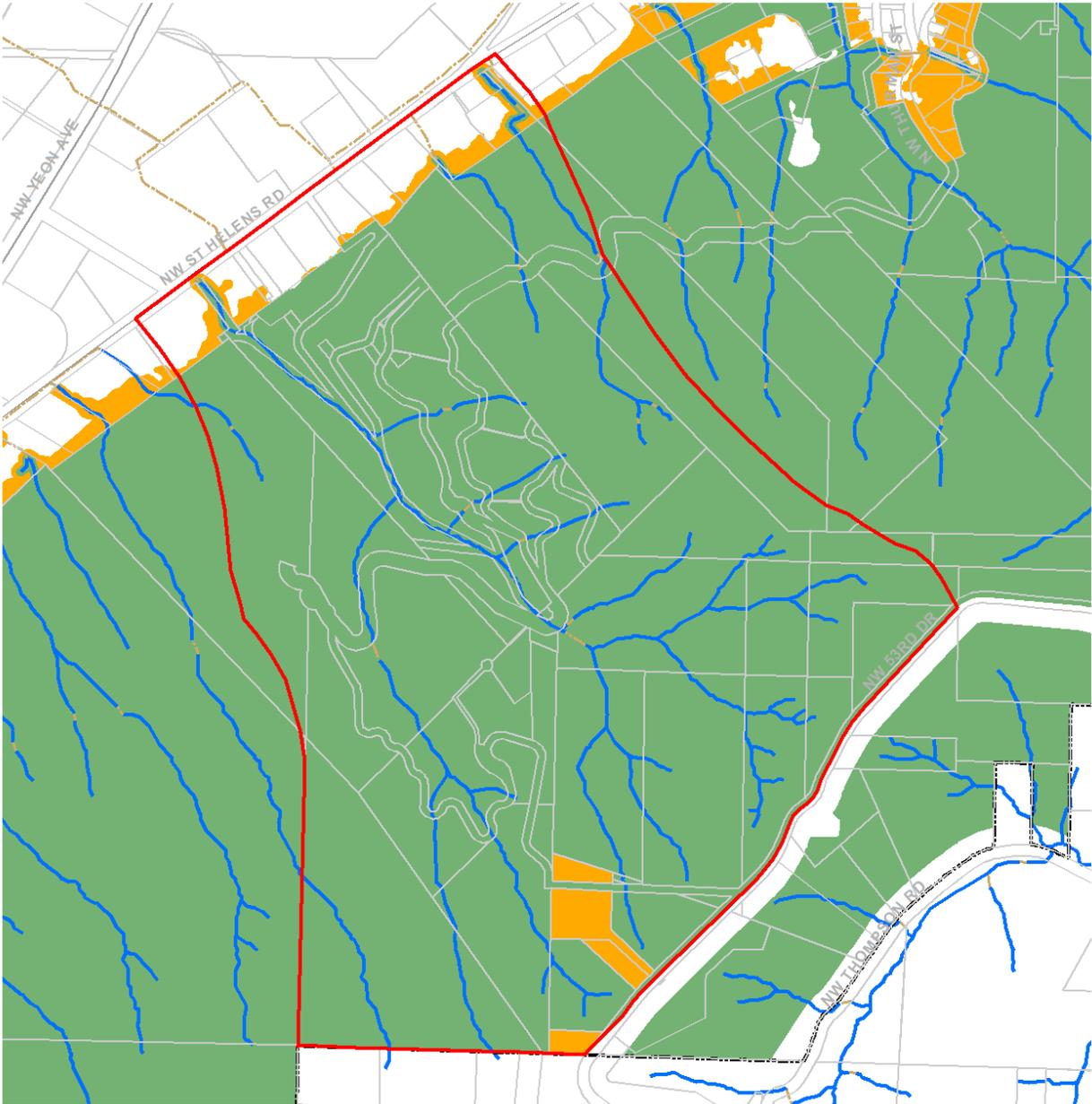
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**Resource Site: FP23
Express Creek**

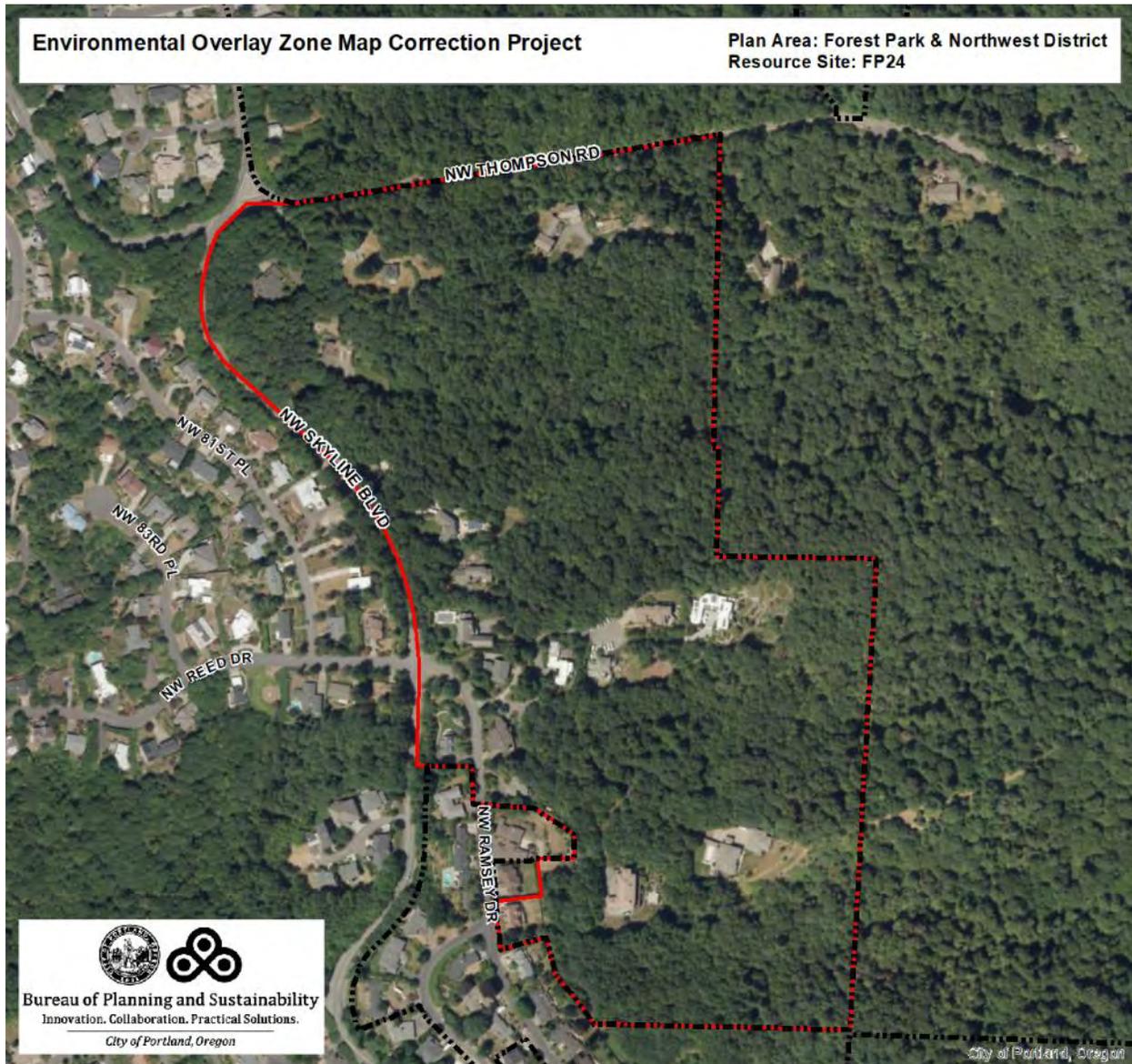
Map G: ESEE Decision

- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP24 **Resource Site Name:** Skyline Headwaters
Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 84



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP24
		Study Area
Stream (Miles)		0.1
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		46.6
	Forest (acres)	45.1
	Woodland (acres)	0.0
	Shrubland (acres)	1.0
	Herbaceous (acres)	0.5
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		44.5
Impervious Surface (acres)		5.4
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The headwaters of Balch Creek in the site provides fishery habitat values. This site contains some of the best trout spawning beds in the watershed.

The stream is surrounding by forest on steep slopes, this provides cover and habitat for wildlife. There are steep forest ravines. Rare plant species found in the site include western wahoo shrubs, and dawn redwoods. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding. Very dark muddy water was observed in lowest section of Balch Creek during the spring of 1990. This mud was silting spawning beds and reducing clarity to a point that trout would have difficulty feeding. The source of some of this mud was a blowout at the juncture of a public and private water line the resource site. This incident is yet another example of soil instability and erosion problems on steep, denuded banks.

Table B: Quality of Natural Resource Functions in Resource Site FP24				
Resource Site (acres) = 57.124629				
	High	Medium	Low	Total
Riparian Corridors*				
acres	19.4	14.6	12.1	46.1
percent total inventory site area	33.9%	25.6%	21.1%	80.6%
Wildlife Habitat*				
acres	45.1	0.0	0.0	45.1
percent total inventory site area	78.9%	0.0%	0.0%	78.9%
Special Habitat Areas**				
acres				43.0
percent total inventory site area				75.3%
Combined Total⁺				
acres	46.9	0.5	0.4	47.8
percent total inventory site area	82.1%	0.9%	0.7%	83.7%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP24 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status plant and fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP24, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk

species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

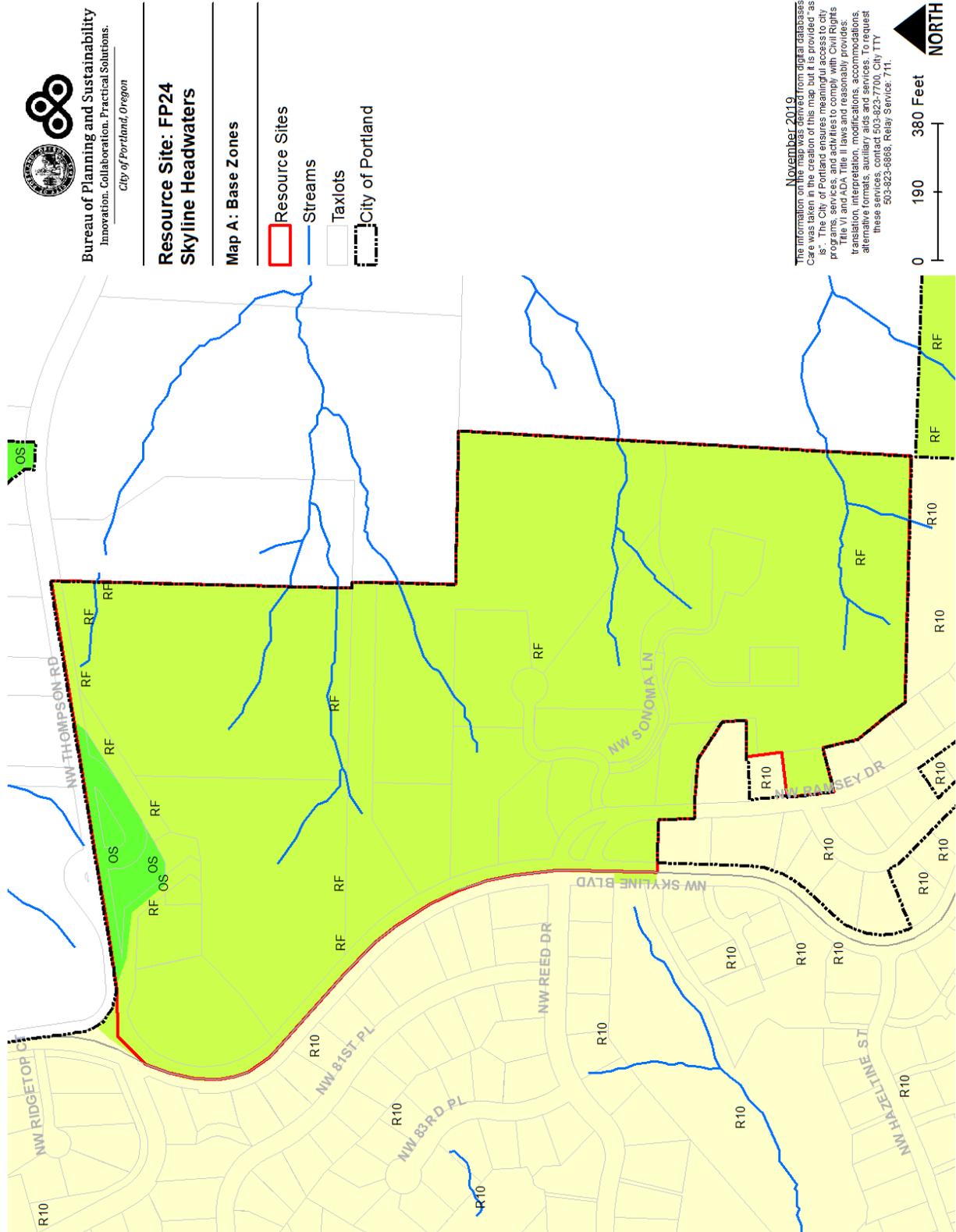
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

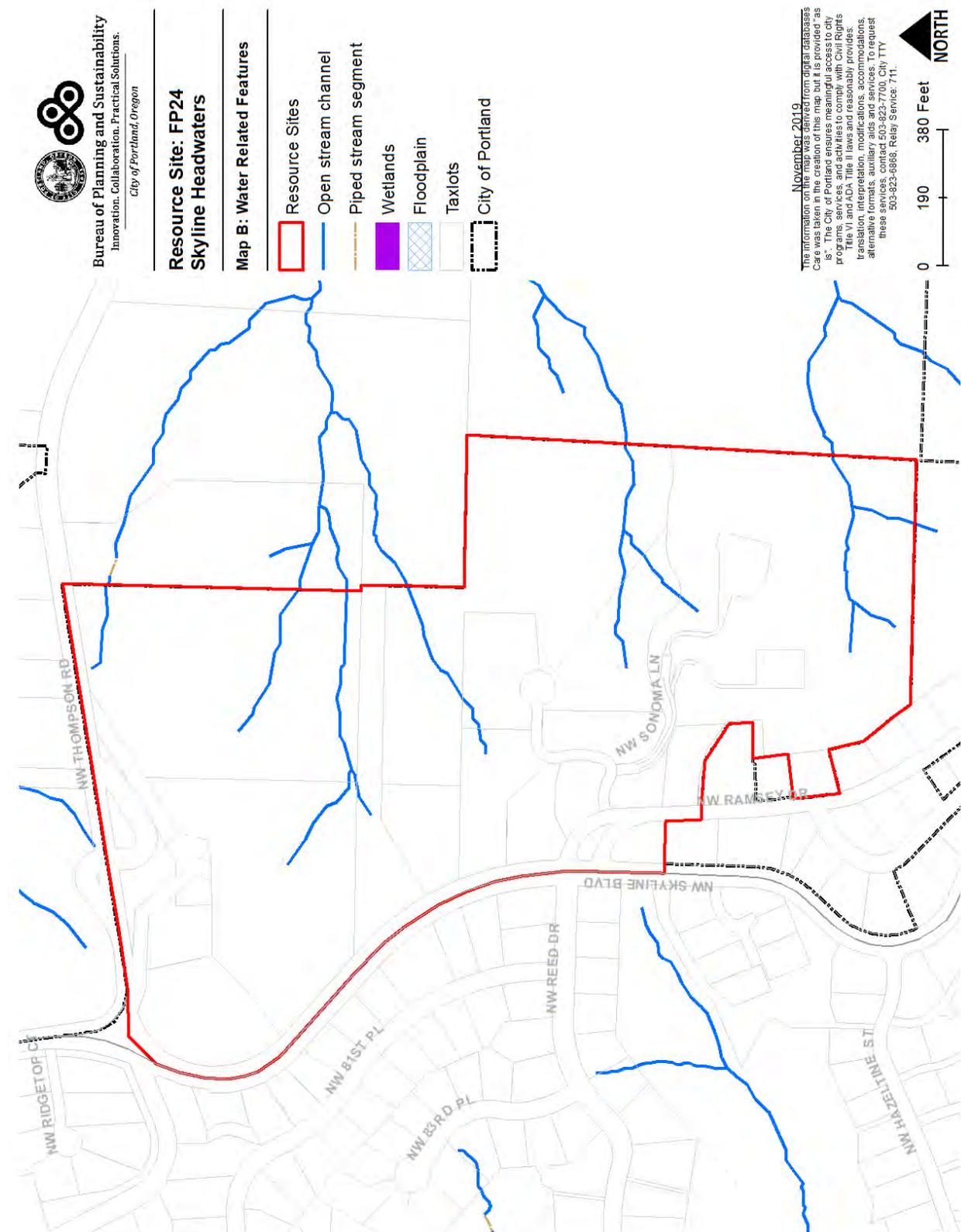
ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resource Site FP24 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation contiguous to but more than 100 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	18.1
Limit	20.5
Allow	18.5





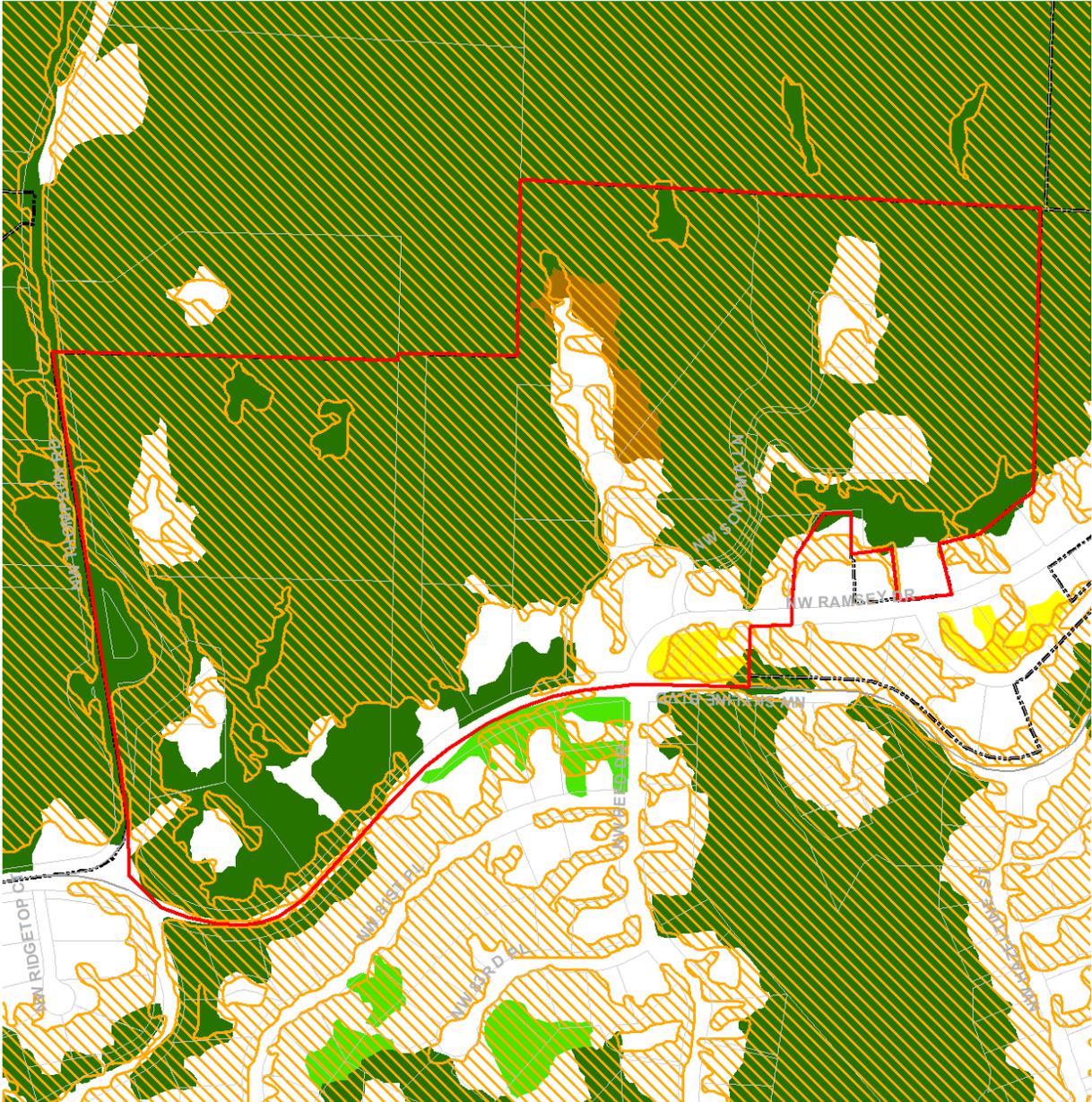


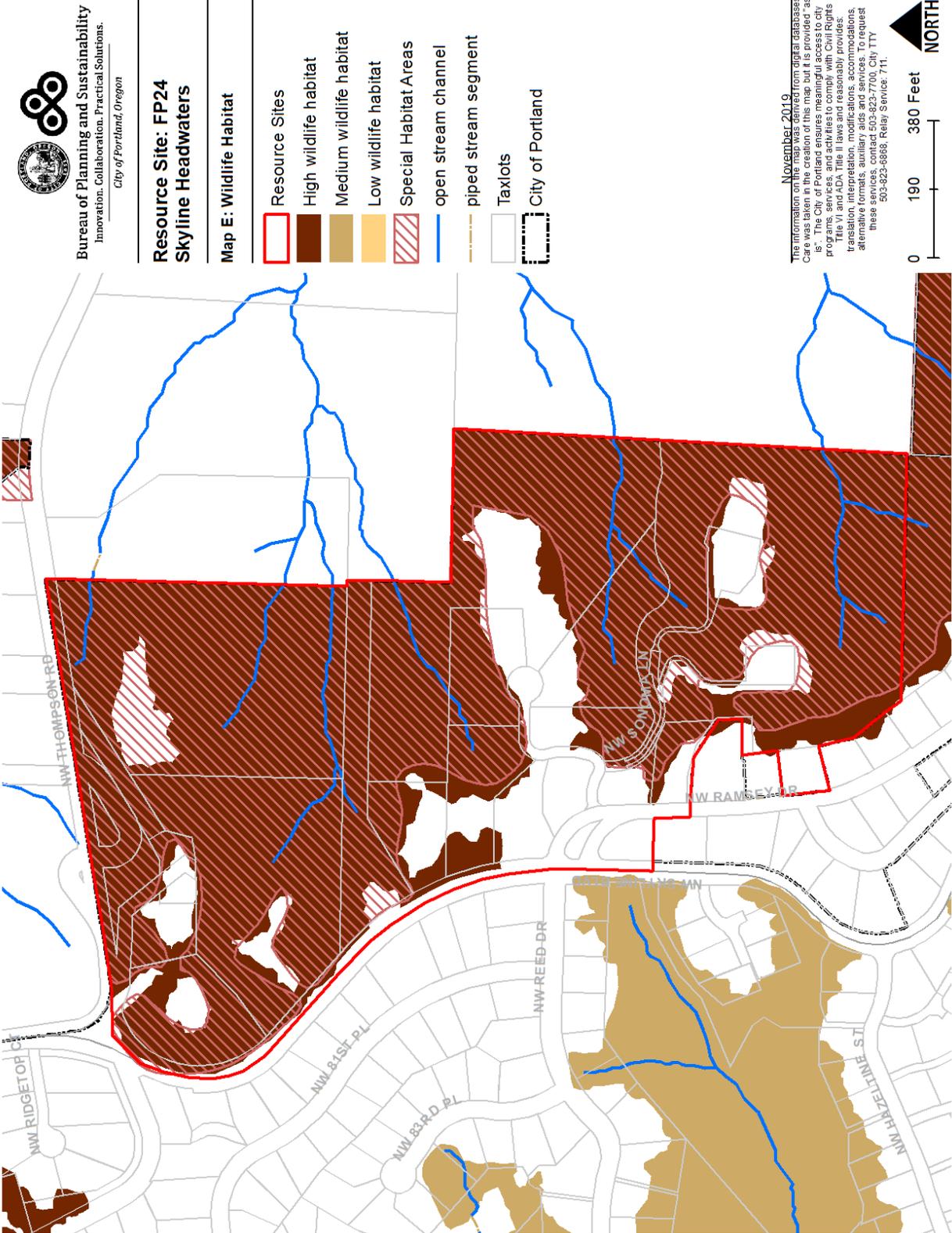
**Resource Site: FP24
Skyline Headwaters**

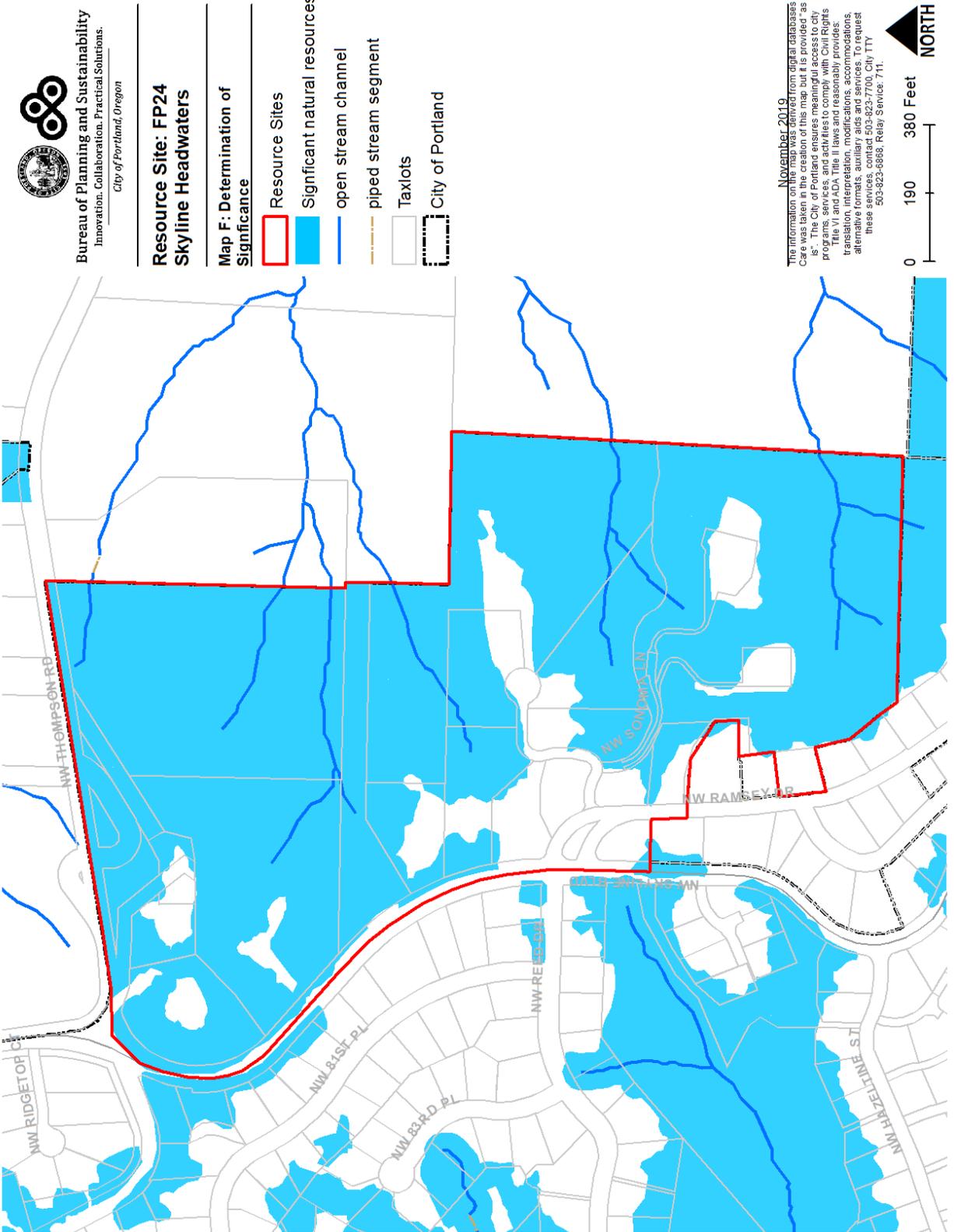
Map C: Land Features

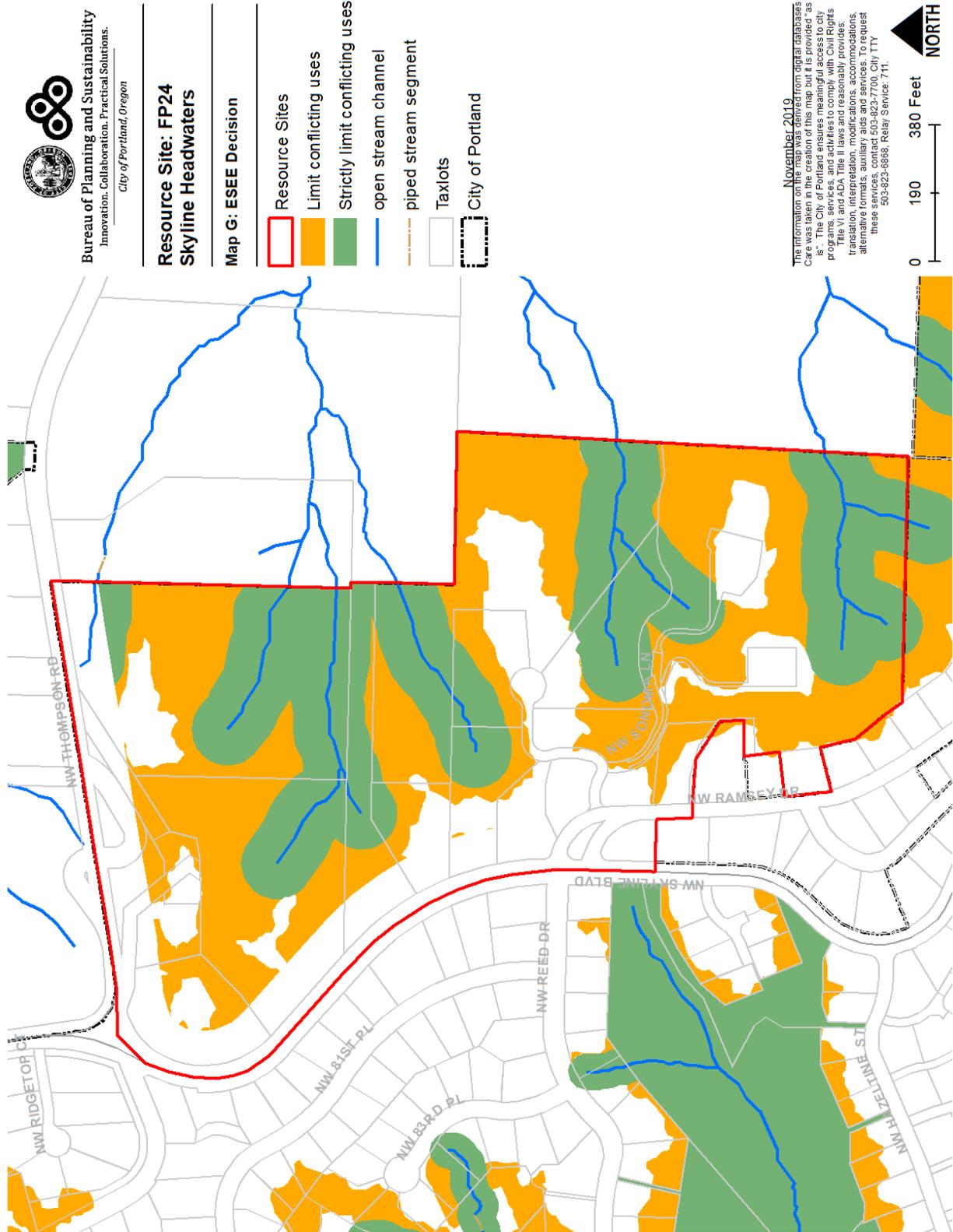
- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

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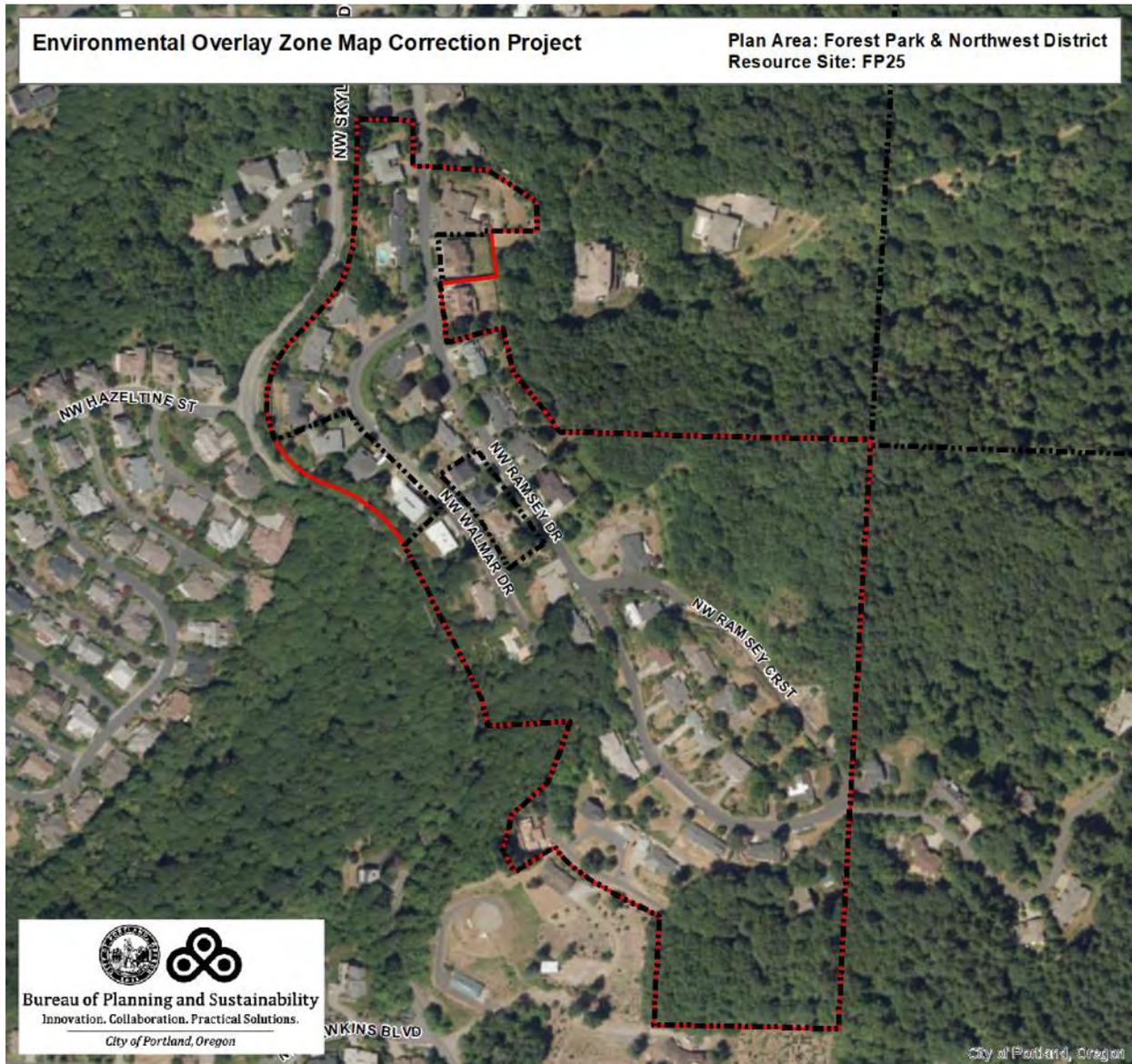








Resource Site No.: FP25 Resource Site Name: NW Ramsey & Walmar
Previous Plan: Multnomah County Urban Lands Previous Resource Site No.: 111



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP25
		Study Area
Stream (Miles)		2.2
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		11.7
	Forest (acres)	11.1
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.7
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		17.6
Impervious Surface (acres)		8.1
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

This site is composed of a patchwork of three soil types: Cascade silt loam, Cascade-Urban land complex and Goble silt loam. The predominant soils are the Cascade silt loam and the Cascade Urban complex. Cascade soils are somewhat poorly drained soils formed from silty materials. A two- to four-foot thick fragipan exists at a depth of 20 to 30 inches. A fragipan is a compacted layer of soil that creates a hard, impervious layer difficult for water and roots to penetrate. In winter and spring, it creates a perched water table; in summer, it creates a nearly rock-hard layer. The wetness of this layer can reduce the effectiveness of septic tank absorption fields and increases the likelihood of erosion. In addition, the shallow depth to the fragipan makes installation of some drainage systems difficult.

The Cascade-Urban complex consists of Cascade soils mixed with soils disturbed by urban development. Urban development alters the soil through excavation, filling and grading, creating a patchwork of soil characteristics. Mostly undisturbed sites have the properties of Cascade silt loam. More disturbed sites vary in their permeability and erosion potential.

Goble silt loams are located primarily in UIAs # 0, 7 and 8, on 30 to 60 percent slopes which are some of the steeper parts of the site. This is a very deep and moderately well-drained soil formed from silt and ash. Goble soils also have a thin (up to 12 inches thick) fragipan at a depth of approximately 30 to 48 inches, making it slightly less limiting for plant growth and excavation. The soil above the fragipan is moderately permeable, and the water table in winter and spring is within four feet of the surface. The steep slopes and seasonal saturation of the soil combine to make the potential for erosion and slumps high where this soil exists.

All of the parcels within the site are located along the ridge and slopes of the Tualatin Mountains. Slopes on the east side of the ridge are generally steeper, contributing to increased slide potential. West-side slopes are also subject to slides. Shallow rooting depth, a product of the fragipan, increases tree

windfalls and slope instability. Where erosion or urban development exposes the fragipan, establishment of vegetation is difficult, compounding erosion problems.

Located on a forested ridge-top above the Willamette Valley, the plant community at this site is characteristic of the Western Hemlock vegetation zone (Franklin and Dymess 1988). The forest generally ranges in age from 50- to 120-year old second growth in a mid-seral stage of succession. With young shade-tolerant cedars well established in the understory, the older forest has entered the understory re-initiation stage (Oliver and Larson 1996).

The forest community is characterized by Douglas fir and bigleaf maple in the canopy layer, with mature western red cedar more common near Balch Creek and along Miller Road. Grand fir, red alder, bitter cherry and western hemlock are common overstory associates. Less common are Pacific dogwood and two invasive aliens, English holly and European hawthorn. In the understory, vine maple occurs in association with Indian plum, red elderberry, Oregon grape, western hazel, oceanspray, snowberry and cedar saplings. The ground layer is typically dominated by sword fern, though Pacific waterleaf and inside-out flower are occasional dominants. Several areas, most notably along Highway 26, are overrun by the exotic English ivy. Other common ground vegetation includes lady fern (on moist slopes and along streams), bracken fern, miner's lettuce, Hooker fairy-bell, false Solomon's seal, fringedcup, western trillium and stream violet.

Large forest tracts within the site provide high quality habitat for a diverse wildlife assemblage. Abundant quantities of large woody debris and a thick organic layer on the forest floor provide habitat and foraging grounds for birds, reptiles, amphibians and small mammals. In most cases, the understory is a thick, diverse assemblage of berry and nut-bearing native shrubs that wildlife depend upon for forage as well as cover, especially during winter months. Other valuable habitat features within these forests include snags, large boulders, ravines and seeps.

Many species of birds were encountered during field surveys of the site: those most frequently observed include downy woodpecker, northern flicker, winter wren, black-capped chickadee, common bushtit, rufous-sided towhee, Wilson's warbler, Swainson's thrush and song sparrow. Due to the abundance of songbirds, sharp-shinned hawks and other forest-dwelling birds of prey such as great-horned owls are likely to occur within the site as well. The area is also potential foraging ground for peregrine falcons, which rely on other birds for the bulk of their diet.

Amphibians and reptiles, including western red-backed salamander, Pacific chorus frog and garter snakes, inhabit the site. Tree cavities serve as roosting and nesting sites for bats, voles, squirrels, weasels, raccoons and cavity-nesting birds, including pileated woodpecker. The abundant cover is essential for black-tail deer, coyote and other large mammals.

Balch Creek runs through a portion of this site. Resident cutthroat trout inhabit the creek; historically, other species inhabited the drainage as well. Balch and other creeks within the site flow through steep forested ravines, providing wildlife with a protected travel corridor, refuge from high summer temperatures and a permanent source of water. Thick riparian forests protect the creeks and the integrity of their banks and influence the quality of stream habitat located downstream. Large quantities of silt are present in several of the streams, providing evidence of the consequences of vegetation removal associated with previous upstream development. Other sources of silt include upstream landslides and bank failures related to new construction.

Special Status Species found in the resource site include:

- Pacific western big-eared bat
- Long-eared myotis
- Fringed myotis
- Long-legged myotis
- Pileated woodpecker
- Little willow flycatcher
- American peregrine falcon
- Olive-sided flycatcher
- Coast cutthroat trout
- Northern red-legged frog

Table B: Quality of Natural Resource Functions in Resource Site FP25				
Resource Site (acres) = 28.849627				
	High	Medium	Low	Total
Riparian Corridors*				
acres	0.8	2.3	7.9	11.1
percent total inventory site area	2.8%	8.0%	27.5%	38.3%
Wildlife Habitat*				
acres	8.4	2.2	0.0	10.6
percent total inventory site area	29.2%	7.7%	0.0%	36.8%
Special Habitat Areas**				
acres				7.6
percent total inventory site area				26.3%
Combined Total⁺				
acres	8.5	2.6	0.0	11.1
percent total inventory site area	29.5%	9.0%	0.1%	38.6%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. ⁺Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP25 the following significant features and functions are present:

Significant Natural Resource Features: open stream, forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish and wildlife species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the R10 base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP25, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk

species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

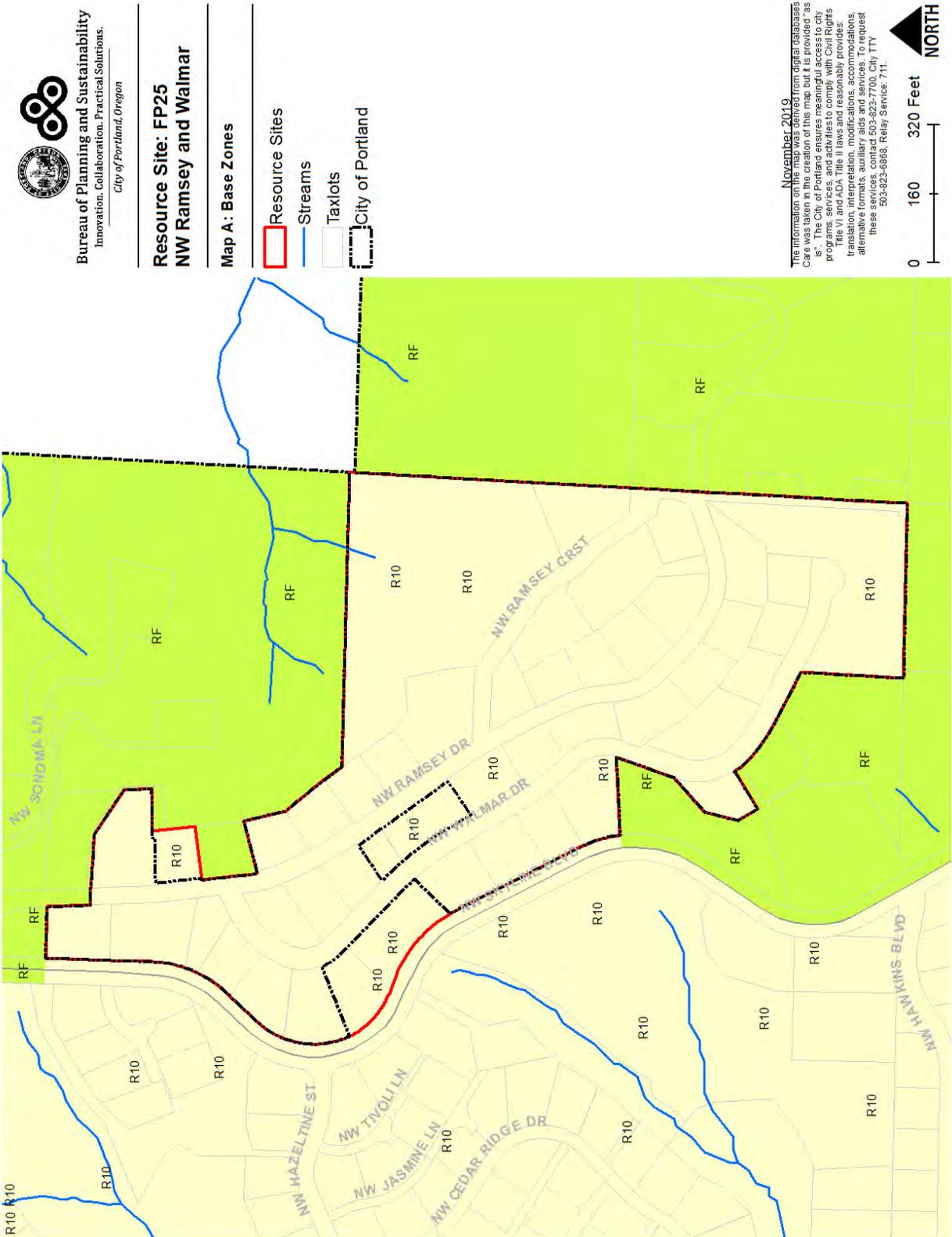
ESEE Decisions

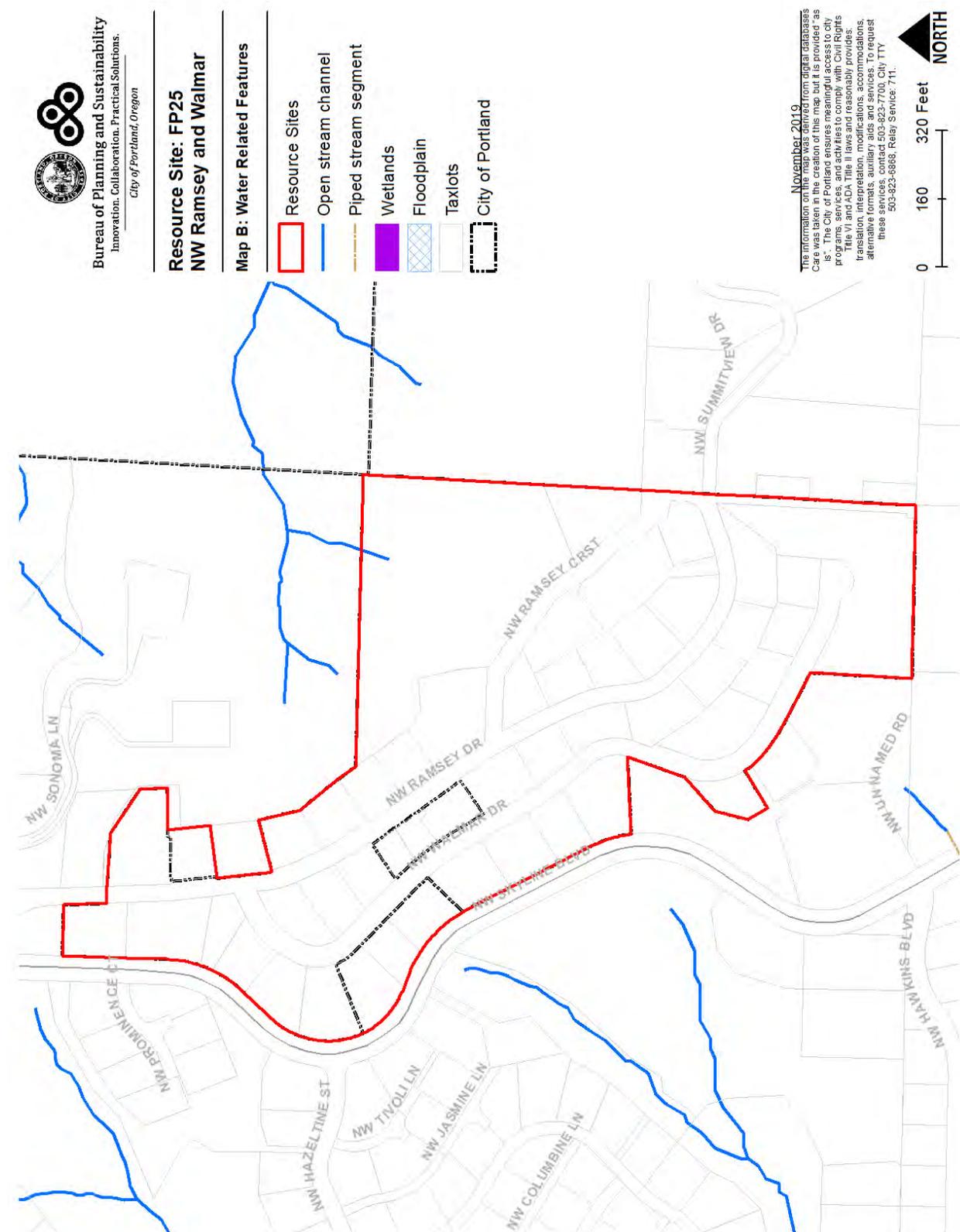
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP25 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation contiguous that are to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 100 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Limit* conflicting uses within the 2-acre patch of forest vegetation that is contiguous to the open stream located in Resource Site SK6.
6. *Allow* conflicting uses within all other areas containing significant natural resources.

The forest canopy that extends across NW Skyline Blvd is providing riparian corridor and wildlife habitat functions for the stream located in Resource Site SK6.

ESEE Decision	Acres
Strictly Limit	0.8
Limit	8.9
Allow	19.2





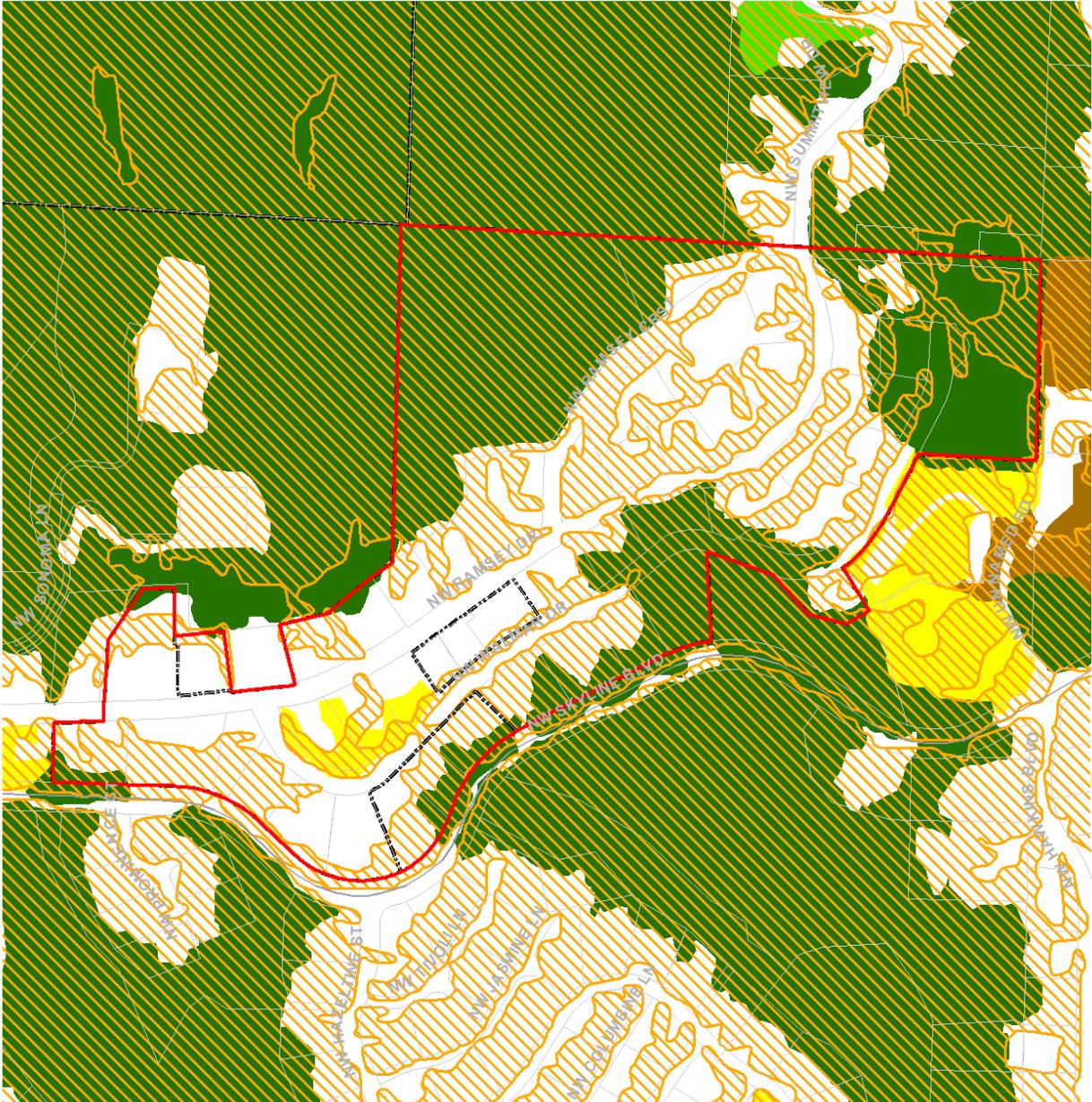
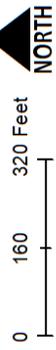


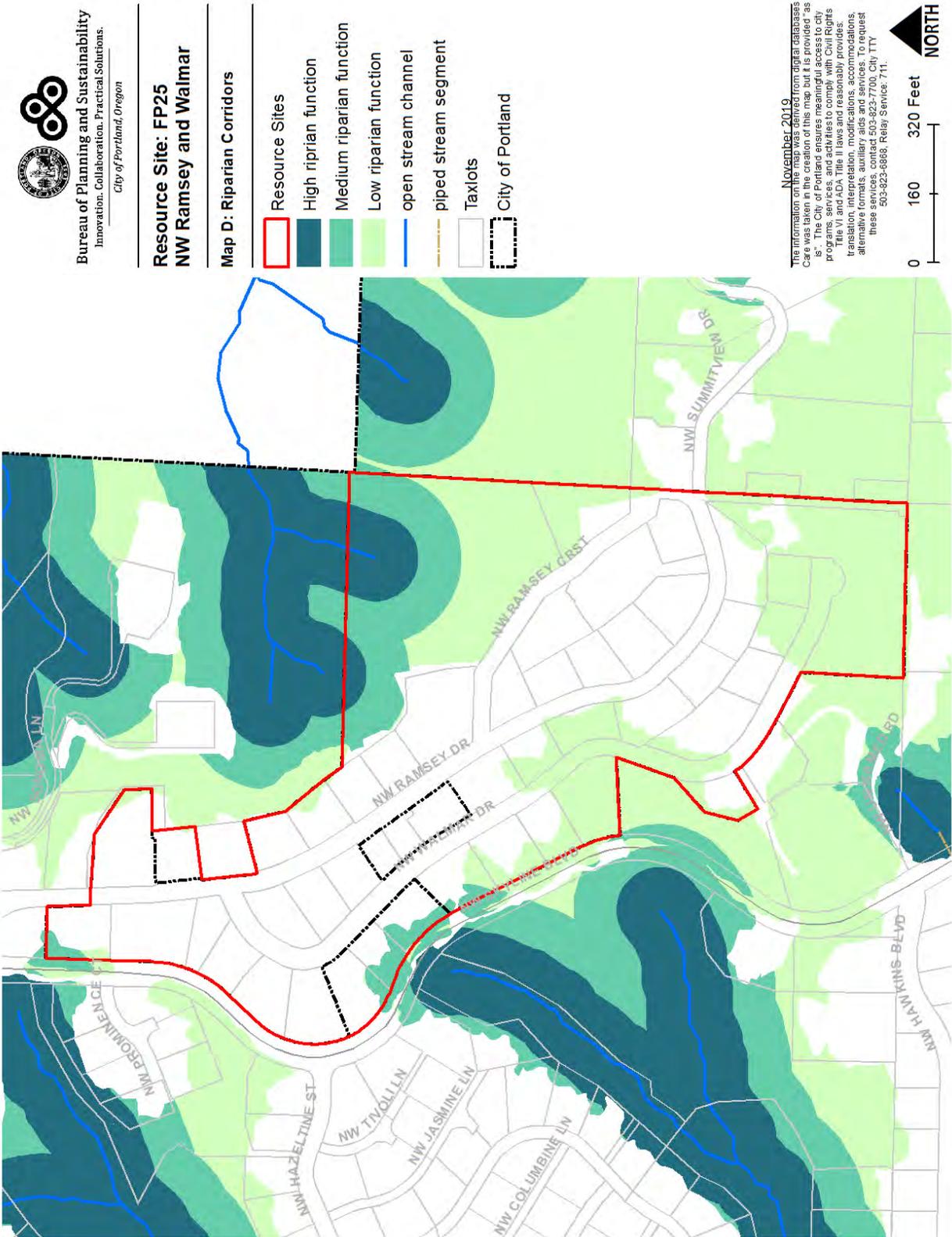
**Resource Site: FP25
NW Ramsey and Walmar**

Map C: Land Features

- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

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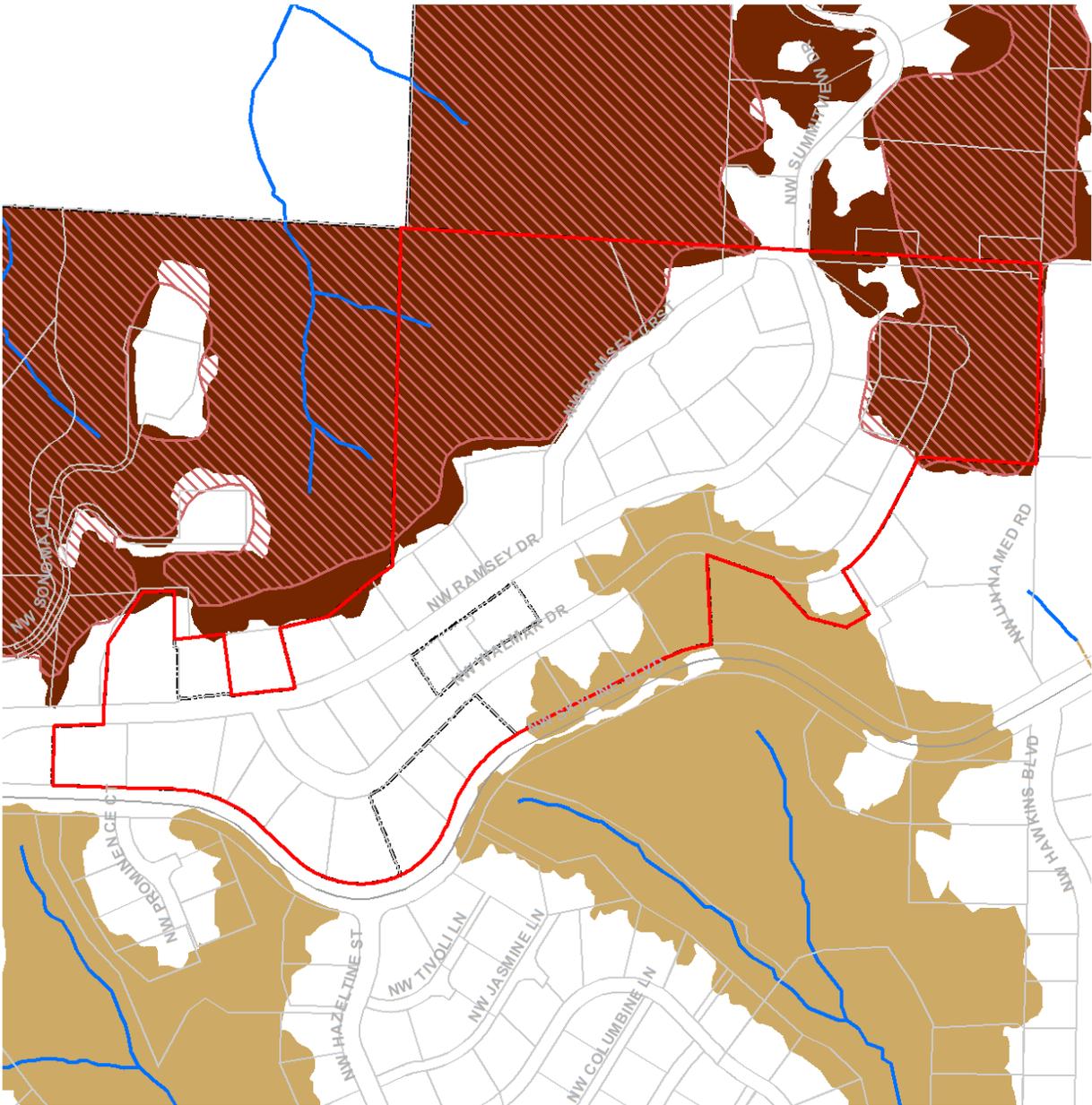


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**Resource Site: FP25
NW Ramsey and Walmar**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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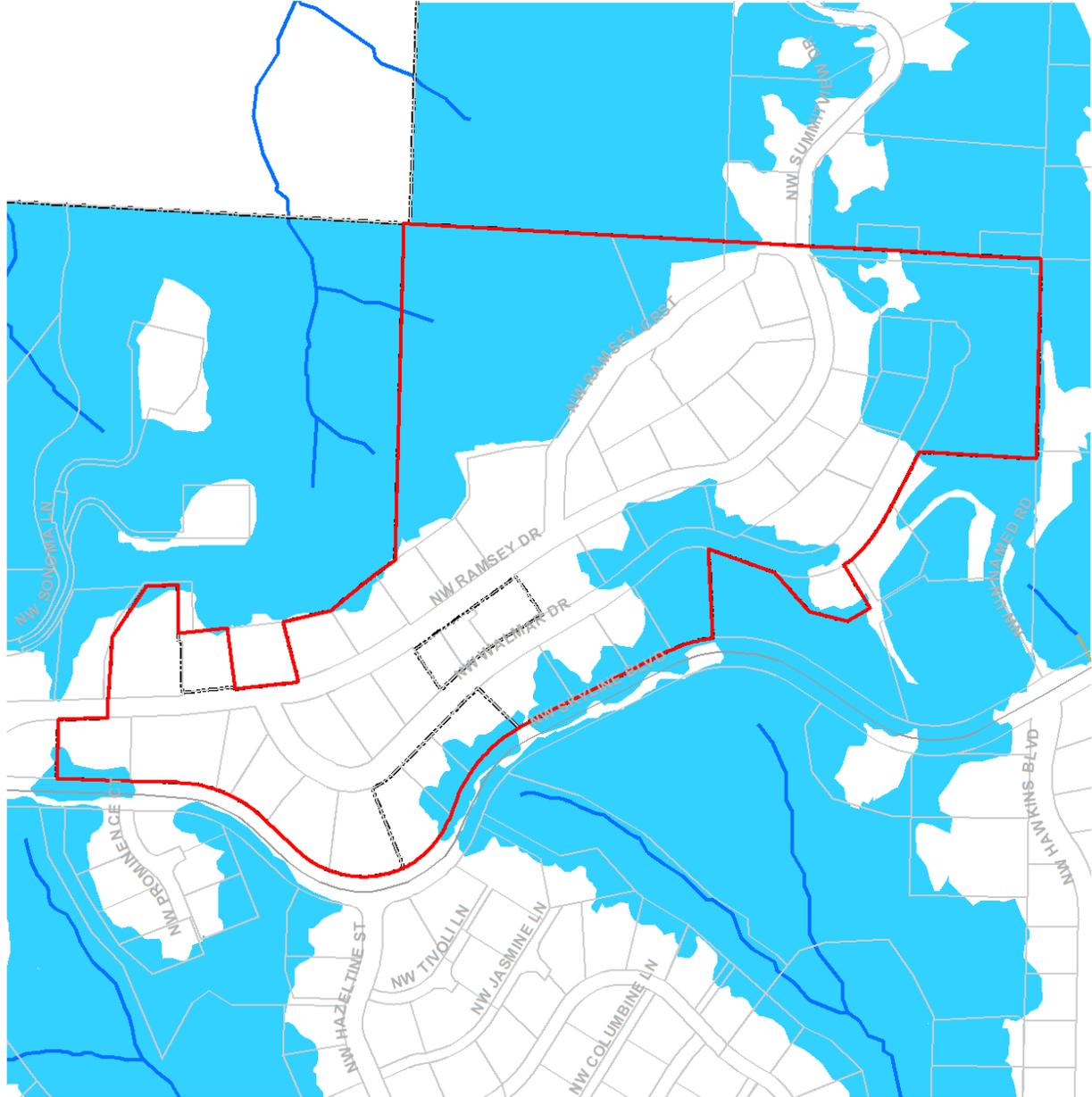


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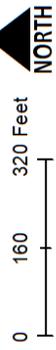
**Resource Site: FP25
NW Ramsey and Walmar**

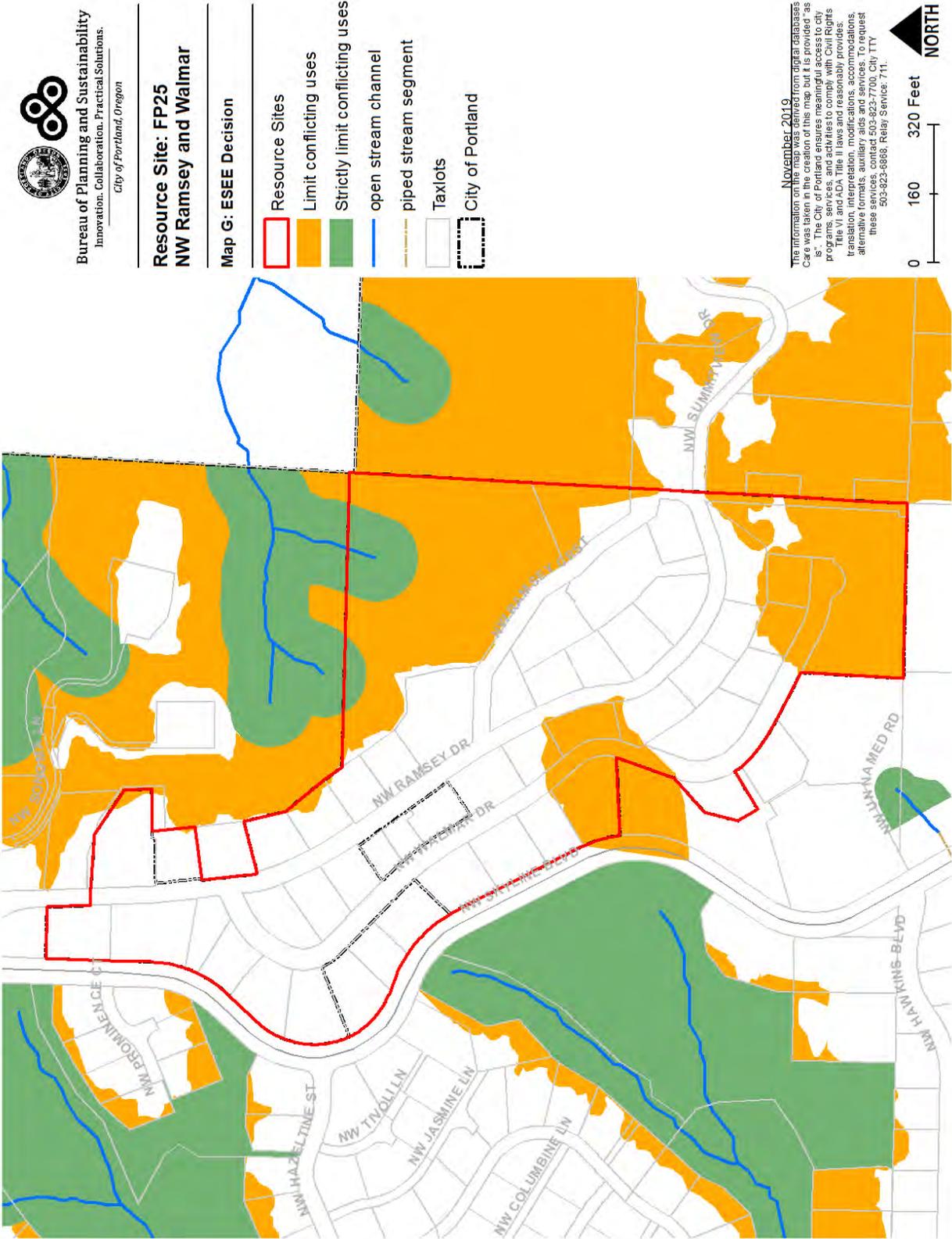
**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

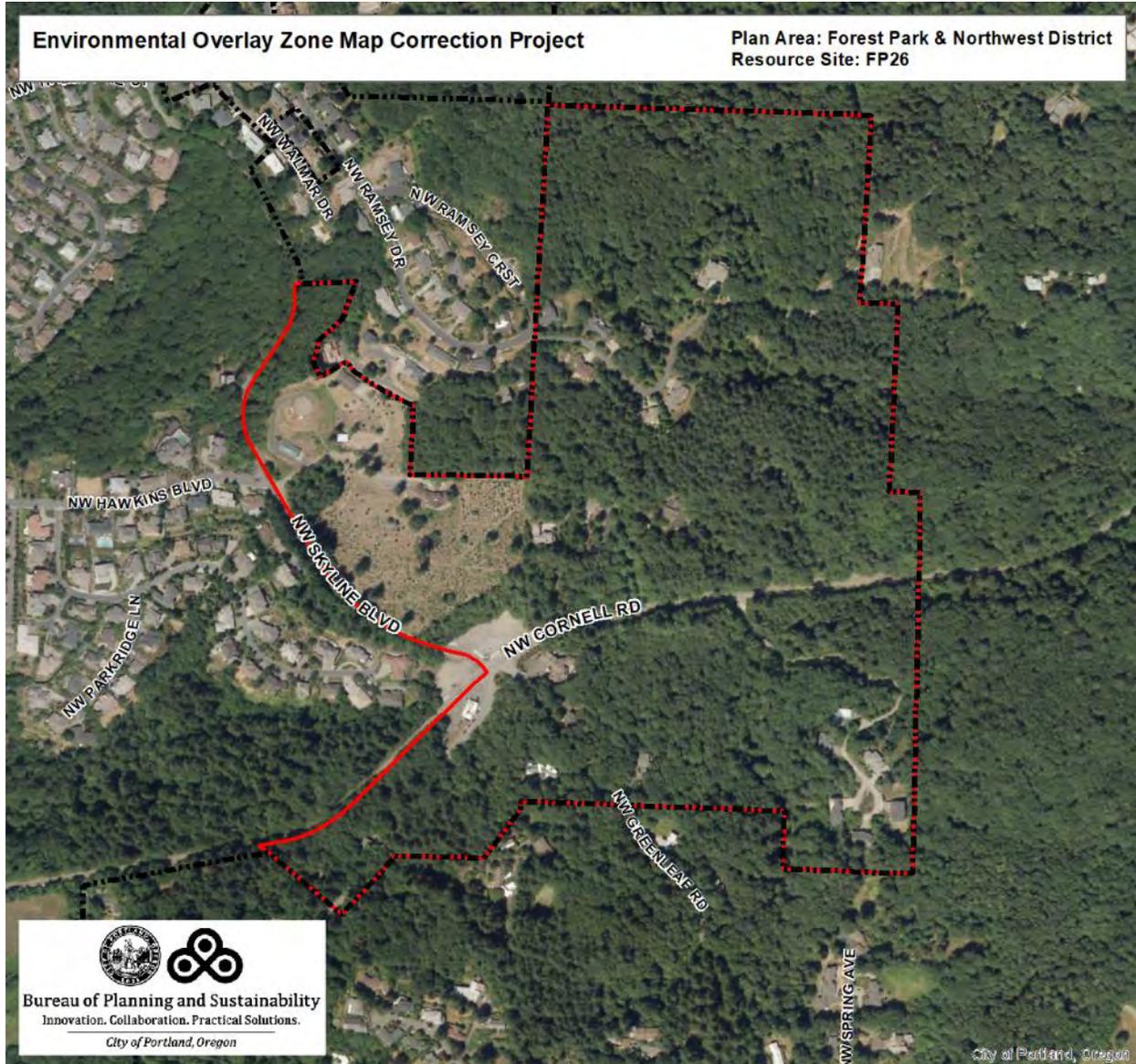


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Resource Site No.: FP26 Resource Site Name: Cornell Headwaters
Previous Plan: Balch Creek Watershed Protection Plan Previous Resources Site No.: 83



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP26
		Study Area
Stream (Miles)		0.1
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		82.6
	Forest (acres)	72.9
	Woodland (acres)	0.7
	Shrubland (acres)	6.6
	Herbaceous (acres)	2.5
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		83.8
Impervious Surface (acres)		7.8
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The stream is surrounded by forest on steep slopes, this provides cover and habitat for wildlife. There are forest ravines in the site as well. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

The site has second growth mixed conifer and hardwood cover with some remnant first growth Douglas fir trees. A meadow is also established on an unpermitted fill. The existing fill harms the creek in two ways, by continuing to erode and by covering a spring which flows through the fill. The combination of fill and spring introduces discolored water into Balch Creek. Down stream water quality tests, however, have not discovered any significant levels of pollutants. The harm appears to be limited to increased turbidity and the silting of trout spawning beds.

Table B: Quality of Natural Resource Functions in Resource Site FP26				
Resource Site (acres) = 93.675923				
	High	Medium	Low	Total
Riparian Corridors*				
acres	21.7	20.8	39.0	81.6
percent total inventory site area	23.2%	22.2%	41.6%	87.1%
Wildlife Habitat*				
acres	70.4	1.9	0.0	72.2
percent total inventory site area	75.1%	2.0%	0.0%	77.1%
Special Habitat Areas**				
acres				67.7
percent total inventory site area				72.3%
Combined Total⁺				
acres	75.7	3.0	7.2	85.9
percent total inventory site area	80.8%	3.2%	7.7%	91.7%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.				
** Special Habitat Areas rank high for wildlife habitat.				
+Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP26 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF and R10 base zones. Commercial uses are allowed in the CM1 base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP26, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk

species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

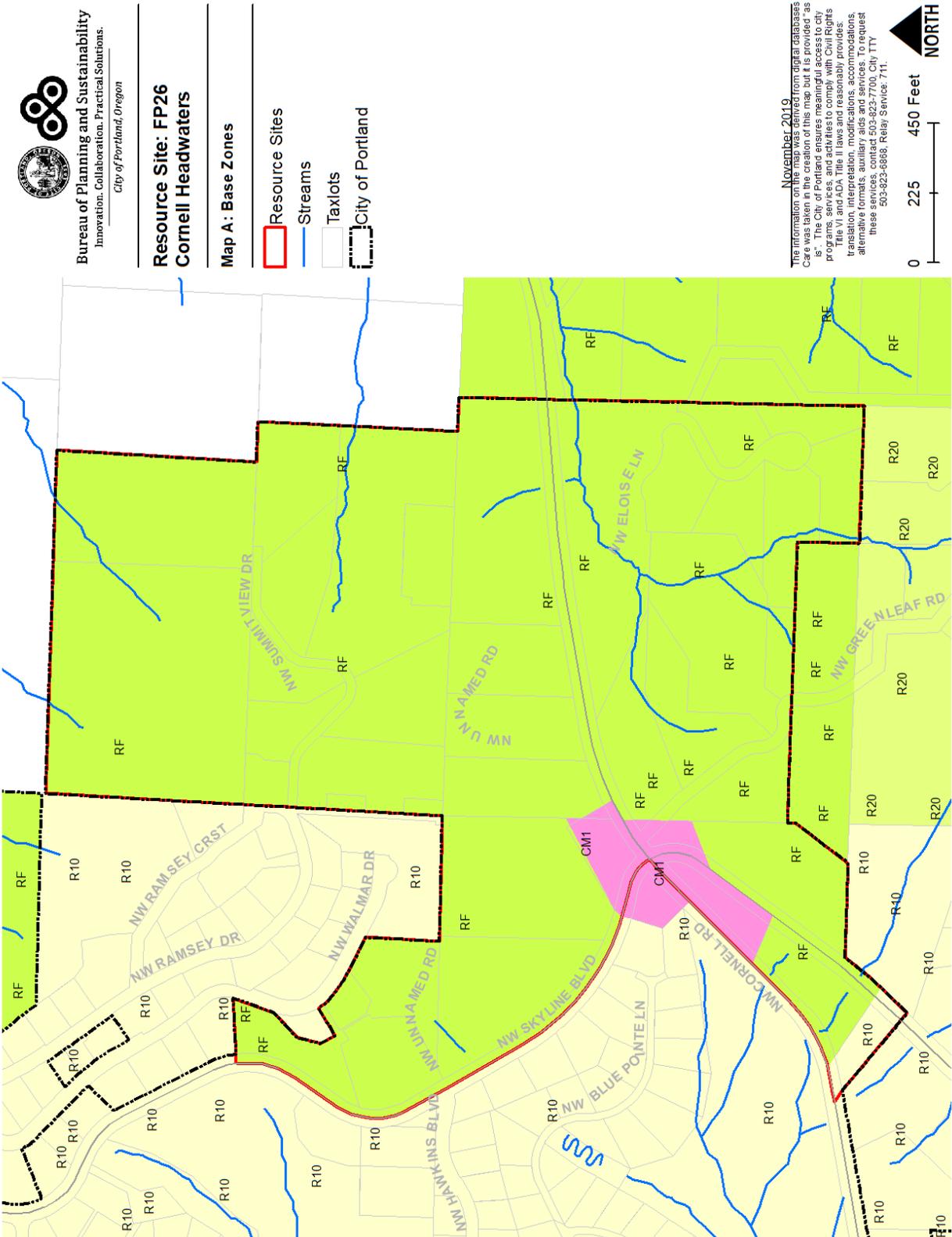
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

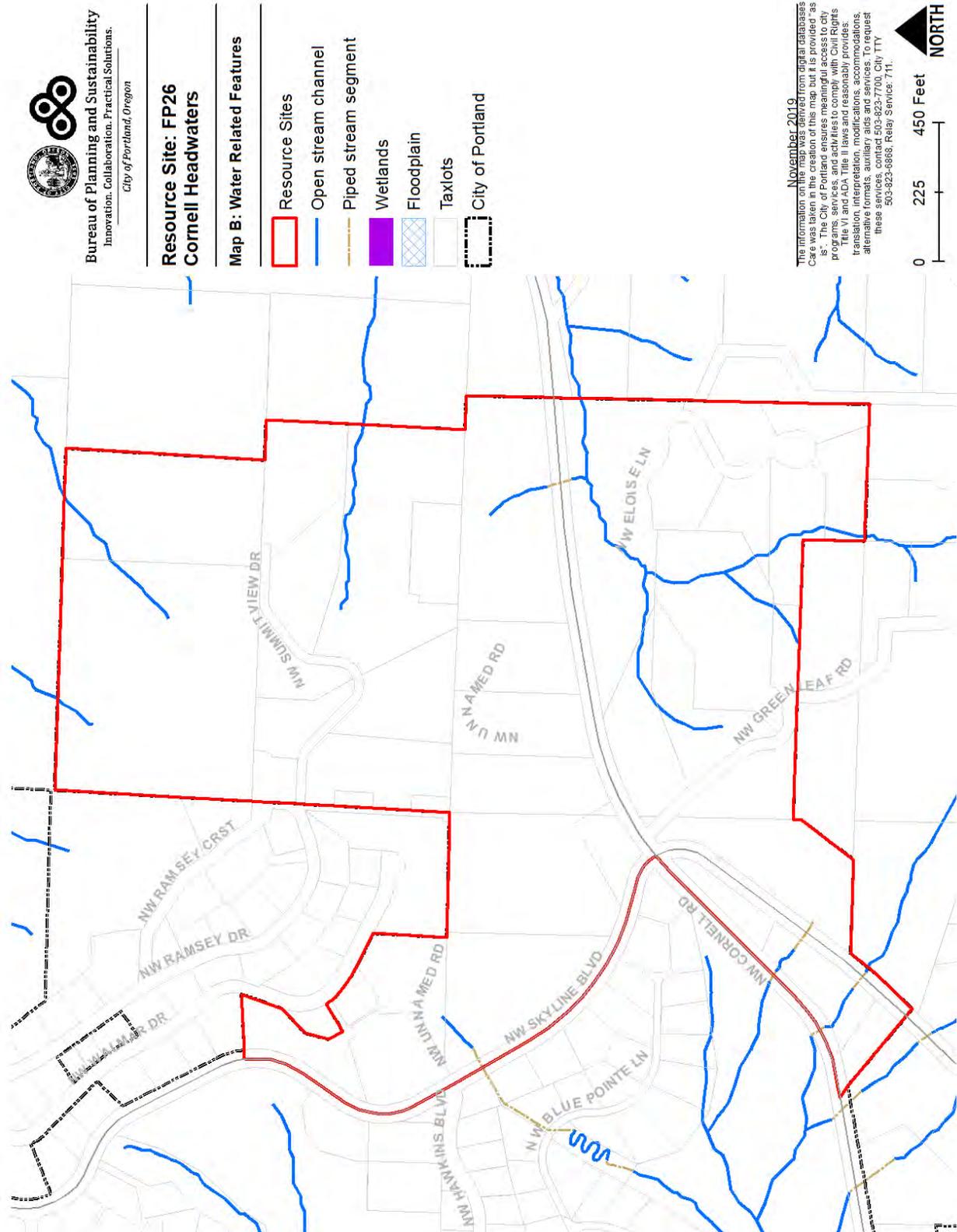
ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP26 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation contiguous to but more than 100 feet from top-of-bank.
4. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	16.5
Limit	41.2
Allow	35.9







**Resource Site: FP26
Cornell Headwaters**

Map C: Land Features

- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

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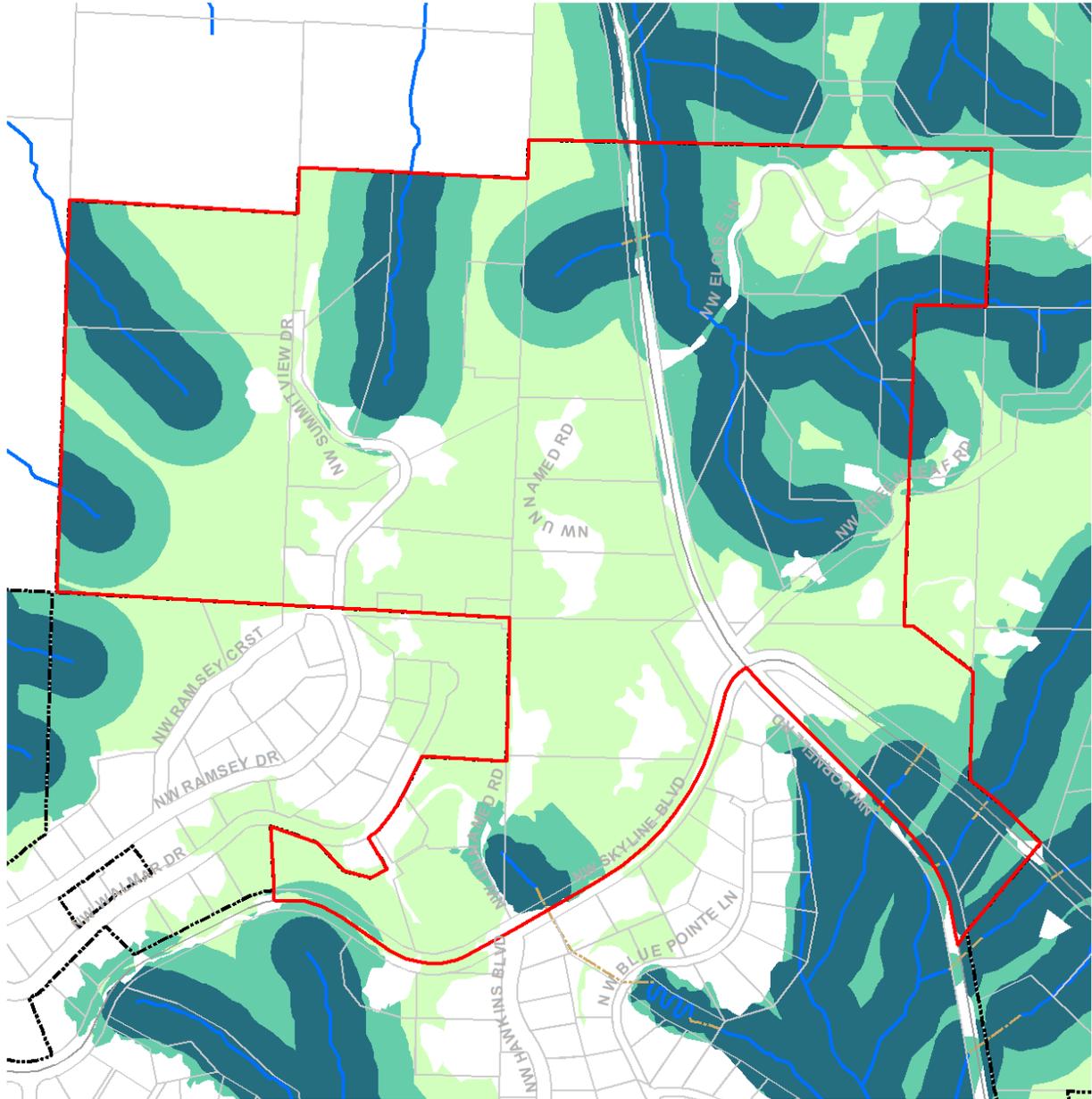


**Resource Site: FP26
Cornell Headwaters**

Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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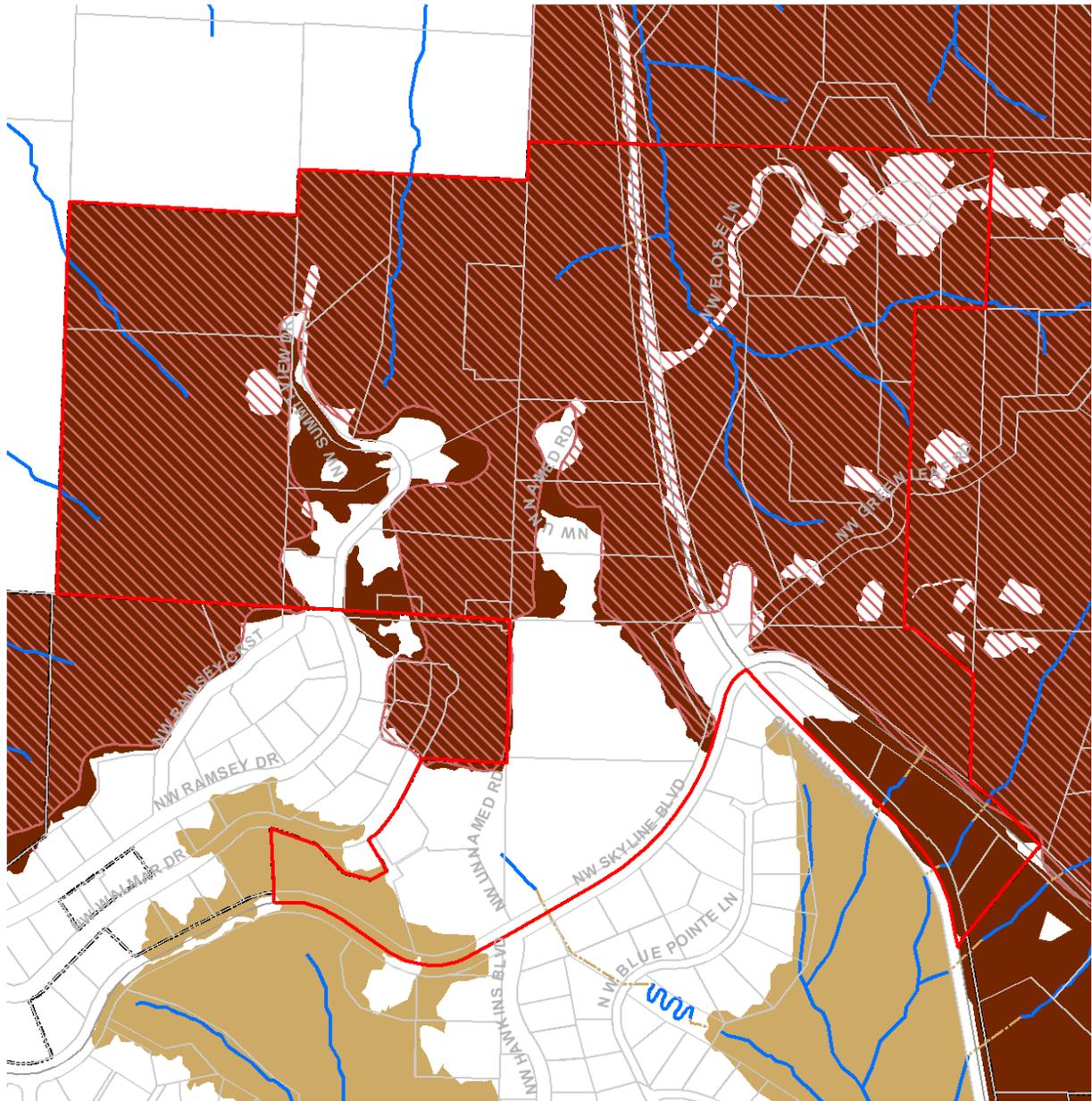


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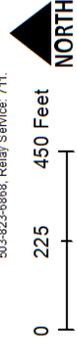
**Resource Site: FP26
Cornell Headwaters**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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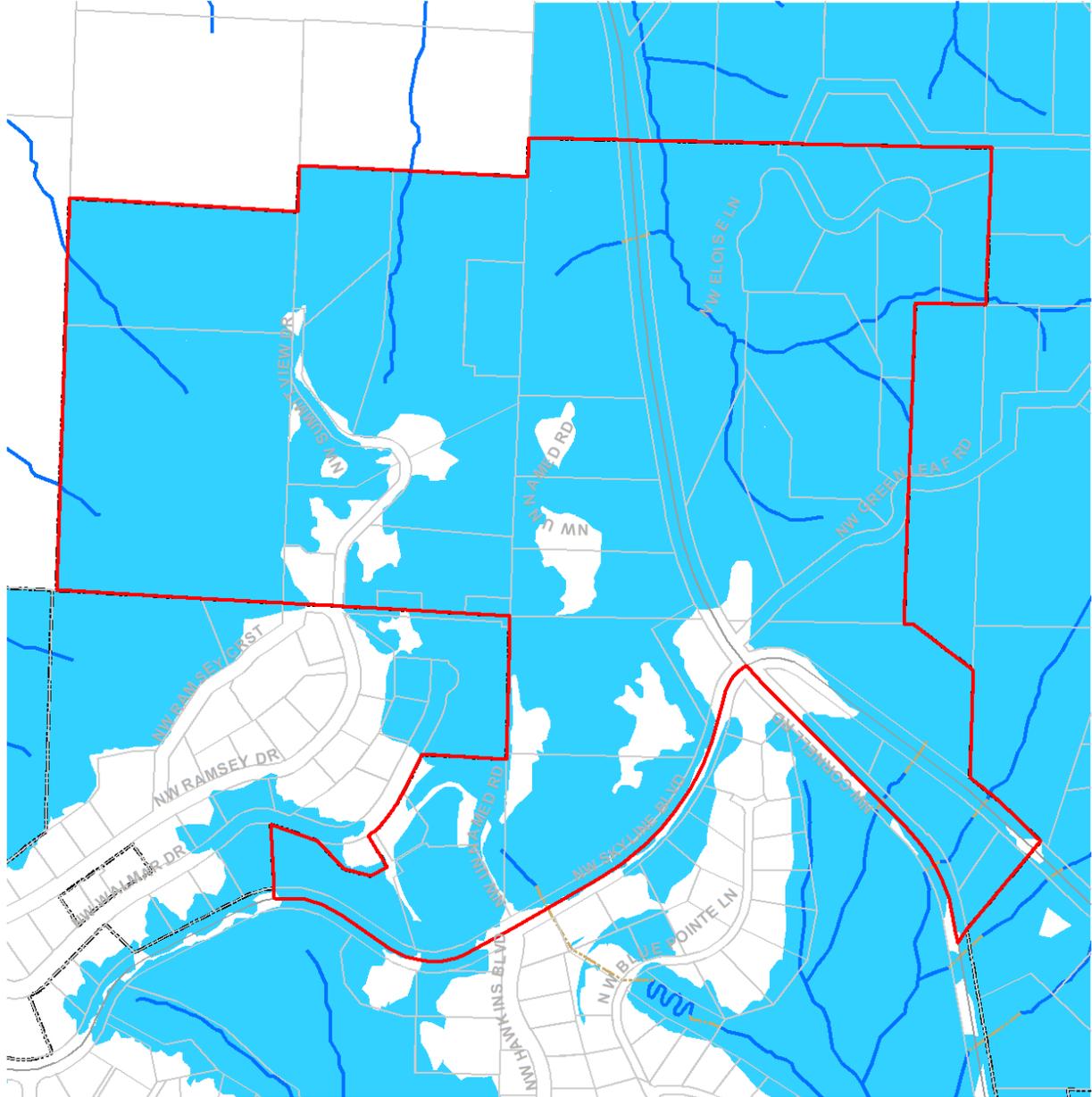


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**Resource Site: FP26
Cornell Headwaters**

**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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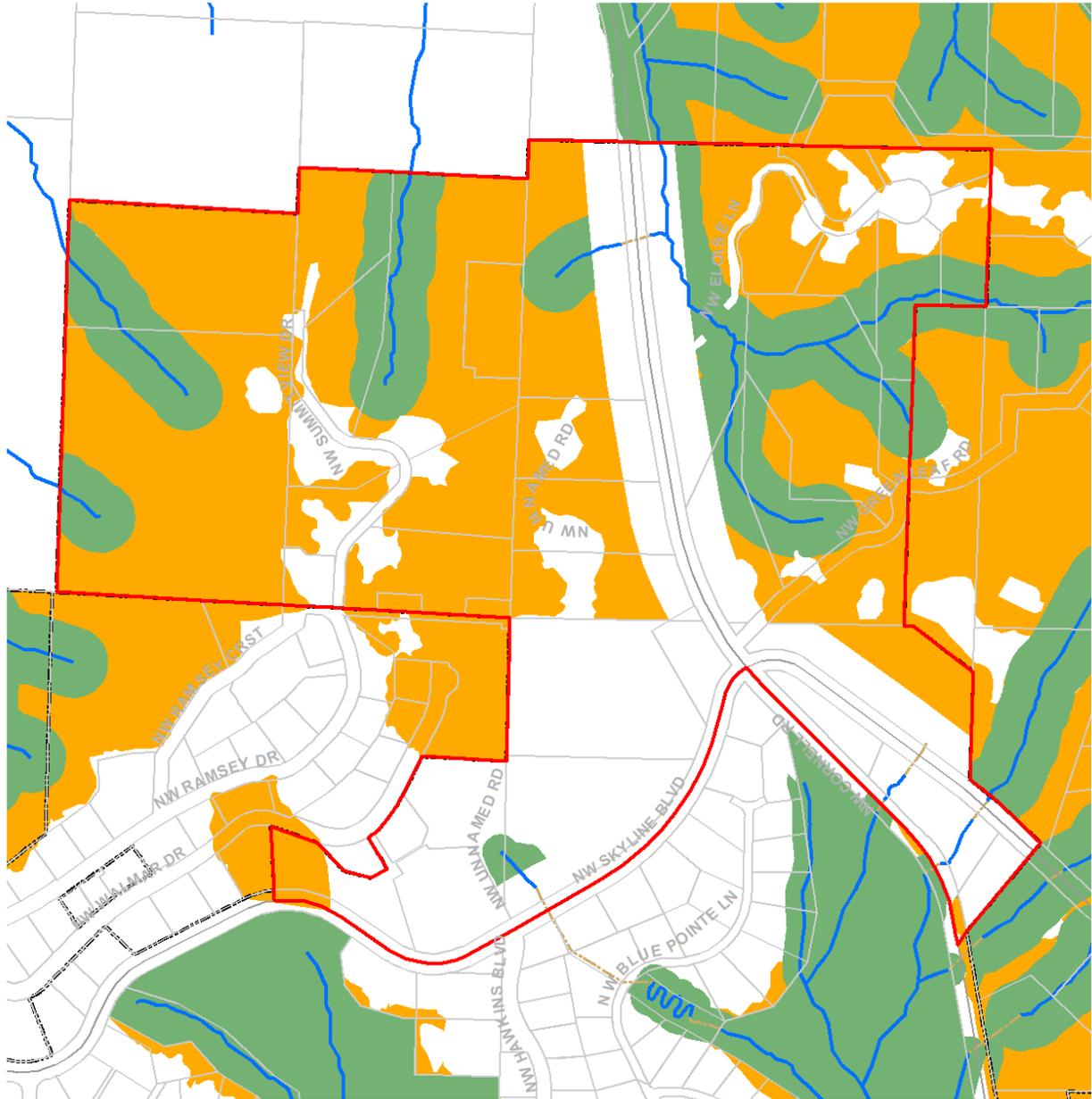


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**Resource Site: FP26
Cornell Headwaters**

Map G: ESEE Decision

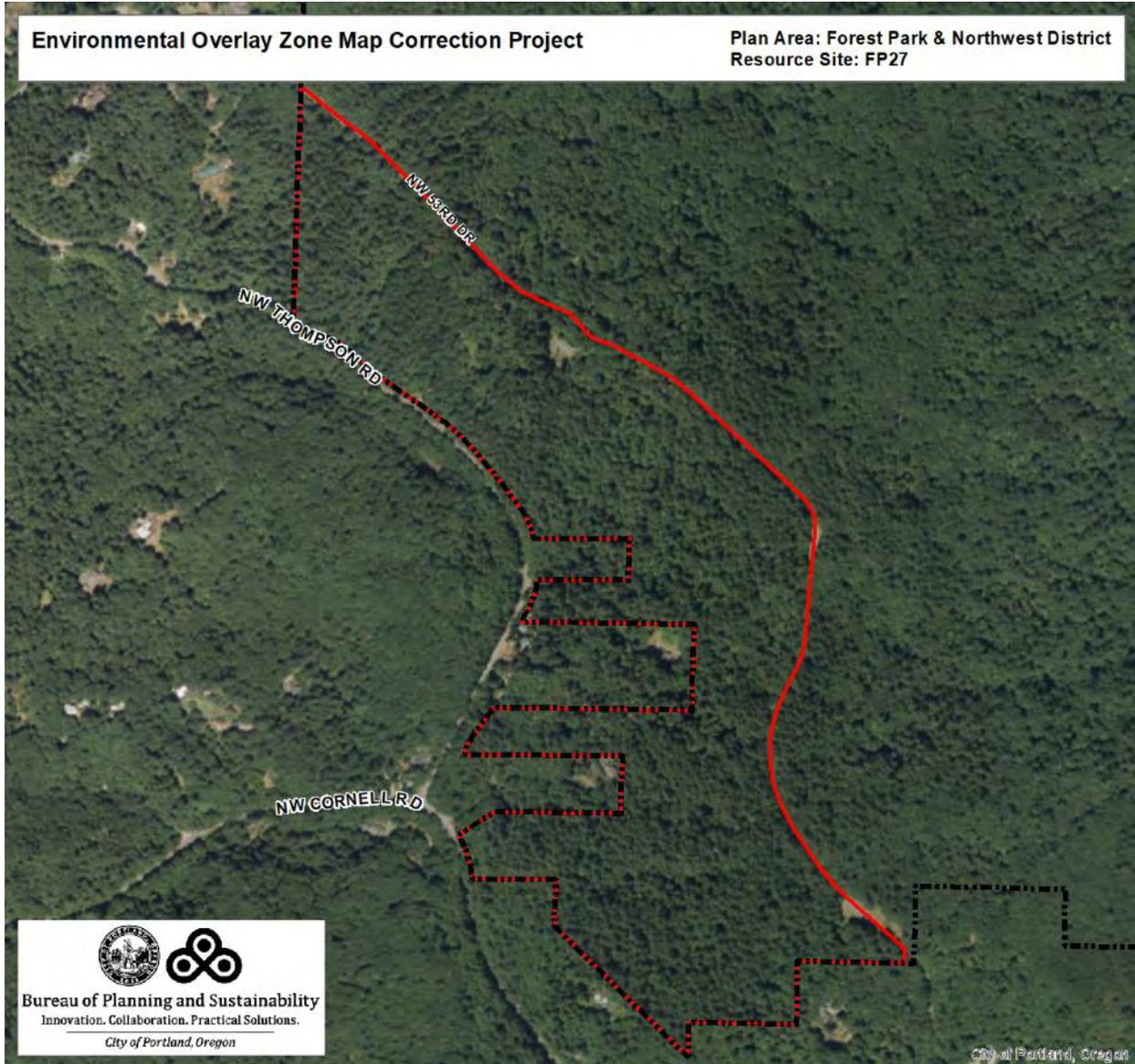
- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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Resource Site No.: FP27 **Resource Site Name:** Thompson Headwaters
Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 85



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP27
		Study Area
Stream (Miles)		0.0
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		101.3
	Forest (acres)	100.9
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.4
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		93.4
Impervious Surface (acres)		4.4
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The headwaters of Balch Creek in the site provides fishery habitat values. The proximity to several hundred acres of adjoining forest land improves fish habitat.

The stream is surrounding by forest on steep slopes, this provides cover and habitat for wildlife. Although the forest is second growth, enough first growth fir remains to give the forest canopy good vertical structure. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP27				
Resource Site (acres) = 101.674917				
	High	Medium	Low	Total
Riparian Corridors*				
acres	29.9	33.5	37.9	101.3
percent total inventory site area	29.4%	32.9%	37.3%	99.6%
Wildlife Habitat*				
acres	100.9	0.0	0.0	100.9
percent total inventory site area	99.2%	0.0%	0.0%	99.2%
Special Habitat Areas**				
acres				101.7
percent total inventory site area				100.0%
Combined Total⁺				
acres	101.7	0.0	0.0	101.7
percent total inventory site area	100.0%	0.0%	0.0%	100.0%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP27 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP27, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP27 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank
2. *Strictly limit* conflicting uses areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
4. *Allow* conflicting uses within all other areas containing significant natural resources.

Table C: ESEE Decision for Resource Site FP27	
ESEE Decision	Acres
Strictly Limit	79.6
Limit	0.0
Allow	22.0

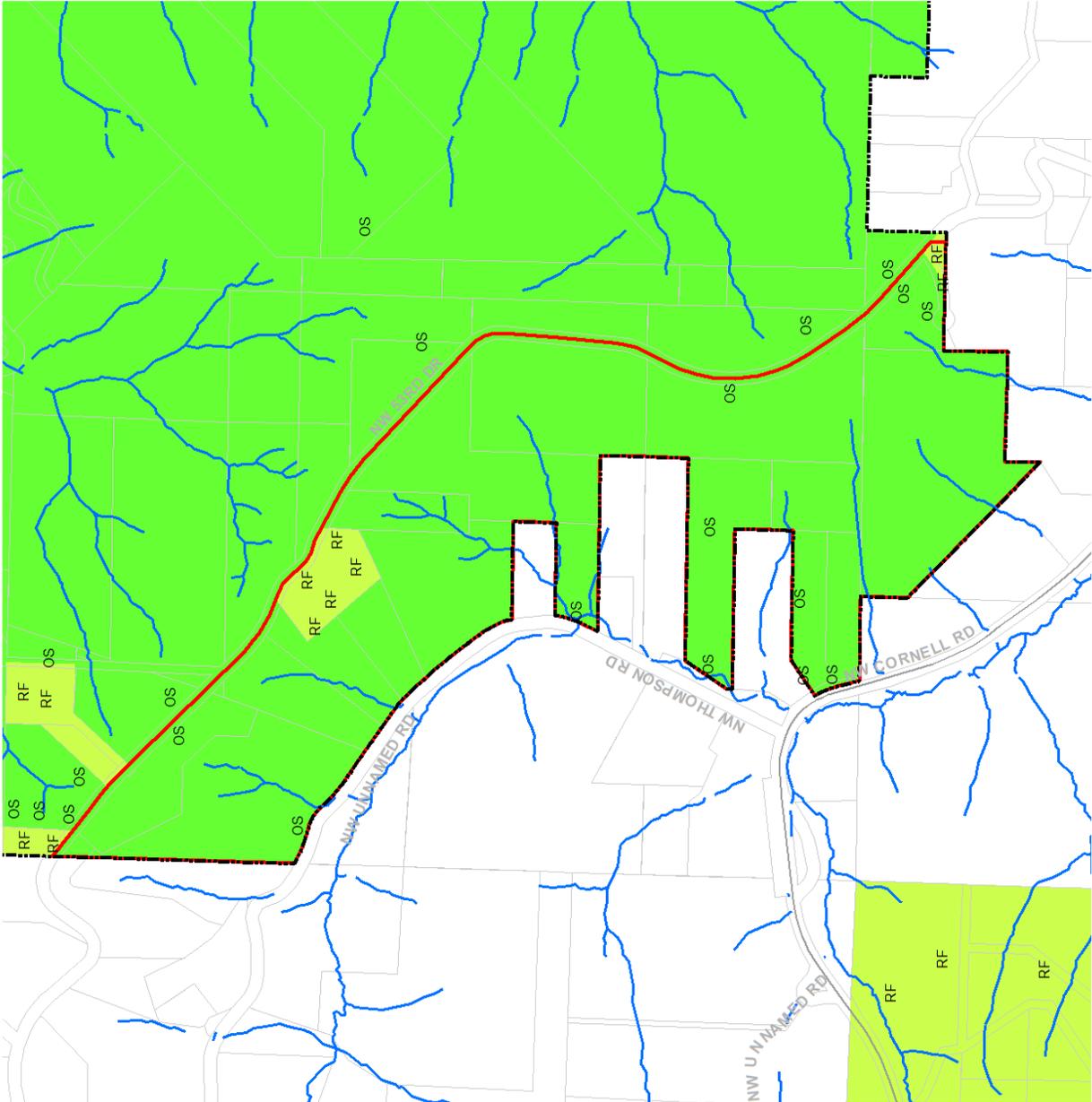


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**Resource Site: FP27
Thompson Headwaters**

Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland



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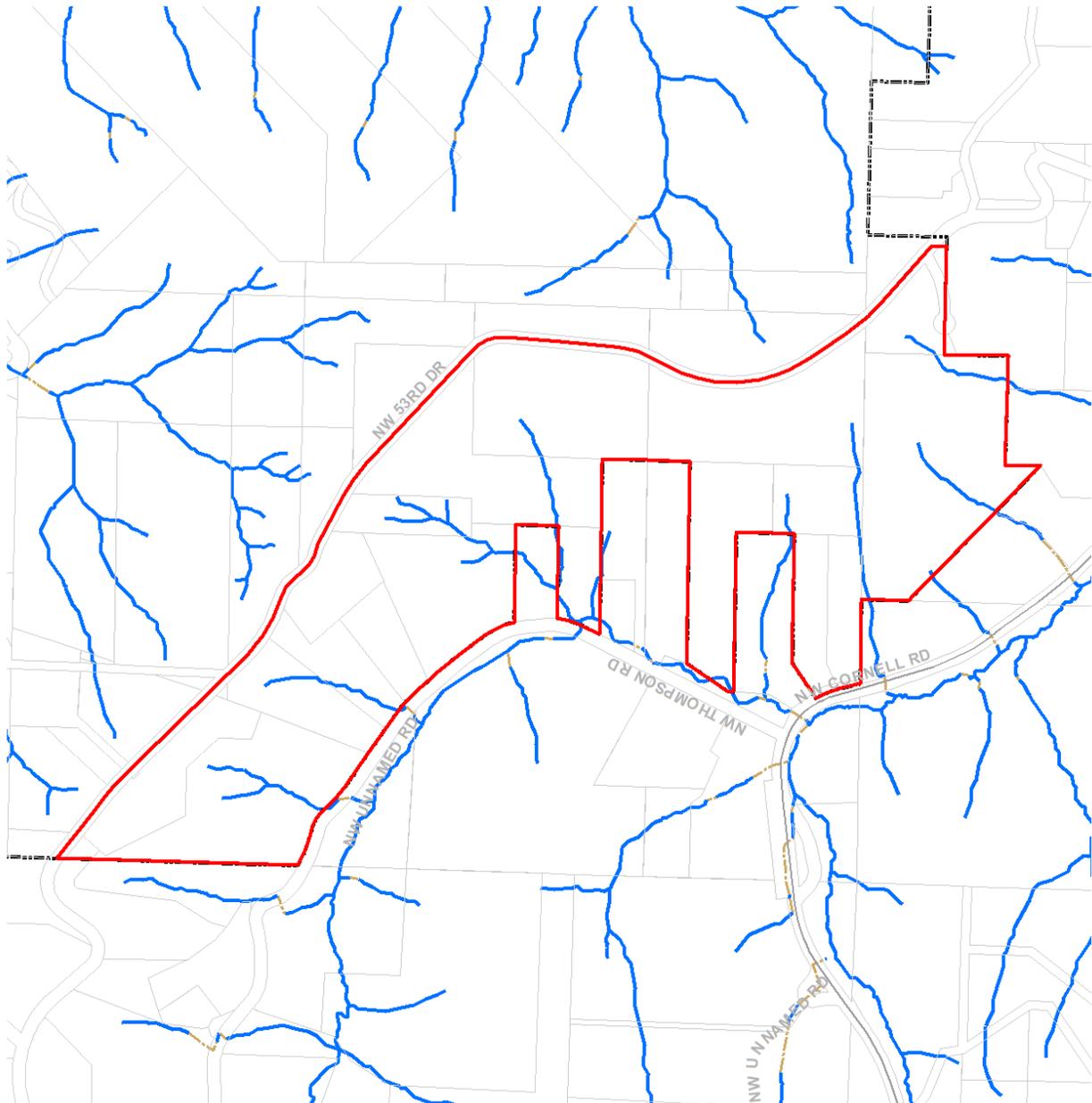


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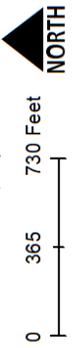
**Resource Site: FP27
Thompson Headwaters**

Map B: Water Related Features

-  Resource Sites
-  Open stream channel
-  Piped stream segment
-  Wetlands
-  Floodplain
-  Taxlots
-  City of Portland



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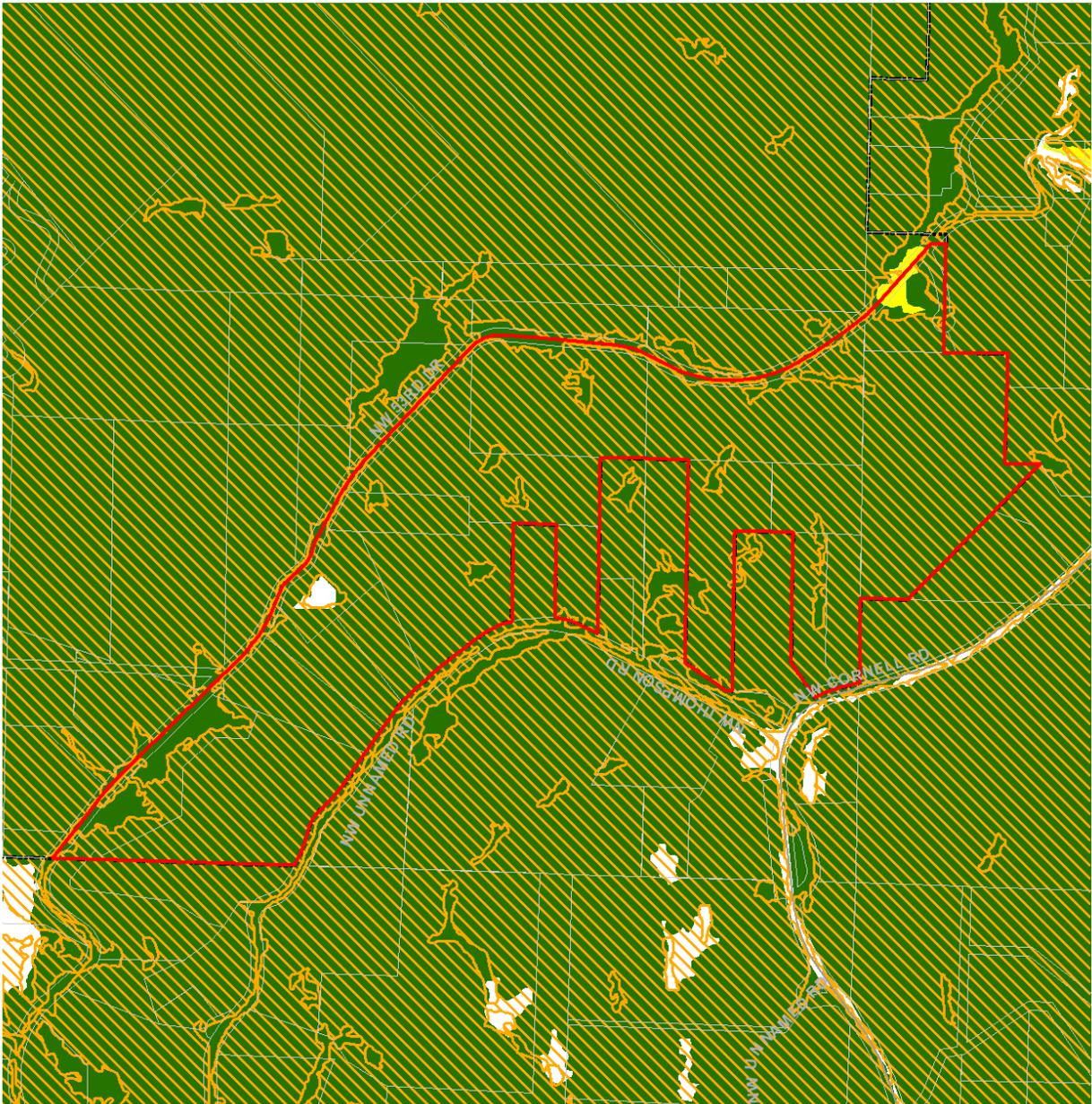


**Resource Site: FP27
Thompson Headwaters**

Map C: Land Features

- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

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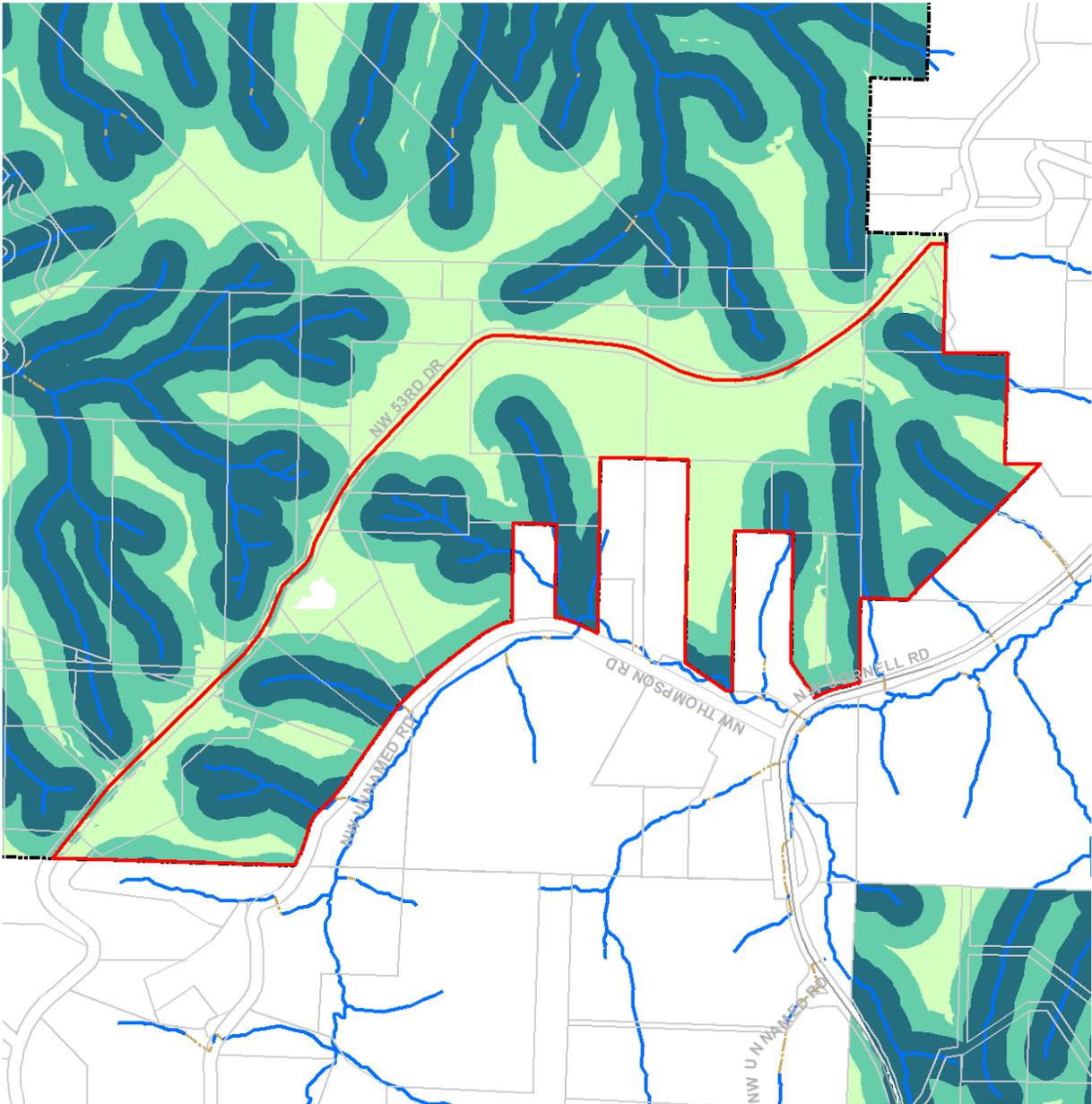
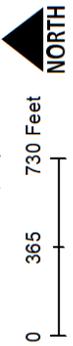


**Resource Site: FP27
Thompson Headwaters**

Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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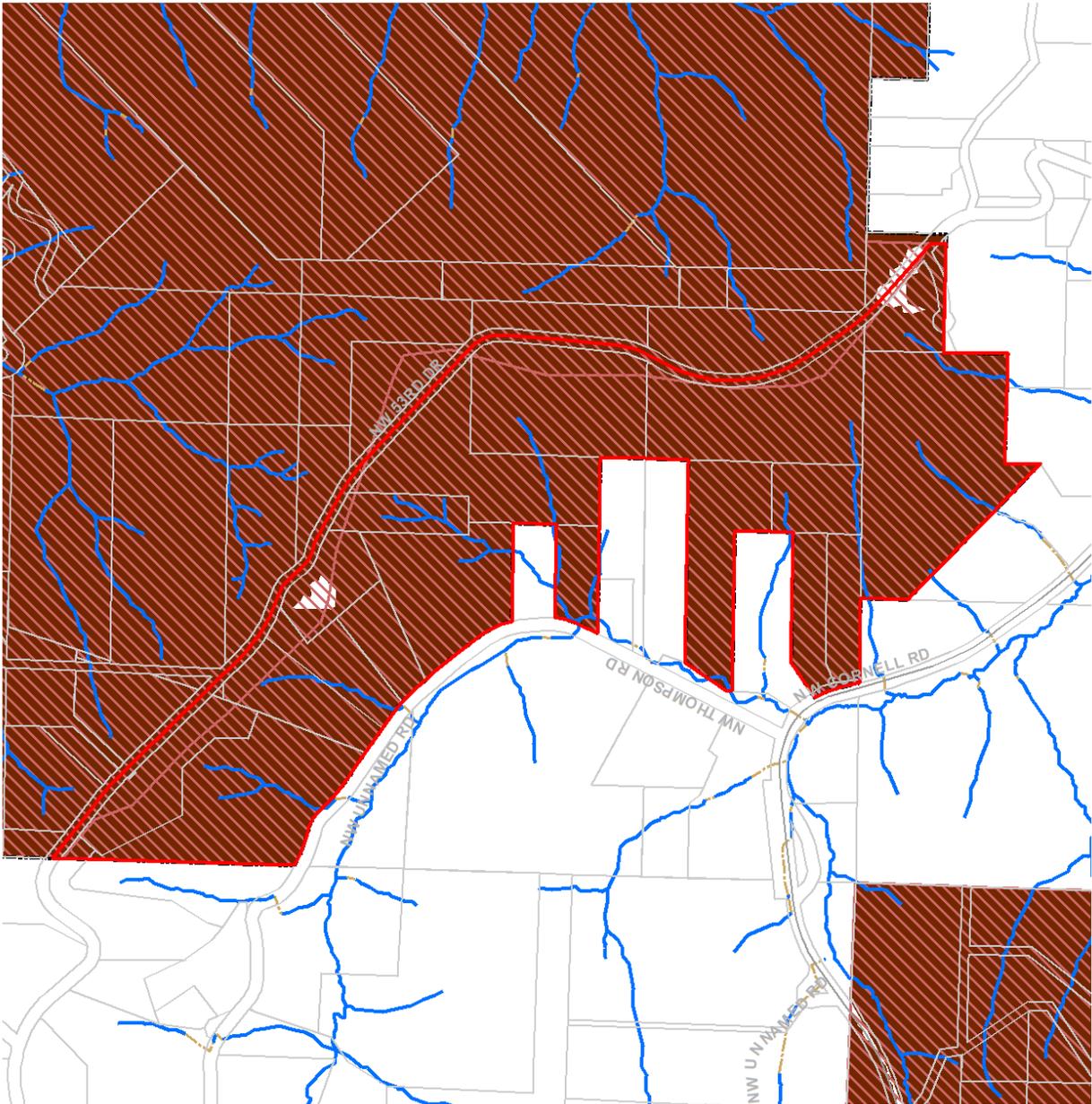


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**Resource Site: FP27
Thompson Headwaters**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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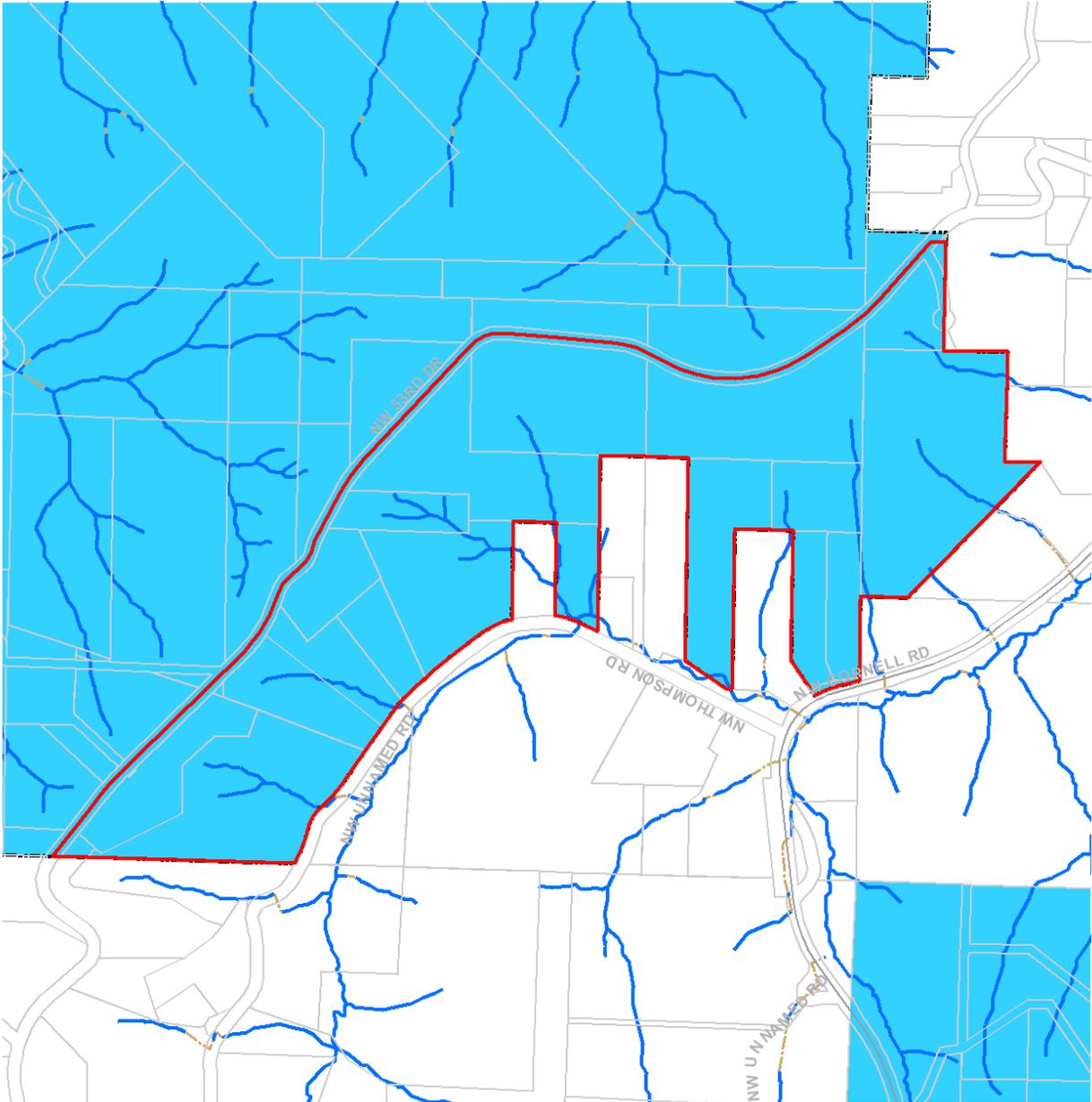


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**Resource Site: FP27
Thompson Headwaters**

**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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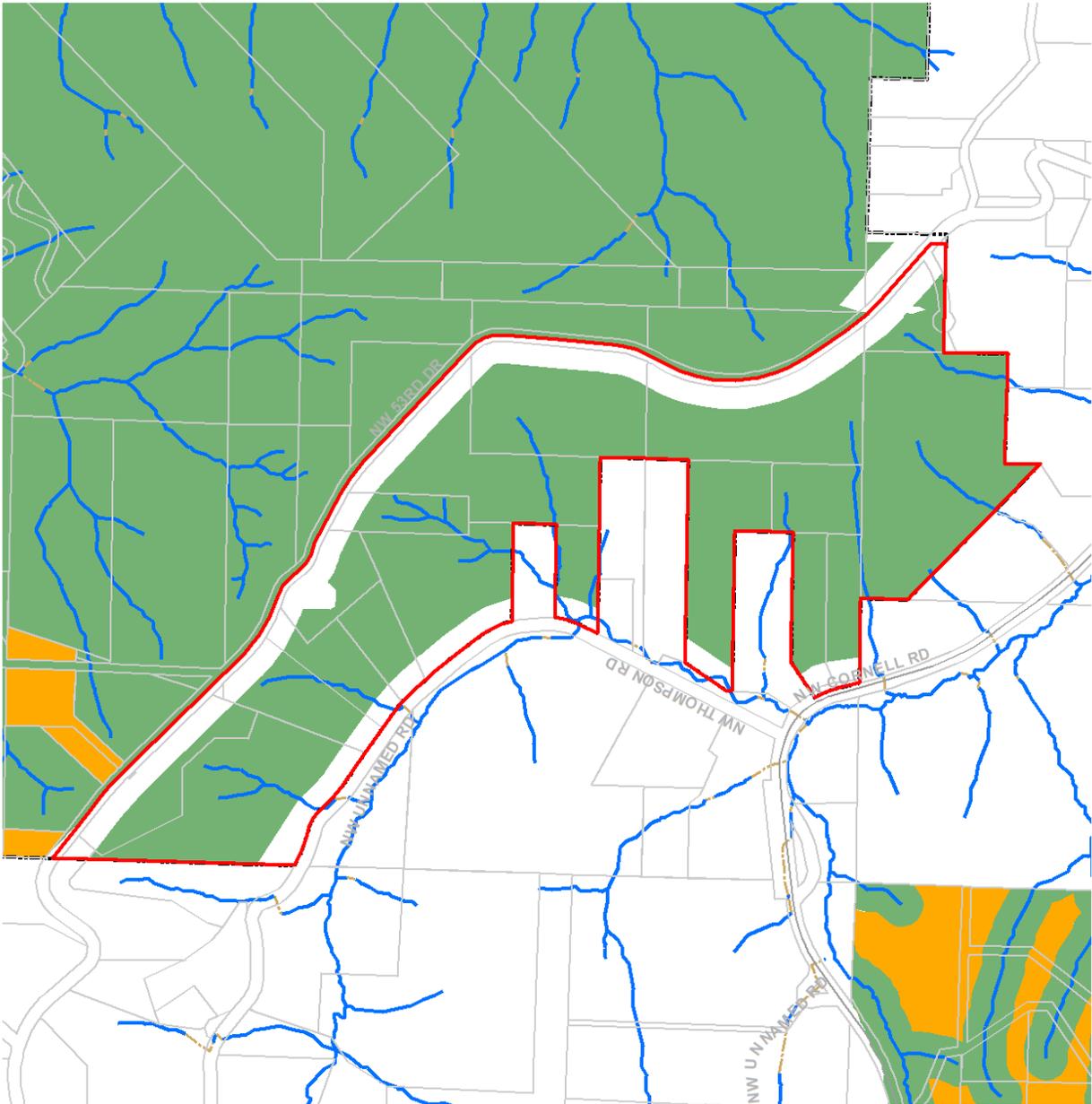


**Resource Site: FP27
Thompson Headwaters**

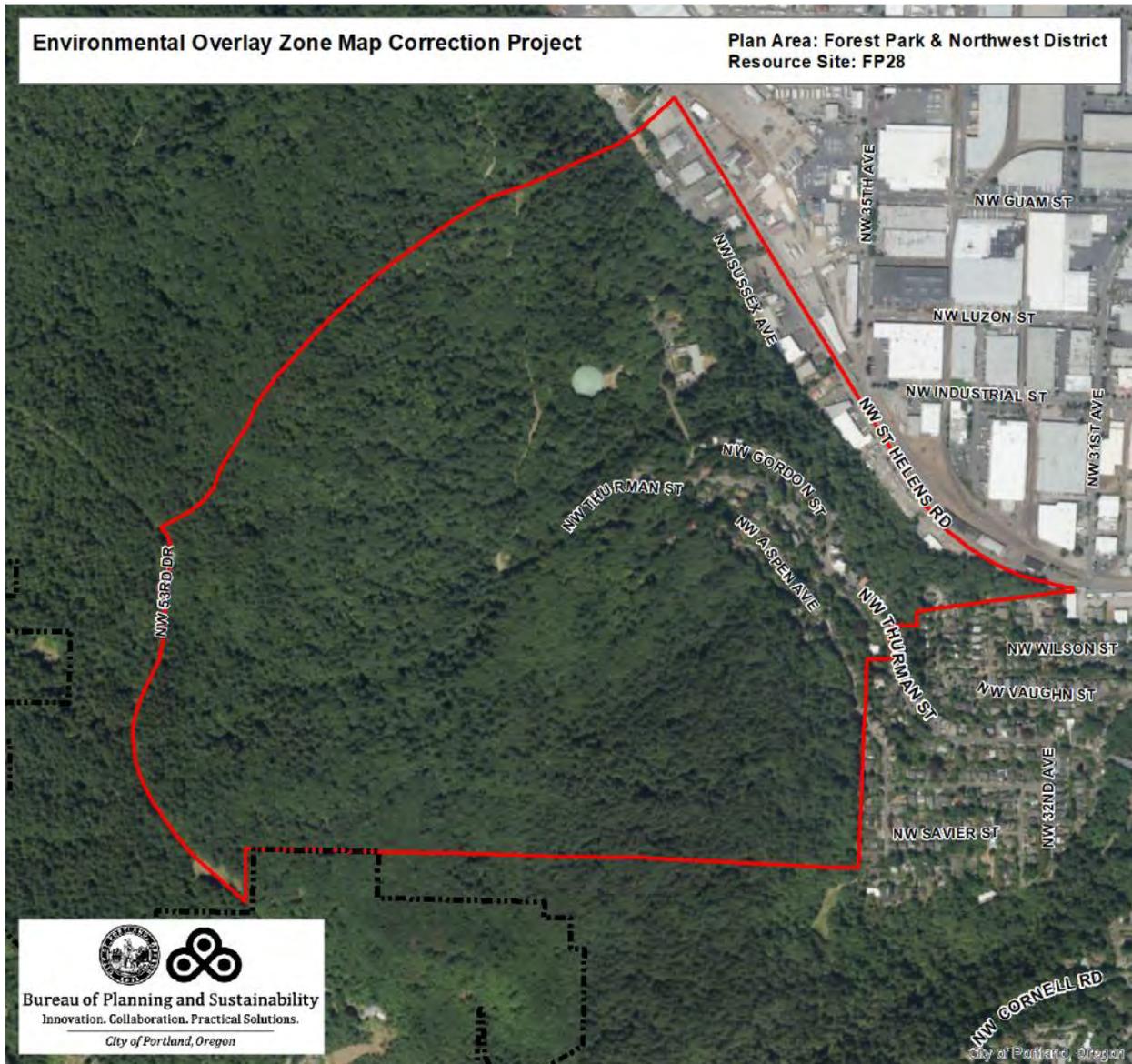
Map G: ESEE Decision

- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP28 Resource Site Name: Holman Park/Thurman St.
Previous Plan: Northwest Hills Natural Areas Protection Plan Previous Resource Site No.: 86



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP28
		Study Area
Stream (Miles)		2.9
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		284.9
Forest (acres)		282.6
Woodland (acres)		1.9
Shrubland (acres)		0.0
Herbaceous (acres)		0.4
Flood Area*		0.0
Vegetated (acres)		0.0
Non-vegetated (acres)		0.0
Steep Slopes (acres)**		288.3
Impervious Surface (acres)		36.2
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The vegetation community is a mosaic of three principle types of second growth western hemlock forest: mid-aged conifer, conifer topping hardwood and mature hardwood. The forest is structurally diverse and offers variety within each canopy layer. Forest cover provides open space, scenic and recreational resources; serves as habitat for resident and migratory wildlife; and helps to balance the local water regimen. Snags, downed logs and woody debris found at the site are critical structural and functional components of the watershed ecosystem. The rare phantom orchid (*Eburophyton austinae*) is found within the forest. Ivy and clematis have spread widely throughout the eastern portion of the site and threaten the health of the local plant community.

Food and cover habitat are of progressively higher quality to the north and to the west of the site. The principle drainage (and water source for local wildlife) passes from south to north through the site. Bird species observed at the site include pileated woodpecker, sharp-shinned hawk, great blue heron and a variety of songbirds. Mammals observed at the site include black-tailed deer, coyote and deer mouse. Red fox was identified a few hundred yards west of the site. Reptiles sited in the area include the northwestern garter snake. This site provides an important link between the Balch Creek ecosystem and the genetic reservoirs to the north. Residential and industrial development to the east limit migration opportunities for wildlife.

An abandoned sluice traverses this site. The intended purpose of the sluice was to carry soil to fill Guilds Lake.

Table B: Quality of Natural Resource Functions in Resource Site FP28				
Resource Site (acres) = 316.386272				
	High	Medium	Low	Total
Riparian Corridors*				
acres	119.4	92.9	73.3	285.6
percent total inventory site area	37.7%	29.4%	23.2%	90.3%
Wildlife Habitat*				
acres	280.1	0.0	0.0	280.1
percent total inventory site area	88.5%	0.0%	0.0%	88.5%
Special Habitat Areas**				
acres				287.3
percent total inventory site area				90.8%
Combined Total⁺				
acres	292.1	0.6	1.2	293.8
percent total inventory site area	92.3%	0.2%	0.4%	92.9%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP28 the following significant features and functions are present:

Significant Natural Resource Features: open stream; wetland; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status plant species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the R10, R5 and R2 base zones. Industrial uses are allowed in the IH and IG1 base zone. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP28, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

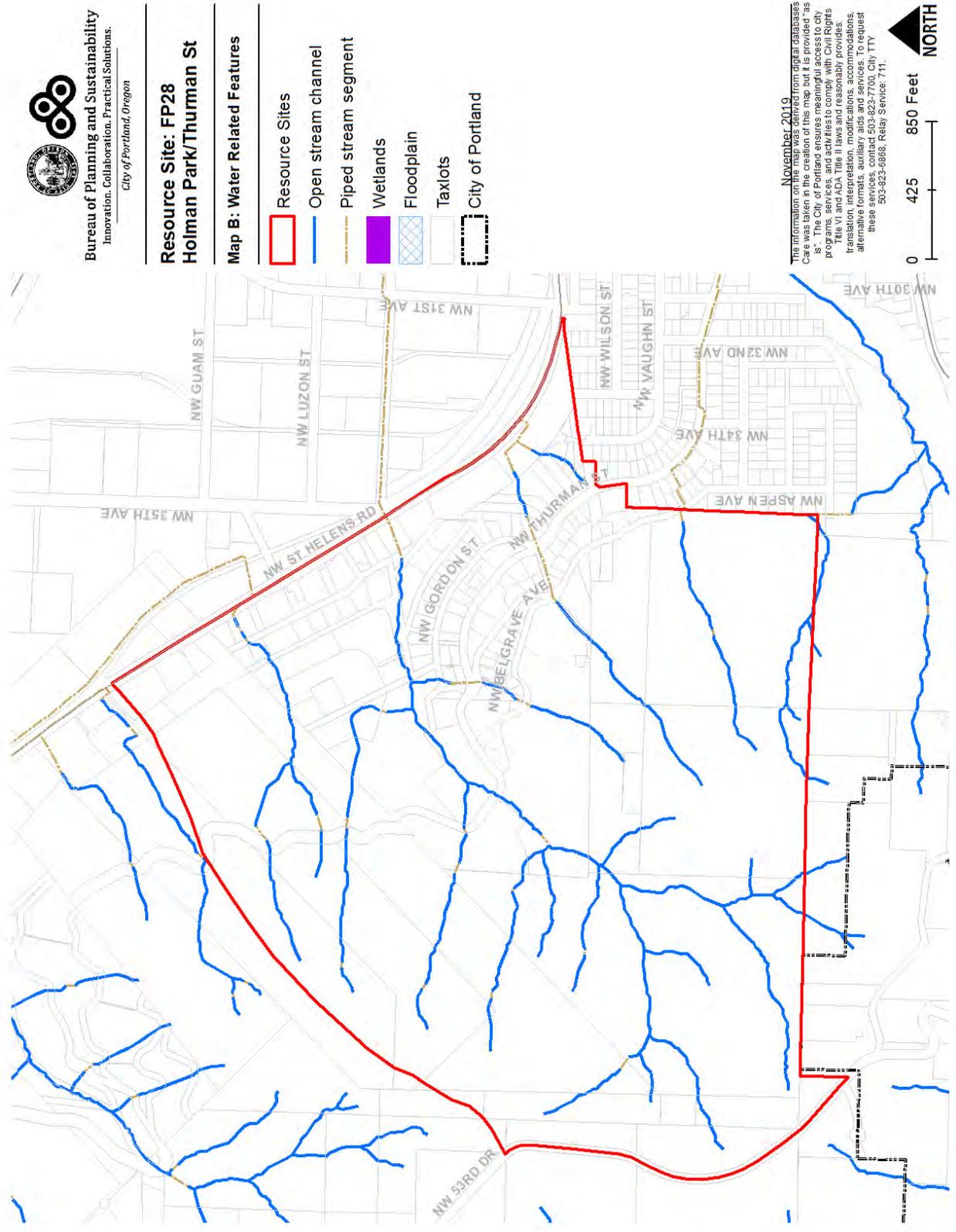
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP28 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. Outside public parks, *limit* conflicting uses between 25 and 50 feet from stream top-of-bank and within areas of forest or woodland vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	254.8
Limit	24.8
Allow	36.8





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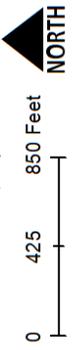
**Resource Site: FP28
Holman Park/Thurman St**

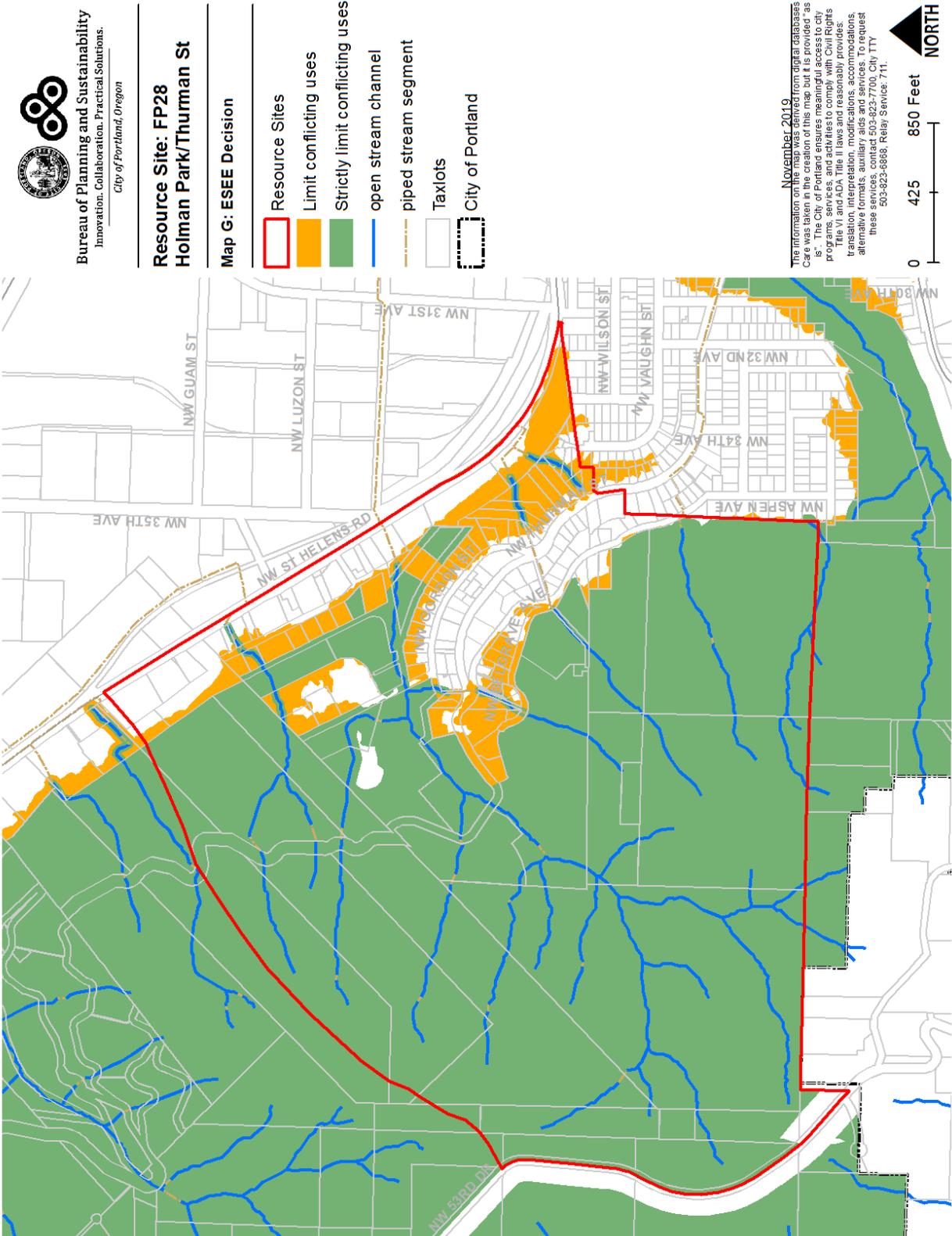
Map C: Land Features

-  Resource Sites
-  Steep Slopes (>25%)
-  Forest
-  Woodland
-  Shrubland
-  Herbaceous
-  Taxlots
-  City of Portland

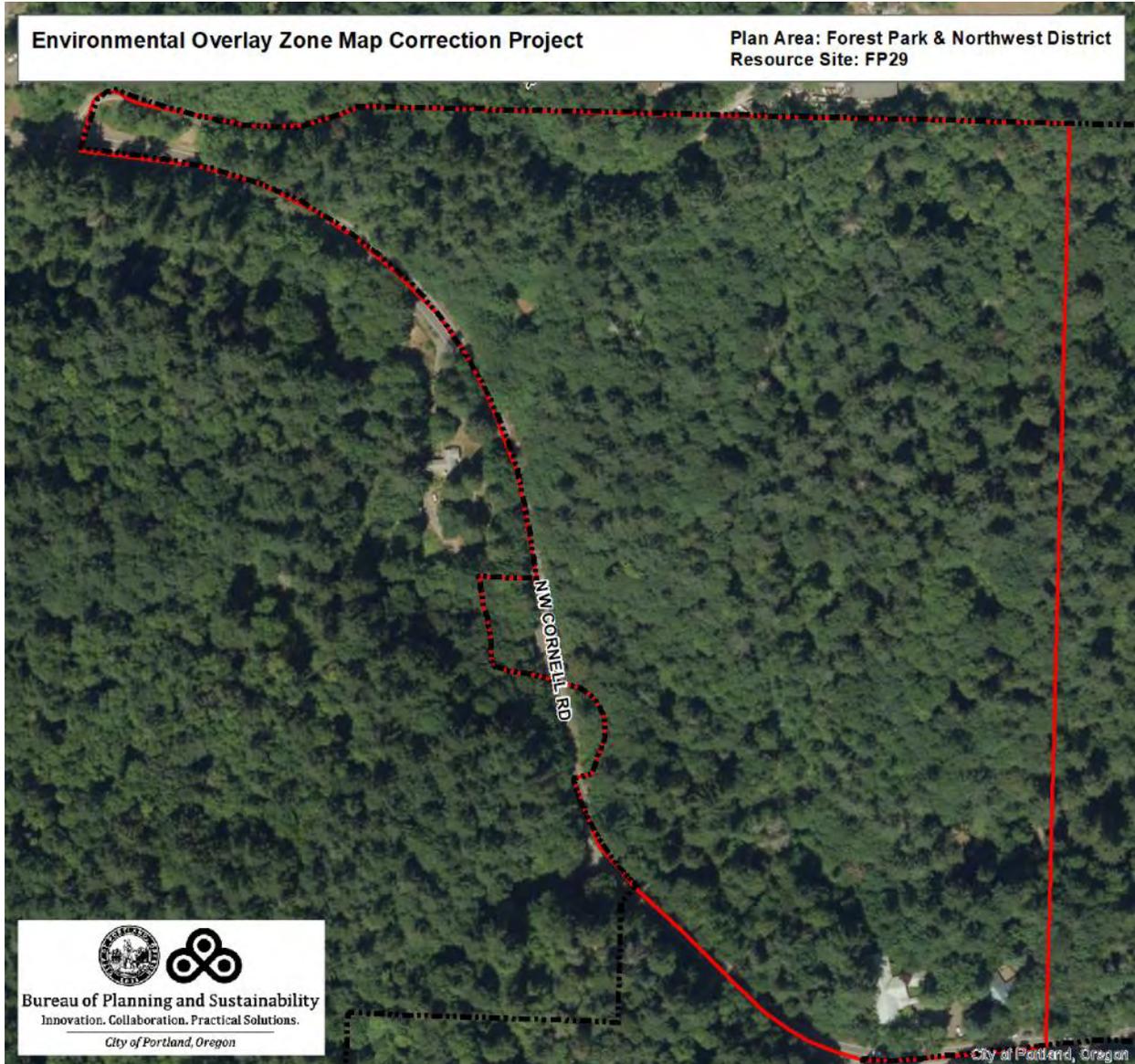


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Resource Site No.: FP29 **Resource Site Name:** Pittock Sanctuary
Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 75



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP29
		Study Area
Stream (Miles)		3.9
Wetlands (acres)		0.2
Vegetated Areas >= 1/2 acre (acres)		24.3
	Forest (acres)	24.3
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		20.9
Impervious Surface (acres)		2.9
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland's West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development. The headwaters of Balch Creek in the site provide fishery habitat values, but values

are diminished by a culvert which inhibits fish passage and could be further diminished by irrigation activities or water use.

The streams are surrounded by forest on steep slopes; this provides cover and habitat for wildlife. The high number of trails in the resource site fragment the wildlife habitat and introduce human activities including noise, light and litter. Rare plant species found in the site includes large sequoia. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP29				
Resource Site (acres) = 25.394436				
	High	Medium	Low	Total
Riparian Corridors*				
acres	15.2	5.3	3.9	24.4
percent total inventory site area	59.8%	21.1%	15.3%	96.2%
Wildlife Habitat*				
acres	24.3	0.0	0.0	24.3
percent total inventory site area	95.6%	0.0%	0.0%	95.6%
Special Habitat Areas**				
acres				25.3
percent total inventory site area				99.7%
Combined Total⁺				
acres	25.3	0.0	0.0	25.3
percent total inventory site area	99.7%	0.0%	0.0%	99.7%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP29 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed in the RF base zone. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP29, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP29 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, within wetlands and land within 50 feet of stream top-of-bank or within 50 feet of wetlands.
2. *Strictly limit* conflicting uses areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
4. *Allow* conflicting uses within all other areas containing significant natural resources.

Table C: ESEE Decision for Resource Site FP29	
ESEE Decision	Acres
Strictly Limit	17.0
Limit	0.0
Allow	8.4

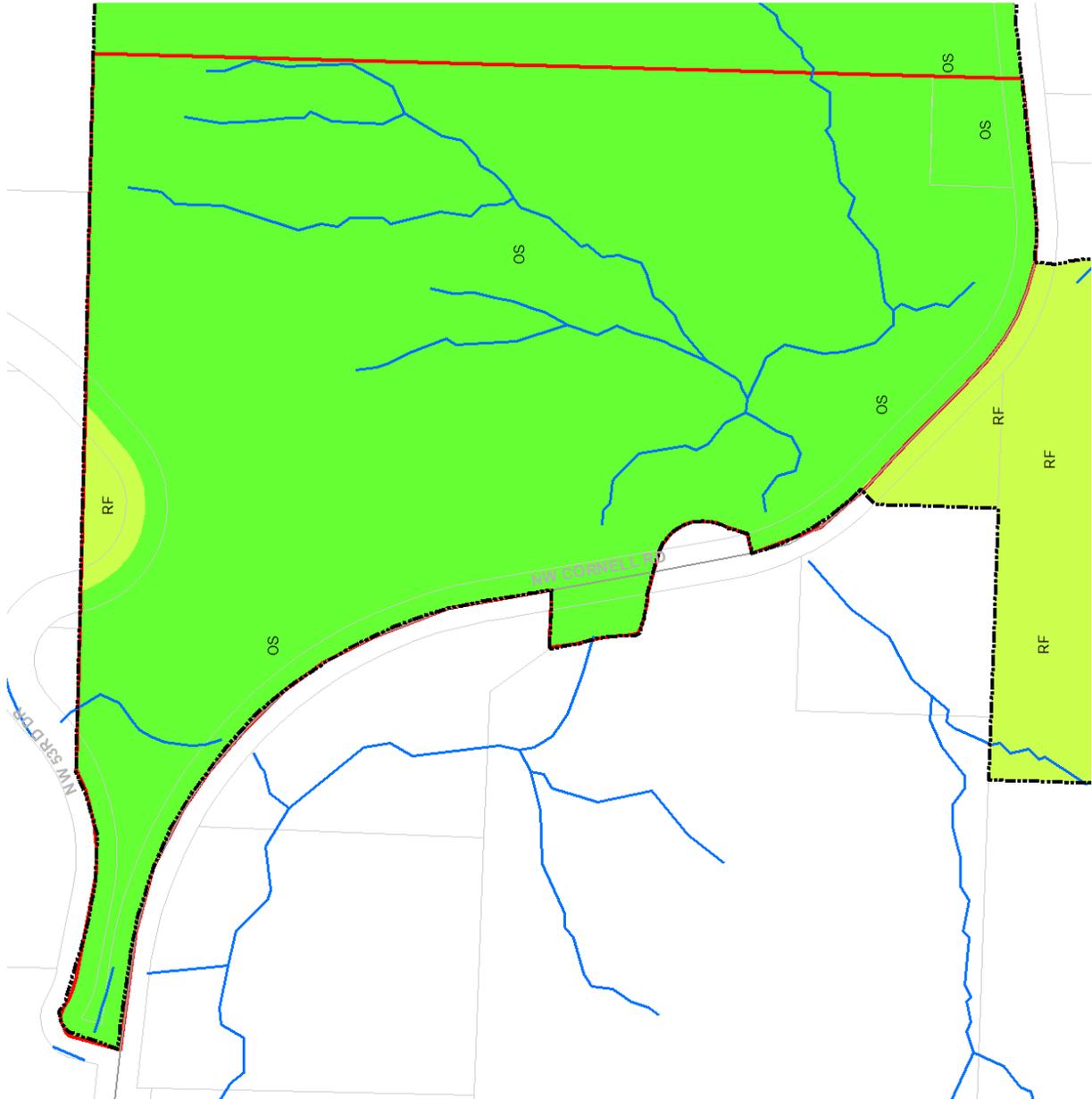


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**Resource Site: FP29
Pittock Sanctuary**

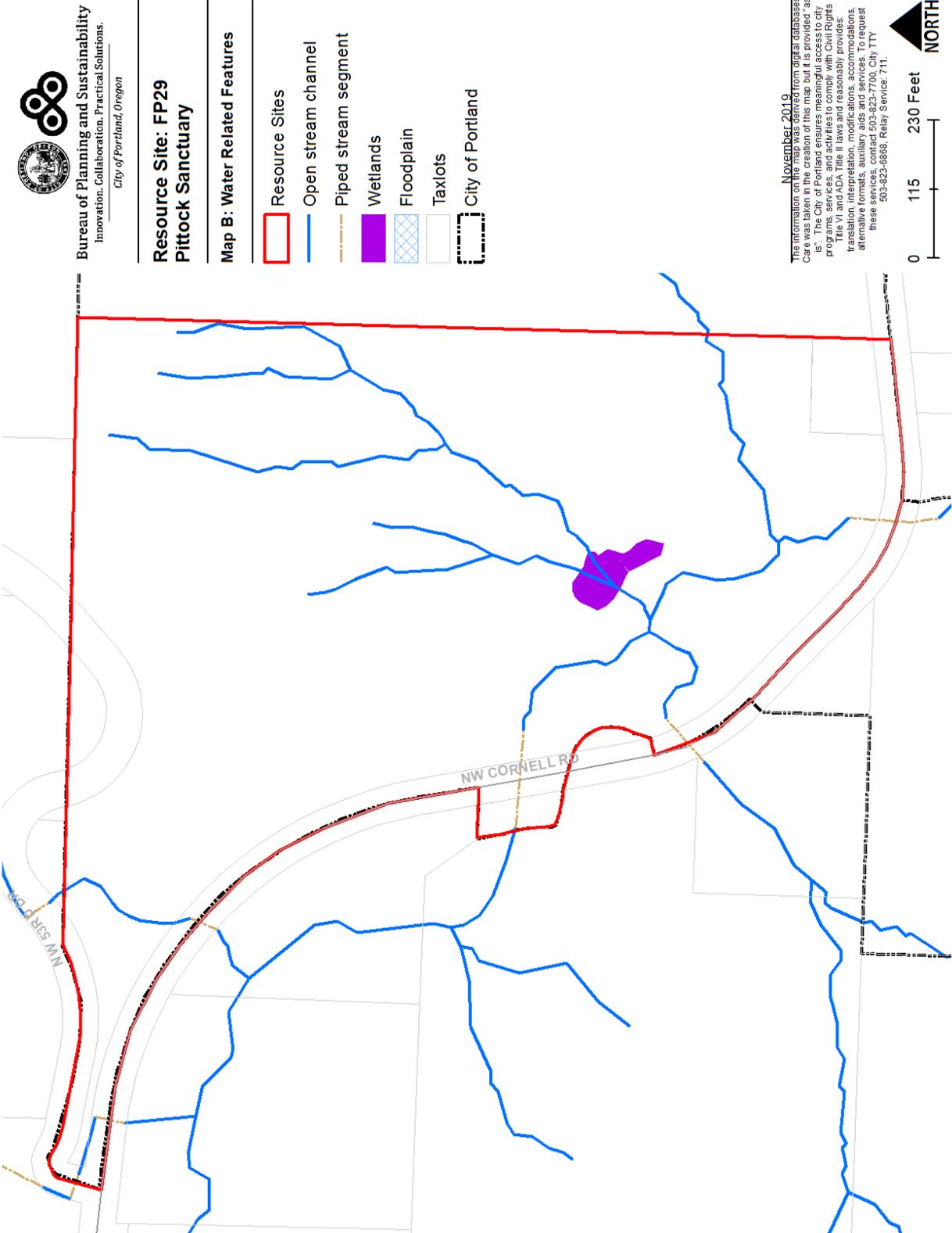
Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland



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**Resource Site: FP29
Pittock Sanctuary**

Map C: Land Features

-  Resource Sites
-  Steep Slopes (>25%)
-  Forest
-  Woodland
-  Shrubland
-  Herbaceous
-  Taxlots
-  City of Portland

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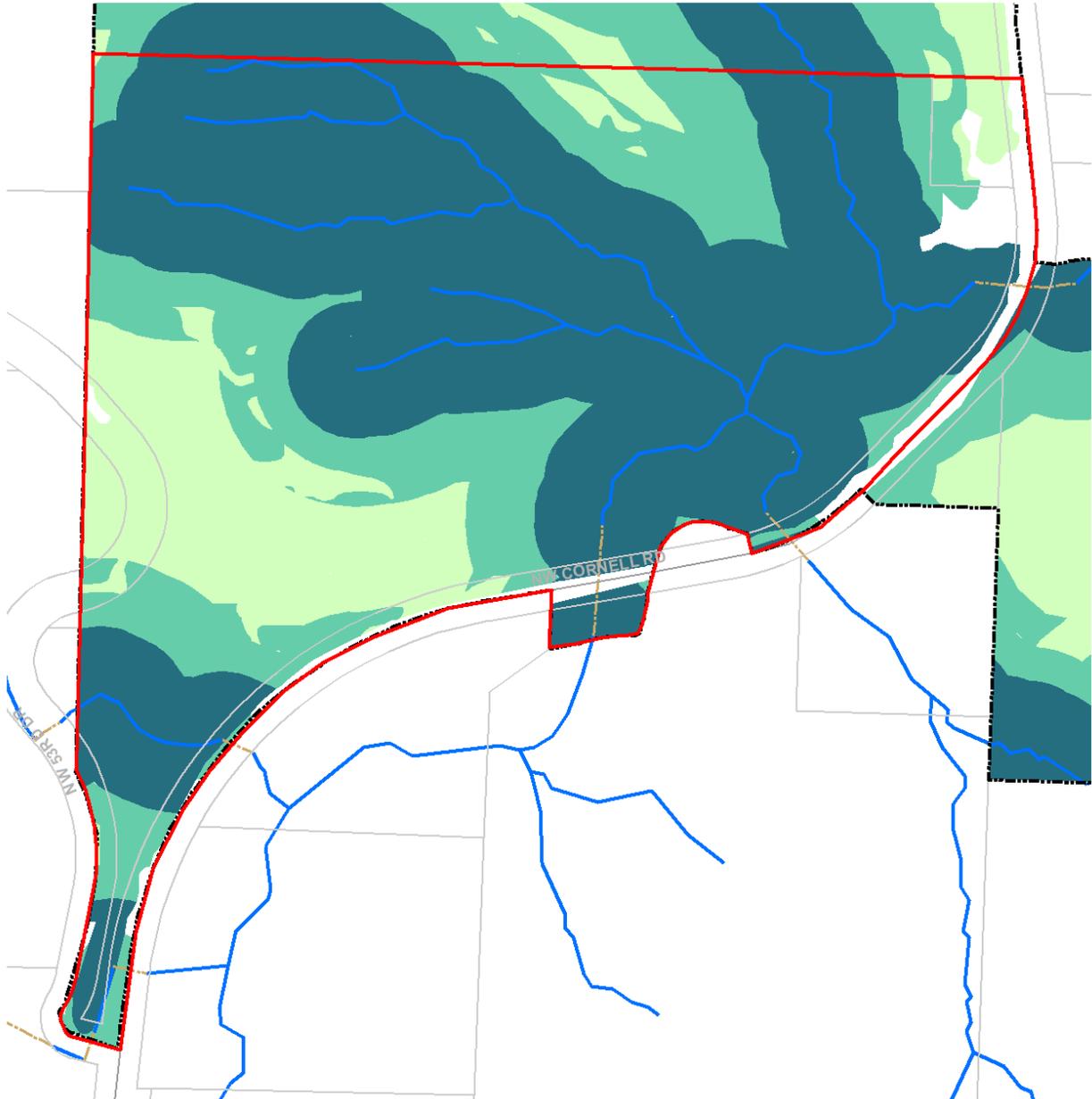
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**Resource Site: FP29
Pittock Sanctuary**

Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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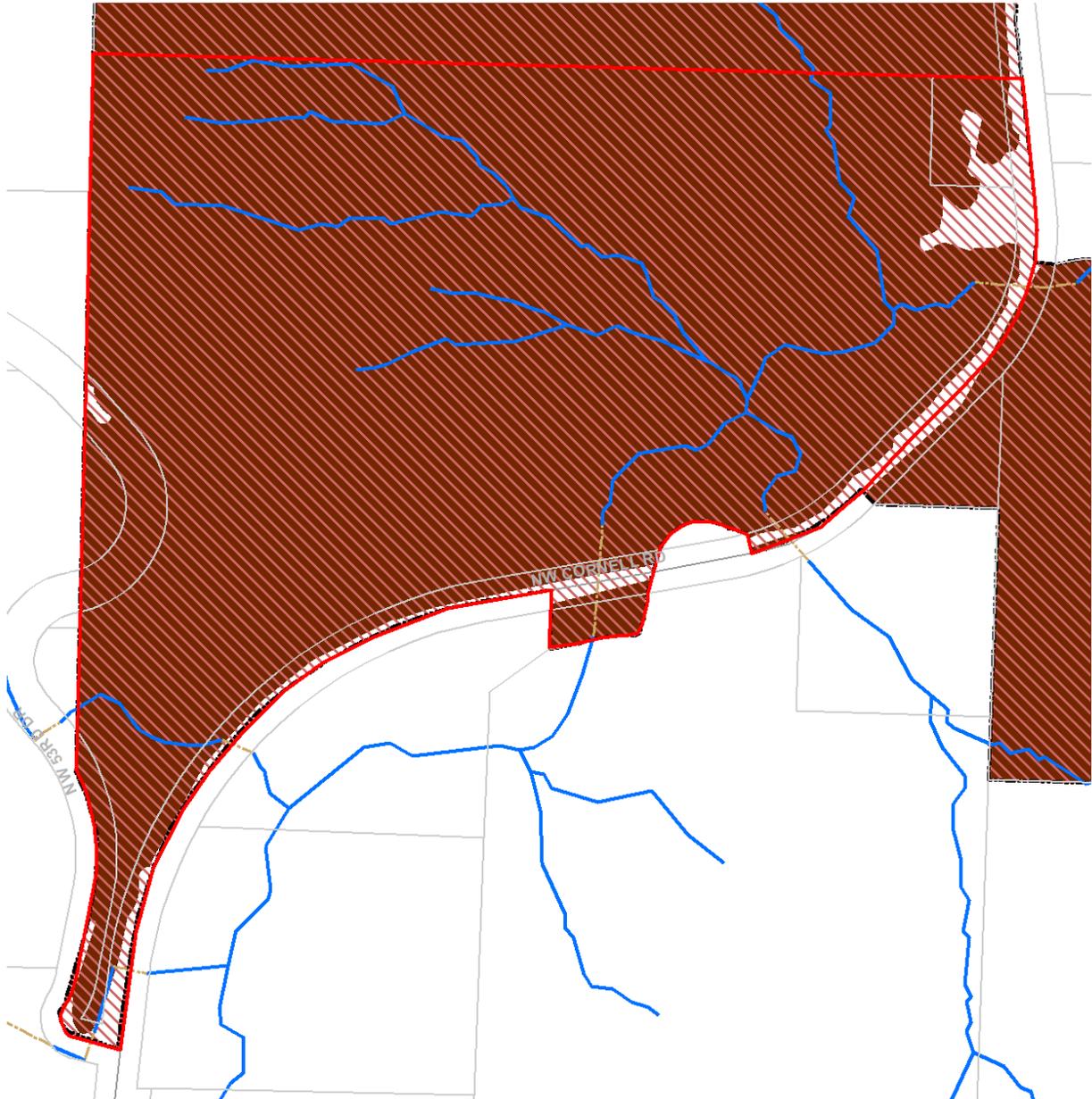




**Resource Site: FP29
Pittock Sanctuary**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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For more information or to request these services, contact 503-823-7700, CH/TTY
503-823-6888, Relay Services: 711.



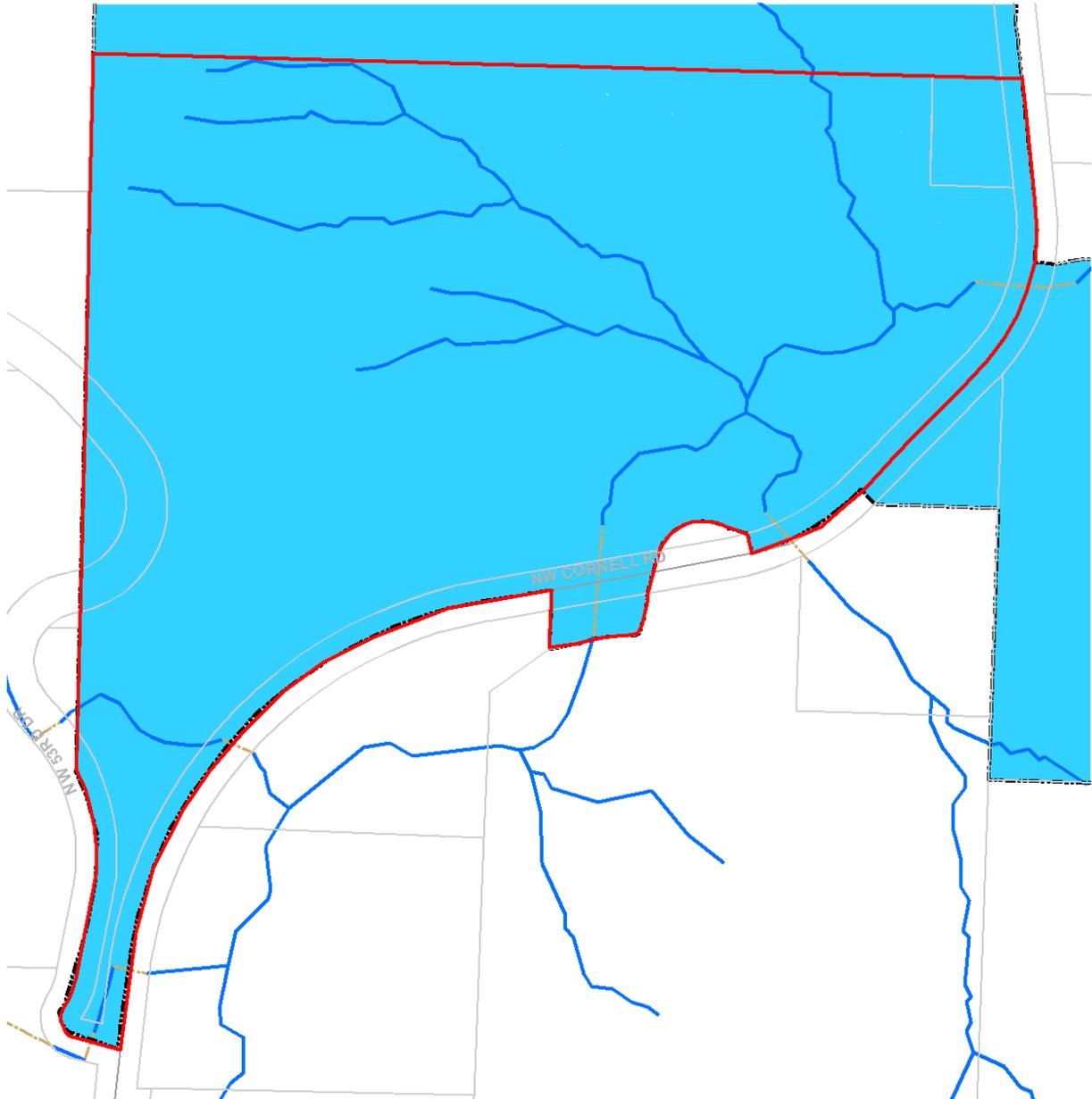


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**Resource Site: FP29
Pittock Sanctuary**

**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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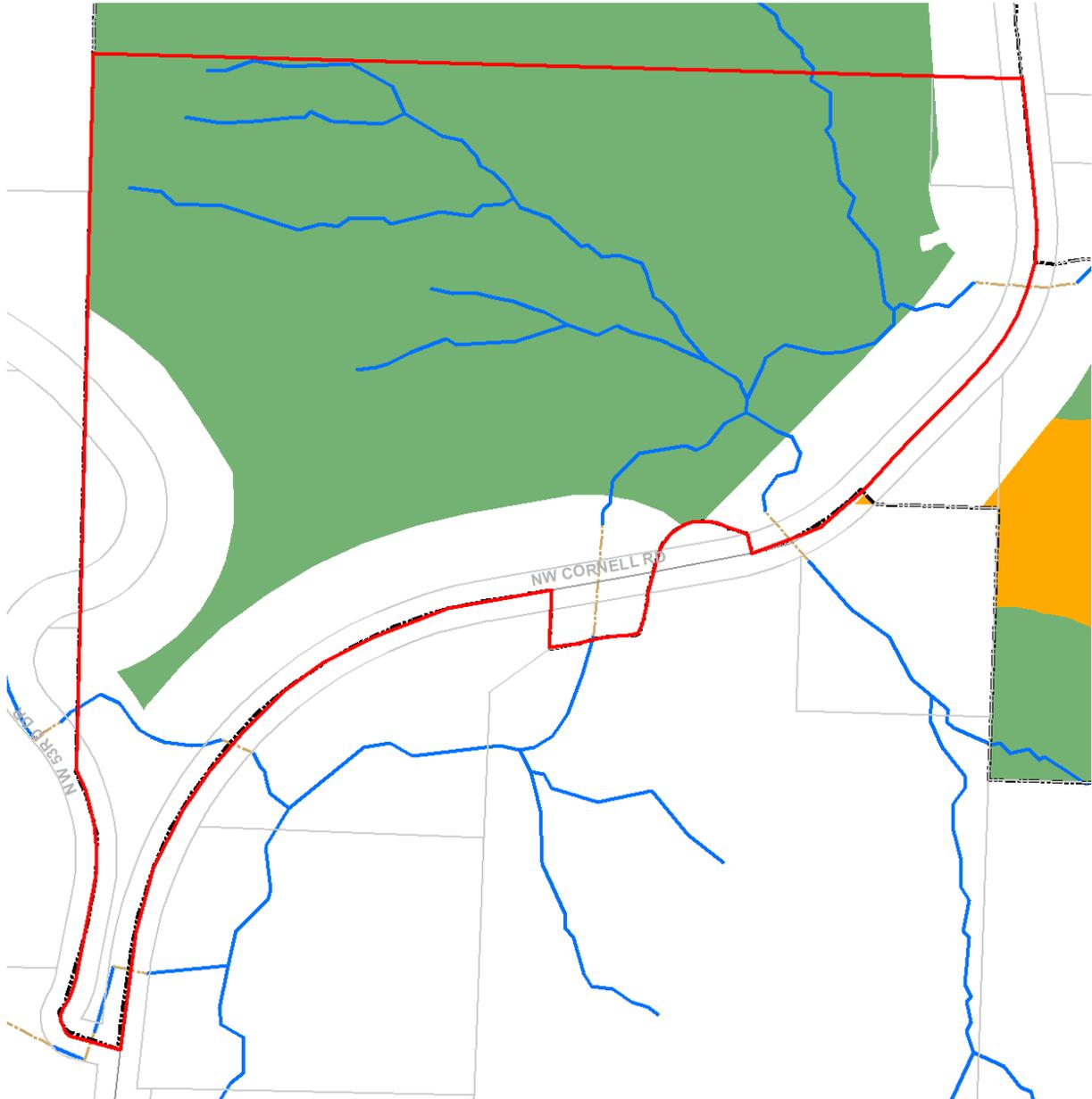




**Resource Site: FP29
Pittock Sanctuary**

Map G: ESEE Decision

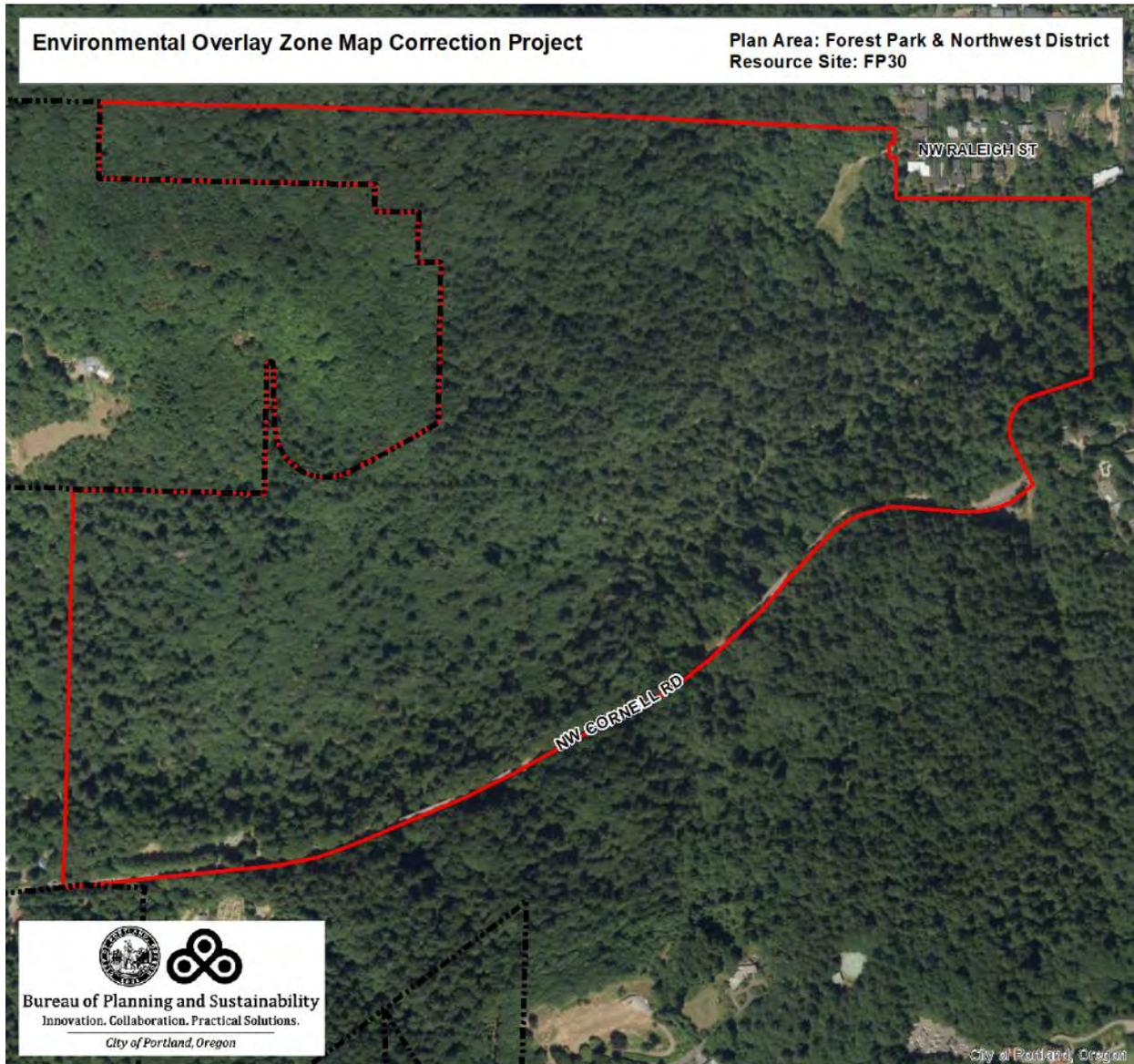
- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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Resource Site No.: FP30 **Resource Site Name:** North of Cornell Rd.

Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 74



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP30
		Study Area
Stream (Miles)		3.1
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		125.1
	Forest (acres)	124.6
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.5
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		122.5
Impervious Surface (acres)		4.2
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The headwaters of Balch Creek in the site provides fishery habitat values, but these values are diminished by a vertical section of concrete which restricts passage of fish to the upper stream spawning beds. Trapped fish provide educational value, but are lost from the population because they are periodically flushed into a storm sewer that does not support aquatic life.

The streams are surrounded by forest on steep slopes. This provides cover and habitat for wildlife. Rare plant species found in the site include western wahoo shrubs, and dawn redwoods. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP30				
Resource Site (acres) = 126.892942				
	High	Medium	Low	Total
Riparian Corridors*				
acres	47.4	37.2	40.6	125.2
percent total inventory site area	37.4%	29.3%	32.0%	98.7%
Wildlife Habitat*				
acres	124.5	0.0	0.0	124.5
percent total inventory site area	98.1%	0.0%	0.0%	98.1%
Special Habitat Areas**				
acres				126.9
percent total inventory site area				100.0%
Combined Total⁺				
acres	126.9	0.0	0.0	126.9
percent total inventory site area	100.0%	0.0%	0.0%	100.0%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP30 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation contiguous to and within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status plant and fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP30, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP30 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Limit* conflicting uses within areas of woodland, shrubland and herbaceous vegetation.
4. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	114.1
Limit	0.0
Allow	12.8

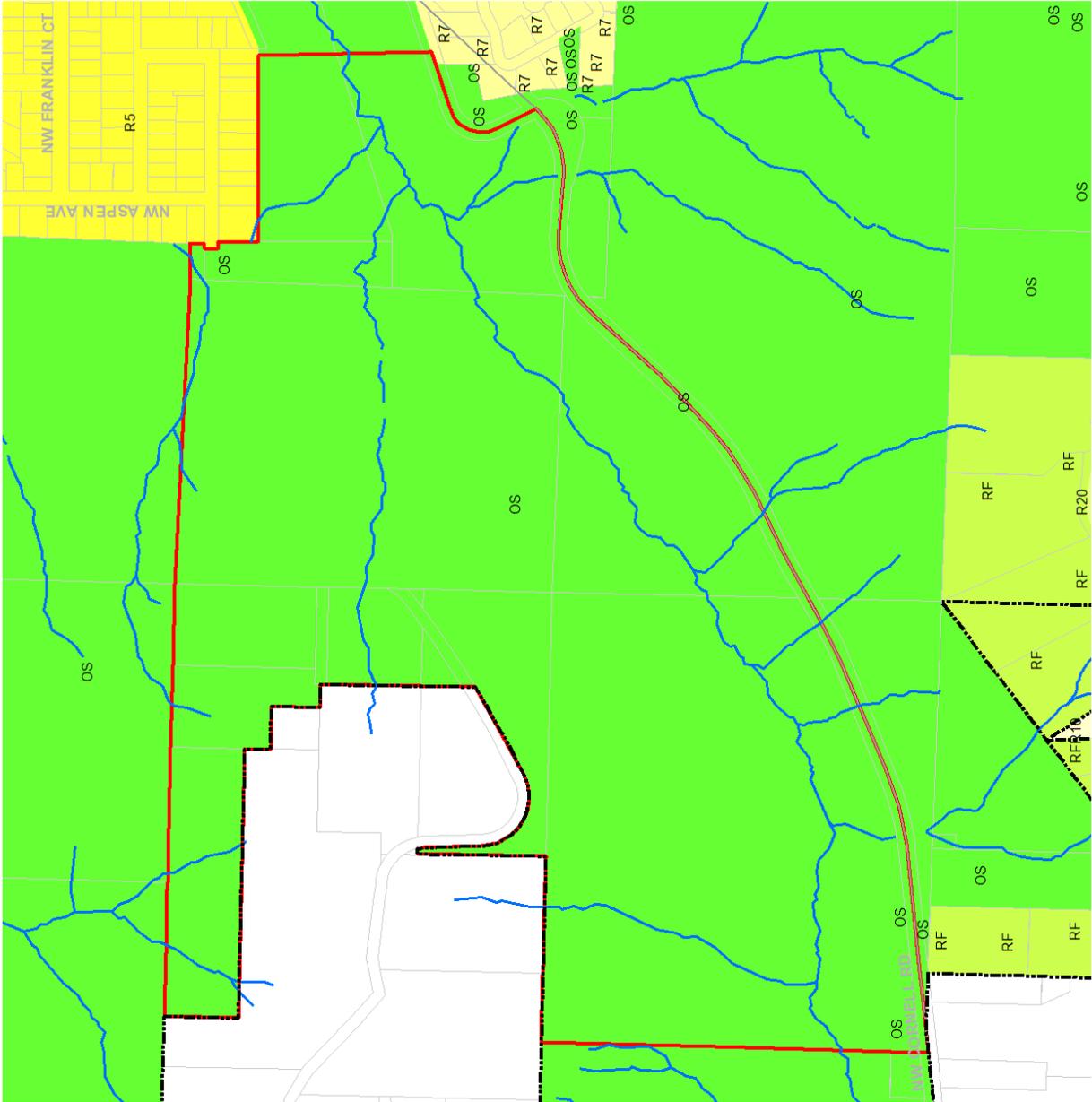


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**Resource Site: FP30
North of Cornell Rd**

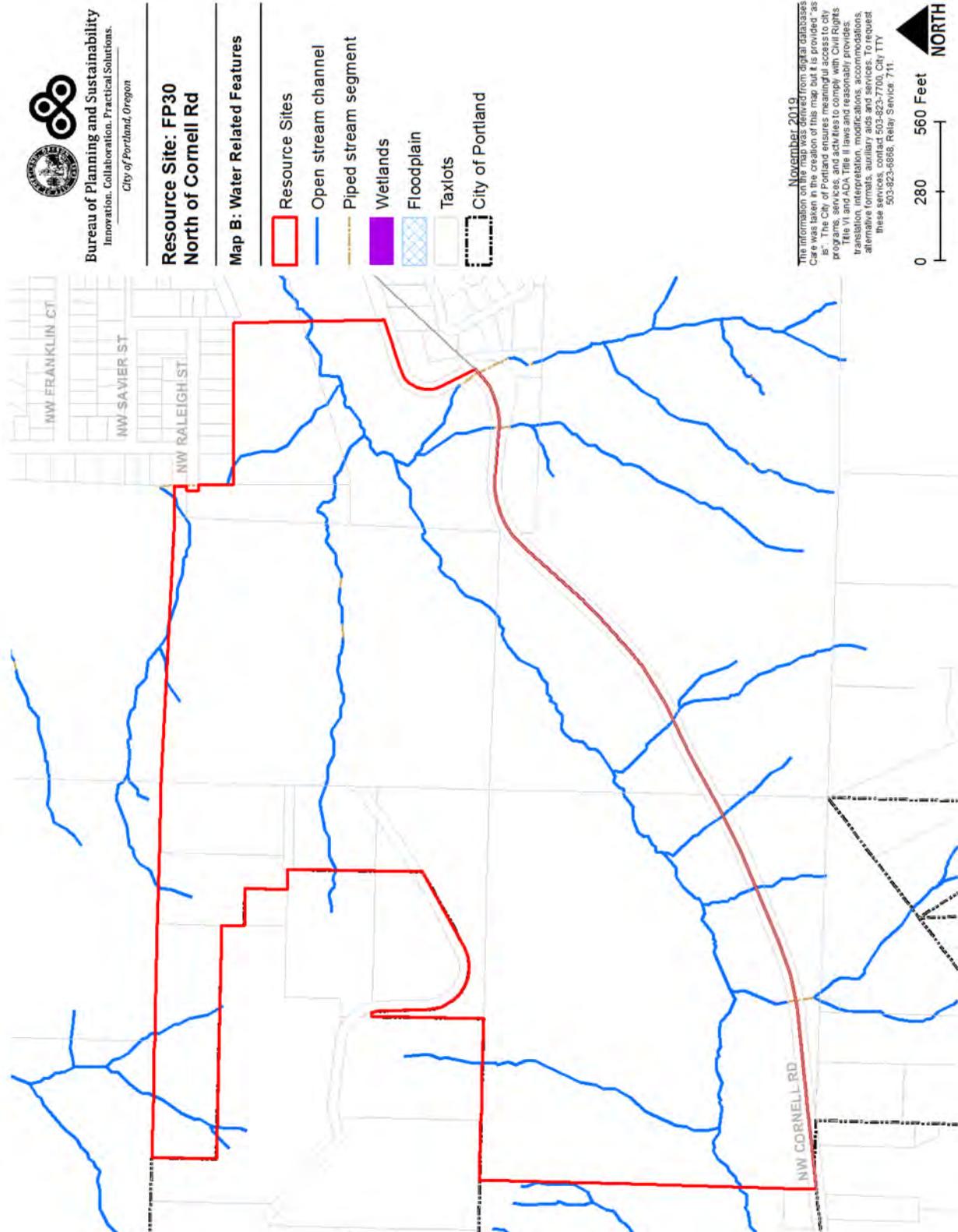
Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland



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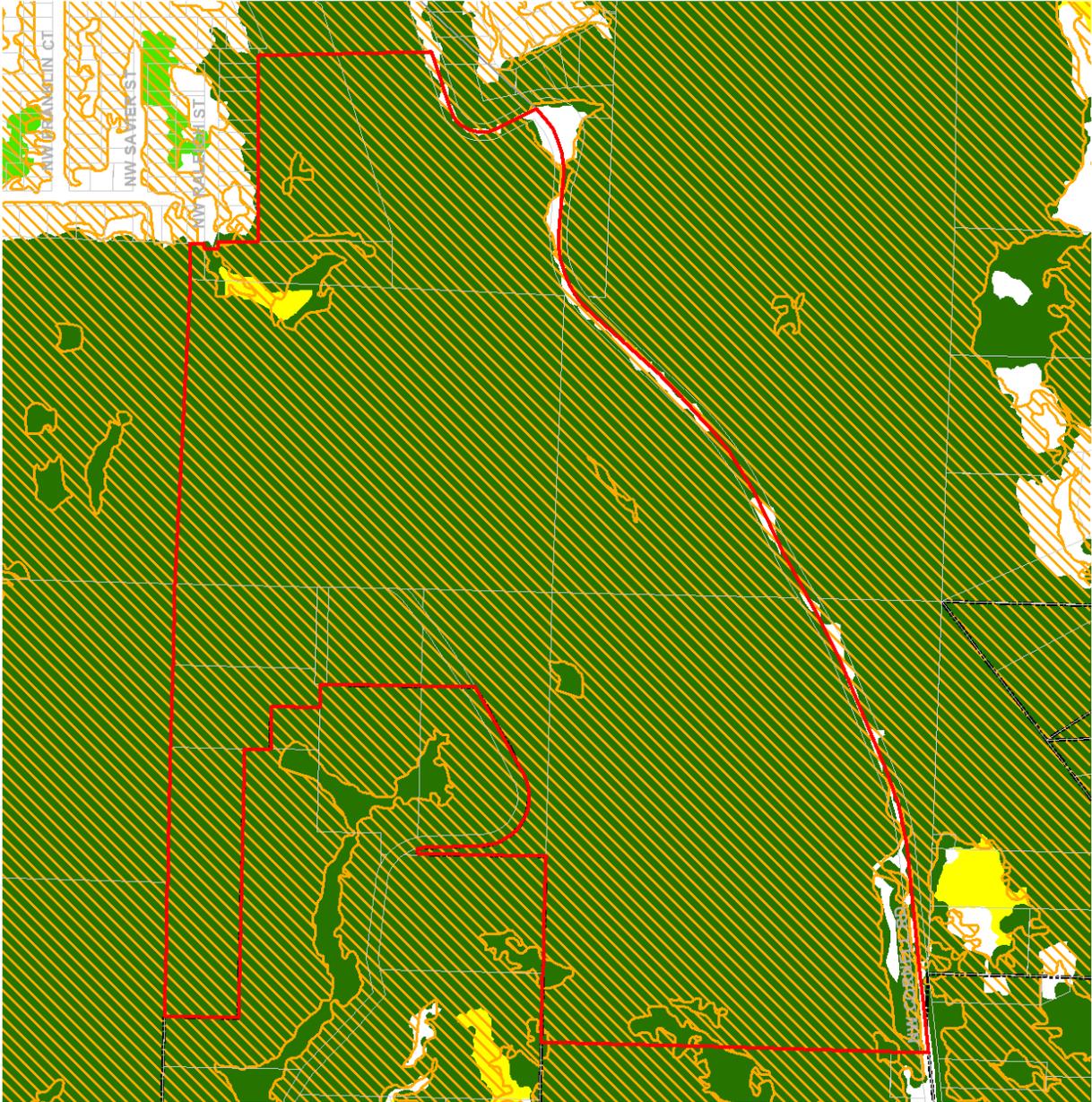




**Resource Site: FP30
North of Cornell Rd**

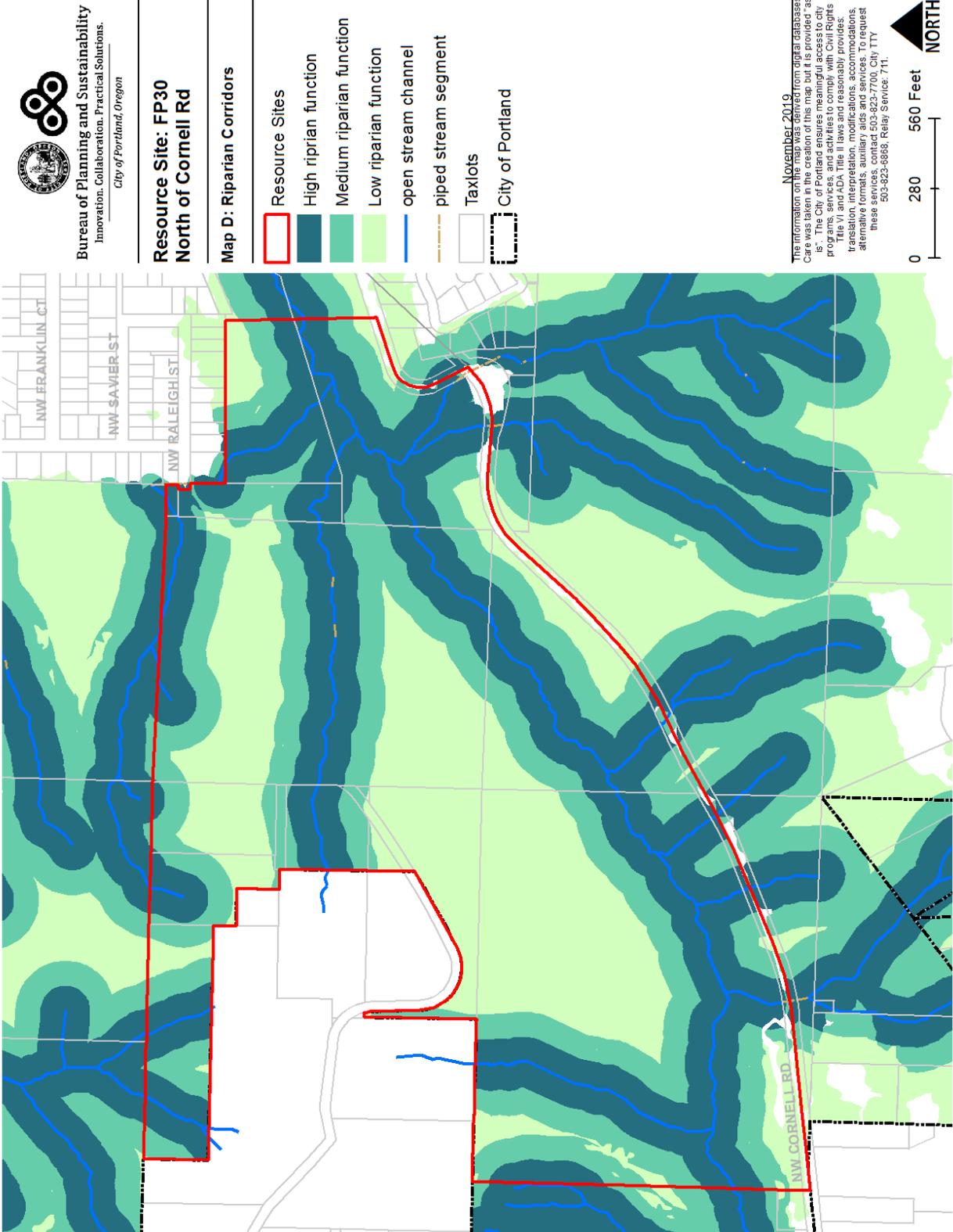
Map C: Land Features

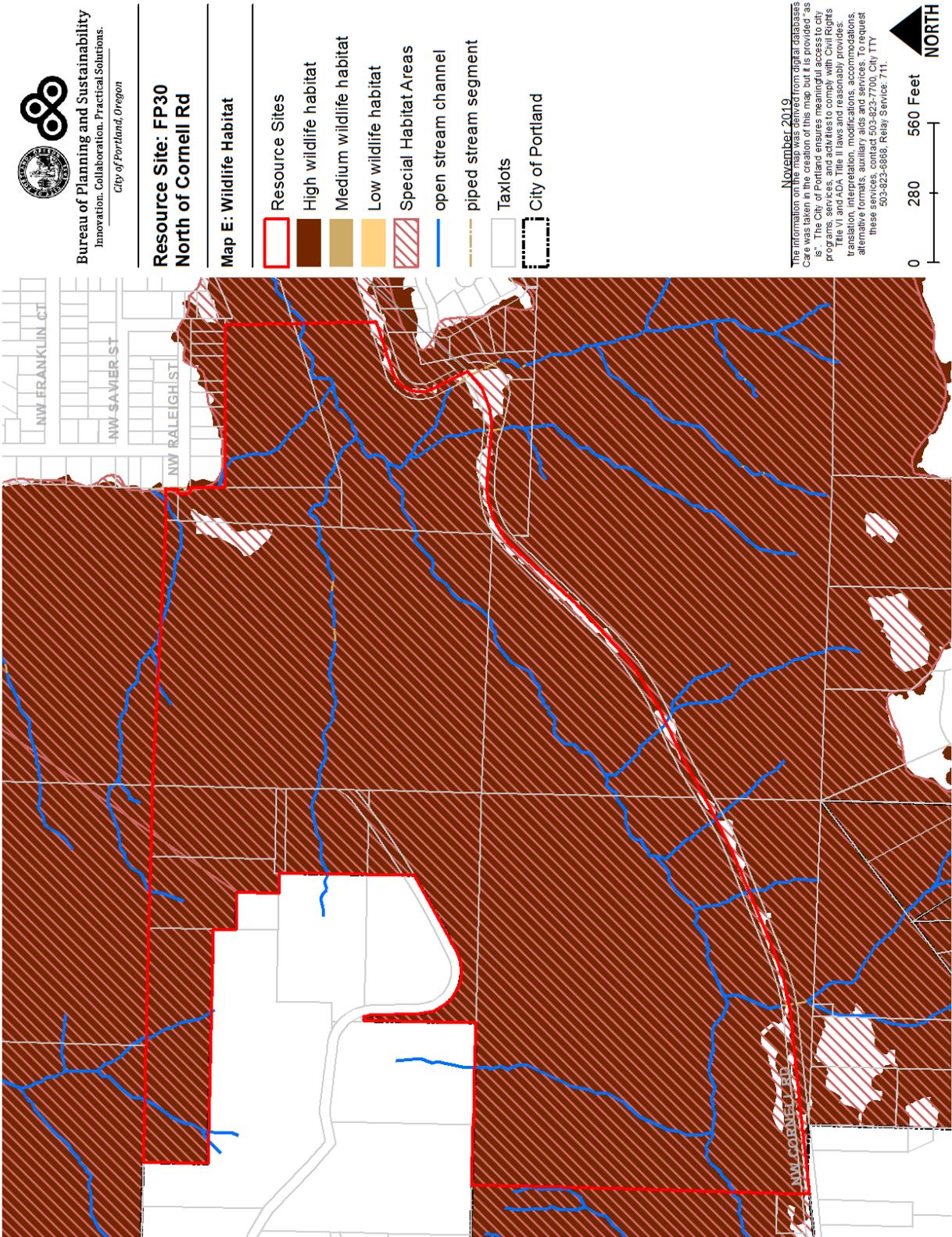
- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

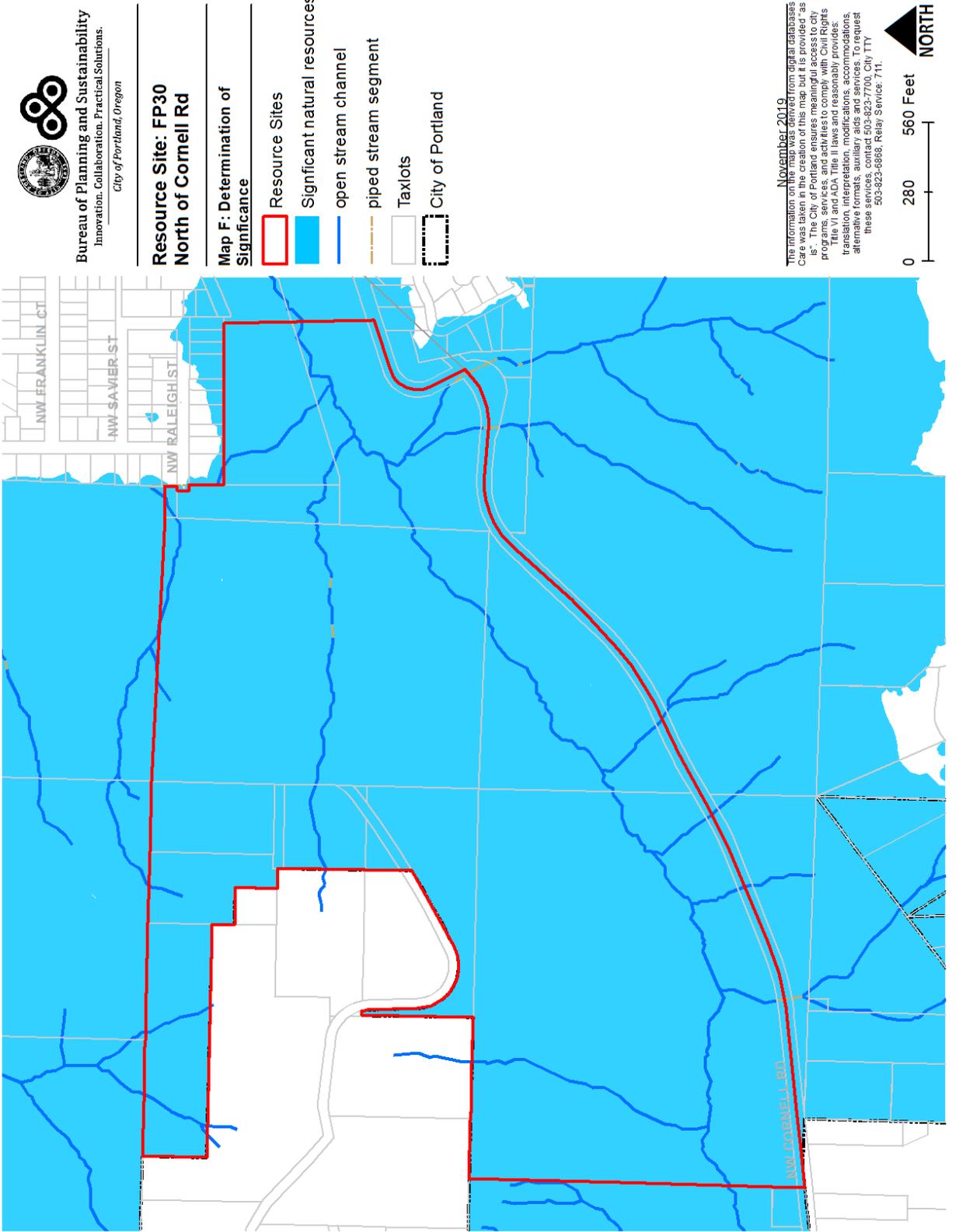


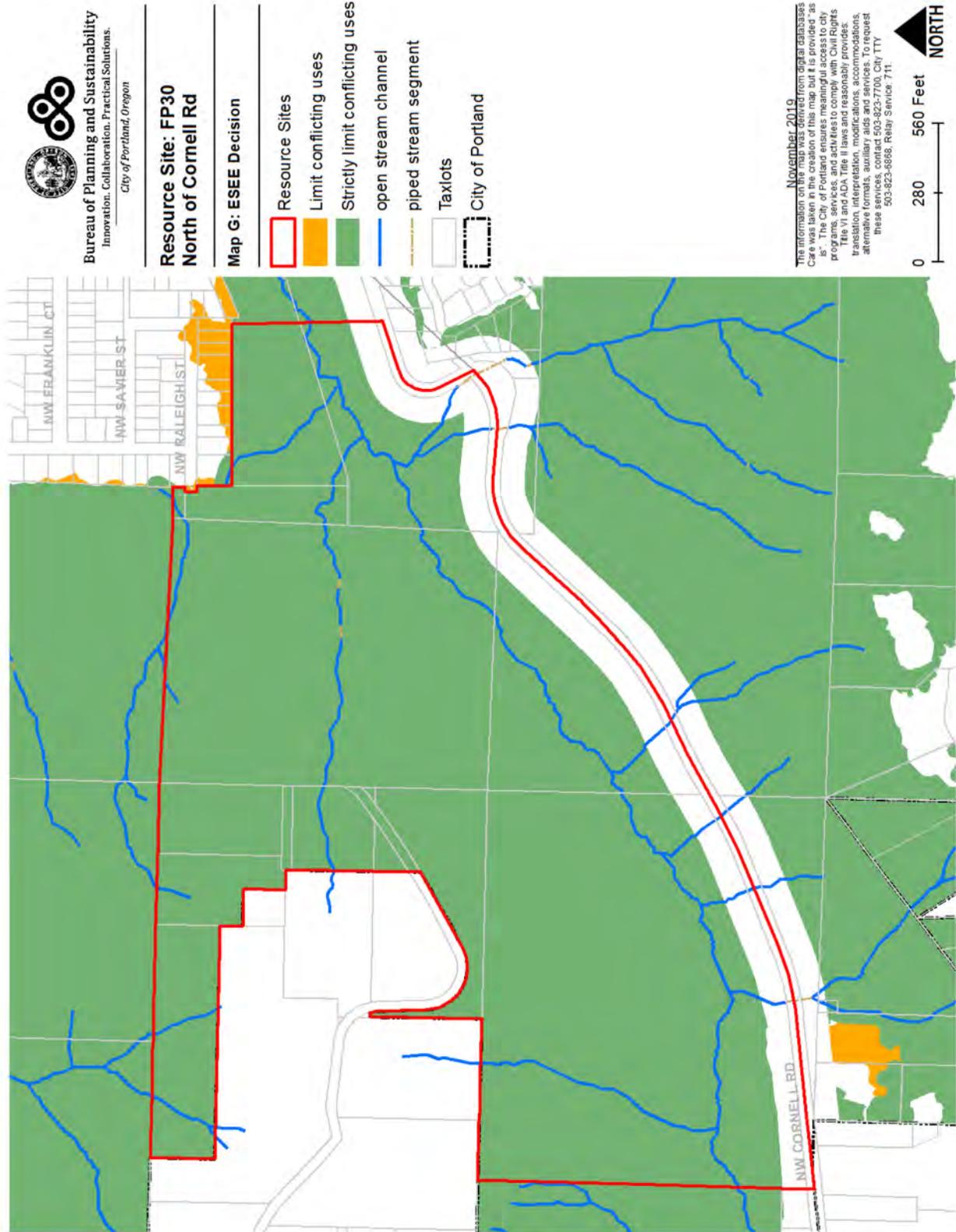
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Resource Site No.: FP31 Resource Site Name: Lower Macleay

Previous Plan: Balch Creek Watershed Protection Plan Previous Resource Site No.: 73



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP31
		Study Area
Stream (Miles)		2.4
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		24.4
	Forest (acres)	20.9
	Woodland (acres)	3.6
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		55.0
Impervious Surface (acres)		38.6
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The headwaters of Balch Creek in the site provides fishery habitat values, but these values are diminished by a vertical section of concrete which restricts passage of fish to the upper stream spawning beds. Trapped fish provide educational value, but are lost from the population because they are periodically flushed into a storm sewer that does not support aquatic life.

The stream is surrounding by forest on steep slopes. This provides cover and habitat for wildlife. Rare plant species found in the site include western wahoo shrubs, and dawn redwoods. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP31				
Resource Site (acres) = 88.1506				
	High	Medium	Low	Total
Riparian Corridors*				
acres	6.6	7.3	8.3	22.2
percent total inventory site area	7.5%	8.2%	9.4%	25.2%
Wildlife Habitat*				
acres	19.1	0.0	0.0	19.1
percent total inventory site area	21.7%	0.0%	0.0%	21.7%
Special Habitat Areas**				
acres				19.3
percent total inventory site area				21.9%
Combined Total⁺				
acres	22.4	0.4	0.6	23.5
percent total inventory site area	25.4%	0.5%	0.7%	26.6%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP31 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; rare fish species; rare plant species; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status plant and fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the R7, R5 and R1 base zones. Employment uses are allowed in the EX base zone. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP31, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk

species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

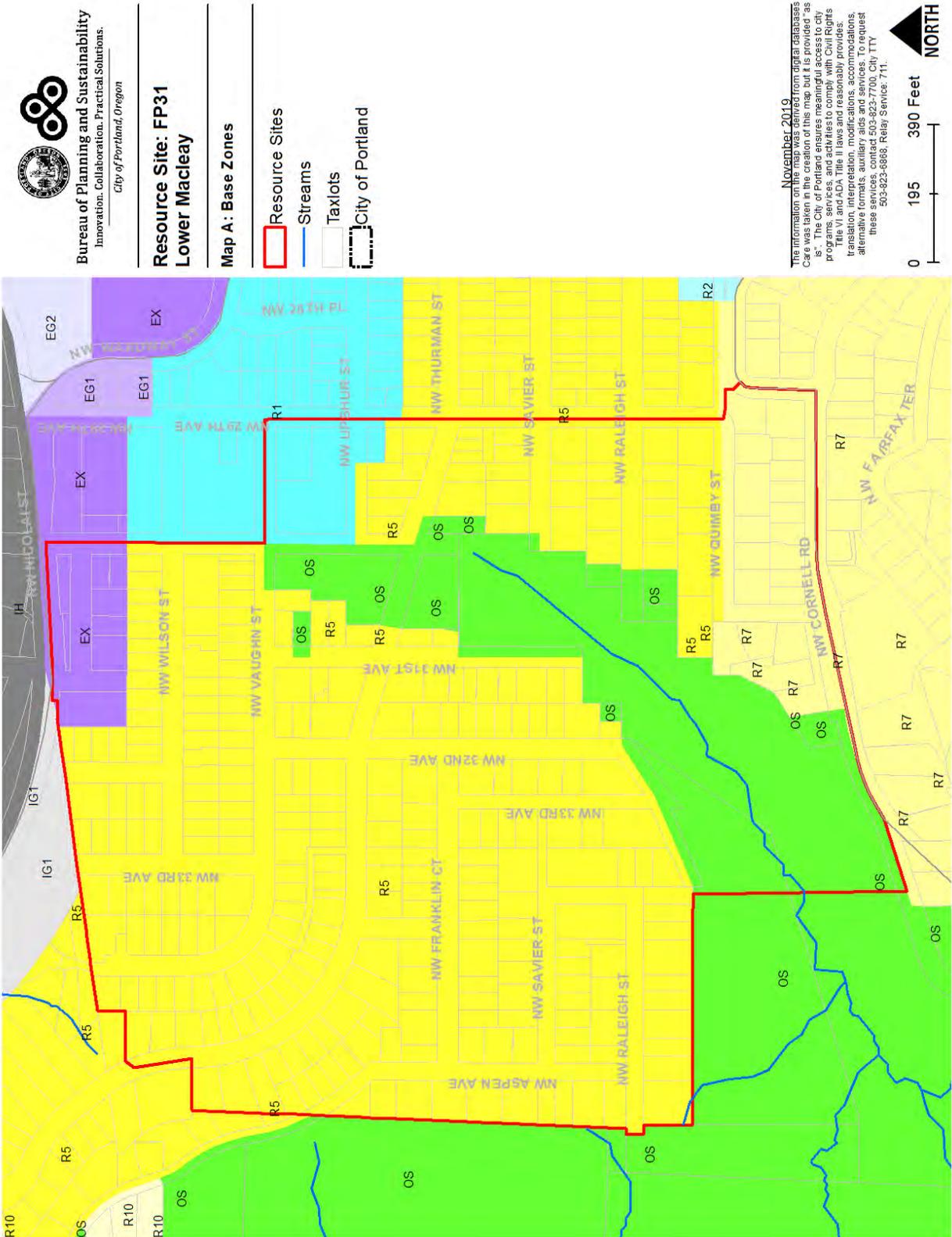
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

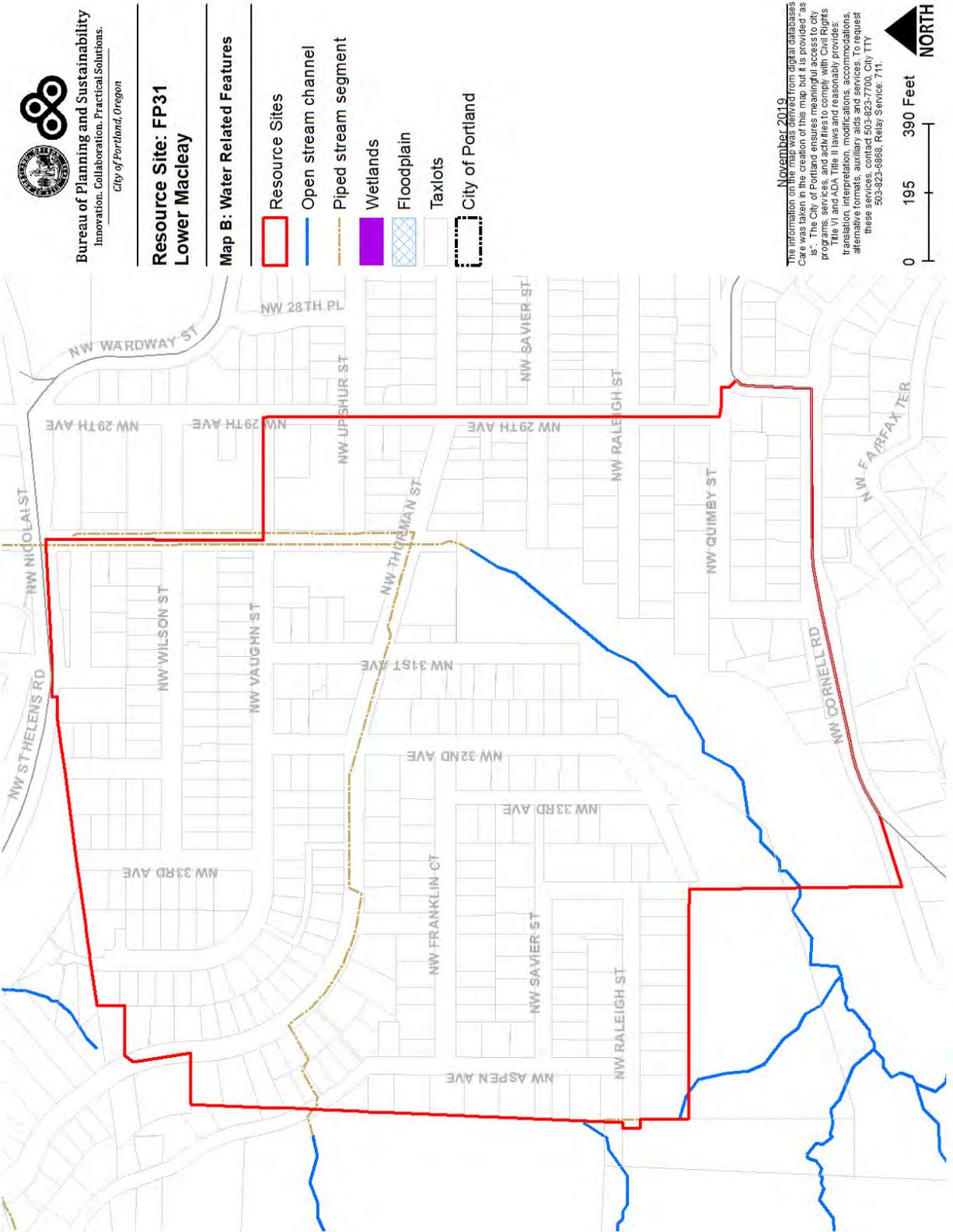
ESEE Decisions

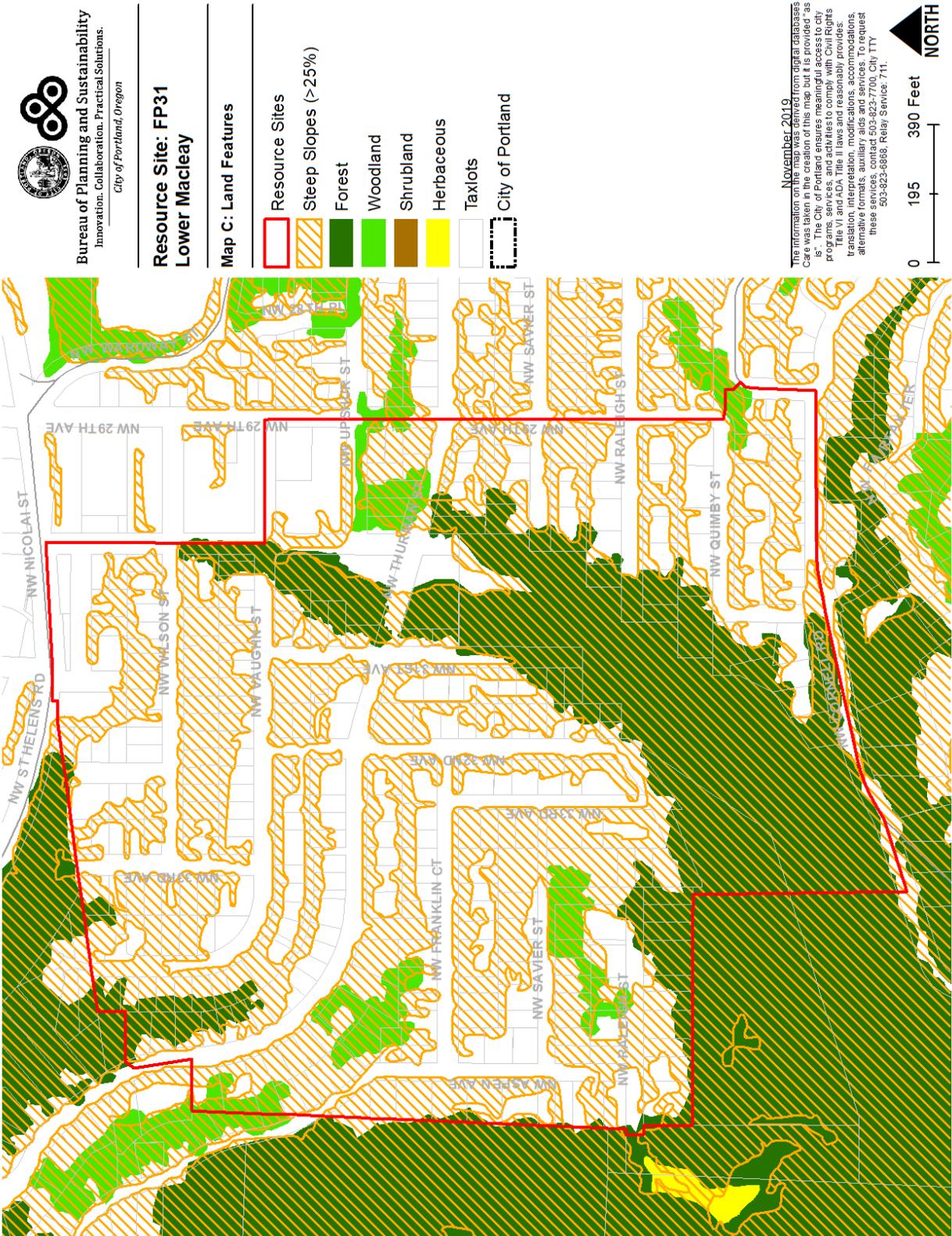
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP31 are:

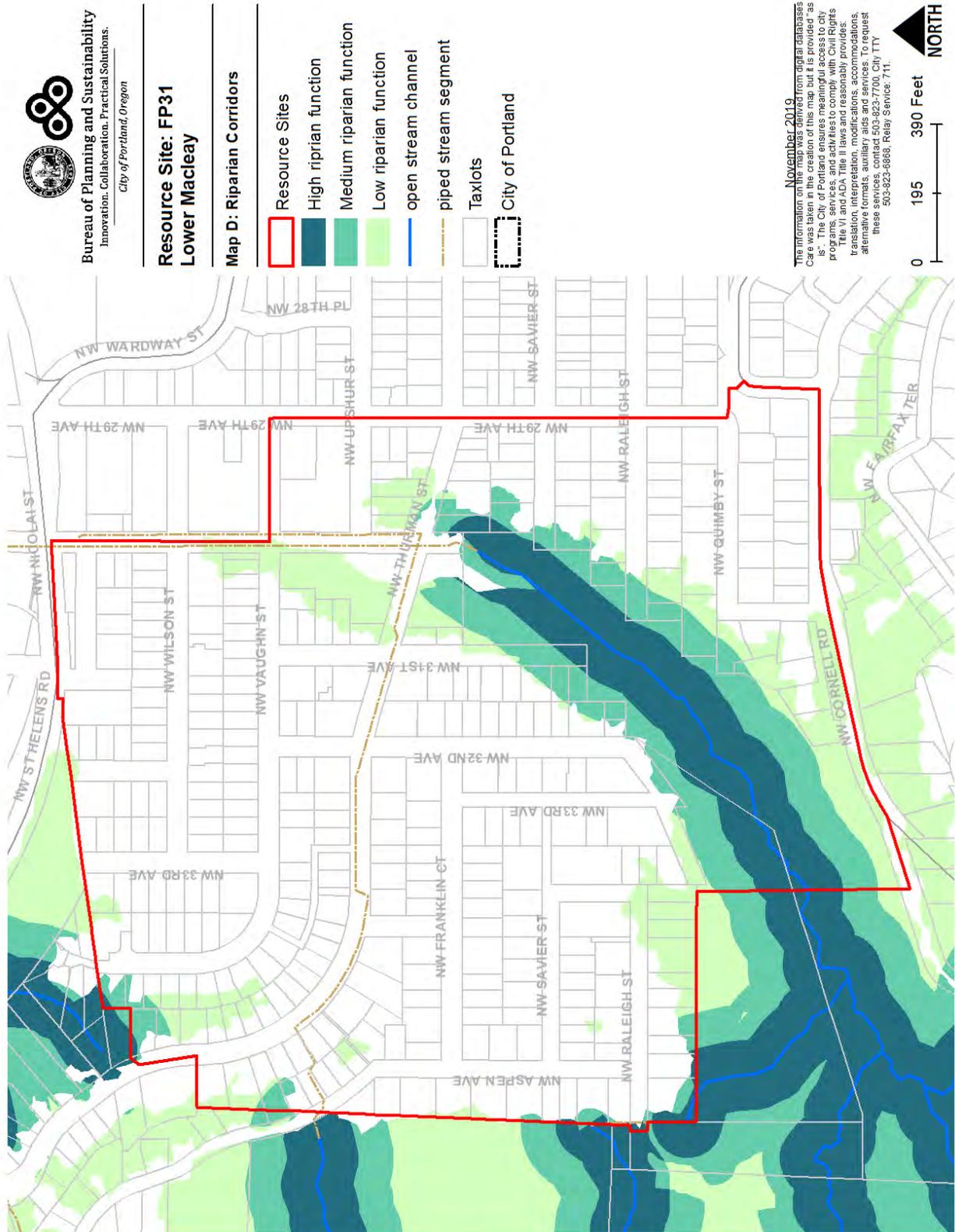
6. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
7. *Strictly limit* conflicting uses within areas of forest vegetation in Forest Park that are contiguous to but more than 50 feet from stream top-of-bank.
8. *Limit* conflicting uses within areas of forest vegetation in Forest Park that are not contiguous to streams and all forest vegetation outside of Forest Park.
9. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
10. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	11.8
Limit	7.5
Allow	68.9









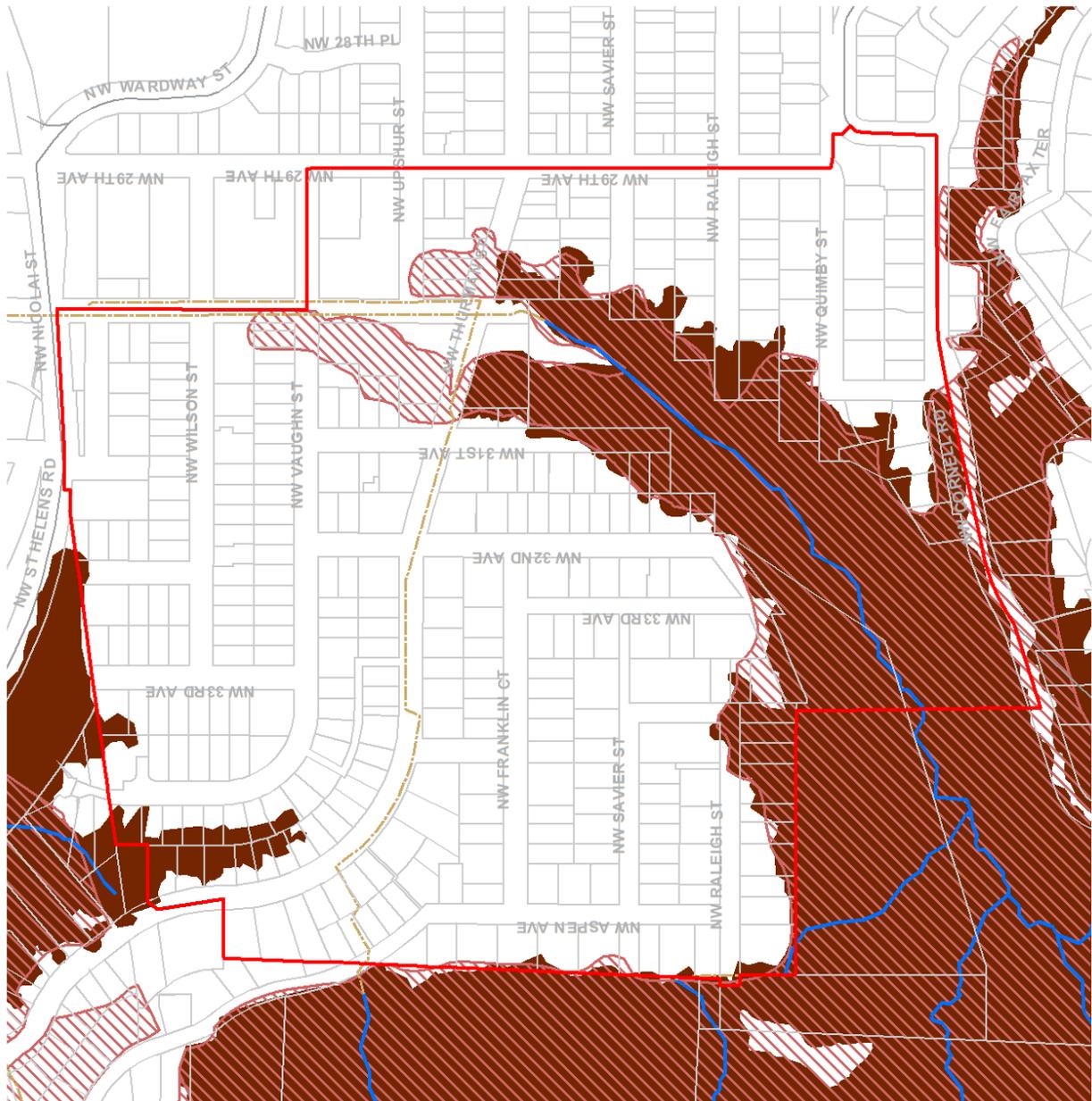


**Resource Site: FP31
Lower Macleay**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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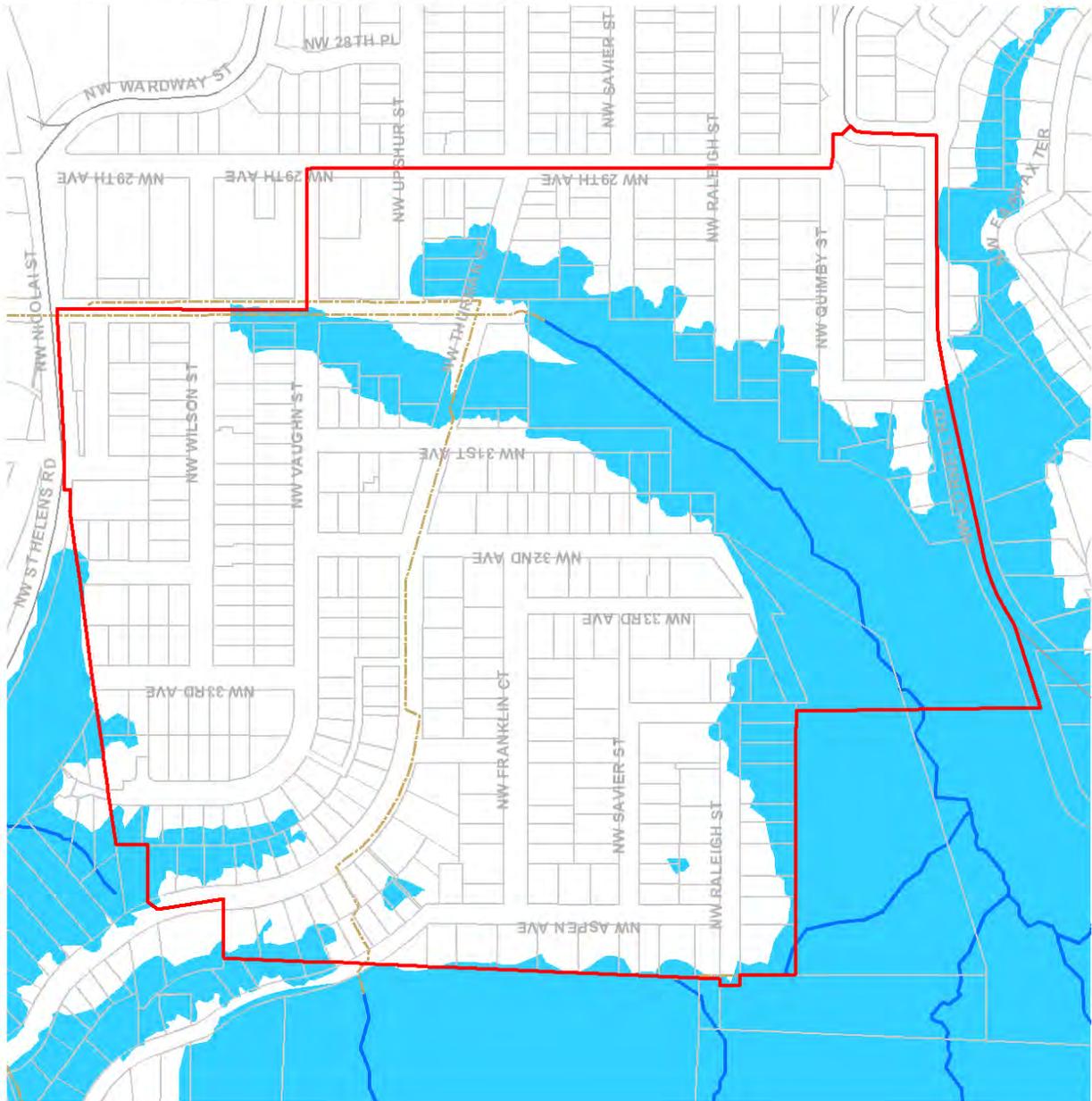
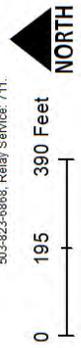
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**Resource Site: FP31
Lower Macleay**

**Map F: Determination of
Significance**

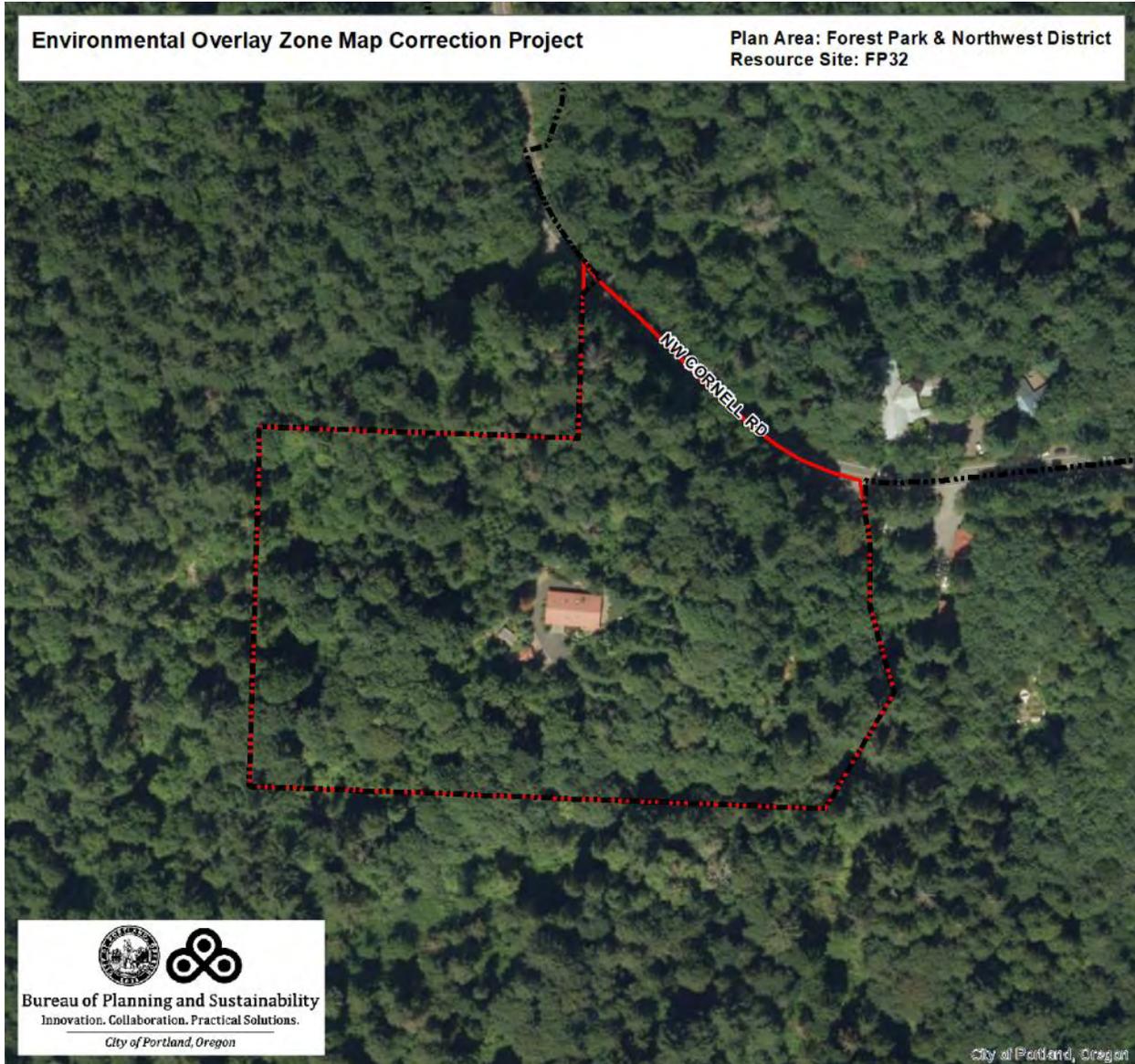
- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP32 Resource Site Name: Southwest Cornell Rd.

Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 78



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP32
		Study Area
Stream (Miles)		0.7
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		8.1
	Forest (acres)	8.1
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		7.7
Impervious Surface (acres)		0.4
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The streams are surrounded by forest on steep slopes, this provides cover and habitat for wildlife. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP32				
Resource Site (acres) = 8.45923				
	High	Medium	Low	Total
Riparian Corridors*				
acres	2.7	3.1	2.4	8.1
percent total inventory site area	31.6%	36.3%	28.0%	95.9%
Wildlife Habitat*				
acres	8.1	0.0	0.0	8.1
percent total inventory site area	95.9%	0.0%	0.0%	95.9%
Special Habitat Areas**				
acres				8.5
percent total inventory site area				99.9%
Combined Total⁺				
acres	8.5	0.0	0.0	8.5
percent total inventory site area	99.9%	0.0%	0.0%	99.9%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP32 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP32, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and

air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

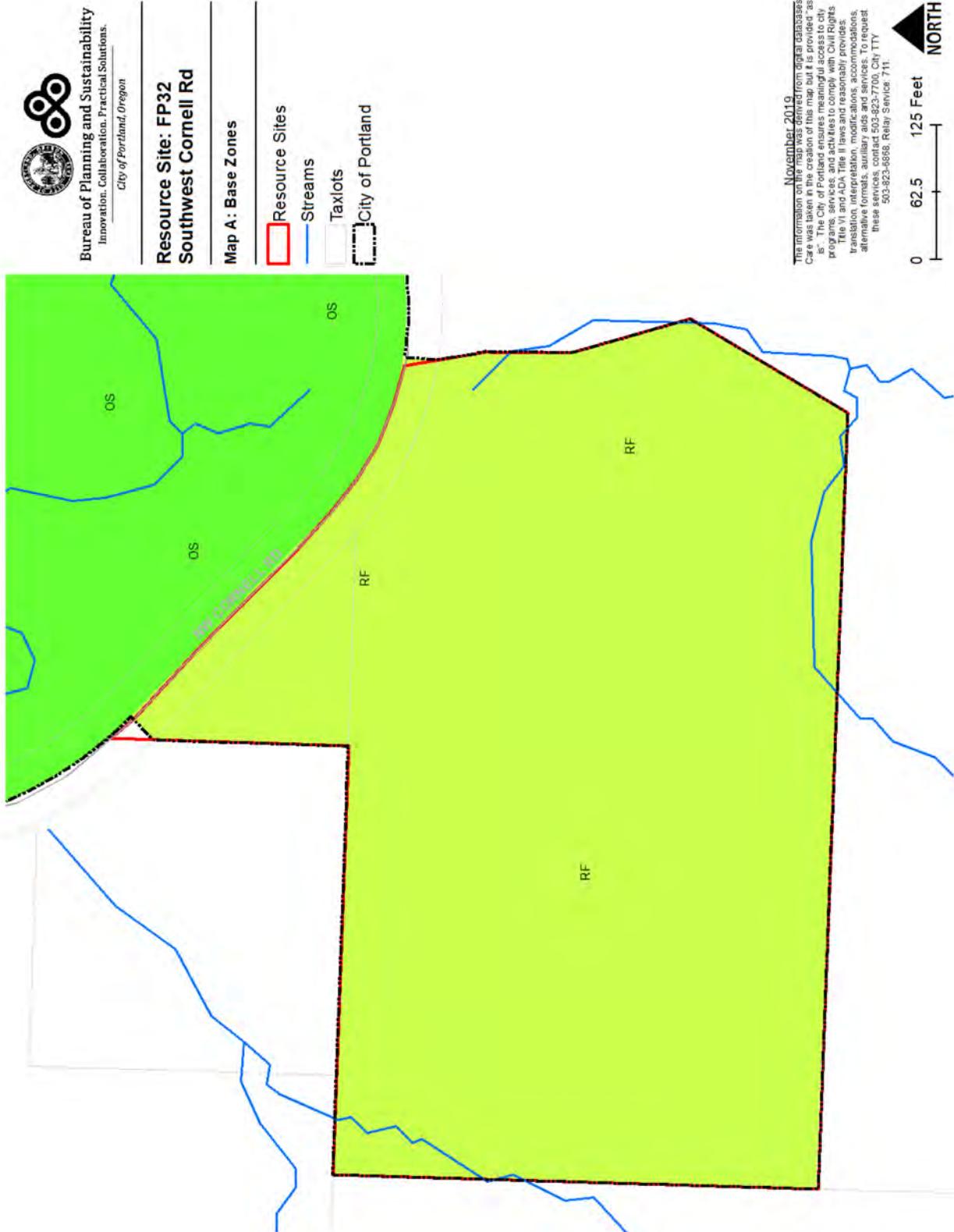
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

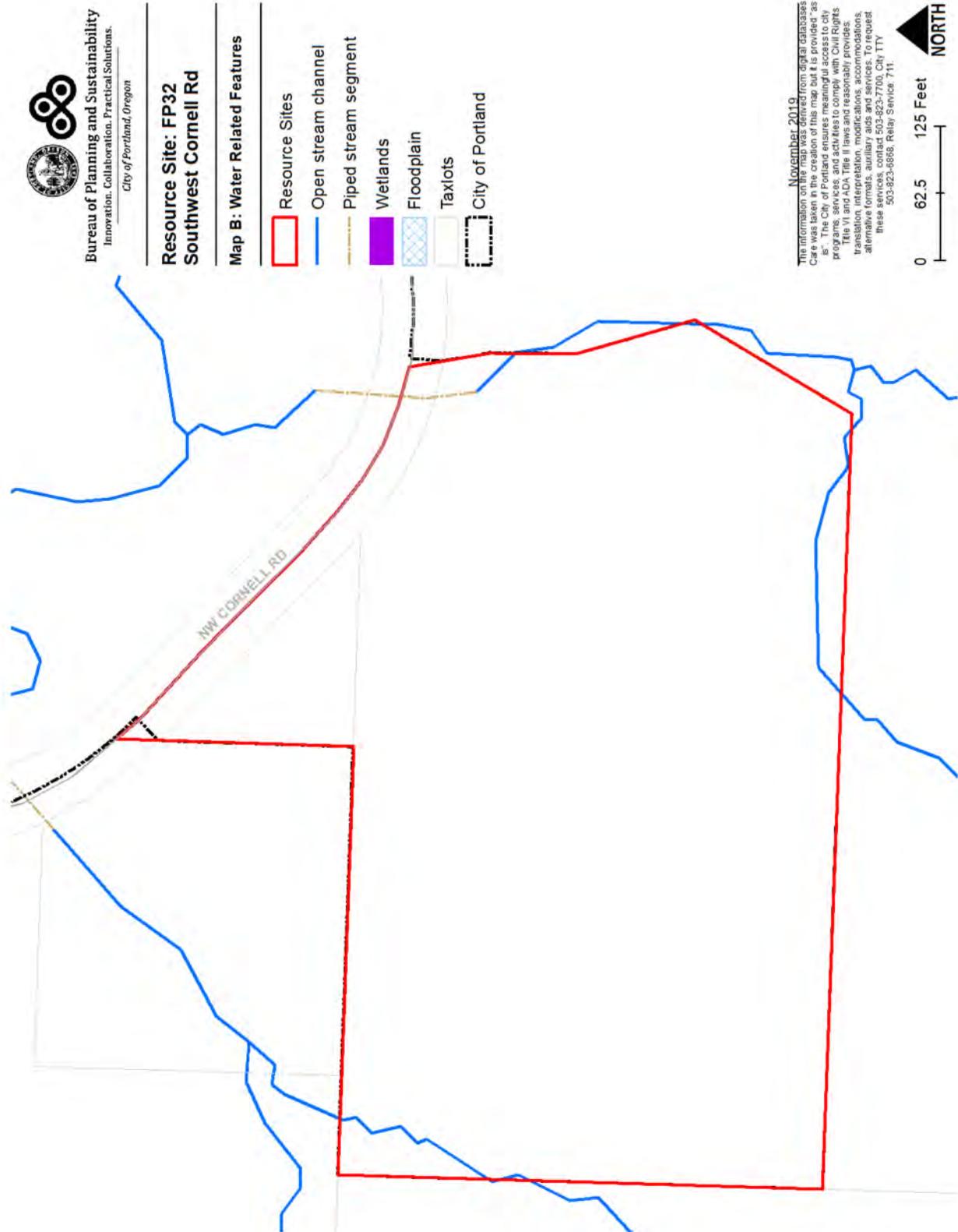
ESEE Decisions

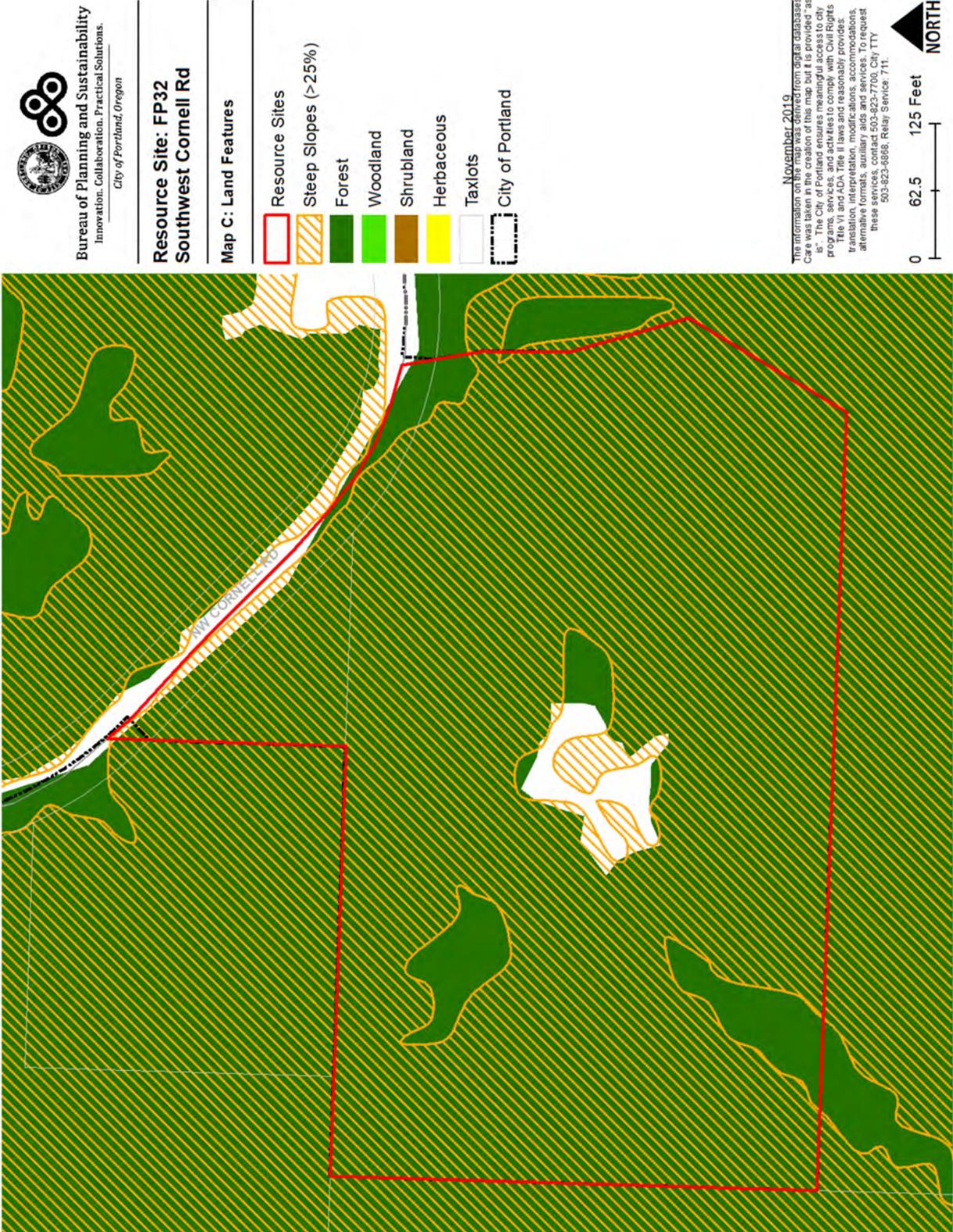
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP32 are:

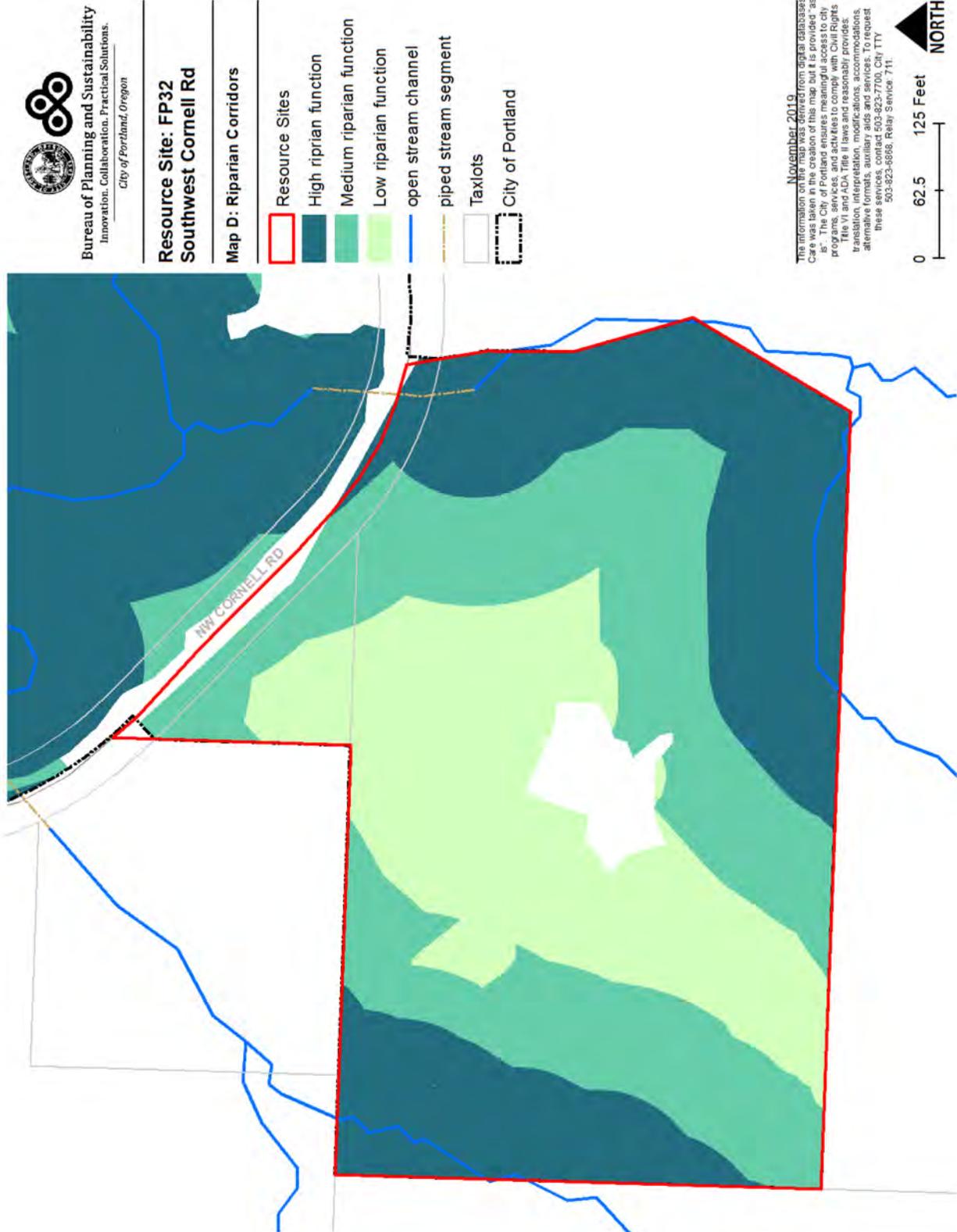
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 200 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 200 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 200 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

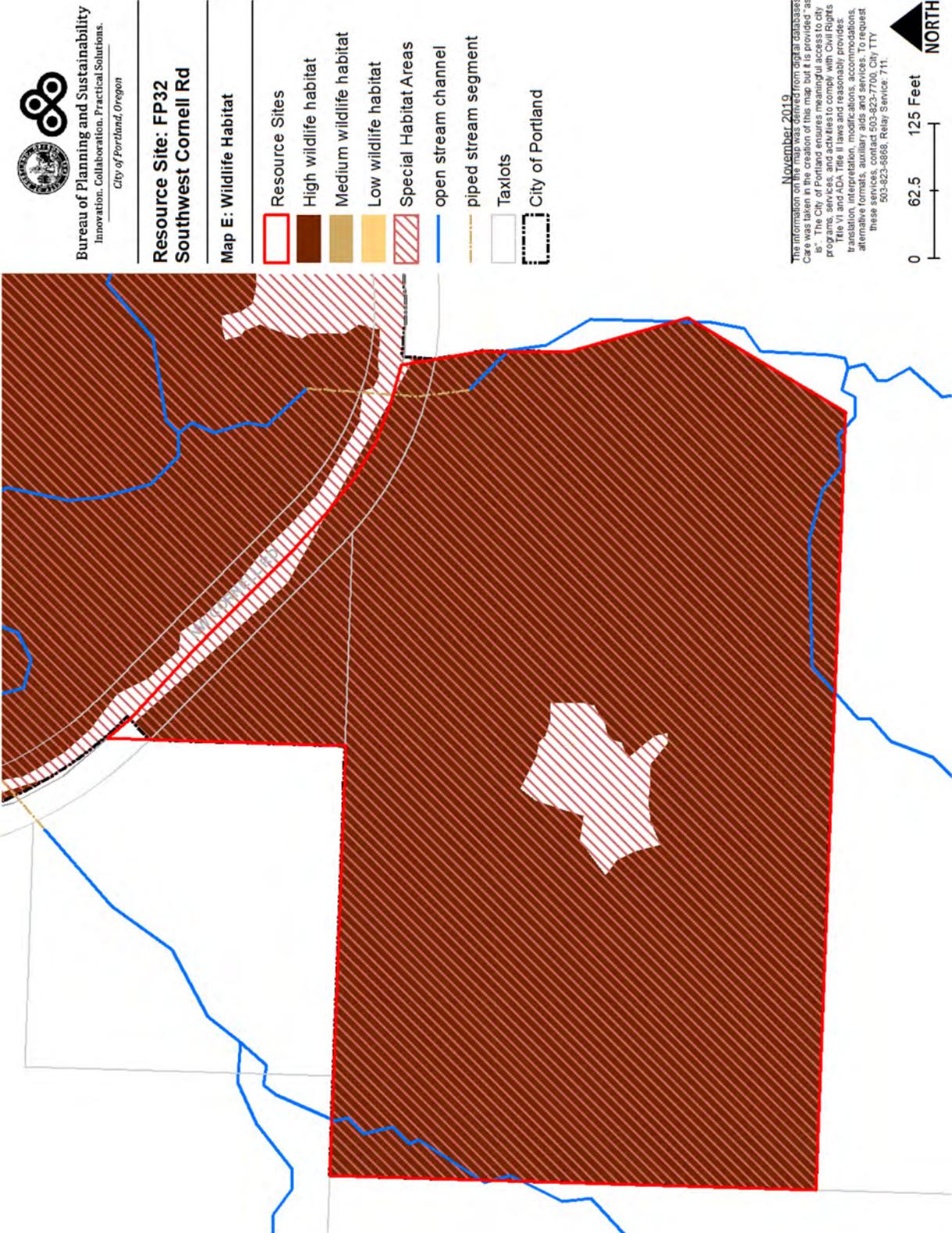
ESEE Decision	Acres
Strictly Limit	4.4
Limit	2.4
Allow	1.6

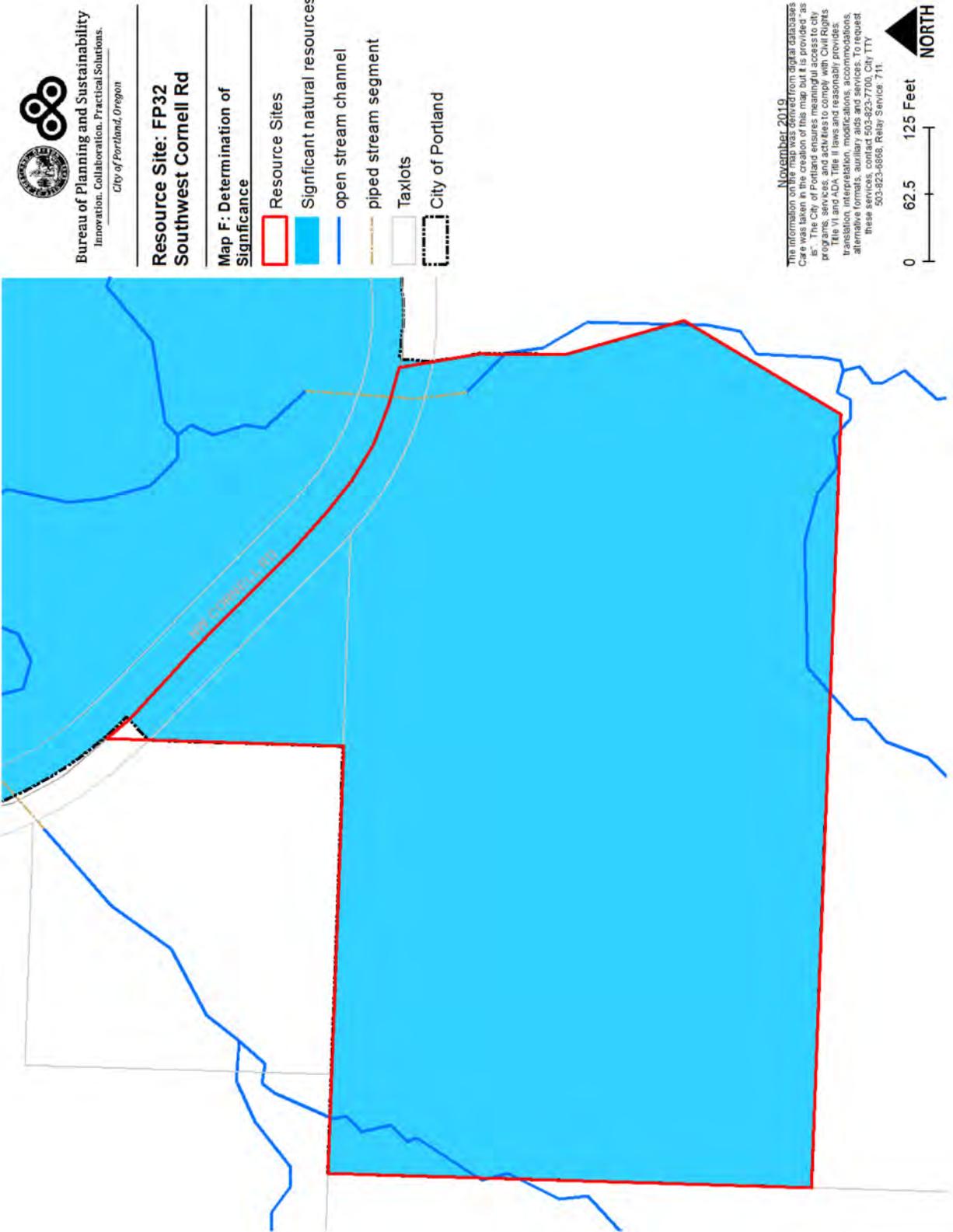












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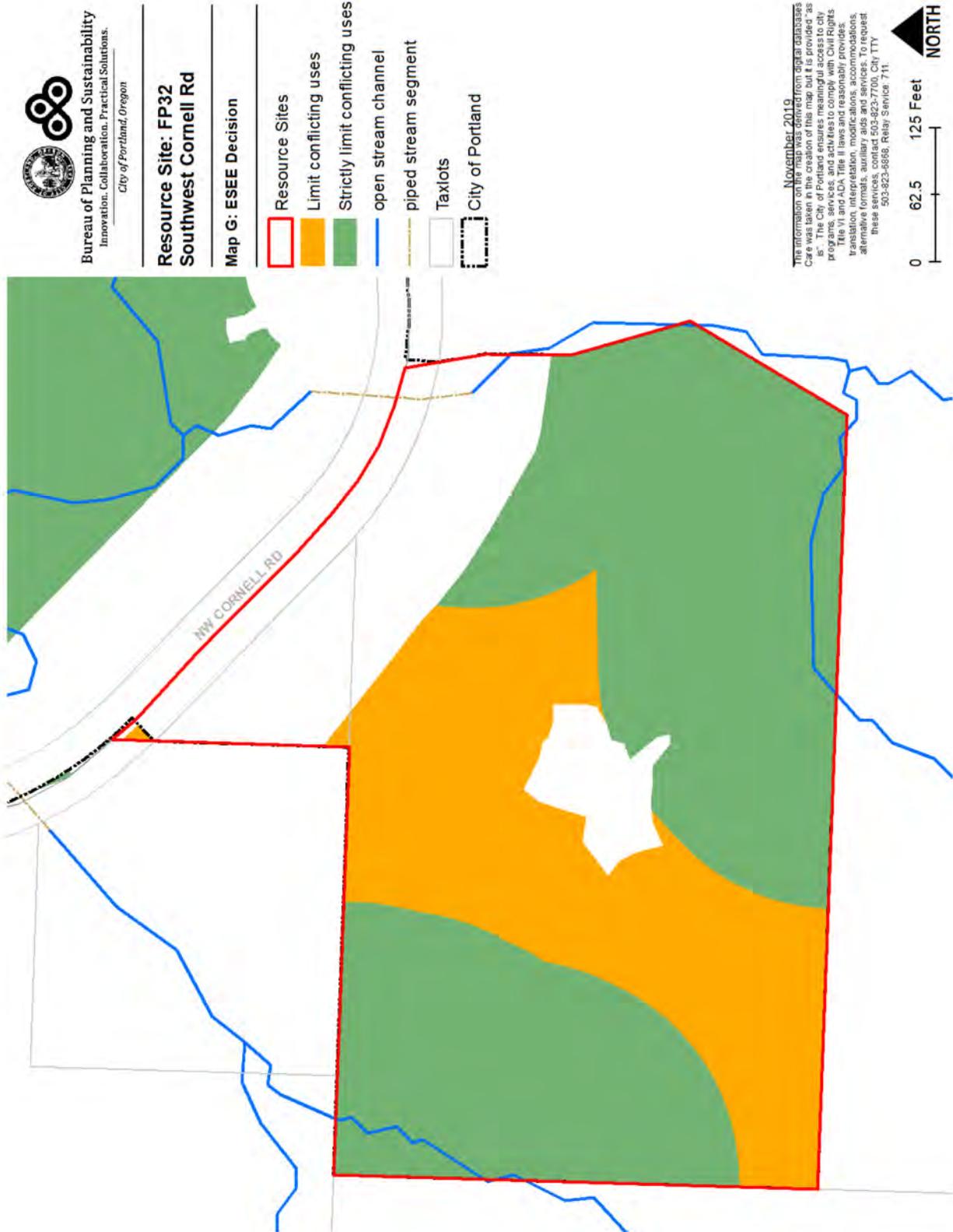
Resource Site: FP32
Southwest Cornell Rd

Map F: Determination of Significance

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

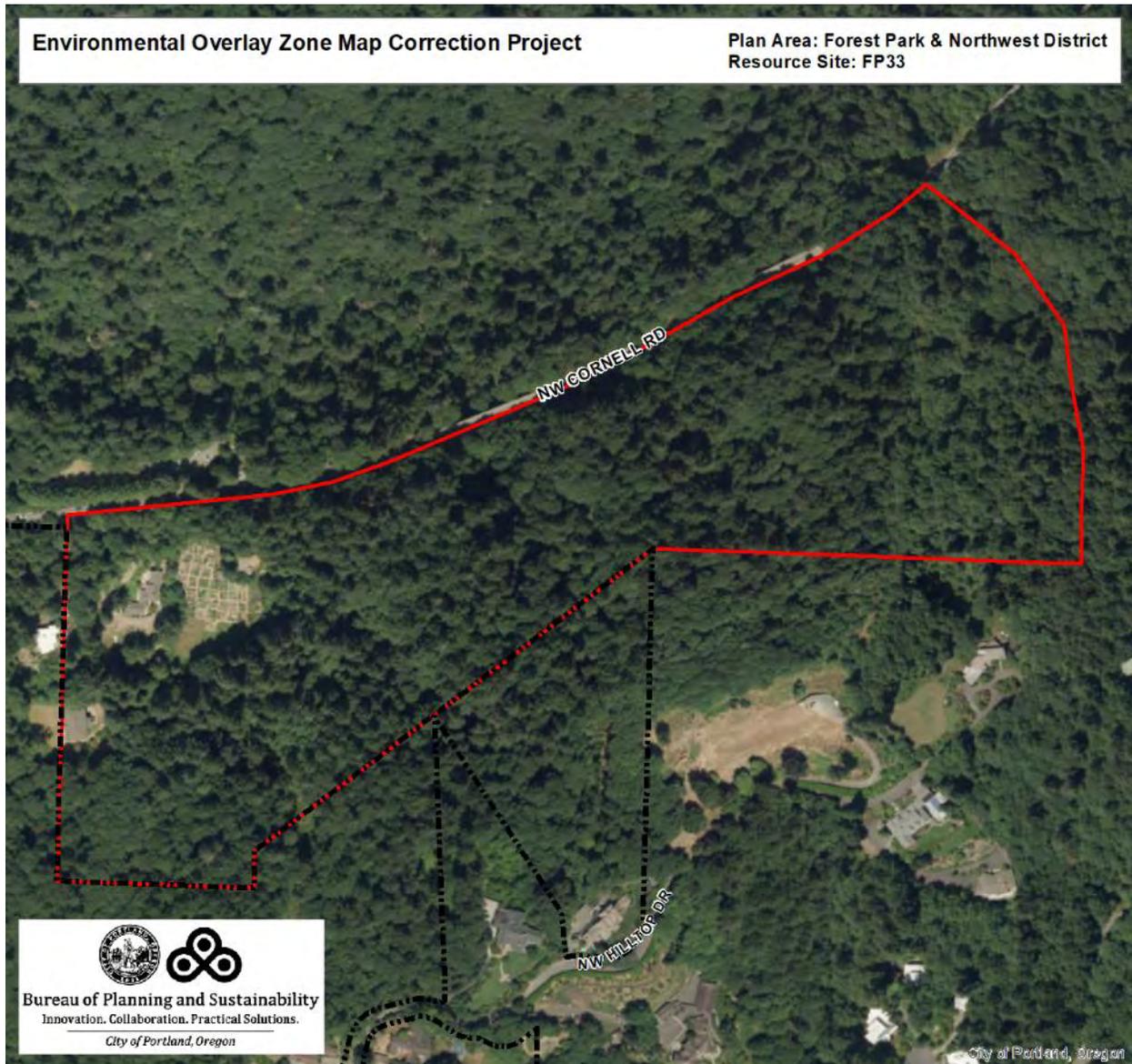
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Resource Site No.: FP33 Resource Site Name: Cornell Tunnels

Previous Plan: Balch Creek Watershed Protection Plan Previous Resource Site No.: 77



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP33
		Study Area
Stream (Miles)		0.5
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		33.4
	Forest (acres)	32.1
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	1.3
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		32.0
Impervious Surface (acres)		1.7
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland's West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The streams are surrounded by forest on steep slopes, this provides cover and habitat for wildlife. Some of the trees in the site are among the largest in the city. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP33				
Resource Site (acres) = 34.609141				
	High	Medium	Low	Total
Riparian Corridors*				
acres	13.1	12.8	7.7	33.5
percent total inventory site area	37.8%	36.9%	22.2%	96.9%
Wildlife Habitat*				
acres	32.1	0.0	0.0	32.1
percent total inventory site area	92.9%	0.0%	0.0%	92.9%
Special Habitat Areas**				
acres				34.6
percent total inventory site area				100.0%
Combined Total⁺				
acres	34.6	0.0	0.0	34.6
percent total inventory site area	100.0%	0.0%	0.0%	100.0%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP33 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RH base zones. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP33, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP33 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Limit* conflicting uses within areas of woodland, shrubland and herbaceous vegetation.
4. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	26.5
Limit	1.0
Allow	7.1

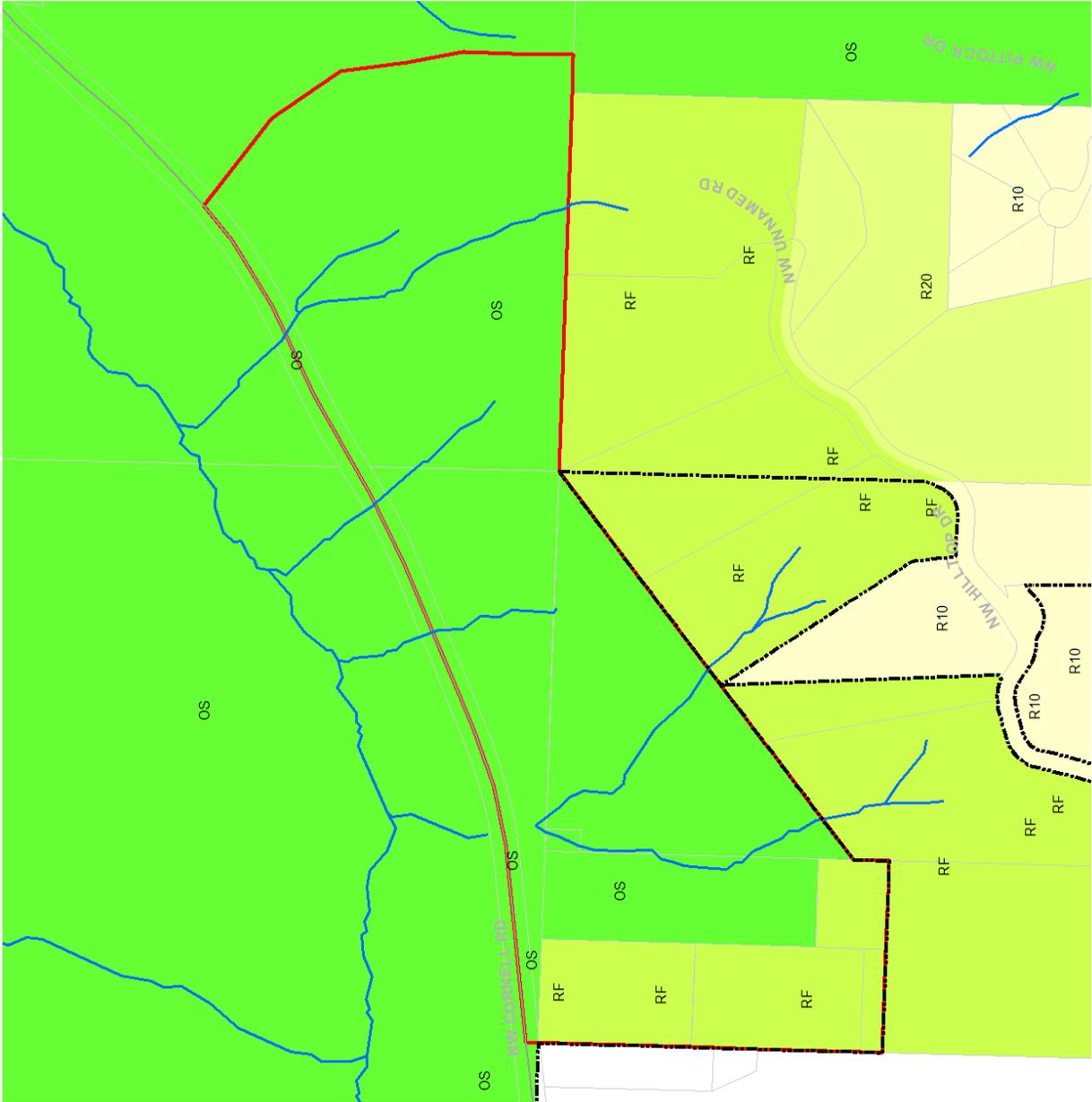


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**Resource Site: FP33
Cornell Tunnels**

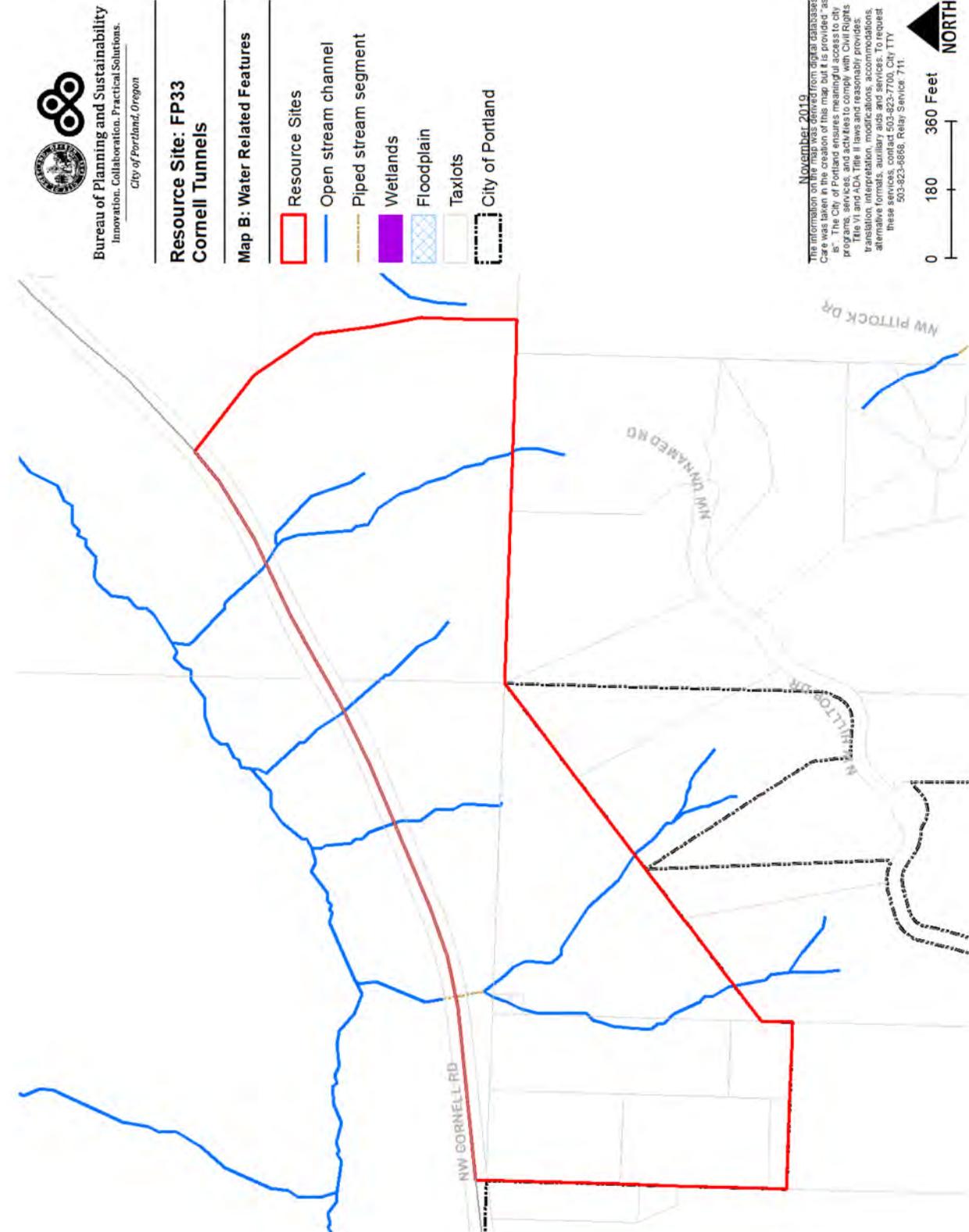
Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland



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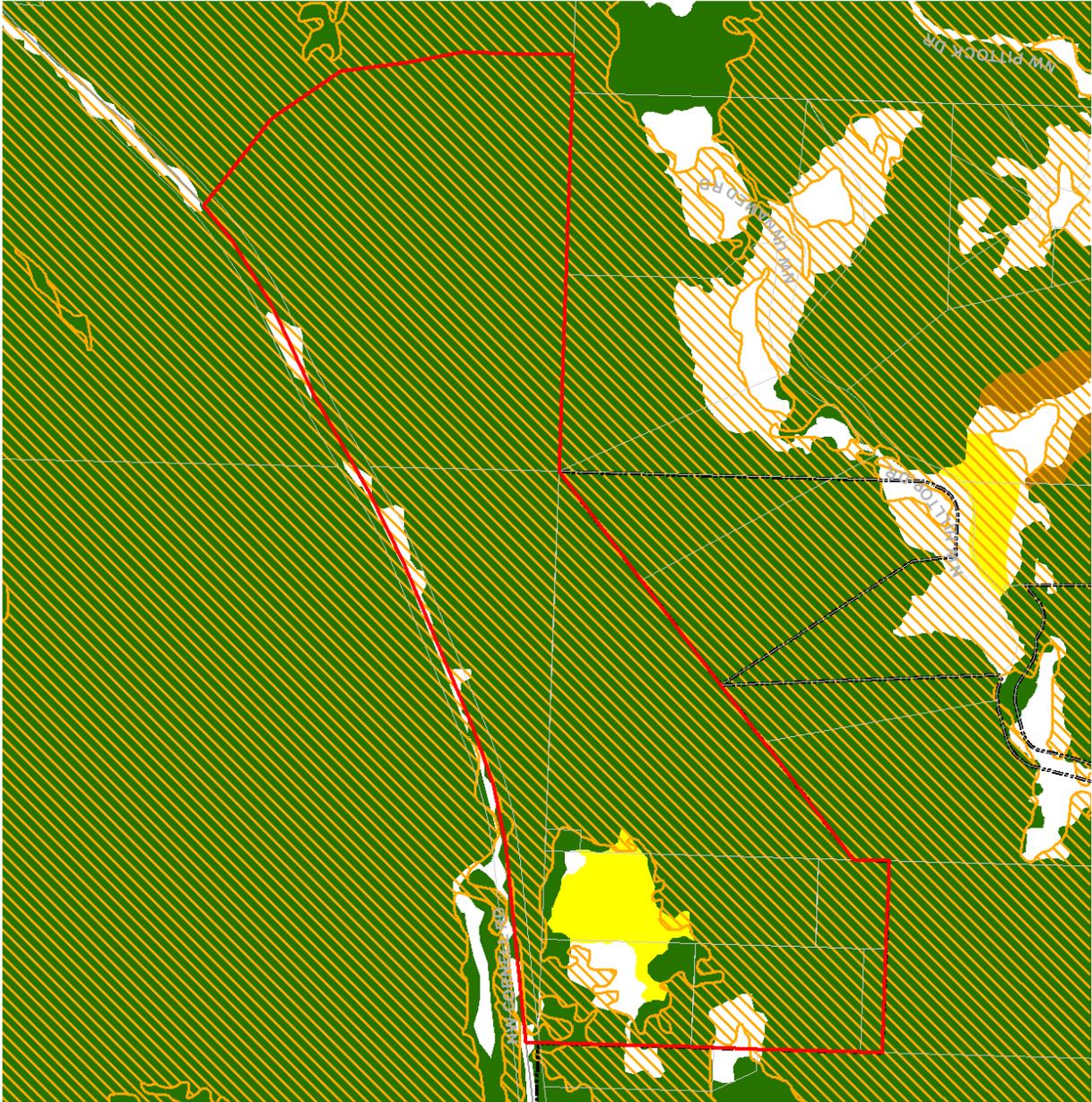


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**Resource Site: FP33
Cornell Tunnels**

Map C: Land Features

-  Resource Sites
-  Steep Slopes (>25%)
-  Forest
-  Woodland
-  Shrubland
-  Herbaceous
-  Taxlots
-  City of Portland



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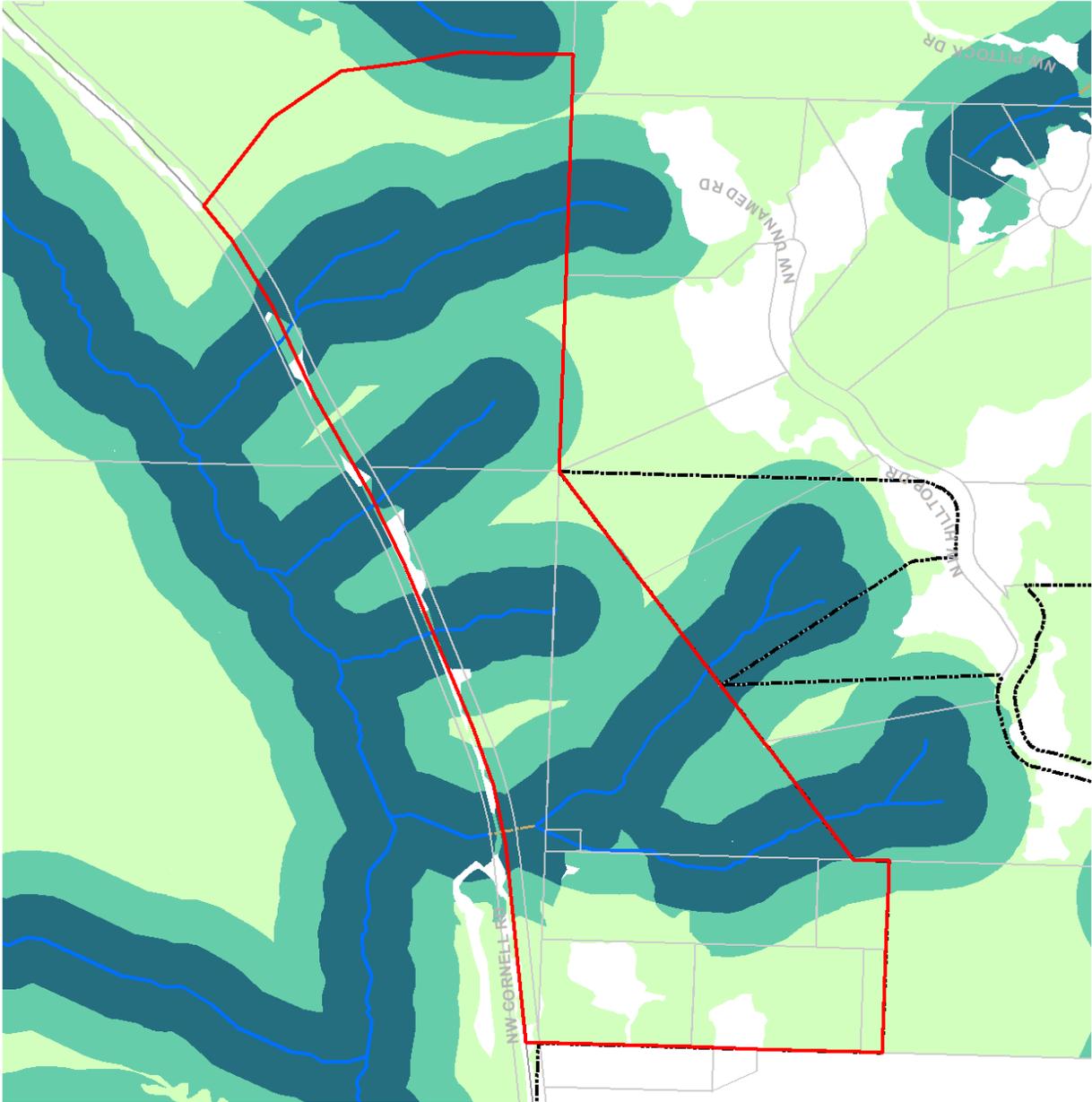


**Resource Site: FP33
Cornell Tunnels**

Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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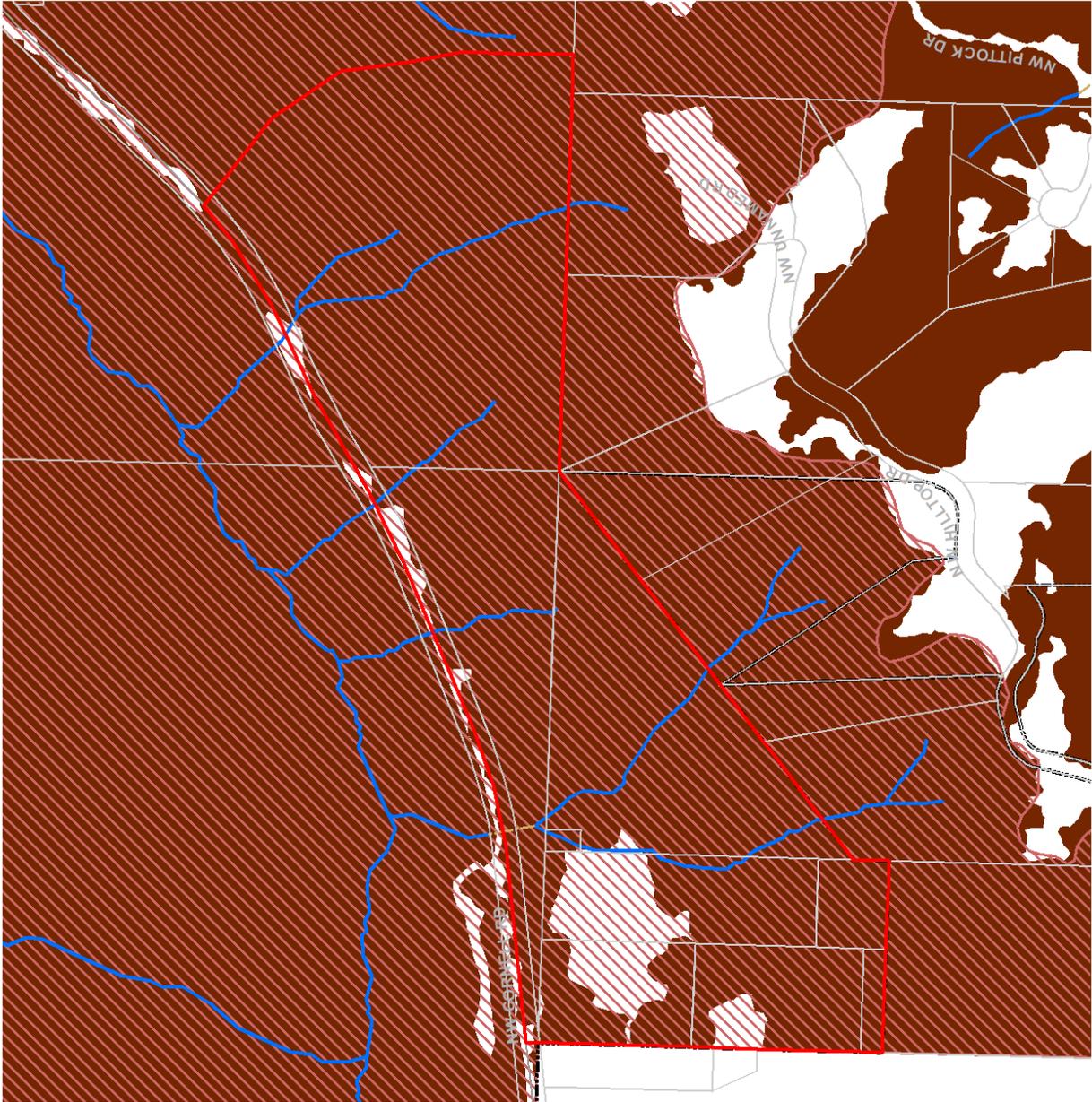


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**Resource Site: FP33
Cornell Tunnels**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



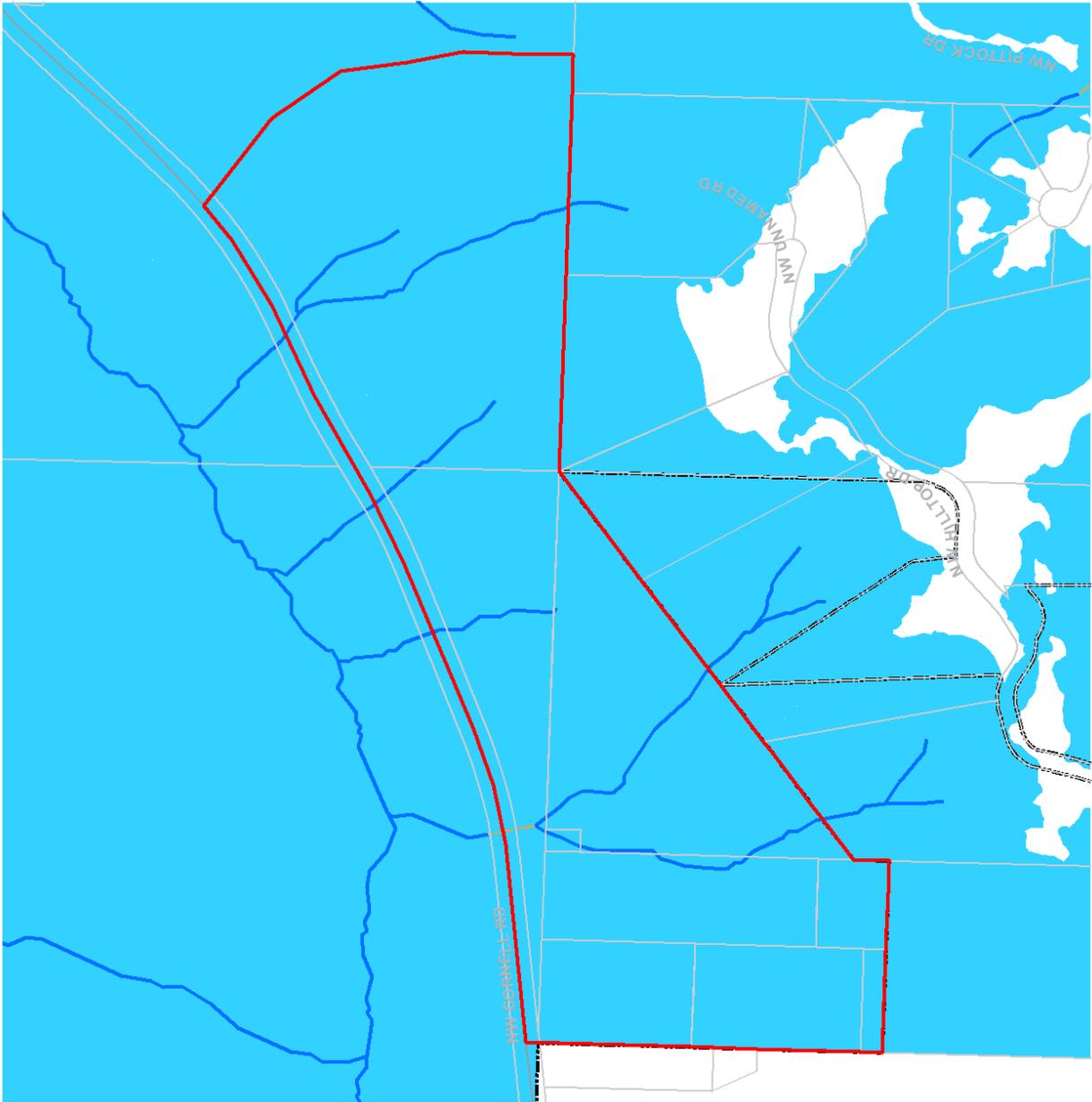
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**Resource Site: FP33
Cornell Tunnels**

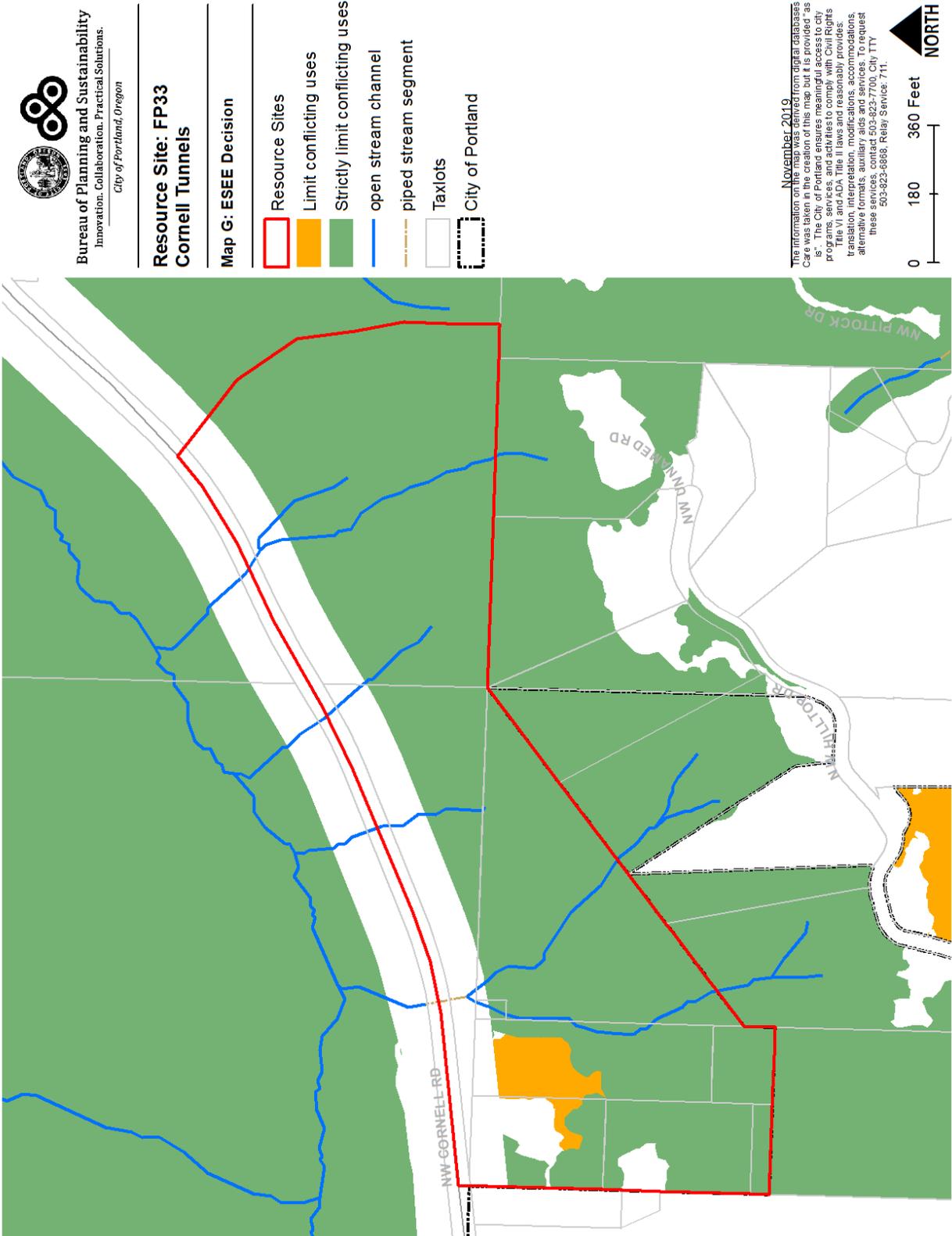
**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



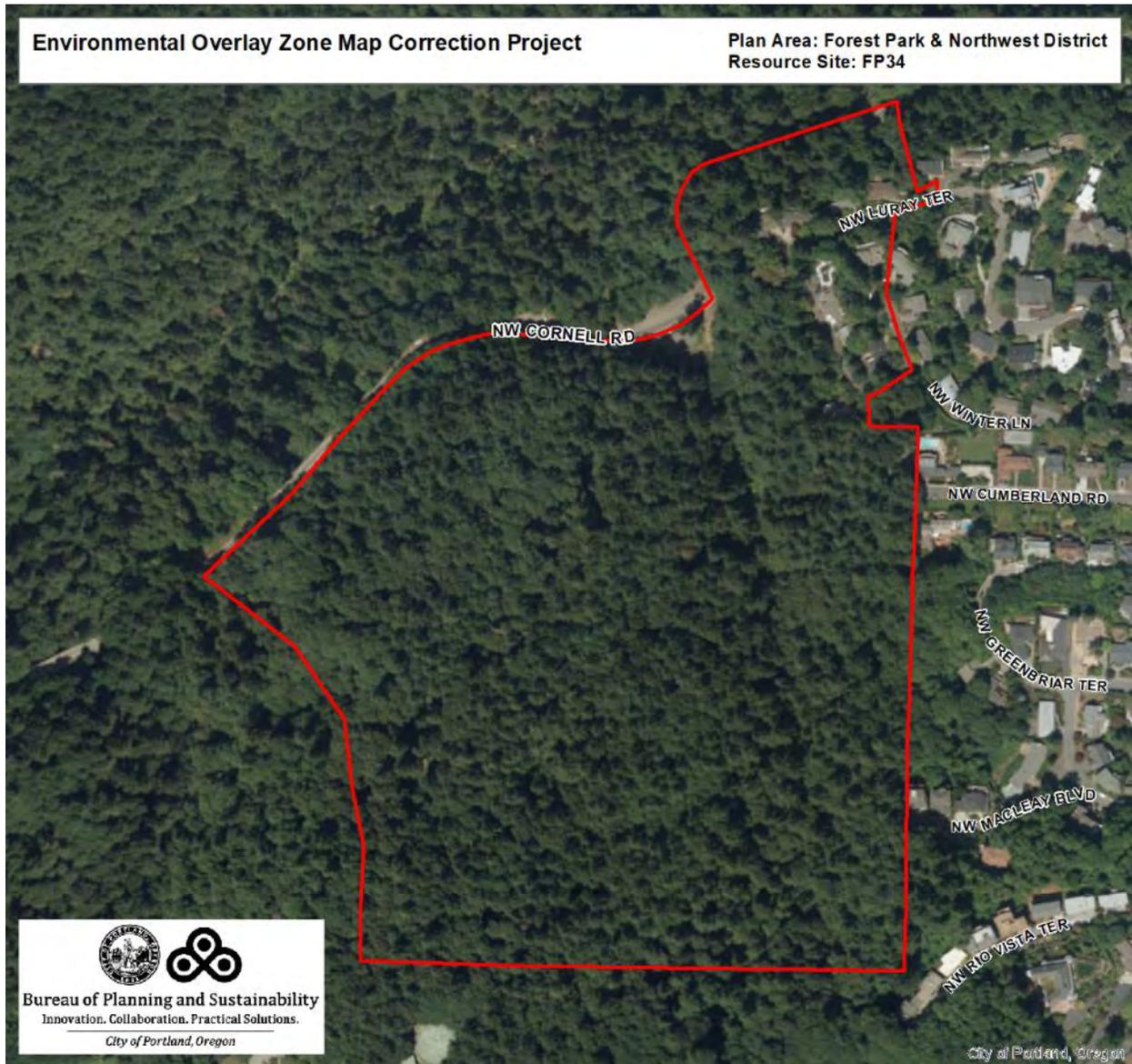
November 2019
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Resource Site No.: FP34 **Resource Site Name:** South of Cornell Rd

Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 76



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP34
		Study Area
Stream (Miles)		0.3
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		42.3
	Forest (acres)	42.3
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		43.7
Impervious Surface (acres)		3.4
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland's West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The streams are surrounded by forest on steep slopes, this provides cover and habitat for wildlife. The forest represents a rare late successional community. It contains a variety of shade tolerant herbs and shrubs including cascara, a once abundant shrub now rare because of over collecting for pharmaceutical use. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP34				
Resource Site (acres) = 45.065922				
	High	Medium	Low	Total
Riparian Corridors*				
acres	22.2	11.7	8.3	42.3
percent total inventory site area	49.4%	26.0%	18.4%	93.8%
Wildlife Habitat*				
acres	42.3	0.0	0.0	42.3
percent total inventory site area	93.8%	0.0%	0.0%	93.8%
Special Habitat Areas**				
acres				42.5
percent total inventory site area				94.3%
Combined Total⁺				
acres	43.1	0.0	0.0	43.1
percent total inventory site area	95.7%	0.0%	0.0%	95.7%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP34 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; r and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the R7 base zones. Open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP34, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the General ESEE and resource site-specific ESEE, the ESEE decisions for Resources Site FP34 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank
2. *Strictly limit* conflicting uses within areas of forest vegetation in Forest Park that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
4. *Allow* conflicting uses within all other areas containing significant natural resources.

Table C: ESEE Decision for Resource Site FP34	
ESEE Decision	Acres
Strictly Limit	36.3
Limit	0.0
Allow	8.8

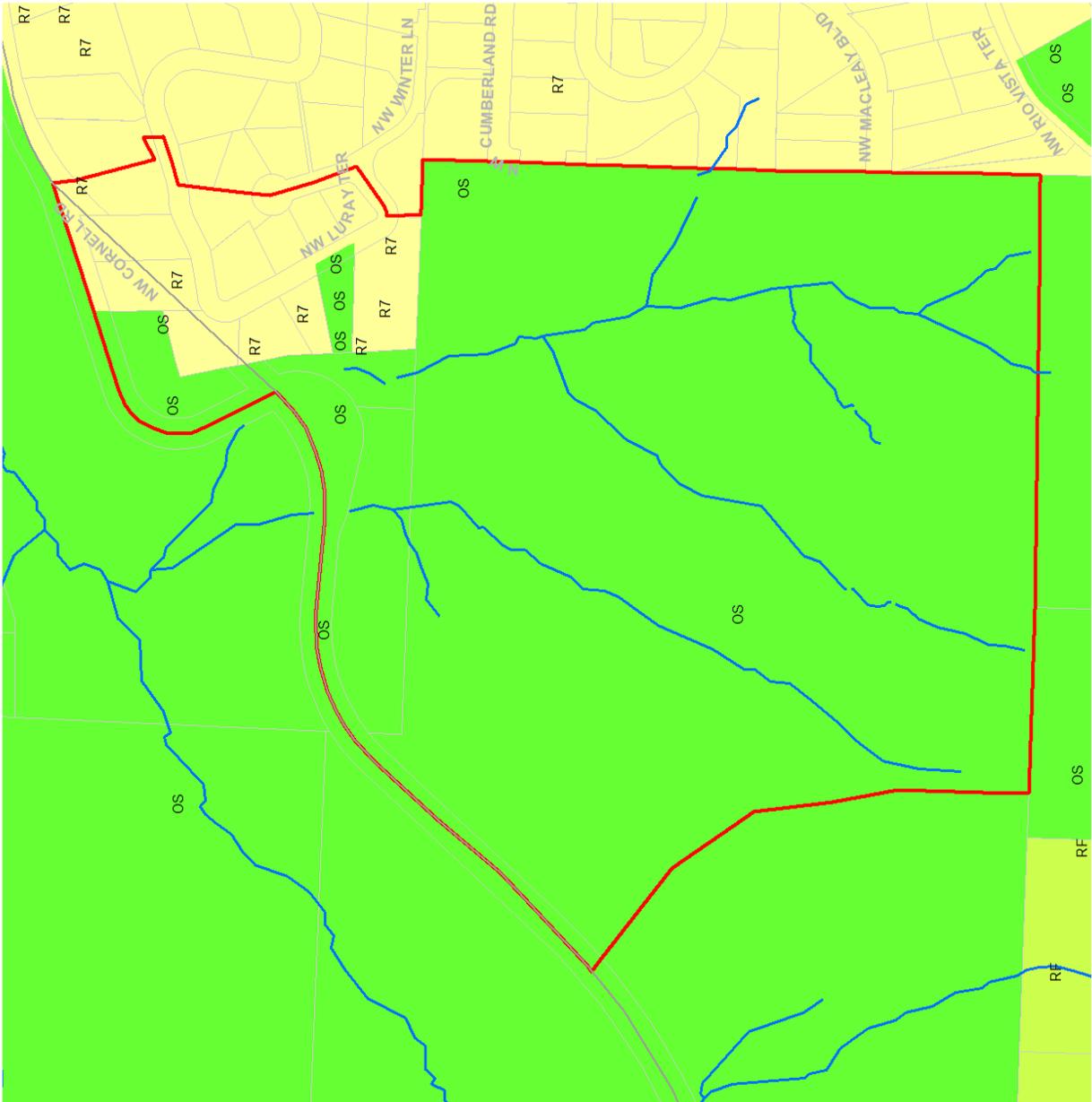


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**Resource Site: FP34
South of Cornell Rd**

Map A: Base Zones

- Resource Sites
- Streams
- Taxlots
- City of Portland



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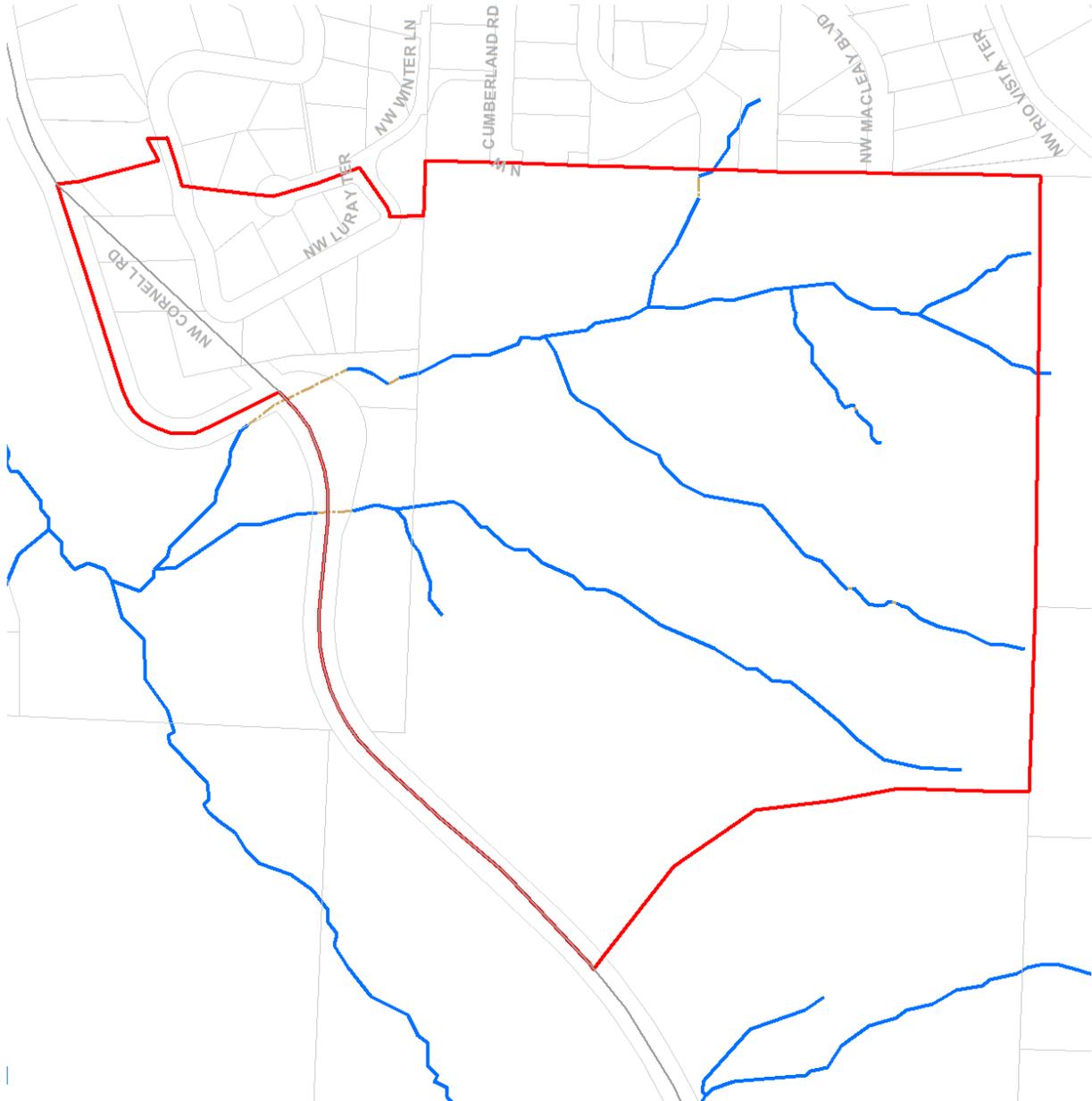


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**Resource Site: FP34
South of Cornell Rd**

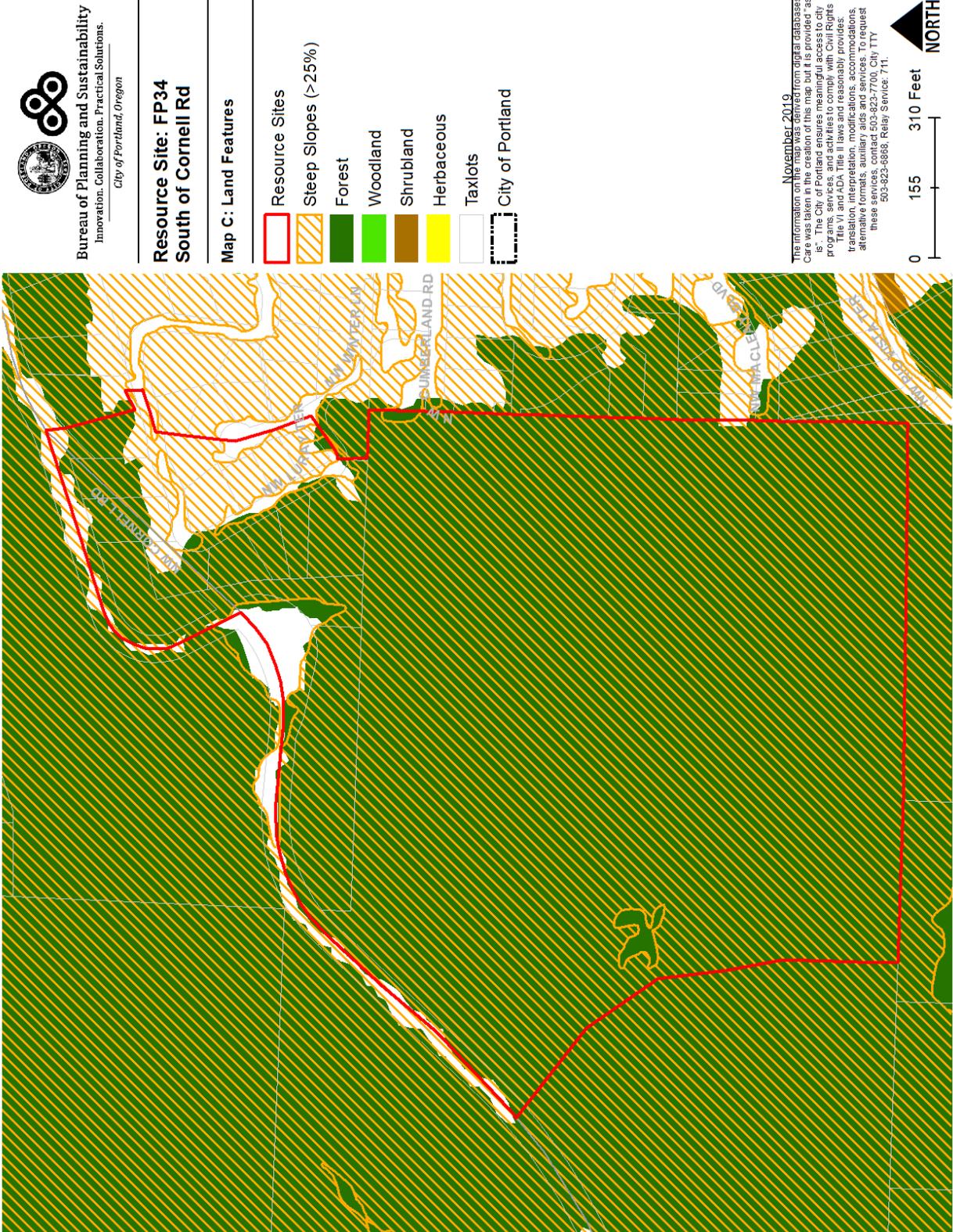
Map B: Water Related Features

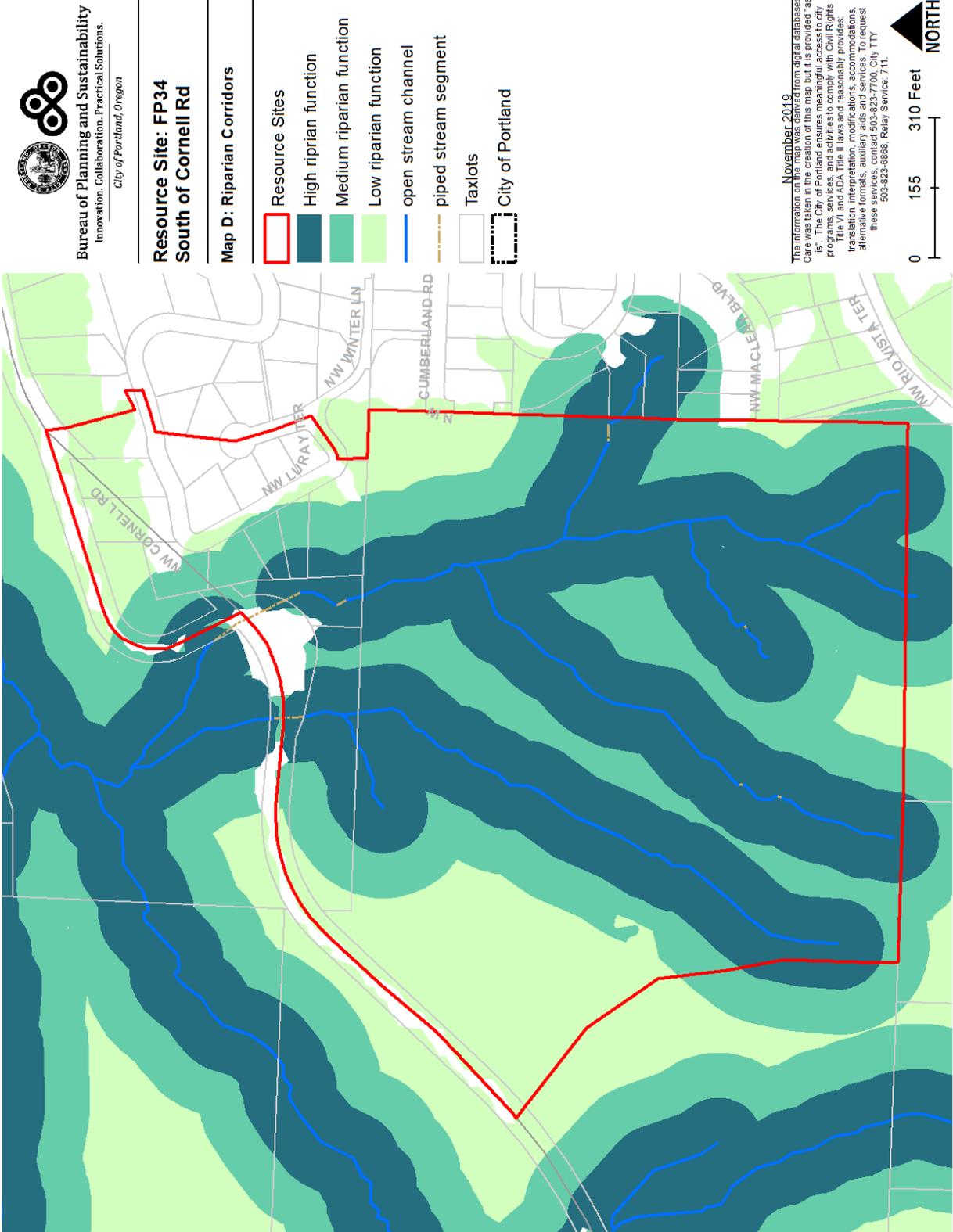
- Resource Sites
- Open stream channel
- Piped stream segment
- Wetlands
- Floodplain
- Taxlots
- City of Portland



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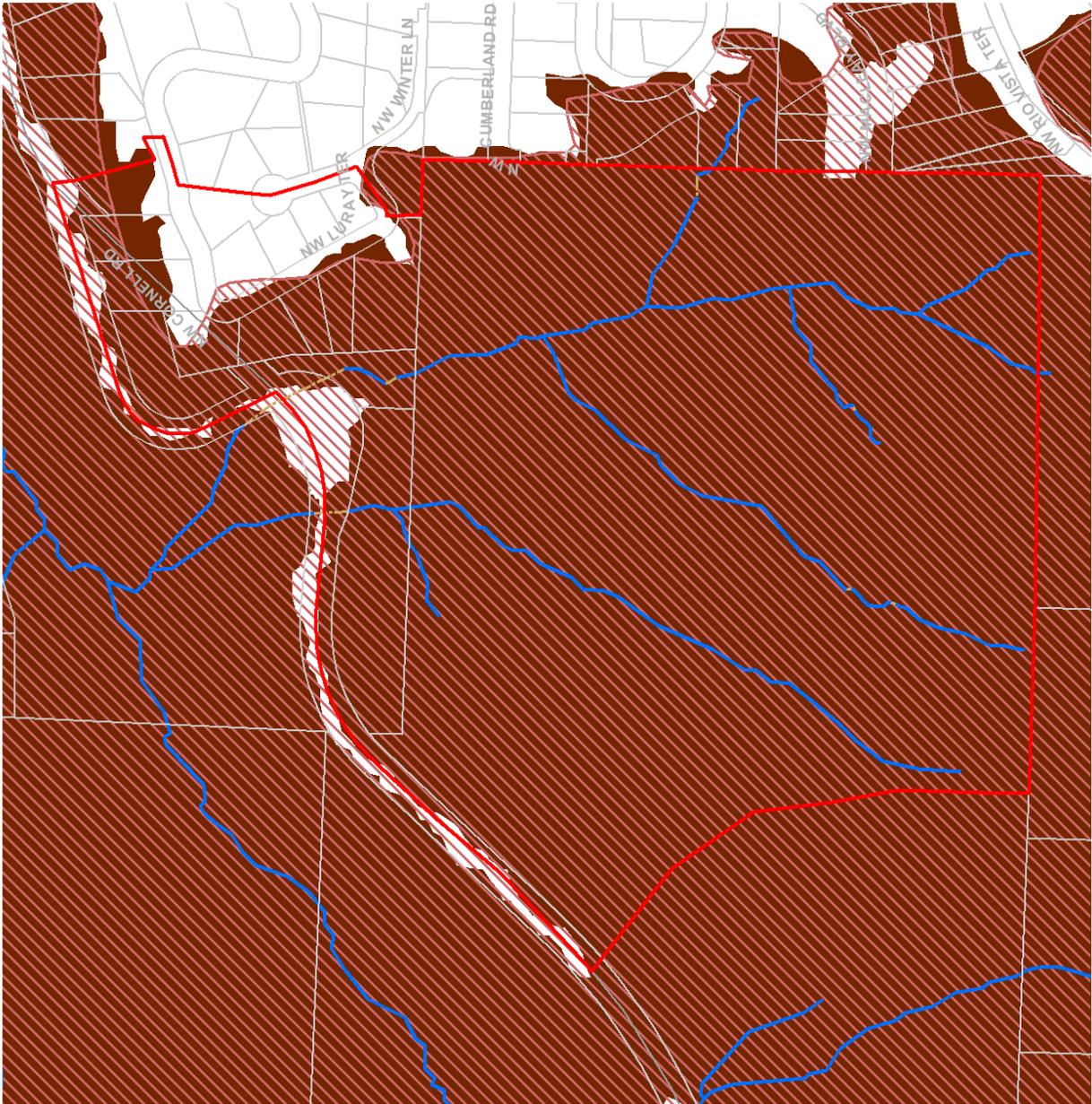




**Resource Site: FP34
South of Cornell Rd**

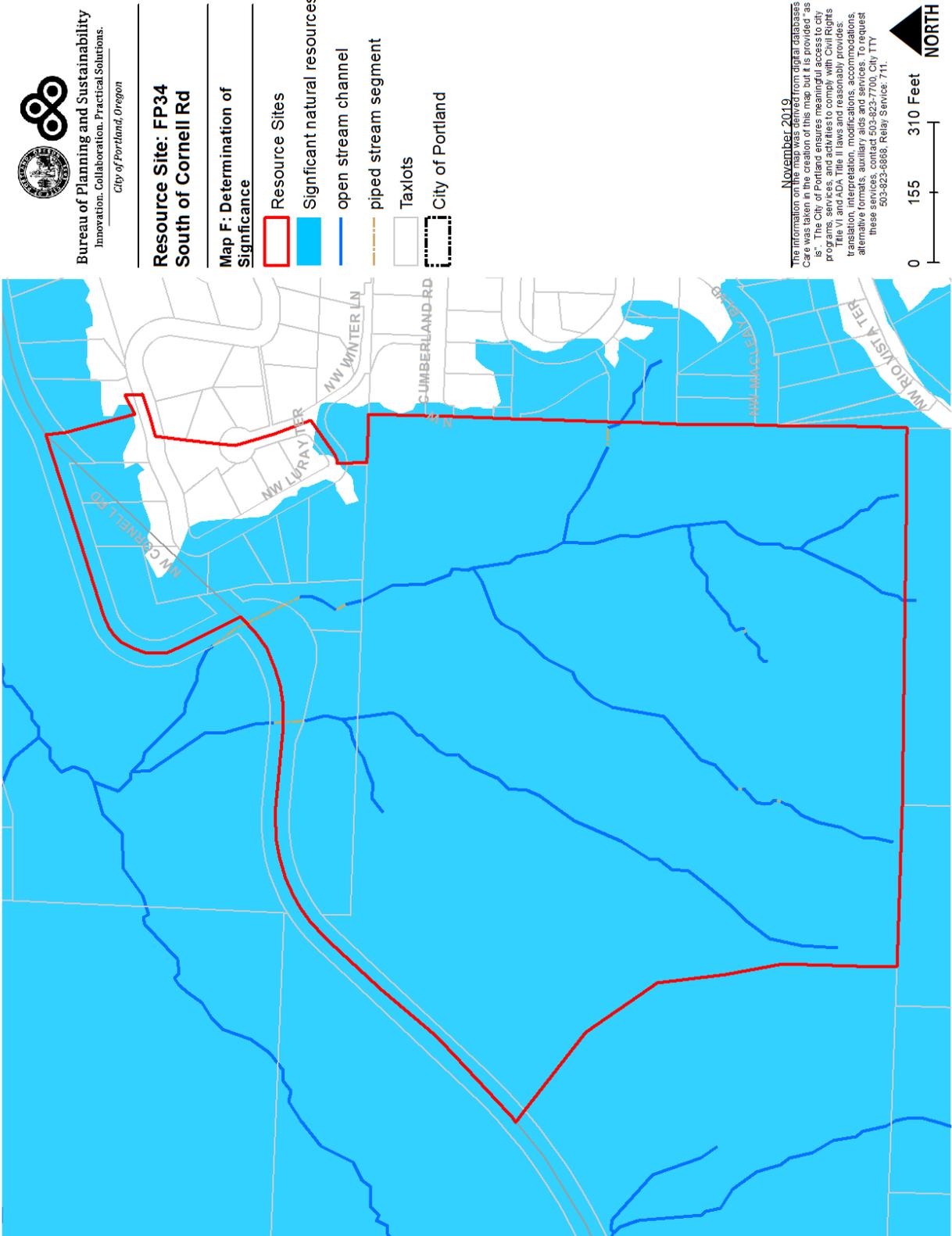
Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



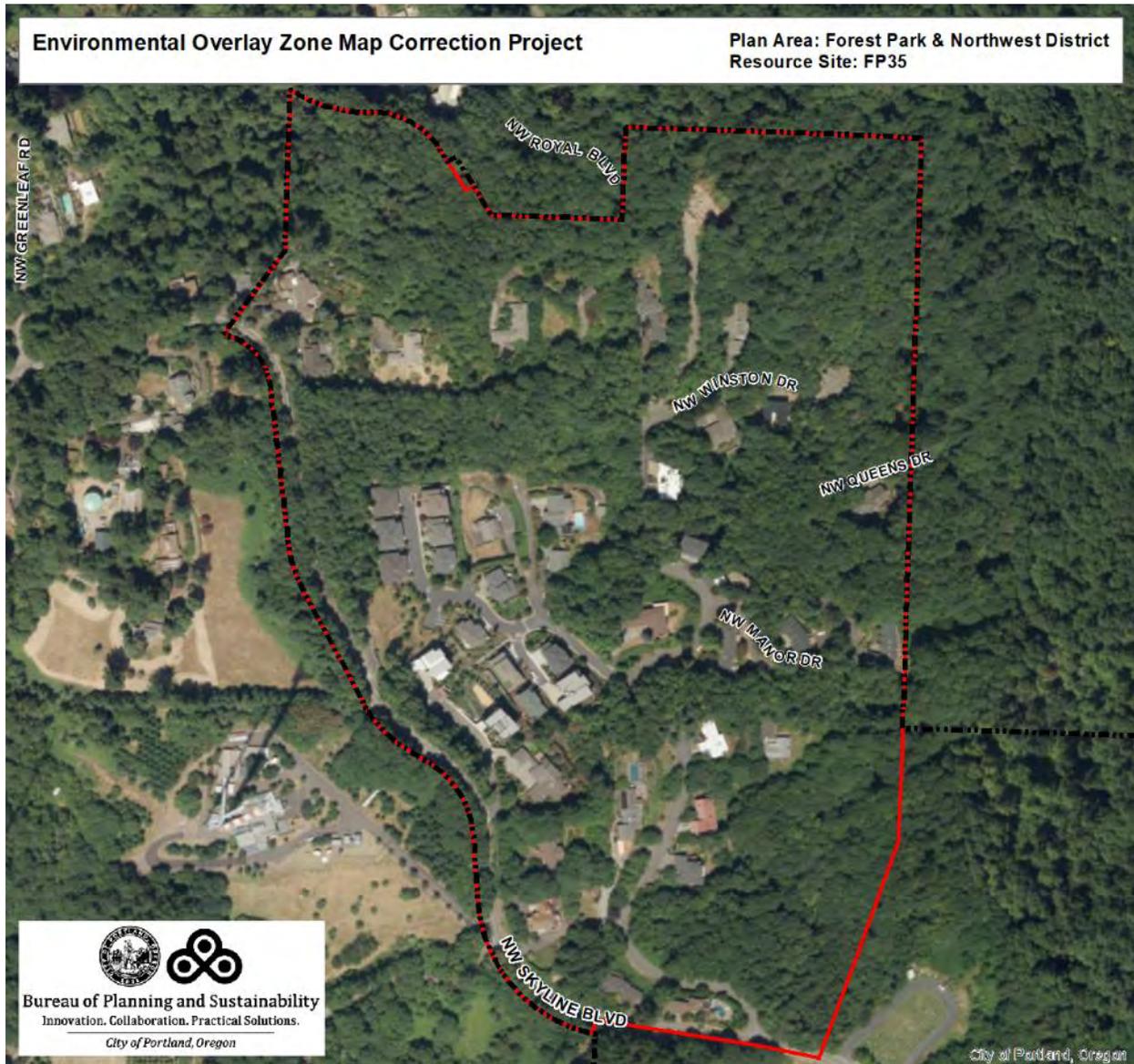
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Resource Site No.: FP35 Resource Site Name: Meridian Royal Manor
Previous Plan: Balch Creek Watershed Protection Plan Previous Resource Site No.: 82



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP35	
	Study Area
Stream (Miles)	1.1
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	35.7
Forest (acres)	35.1
Woodland (acres)	0.0
Shrubland (acres)	0.6
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	48.4
Impervious Surface (acres)	13.6
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.	
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.	

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The streams are surrounded by forest on steep slopes, this provides cover and habitat for wildlife. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP35				
Resource Site (acres) = 54.078382				
	High	Medium	Low	Total
Riparian Corridors*				
acres	15.0	10.5	10.0	35.5
percent total inventory site area	27.7%	19.4%	18.5%	65.7%
Wildlife Habitat*				
acres	33.5	0.2	0.0	33.7
percent total inventory site area	62.0%	0.3%	0.0%	62.3%
Special Habitat Areas**				
acres				32.4
percent total inventory site area				59.8%
Combined Total⁺				
acres	35.6	0.3	1.6	37.4
percent total inventory site area	65.8%	0.5%	2.9%	69.2%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP35 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF, R20 and R10 base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site **JC1**, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

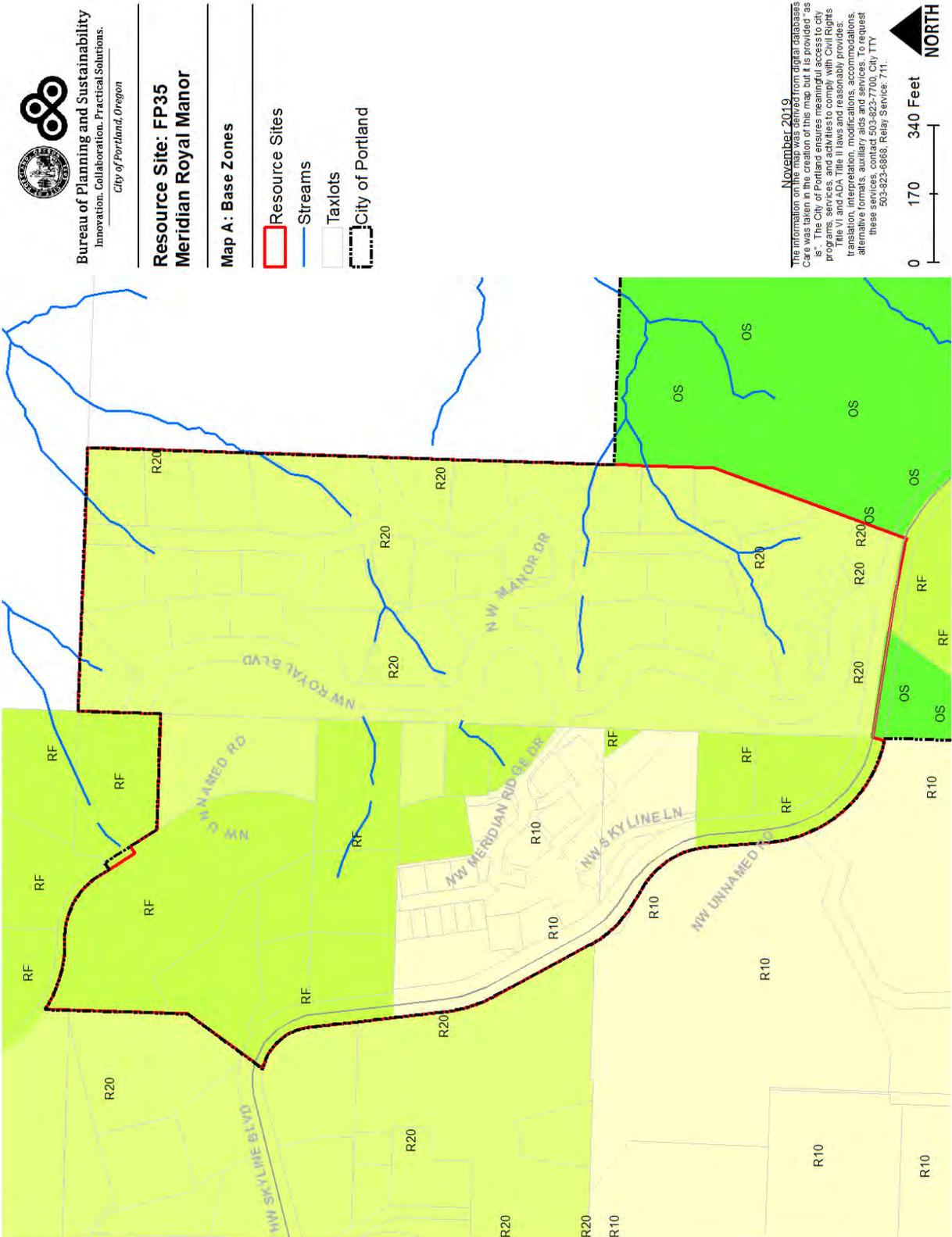
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP35 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation contiguous to but more than 100 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation west of and adjacent to NW Skyline Boulevard.
5. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
6. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	14.5
Limit	18.2
Allow	21.4



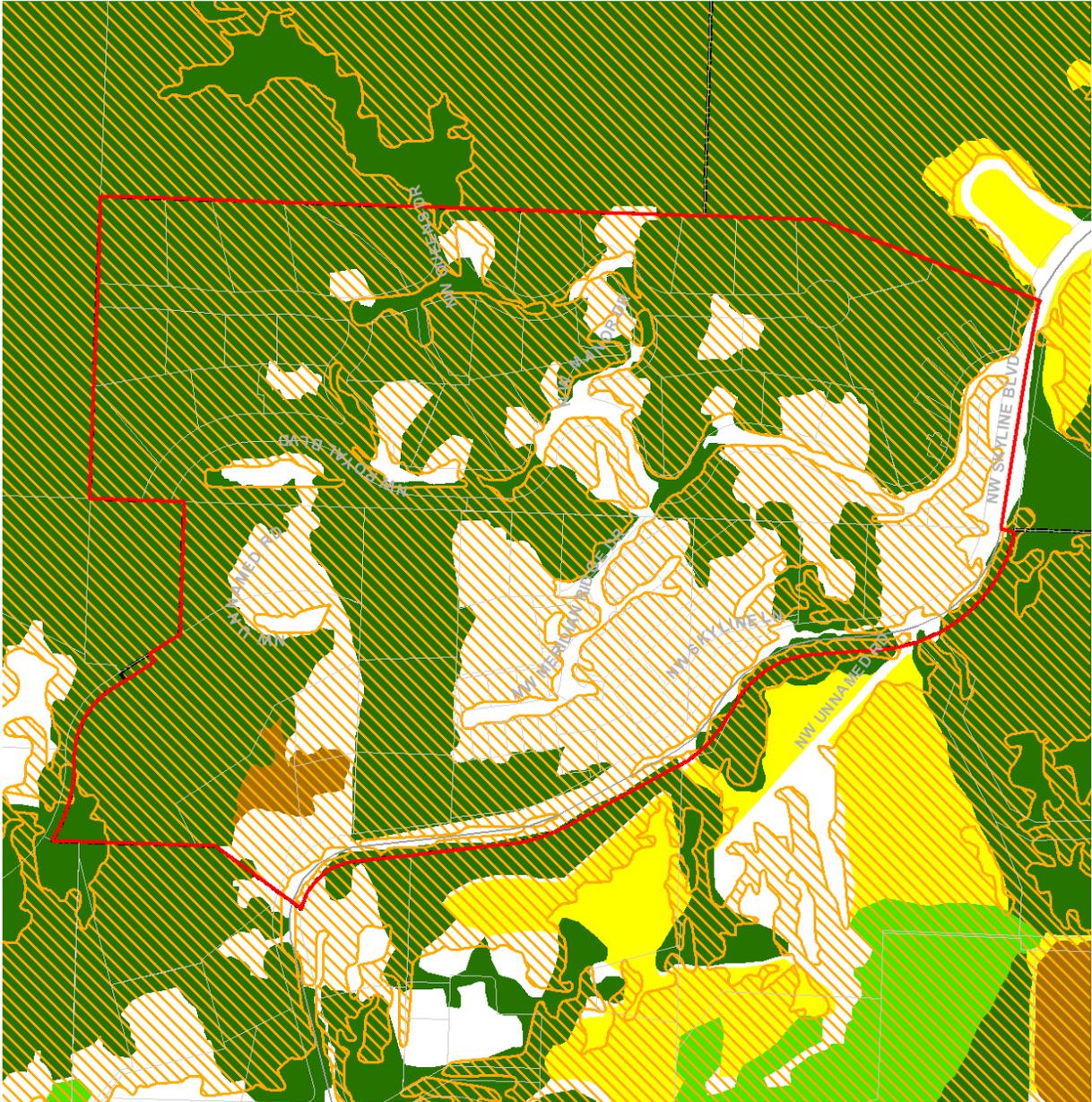


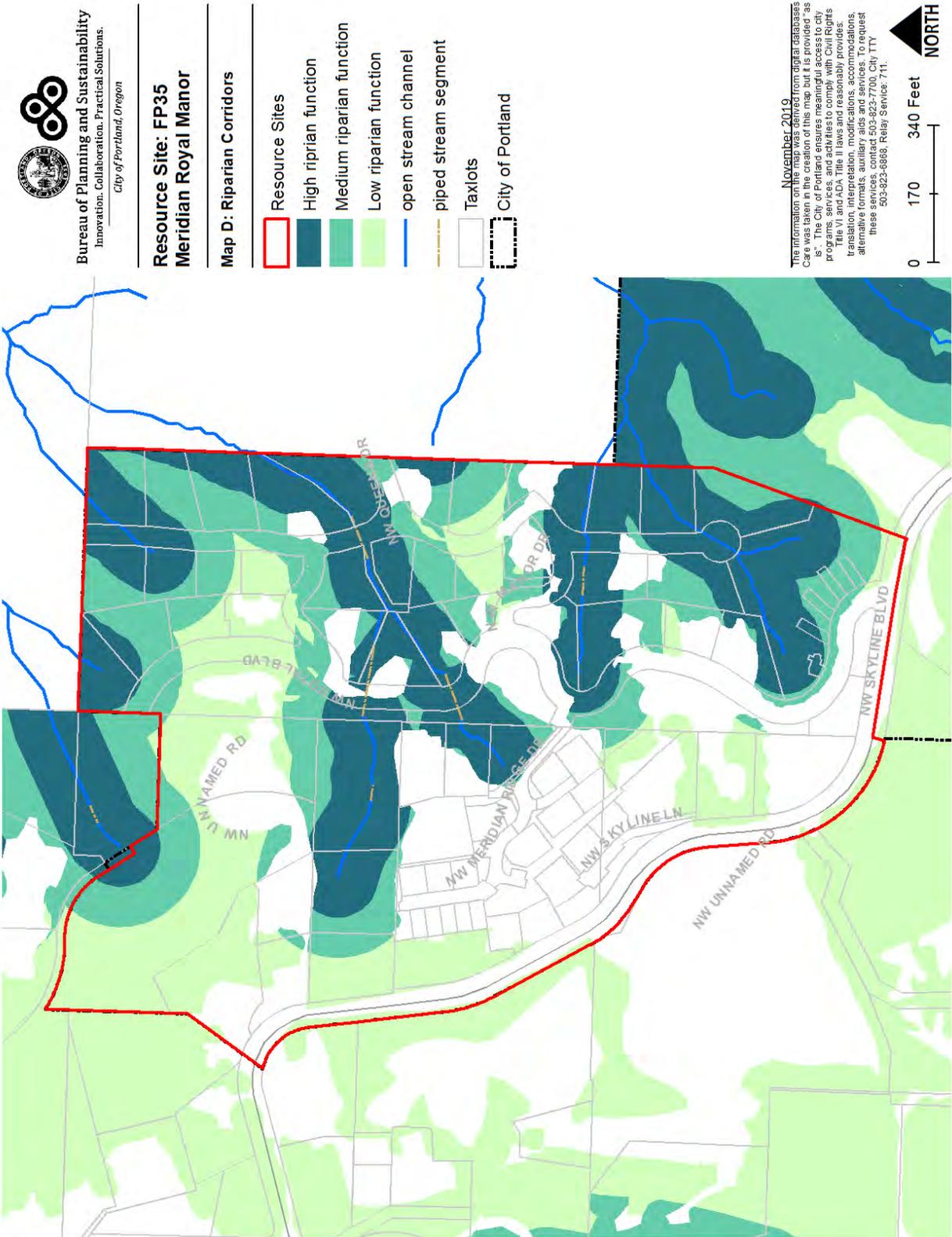
**Resource Site: FP35
Meridian Royal Manor**

Map C: Land Features

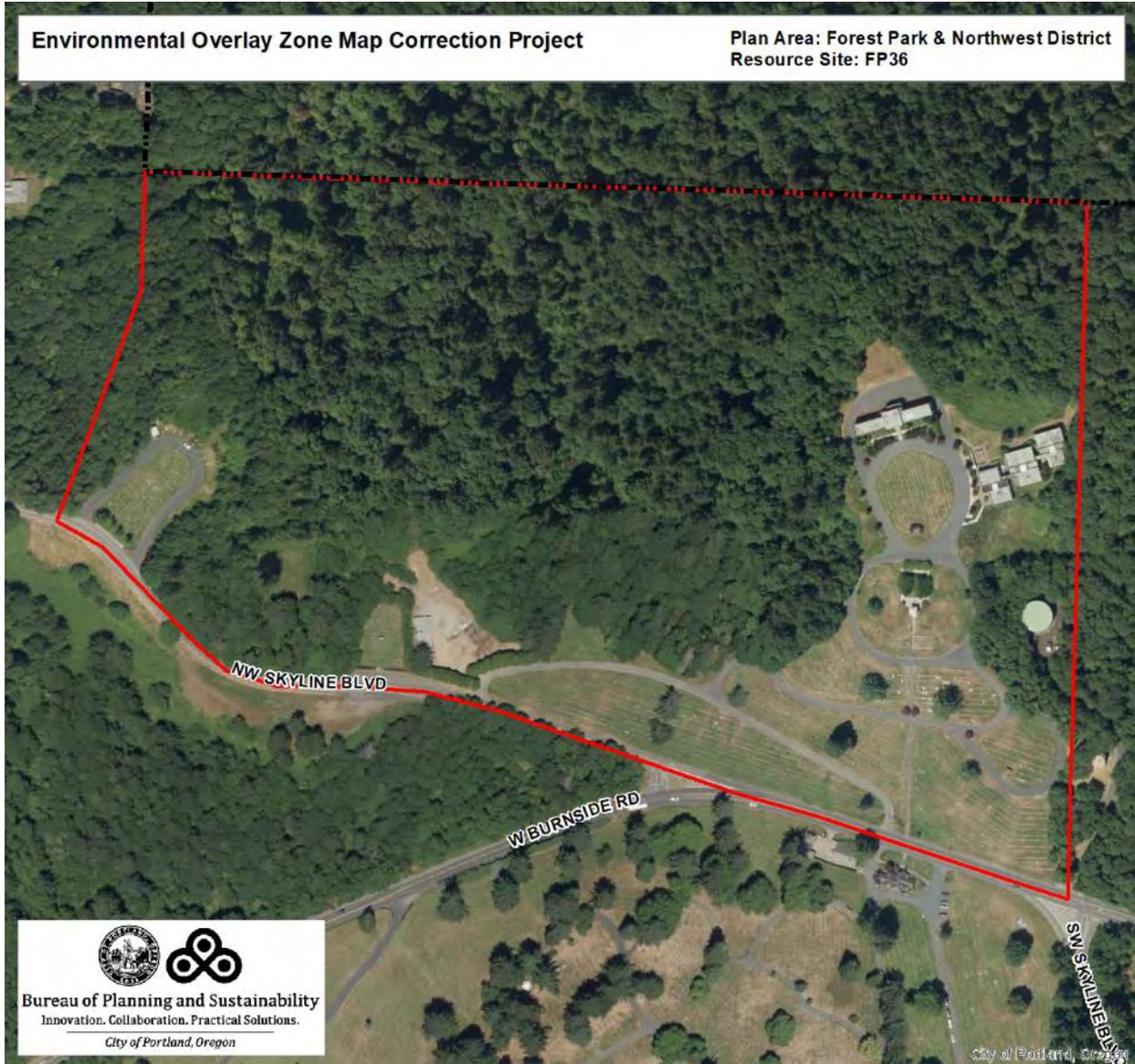
- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland

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Resource Site No.: FP36 Resource Site Name: Mount Calvary Cemetery
Previous Plan: Balch Creek Watershed Protection Plan Previous Resource Site No.: 81



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP36
		Study Area
Stream (Miles)		0.7
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		48.9
	Forest (acres)	38.2
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	10.7
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		42.6
Impervious Surface (acres)		2.3
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development. The headwaters of Balch Creek in the site provides fishery habitat values, but values

are diminished by a culvert which inhibits fish passage and could be further diminished by irrigation activities or water use.

This site has experienced a major slide which emphasized the instability of the soils and the importance of reestablishing vegetation after construction. This slide, although originating near the top of the watershed, seriously threatened fish life in lower Balch Creek. The effects of the erosion were reduced by thick forest cover between an eroding fill and the nearest open water, but this cover is not capable of capturing all sediment during storms. The remaining forest provides wildlife habitat.

Table B: Quality of Natural Resource Functions in Resource Site FP36				
Resource Site (acres) = 54.607897				
	High	Medium	Low	Total
Riparian Corridors*				
acres	18.6	14.4	8.8	41.9
percent total inventory site area	34.1%	26.5%	16.1%	76.7%
Wildlife Habitat*				
acres	38.2	0.0	0.0	38.2
percent total inventory site area	70.0%	0.0%	0.0%	70.0%
Special Habitat Areas**				
acres				36.6
percent total inventory site area				67.1%
Combined Total⁺				
acres	39.2	0.1	2.7	41.9
percent total inventory site area	71.8%	0.1%	4.9%	76.8%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP36 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site open space uses are allowed in the OS base zone. Development of new uses may involve vegetation clearing, grading, filling, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP36, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and

air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

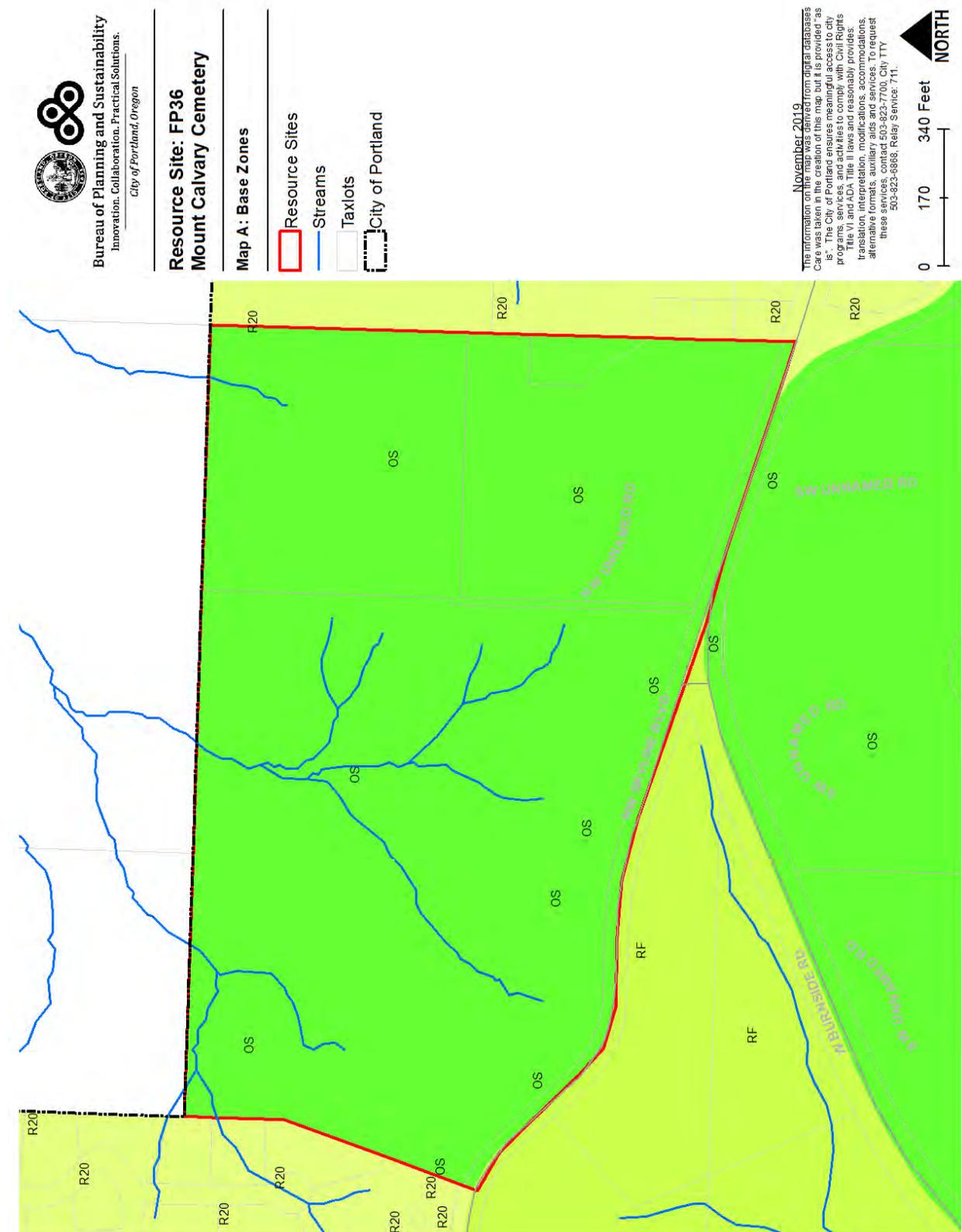
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resource Site FP36 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation contiguous to but more than 100 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	18.4
Limit	18.3
Allow	17.9



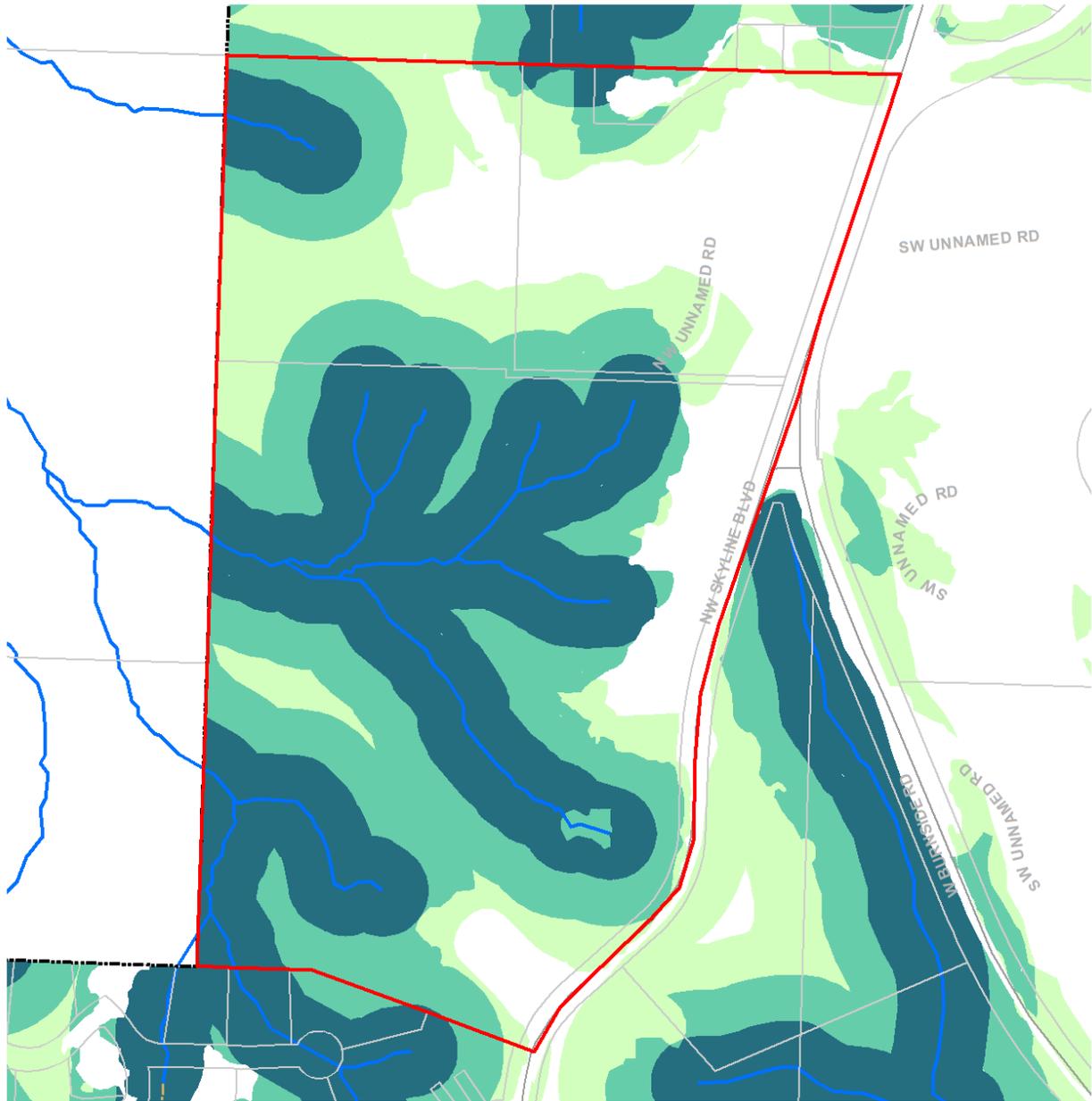


**Resource Site: FP36
Mount Calvary Cemetery**

Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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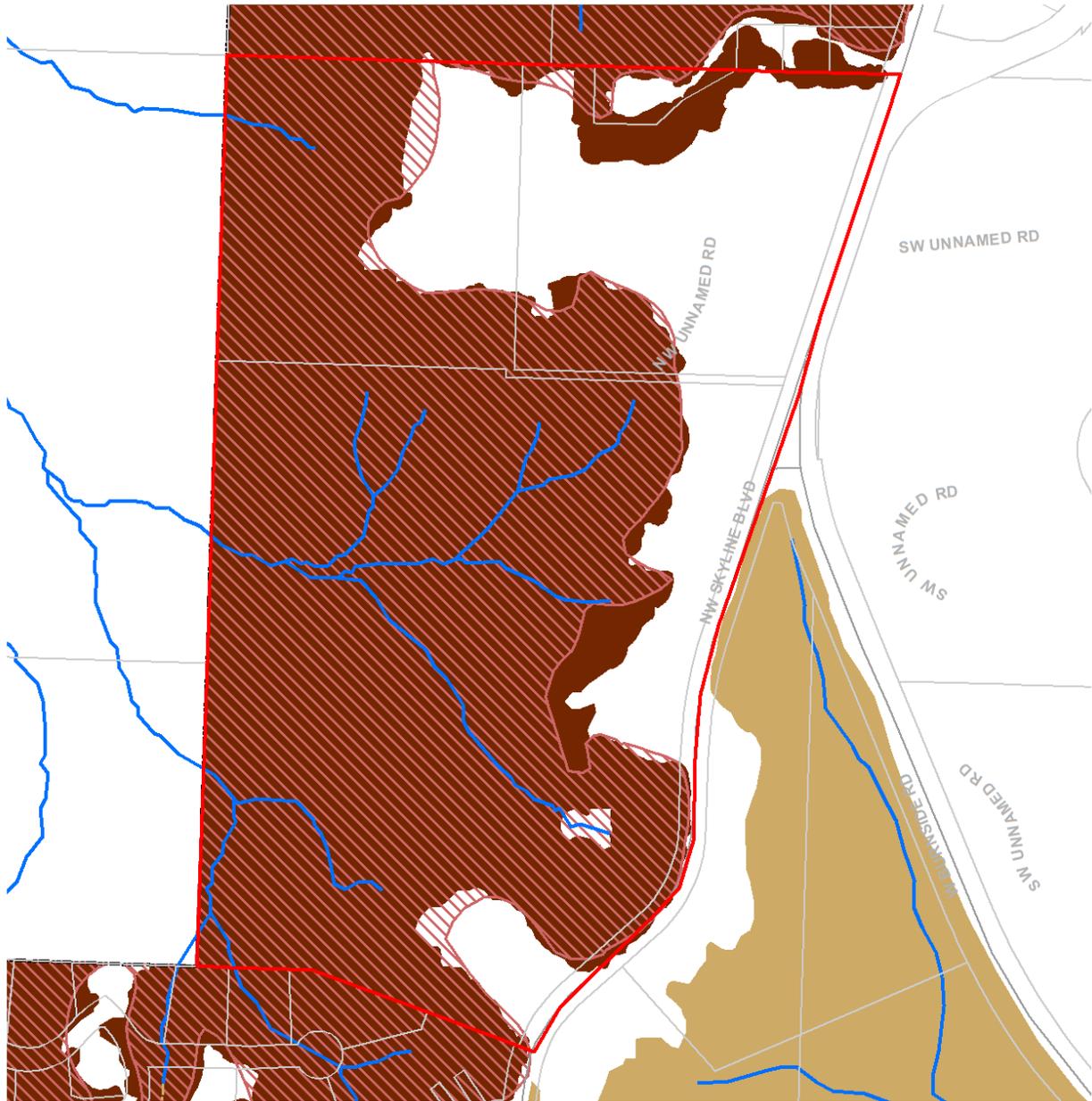


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**Resource Site: FP36
Mount Calvary Cemetery**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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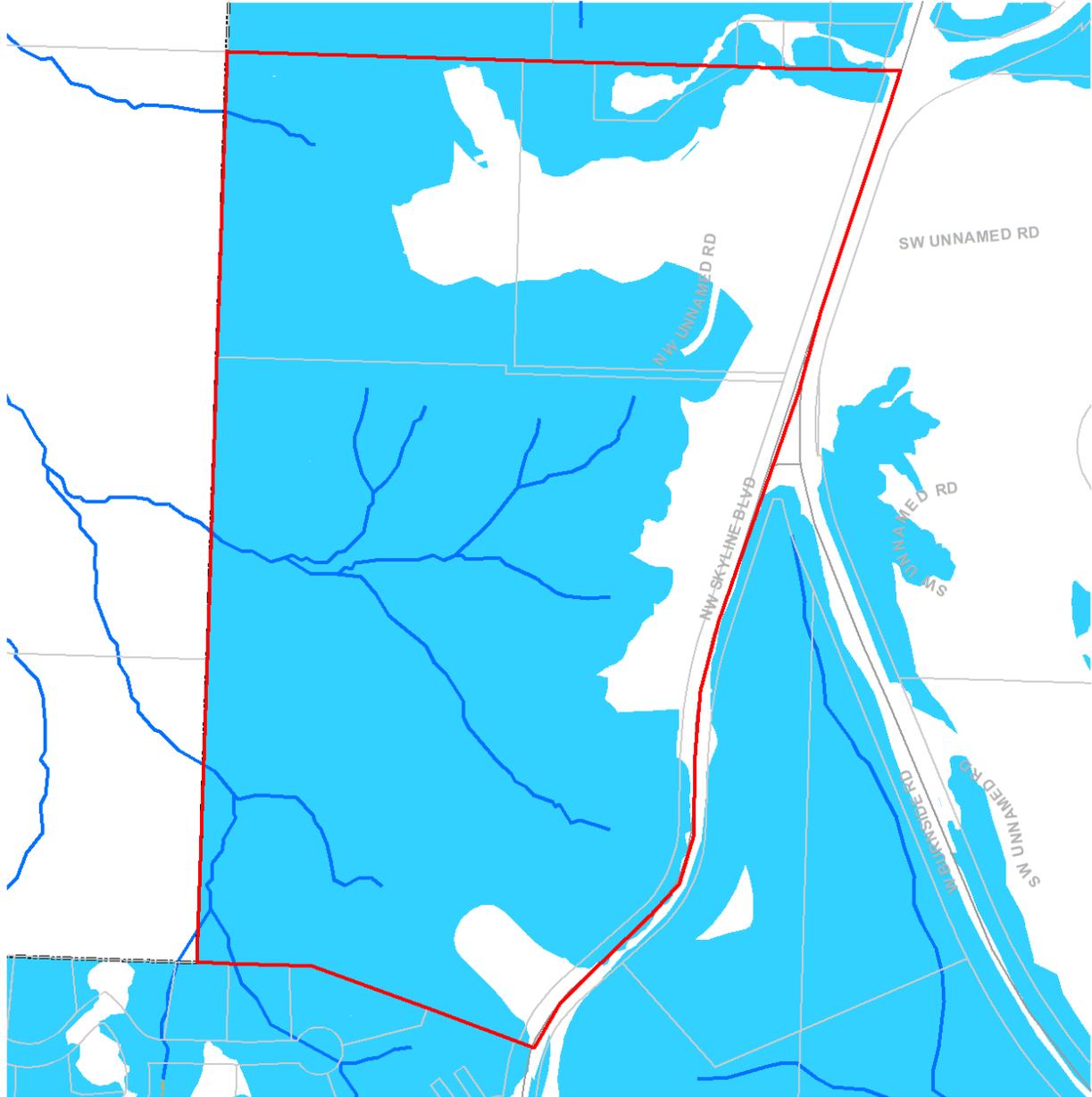




**Resource Site: FP36
Mount Calvary Cemetery**

**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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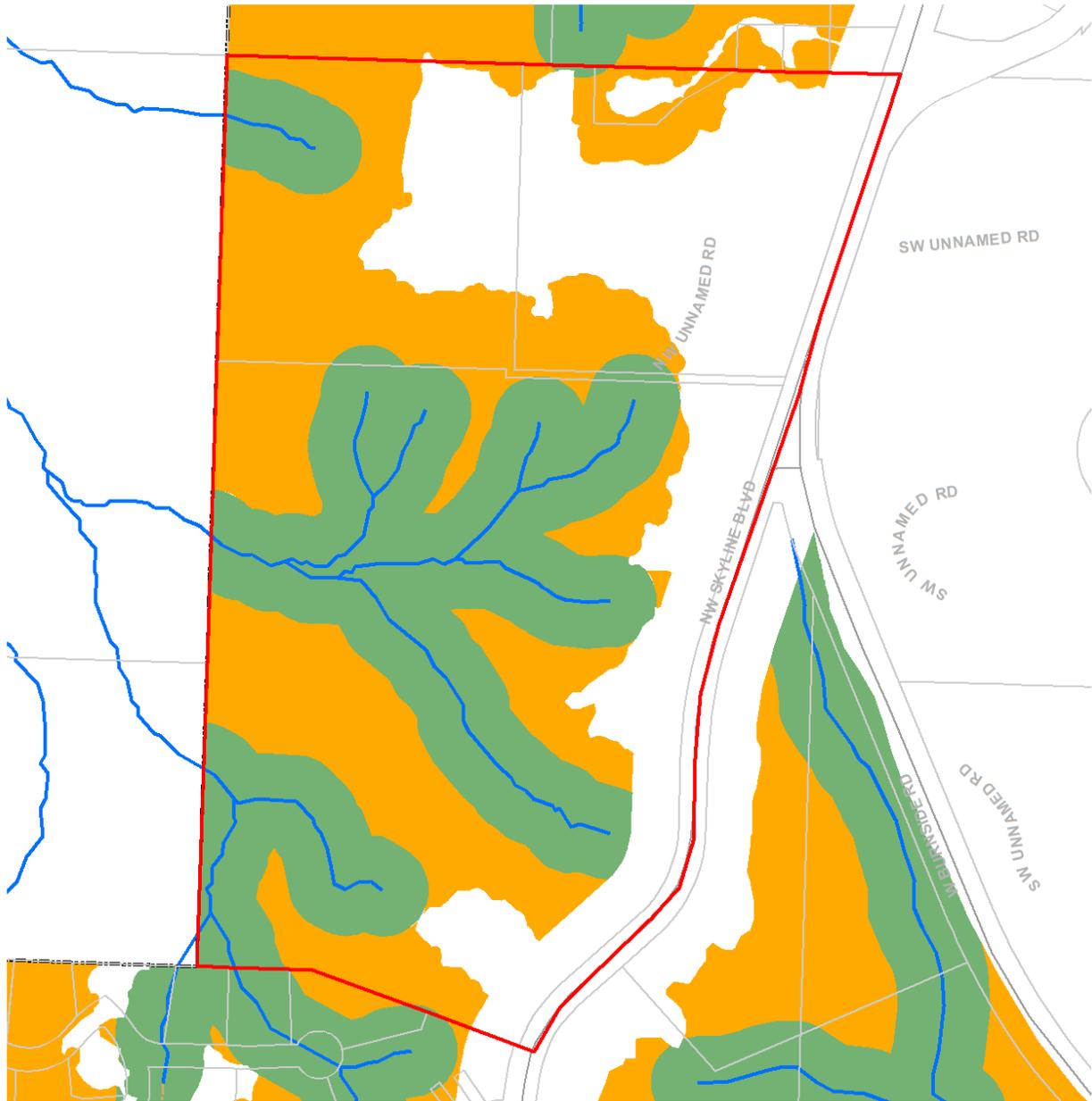
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Resource Site: FP36
Mount Calvary Cemetery

Map G: ESEE Decision

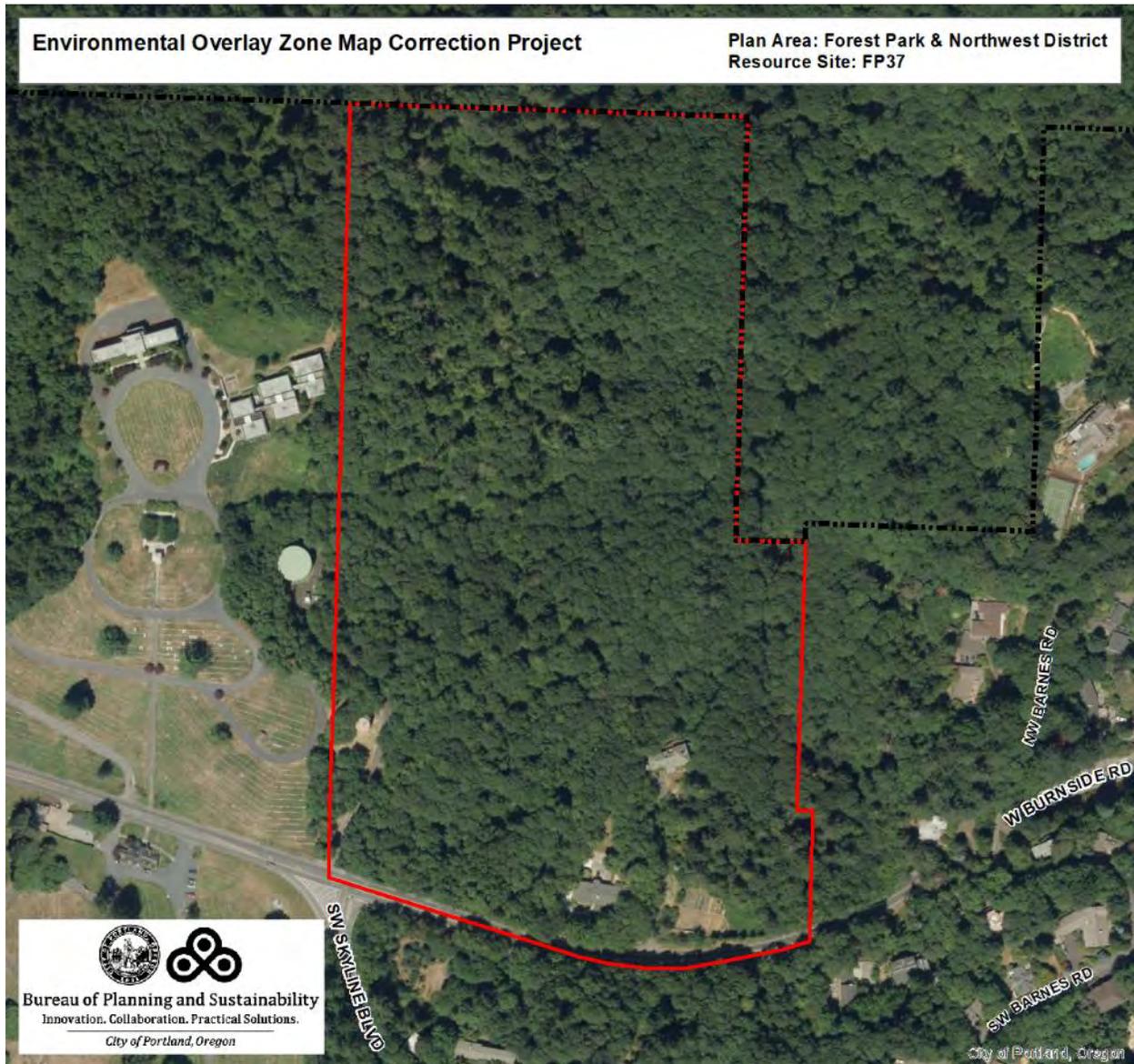
- Resource Sites
- Limit conflicting uses
- Strictly limit conflicting uses
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP37 Resource Site Name: Burnside Headwaters

Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 80



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP37
		Study Area
Stream (Miles)		0.7
Wetlands (acres)		0.2
Vegetated Areas >= 1/2 acre (acres)		27.6
	Forest (acres)	27.6
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		27.8
Impervious Surface (acres)		1.0
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The streams are surrounding by forest on steep slopes, this provides cover and habitat for wildlife. There are several steep ravines in the resource site. These ravines are completely vegetated, and this vegetation prevents soil erosion and helps to control storm flooding. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding. The conifers are growing through the alder and maple canopy, and shade tolerant conifer tree species like cedar, yew, and hemlock are well established in the understory.

Table B: Quality of Natural Resource Functions in Resource Site FP37				
Resource Site (acres) = 29.129176				
	High	Medium	Low	Total
Riparian Corridors*				
acres	10.8	9.3	7.5	27.6
percent total inventory site area	36.9%	31.9%	25.9%	94.7%
Wildlife Habitat*				
acres	27.6	0.0	0.0	27.6
percent total inventory site area	94.7%	0.0%	0.0%	94.7%
Special Habitat Areas**				
acres				25.9
percent total inventory site area				89.0%
Combined Total⁺				
acres	27.7	0.0	0.0	27.7
percent total inventory site area	95.1%	0.0%	0.0%	95.1%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP37 the following significant features and functions are present:

Significant Natural Resource Features: open stream; wetland; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the R20 base zone. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP37, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

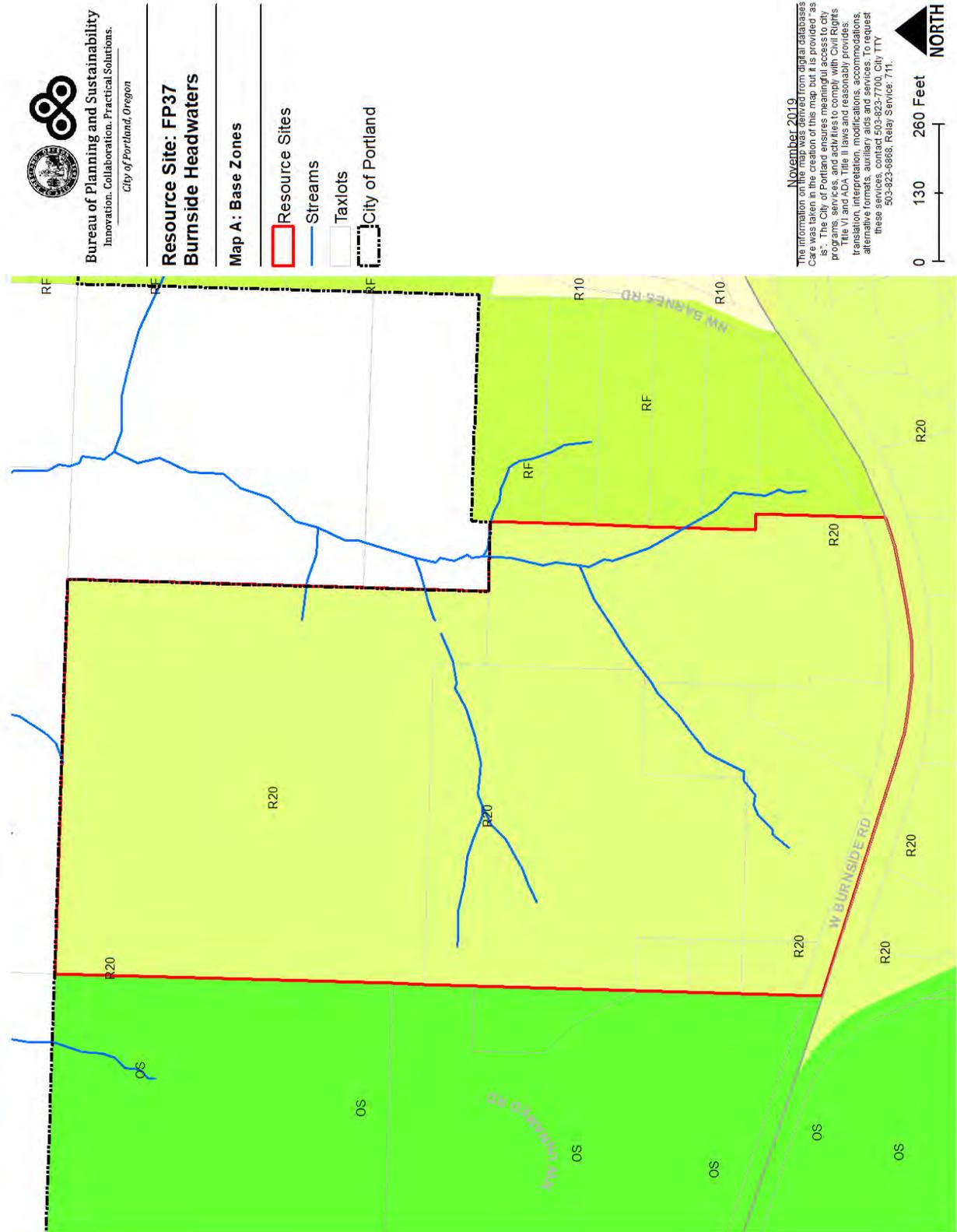
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

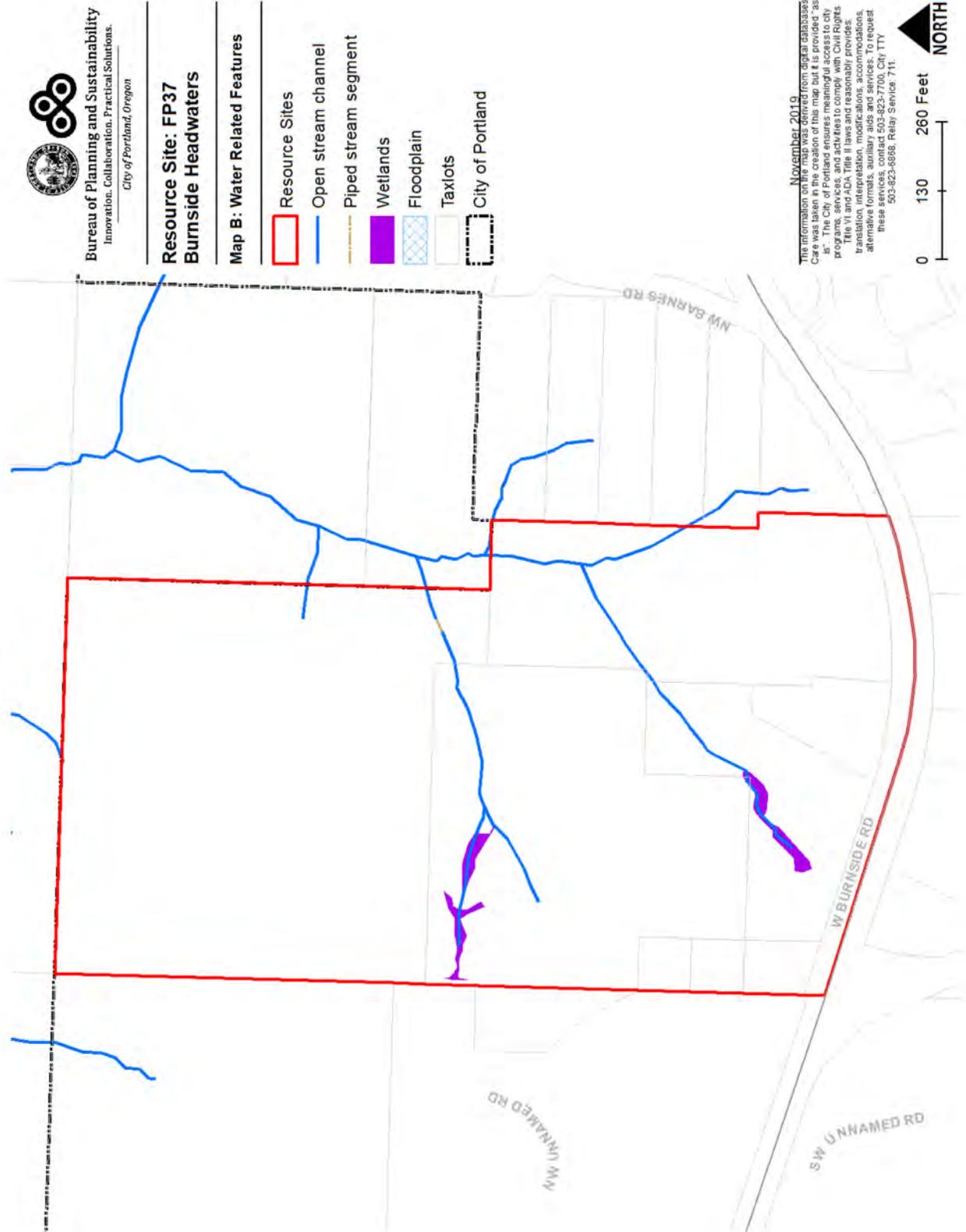
ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resource Site FP37 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 50 feet of stream top-of-bank and land within 50 feet of wetlands.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation contiguous to but more than 100 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

ESEE Decision	Acres
Strictly Limit	10.1
Limit	17.0
Allow	2.0



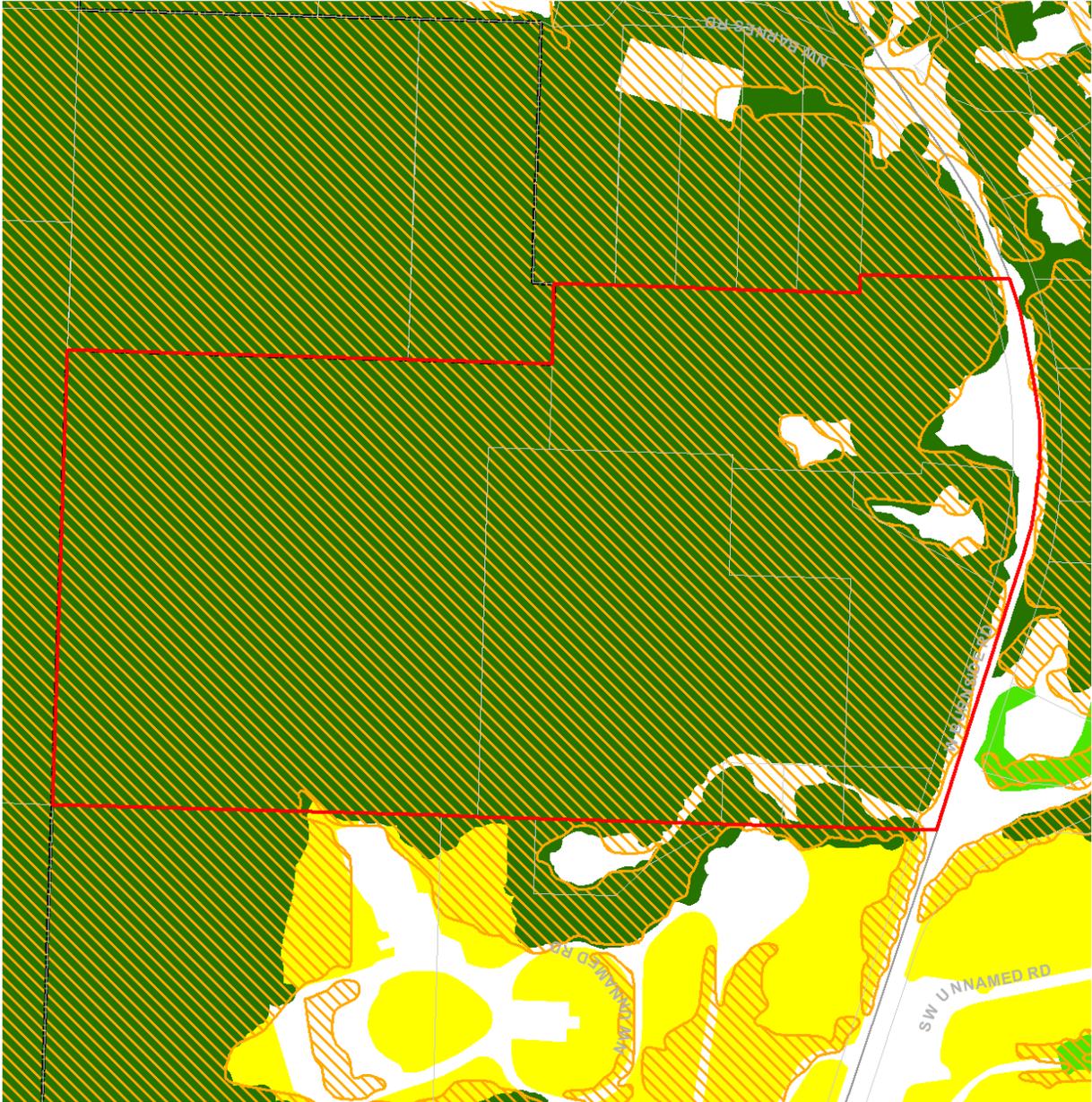




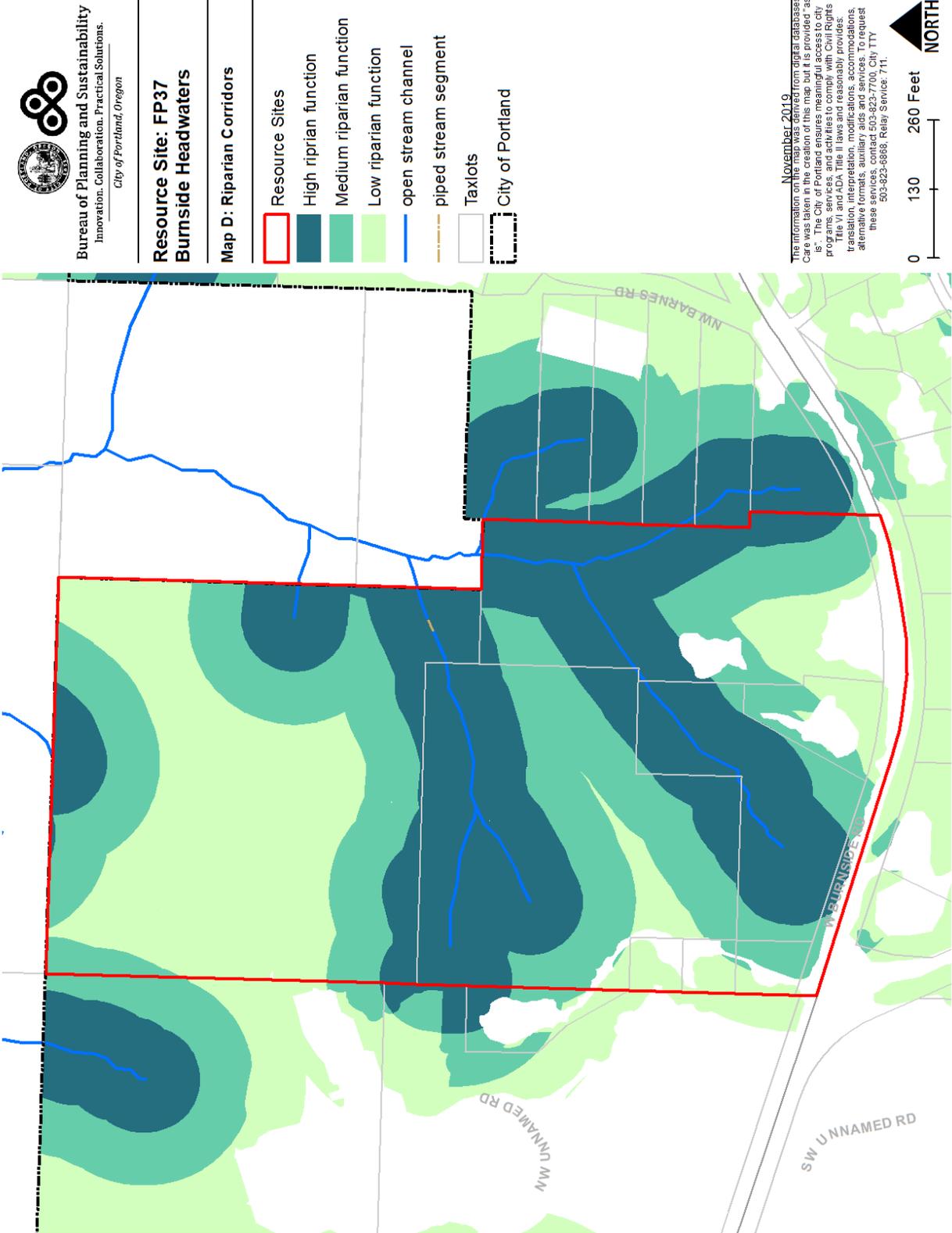
**Resource Site: FP37
Burnside Headwaters**

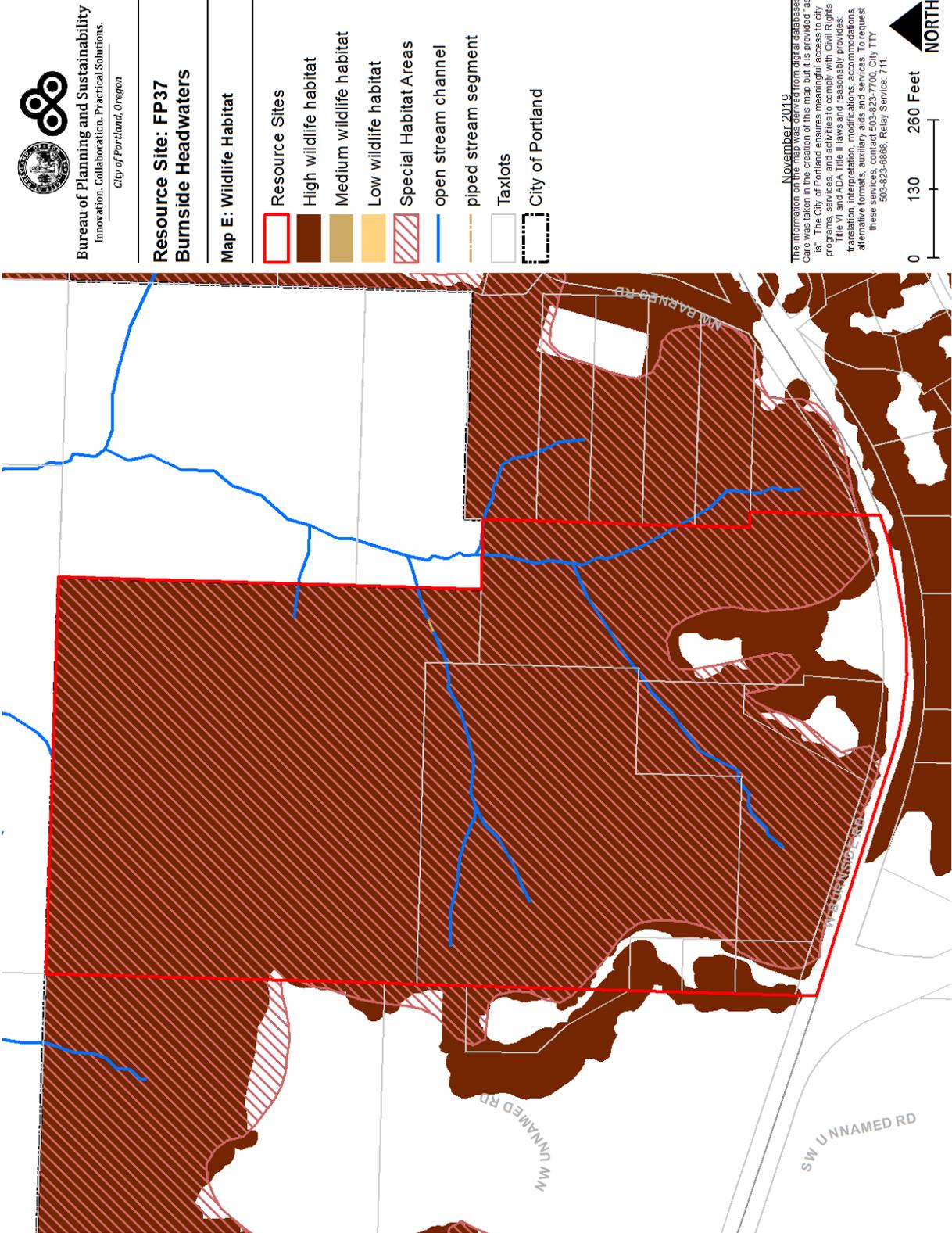
Map C: Land Features

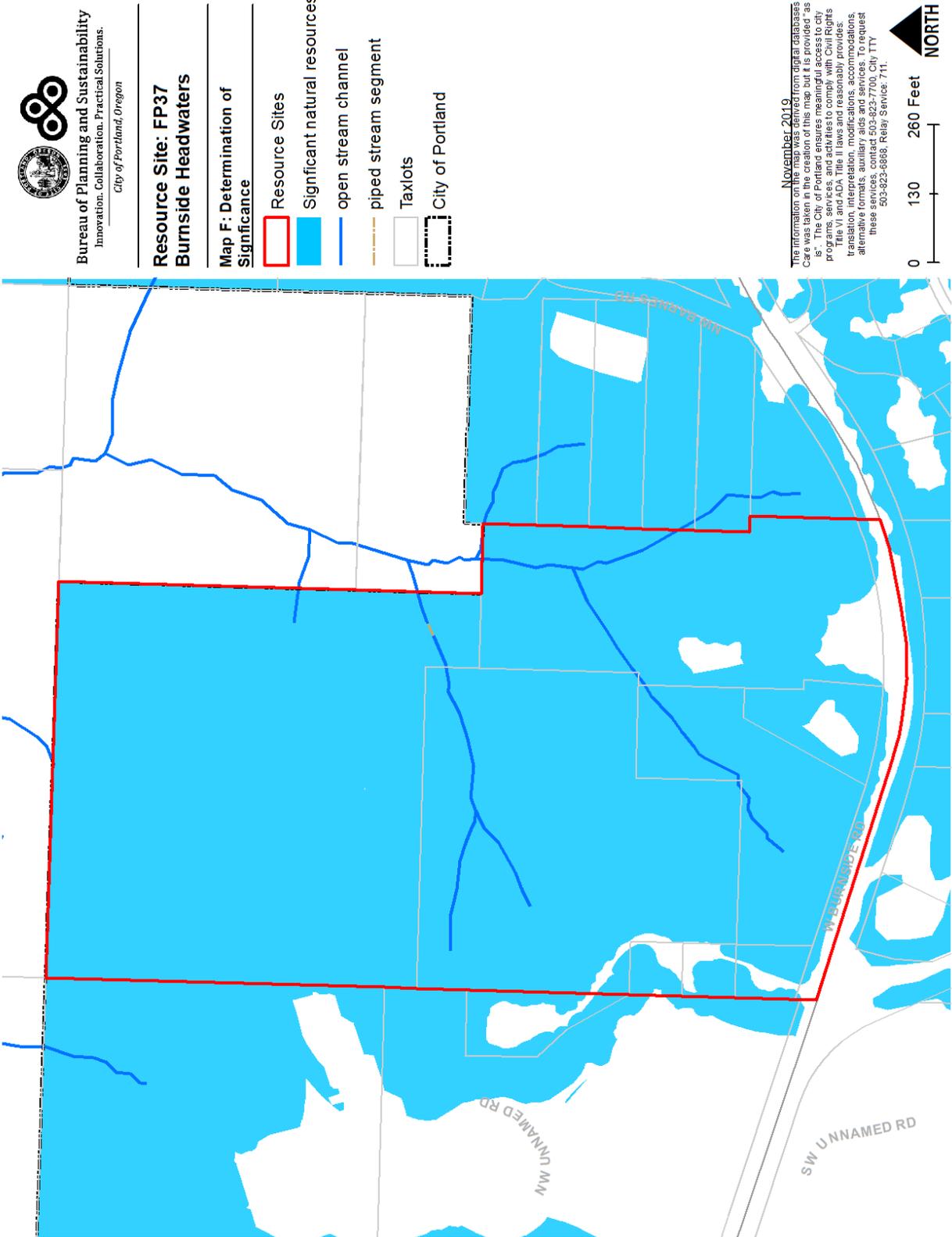
- Resource Sites
- Steep Slopes (>25%)
- Forest
- Woodland
- Shrubland
- Herbaceous
- Taxlots
- City of Portland



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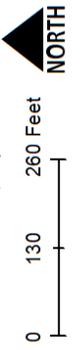
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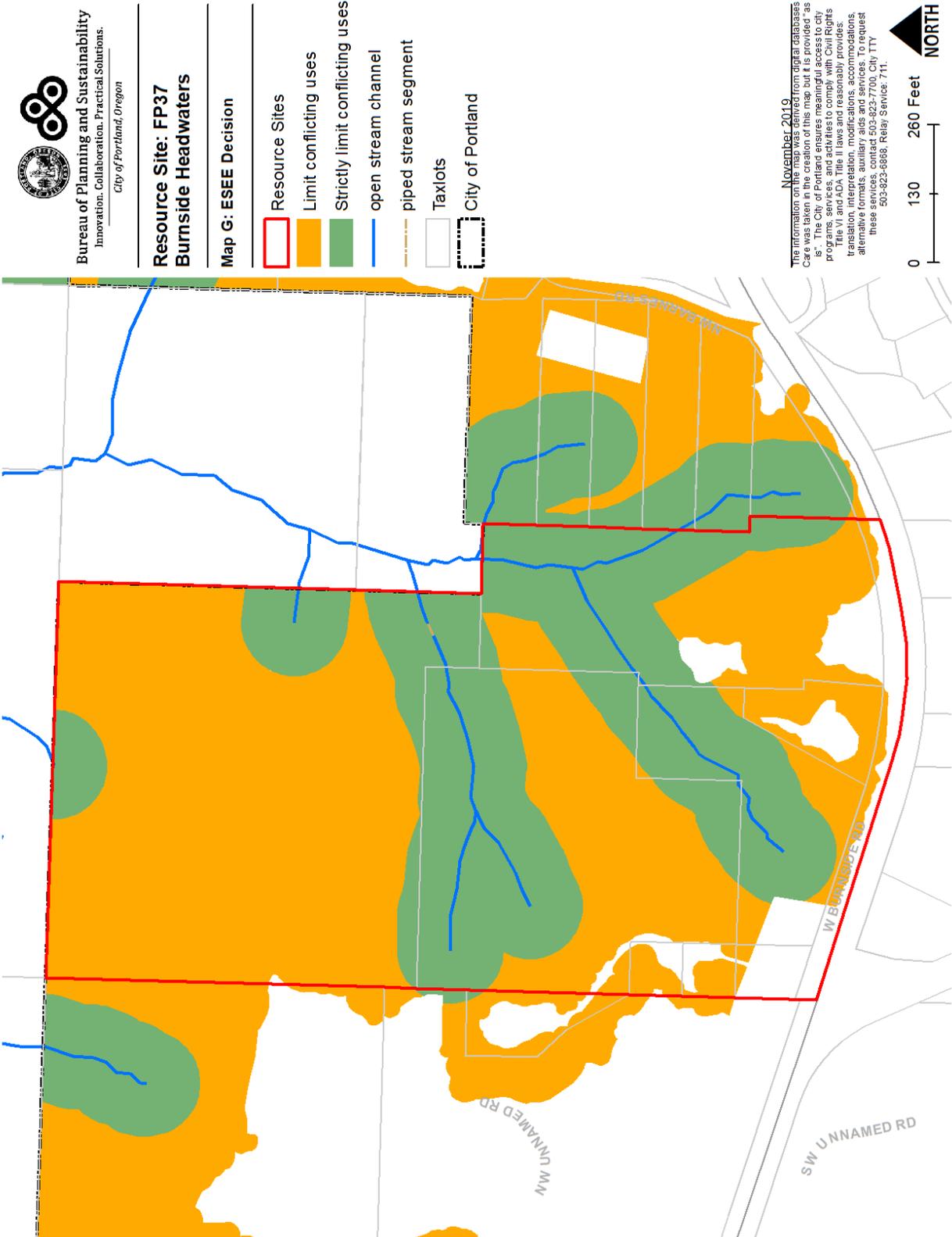
**Resource Site: FP37
Burnside Headwaters**

**Map F: Determination of
Significance**

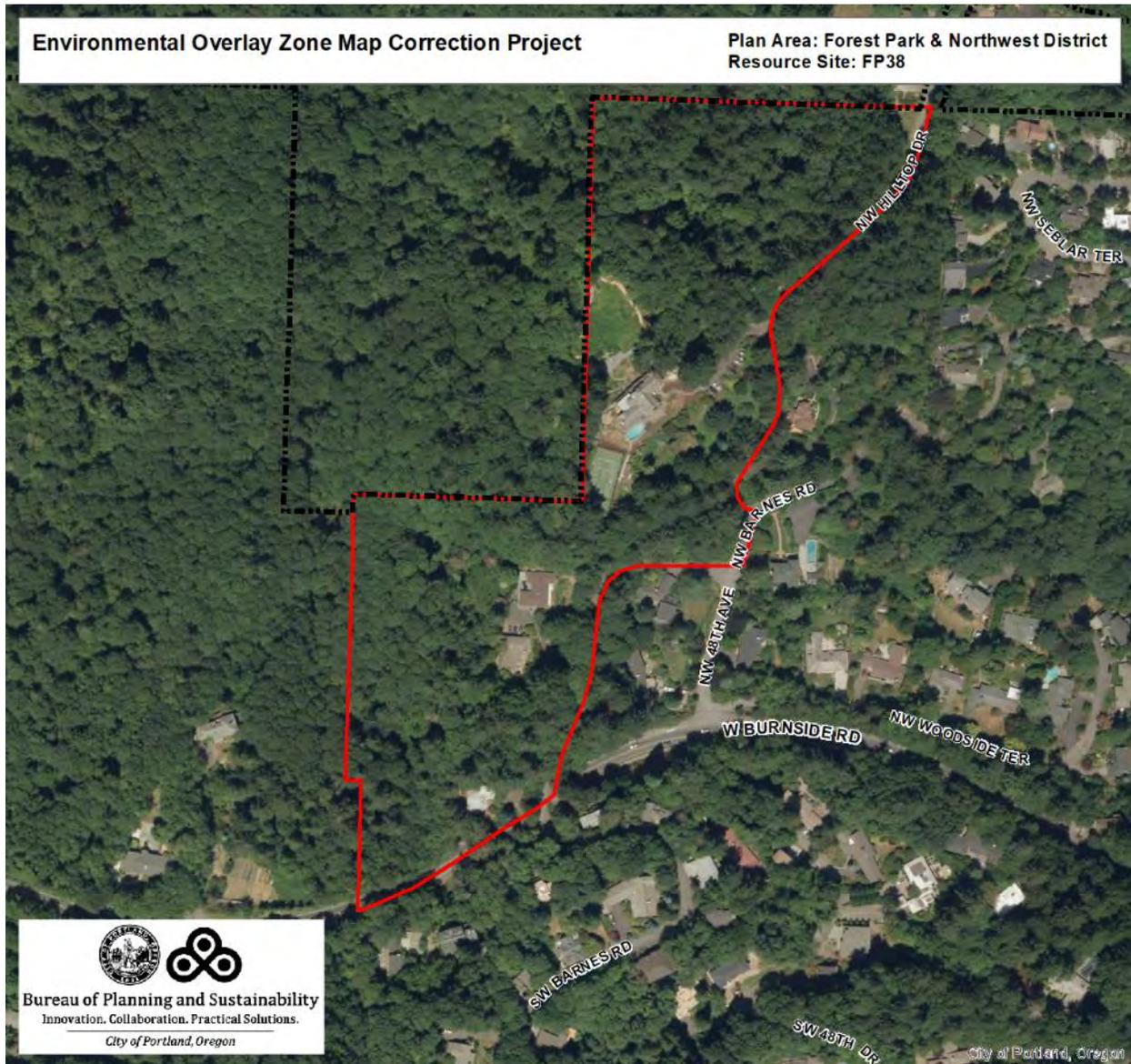
- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

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Resource Site No.: FP38 Resource Site Name: Lower Hilltop Dr.
Previous Plan: Balch Creek Watershed Protection Plan Previous Resource Site No.: 79



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP38
		Study Area
Stream (Miles)		0.7
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		13.7
	Forest (acres)	13.1
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.6
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		13.9
Impervious Surface (acres)		1.6
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The streams are surrounded by forest on steep slopes, this provides cover and habitat for wildlife. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP38				
Resource Site (acres) = 15.084412				
	High	Medium	Low	Total
Riparian Corridors*				
acres	5.1	3.8	4.3	13.2
percent total inventory site area	33.7%	25.3%	28.4%	87.4%
Wildlife Habitat*				
acres	13.1	0.0	0.0	13.1
percent total inventory site area	87.0%	0.0%	0.0%	87.0%
Special Habitat Areas**				
acres				11.2
percent total inventory site area				74.2%
Combined Total⁺				
acres	13.3	0.0	0.1	13.4
percent total inventory site area	88.4%	0.0%	0.4%	88.7%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP38 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RH and R10 base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP38, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

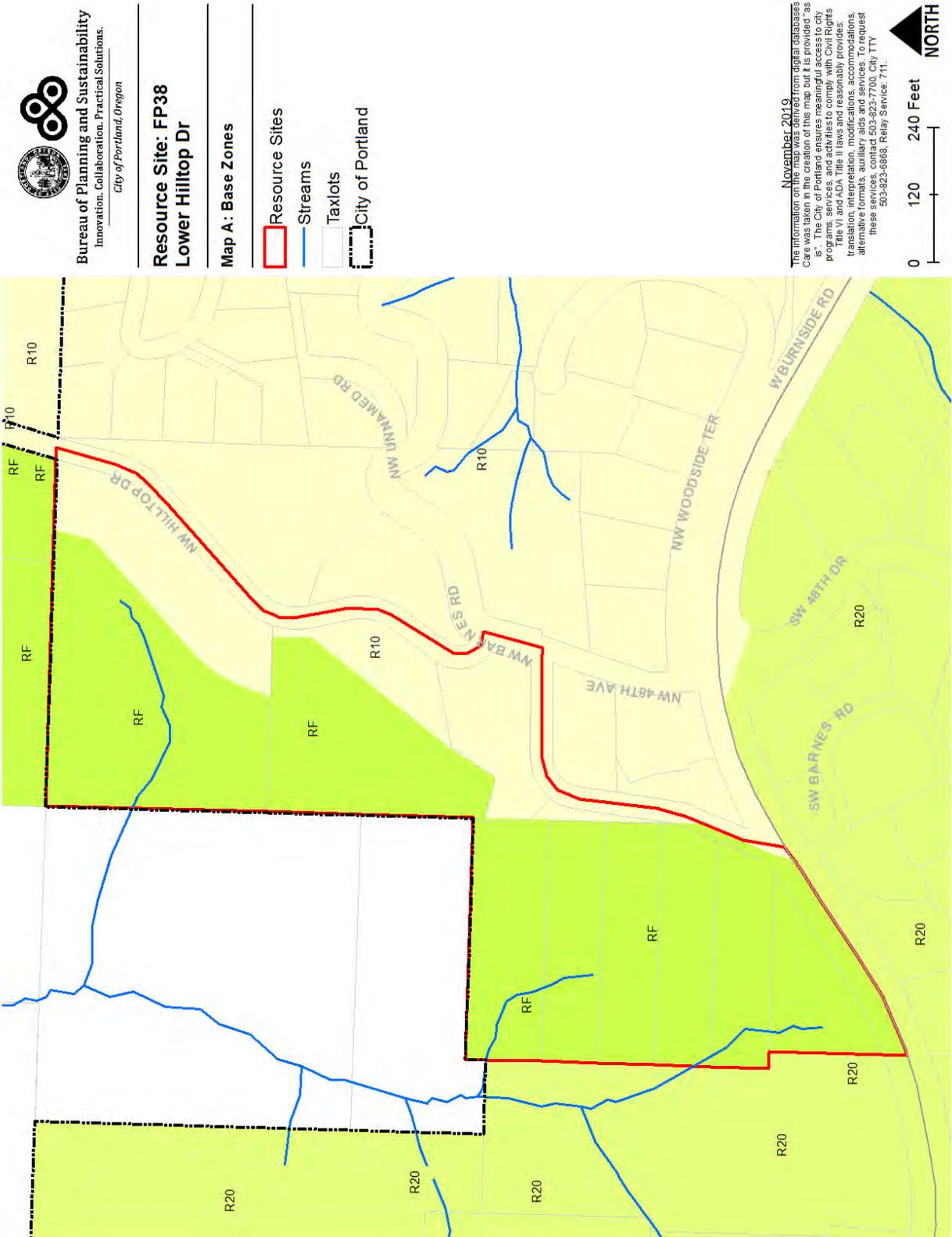
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

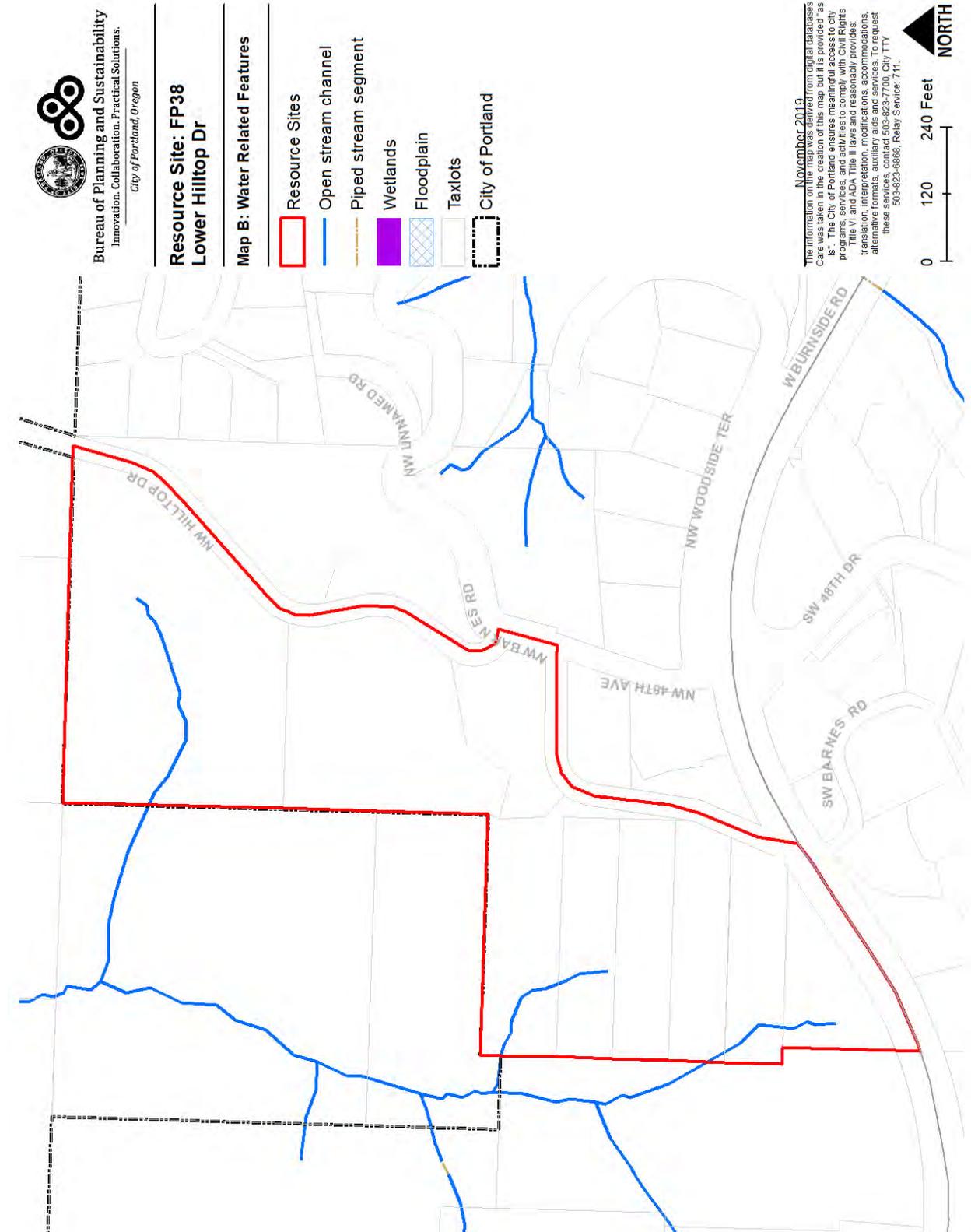
ESEE Decisions

Based on the General ESEE and resource site-specific ESEE, the ESEE decisions for Resources Site FP38 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Limit* conflicting uses within areas of forest vegetation contiguous to but more than 100 feet from stream top-of-bank.
4. *Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

Table C: ESEE Decision for Resource Site FP38	
ESEE Decision	Acres
Strictly Limit	5.1
Limit	8.0
Allow	2.0



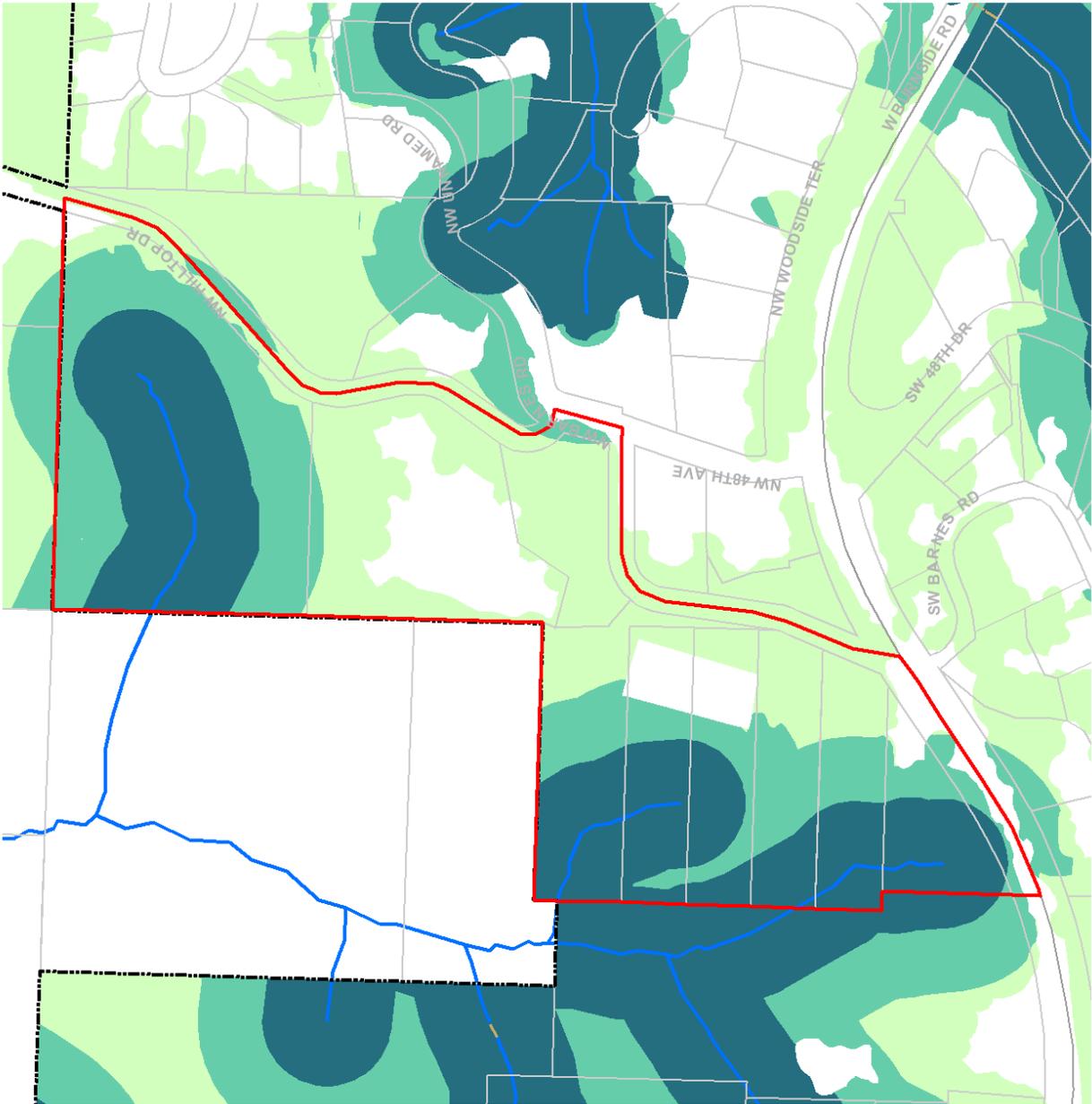




**Resource Site: FP38
Lower Hilltop Dr**

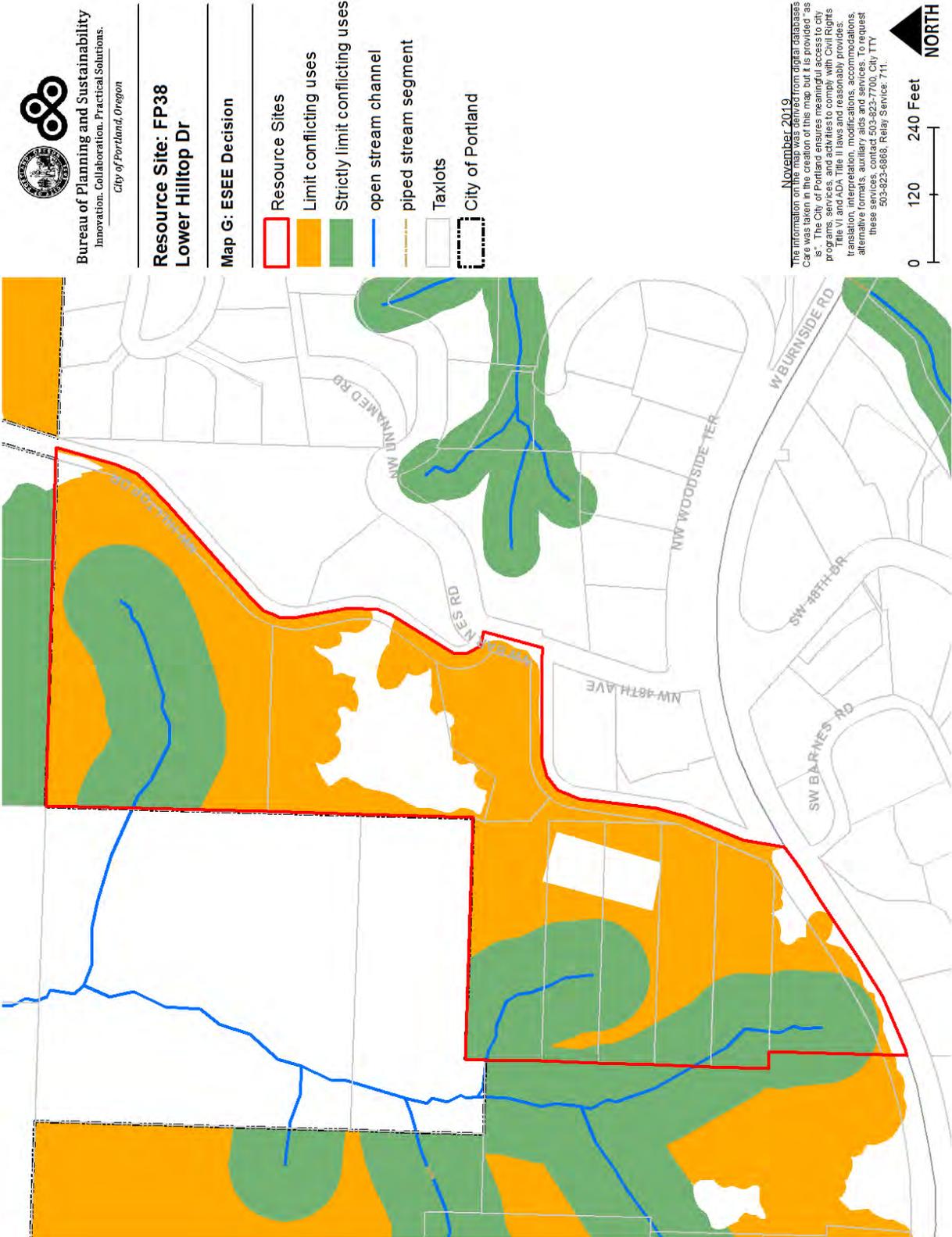
Map D: Riparian Corridors

- Resource Sites
- High riparian function
- Medium riparian function
- Low riparian function
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

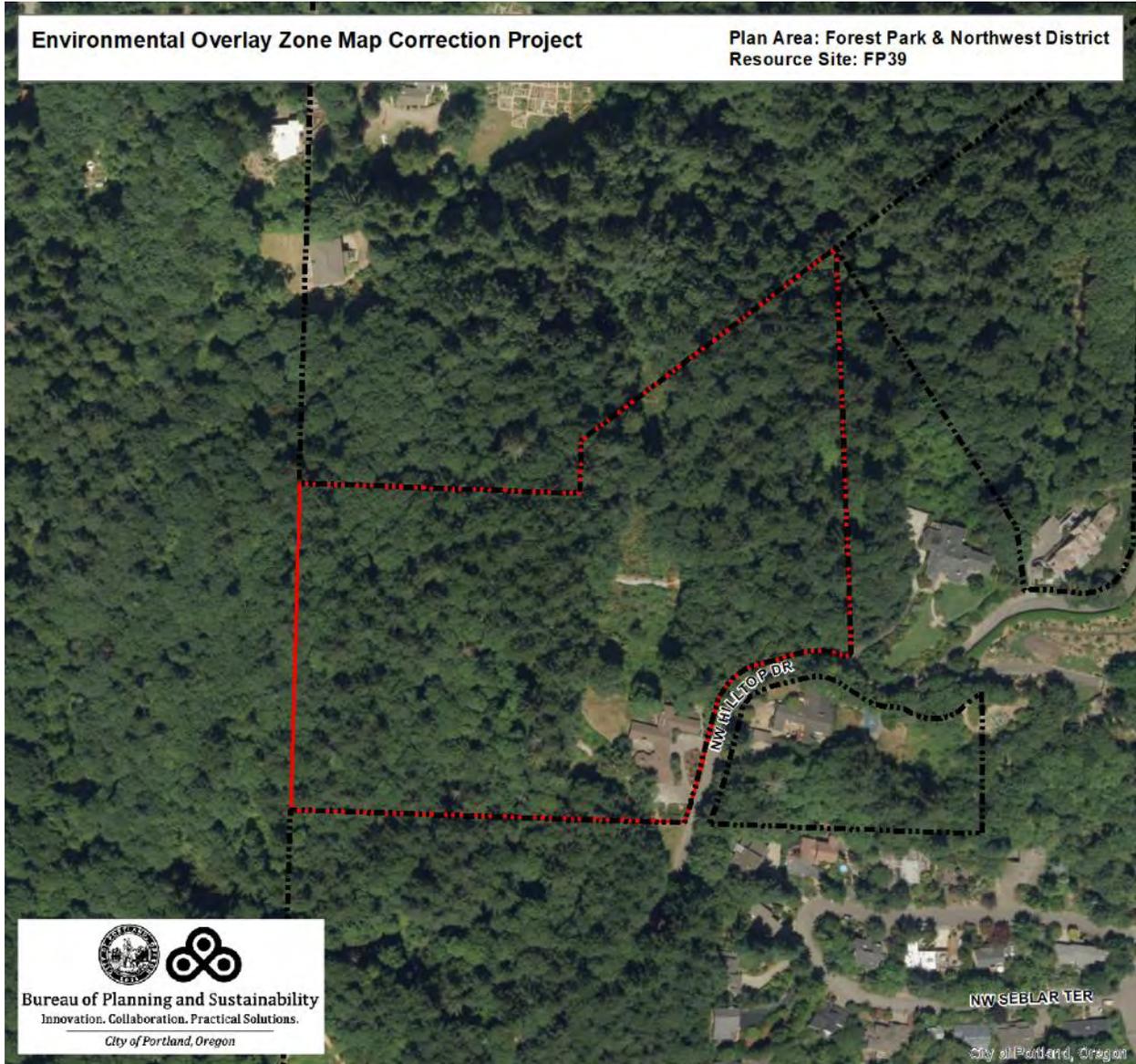


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Resource Site No.: FP39 Resource Site Name: Hilltop West
Previous Plan: Multnomah County Urban Lands Previous Resource Site No.: 111



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP39	
	Study Area
Stream (Miles)	0.6
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	10.6
Forest (acres)	10.6
Woodland (acres)	0.0
Shrubland (acres)	0.0
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	10.6
Impervious Surface (acres)	0.1
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.	
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.	

This site is composed of a patchwork of three soil types: Cascade silt loam, Cascade-Urban land complex and Goble silt loam. The predominant soils are the Cascade silt loam and the Cascade Urban complex. Cascade soils are somewhat poorly drained soils formed from silty materials. A two- to four-foot thick fragipan exists at a depth of 20 to 30 inches. A fragipan is a compacted layer of soil that creates a hard, impervious layer difficult for water and roots to penetrate. In winter and spring, it creates a perched water table; in summer, it creates a nearly rock-hard layer. The wetness of this layer can reduce the effectiveness of septic tank absorption fields and increases the likelihood of erosion. In addition, the shallow depth to the fragipan makes installation of some drainage systems difficult.

The Cascade-Urban complex consists of Cascade soils mixed with soils disturbed by urban development. Urban development alters the soil through excavation, filling and grading, creating a patchwork of soil characteristics. Mostly undisturbed sites have the properties of Cascade silt loam. More disturbed sites vary in their permeability and erosion potential.

Goble silt loams are located primarily in UIAs # 0, 7 and 8, on 30 to 60 percent slopes which are some of the steeper parts of the site. This is a very deep and moderately well-drained soil formed from silt and ash. Goble soils also have a thin (up to 12 inches thick) fragipan at a depth of approximately 30 to 48 inches, making it slightly less limiting for plant growth and excavation. The soil above the fragipan is moderately permeable, and the water table in winter and spring is within four feet of the surface. The steep slopes and seasonal saturation of the soil combine to make the potential for erosion and slumps high where this soil exists.

All of the parcels within the Sylvan site are located along the ridge and slopes of the Tualatin Mountains. Slopes on the east side of the ridge are generally steeper, contributing to increased slide potential. West-side slopes are also subject to slides. Shallow rooting depth, a product of the fragipan, increases

tree windfalls and slope instability. Where erosion or urban development exposes the fragipan, establishment of vegetation is difficult, compounding erosion problems.

Located on a forested ridge-top above the Willamette Valley, the plant community at this site is characteristic of the Western Hemlock vegetation zone (Franklin and Dymess 1988). The forest generally ranges in age from 50- to 120-year old second growth in a mid-seral stage of succession. With young shade-tolerant cedars well established in the understory, the older forest has entered the understory re-initiation stage (Oliver and Larson 1996).

The forest community is characterized by Douglas fir and bigleaf maple in the canopy layer, with mature western red cedar more common near Balch Creek and along Miller Road. Grand fir, red alder, bitter cherry and western hemlock are common overstory associates. Less common are Pacific dogwood and two invasive aliens, English holly and European hawthorn. In the understory, vine maple occurs in association with Indian plum, red elderberry, Oregon grape, western hazel, oceanspray, snowberry and cedar saplings. The ground layer is typically dominated by sword fern, though Pacific waterleaf and inside-out flower are occasional dominants. Several areas, most notably along Highway 26, are overrun by the exotic English ivy. Other common ground vegetation includes lady fern (on moist slopes and along streams), bracken fern, miner's lettuce, Hooker fairy-bell, false Solomon's seal, fringecup, western trillium and stream violet.

Large forest tracts within the site provide high quality habitat for a diverse wildlife assemblage. Abundant quantities of large woody debris and a thick organic layer on the forest floor provide habitat and foraging grounds for birds, reptiles, amphibians and small mammals. In most cases, the understory is a thick, diverse assemblage of berry and nut-bearing native shrubs that wildlife depend upon for forage as well as cover, especially during winter months. Other valuable habitat features within these forests include snags, large boulders, ravines and seeps.

Many species of birds were encountered during field surveys of the site: those most frequently observed include downy woodpecker, northern flicker, winter wren, black-capped chickadee, common bushtit, rufous-sided towhee, Wilson's warbler, Swainson's thrush and song sparrow. Due to the abundance of songbirds, sharp-shinned hawks and other forest-dwelling birds of prey such as great-horned owls are likely to occur within the site as well. The area is also potential foraging ground for peregrine falcons, which rely on other birds for the bulk of their diet.

Amphibians and reptiles, including western red-backed salamander, Pacific chorus frog and garter snakes, inhabit the site. Tree cavities serve as roosting and nesting sites for bats, voles, squirrels, weasels, raccoons and cavity-nesting birds, including pileated woodpecker. The abundant cover is essential for black-tail deer, coyote and other large mammals.

Balch Creek runs through a portion of this site. Resident cutthroat trout inhabit the creek; historically, other species inhabited the drainage as well. Balch and other creeks within the site flow through steep forested ravines, providing wildlife with a protected travel corridor, refuge from high summer temperatures and a permanent source of water. Thick riparian forests protect the creeks and the integrity of their banks and influence the quality of stream habitat located downstream. Large quantities of silt are present in several of the streams, providing evidence of the consequences of vegetation removal associated with previous upstream development. Other sources of silt include upstream landslides and bank failures related to new construction.

Special Status Species found in the resource site include:

- Pacific western big-eared bat
- Long-eared myotis
- Fringed myotis
- Long-legged myotis
- Pileated woodpecker
- Little willow flycatcher
- American peregrine falcon
- Olive-sided flycatcher
- Coast cutthroat trout
- Northern red-legged frog

Table B: Quality of Natural Resource Functions in Resource Site FP39				
Resource Site (acres) = 11.073006				
	High	Medium	Low	Total
Riparian Corridors*				
acres	2.3	3.2	5.0	10.6
percent total inventory site area	20.8%	29.3%	45.4%	95.4%
Wildlife Habitat*				
acres	10.6	0.0	0.0	10.6
percent total inventory site area	95.4%	0.0%	0.0%	95.4%
Special Habitat Areas**				
acres				10.4
percent total inventory site area				93.7%
Combined Total⁺				
acres	10.6	0.0	0.0	10.6
percent total inventory site area	95.7%	0.0%	0.0%	95.7%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP39 the following significant features and functions are present:

Significant Natural Resource Features: open stream, forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish and wildlife species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP39, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and

wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

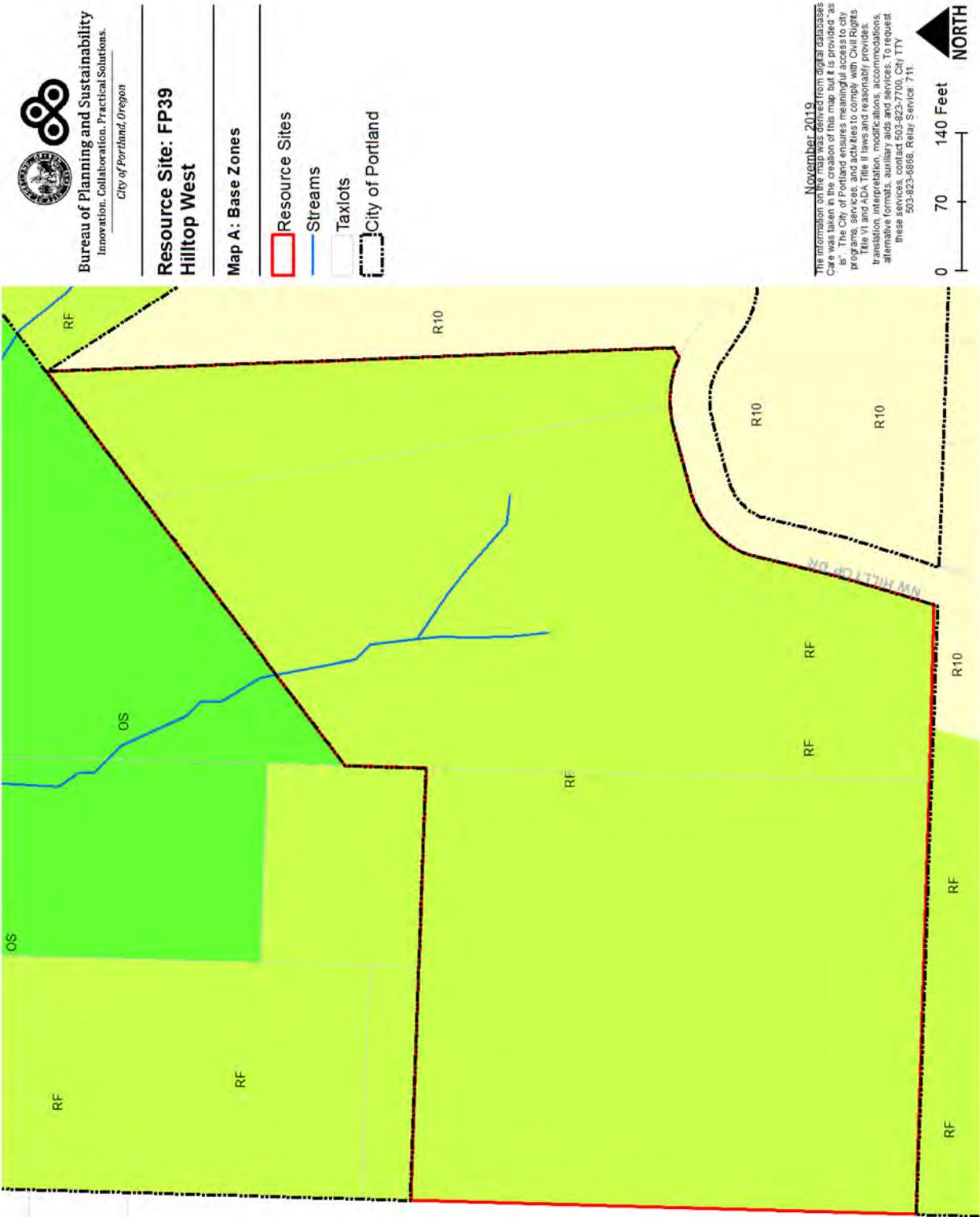
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

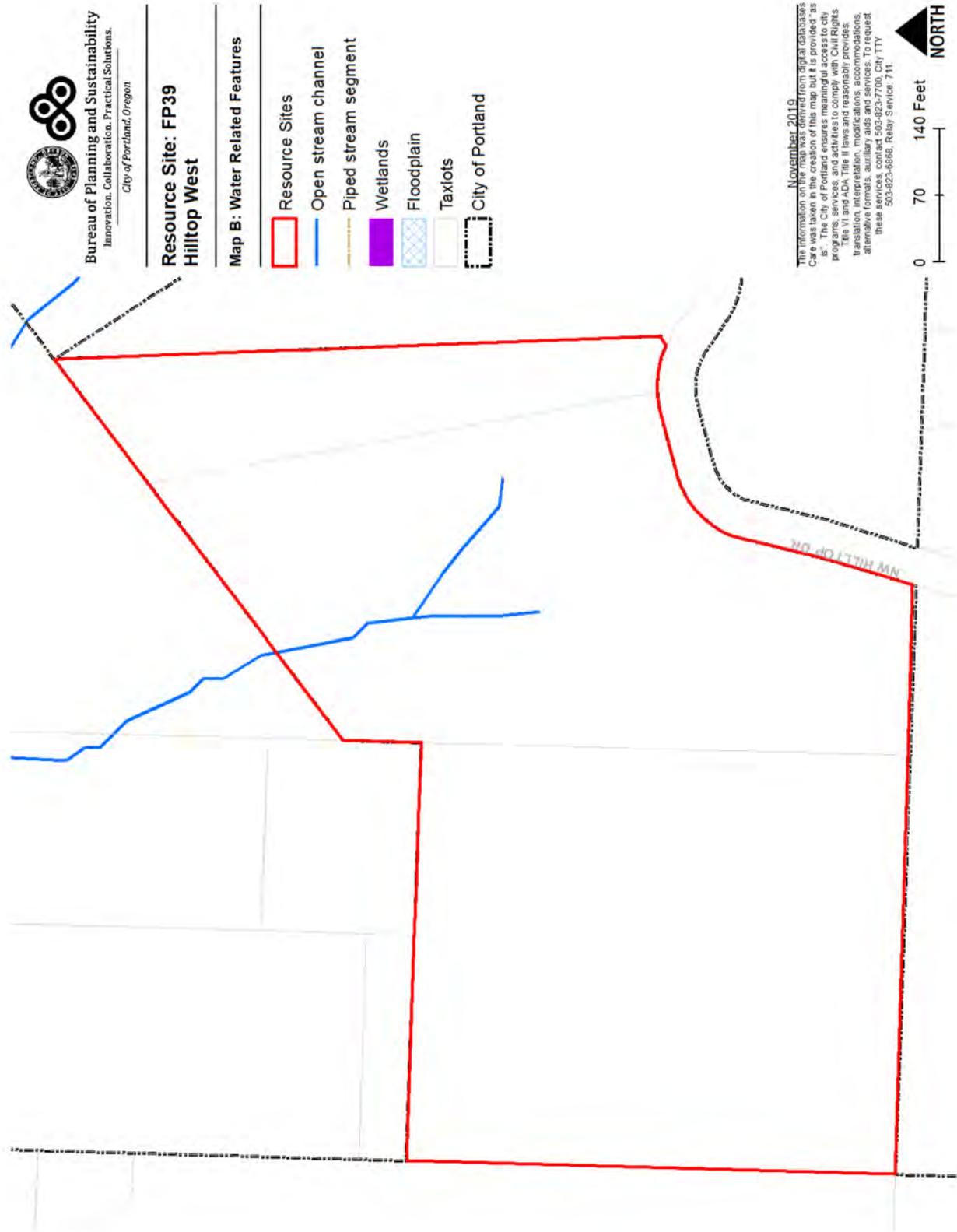
ESEE Decisions

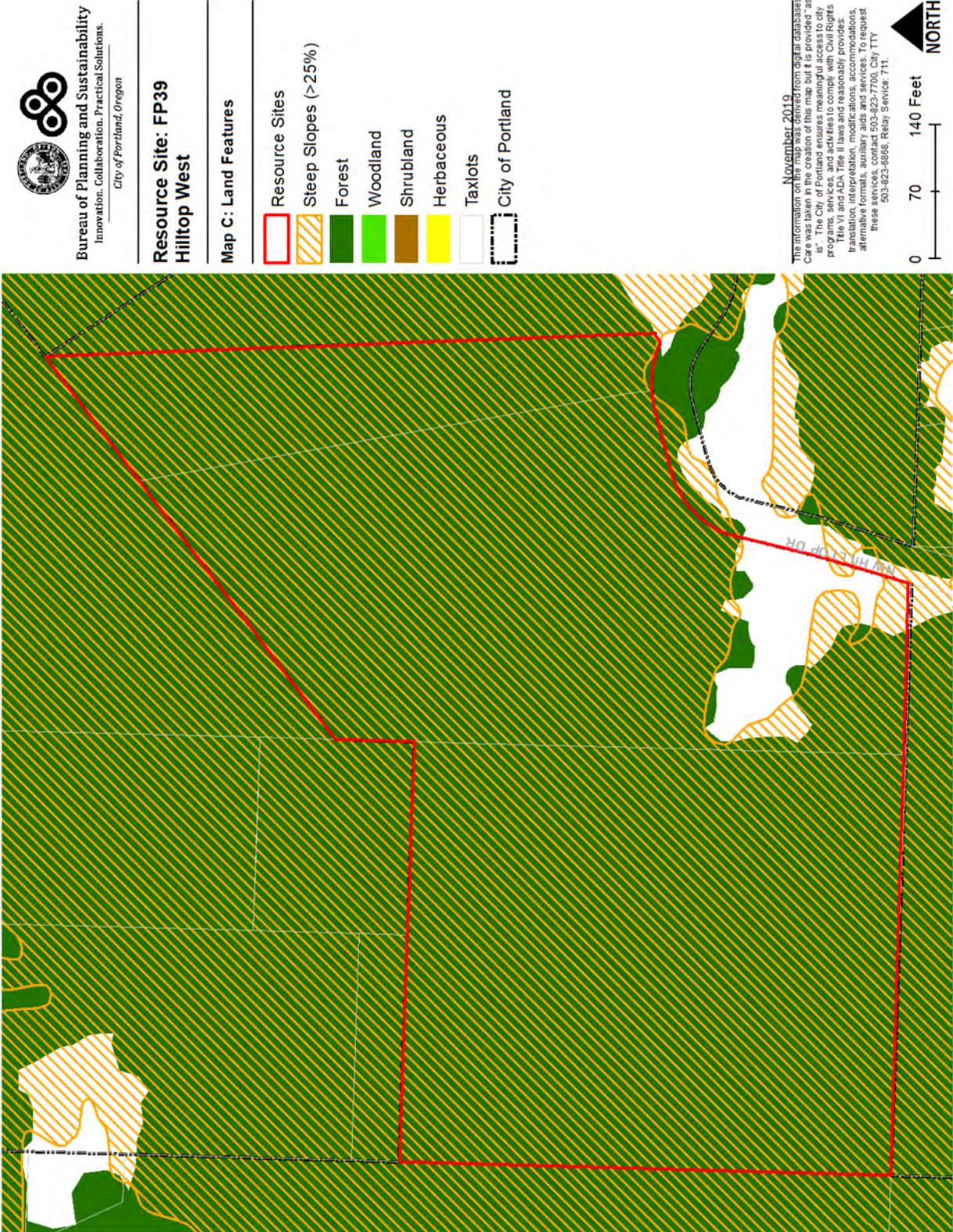
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP39 are:

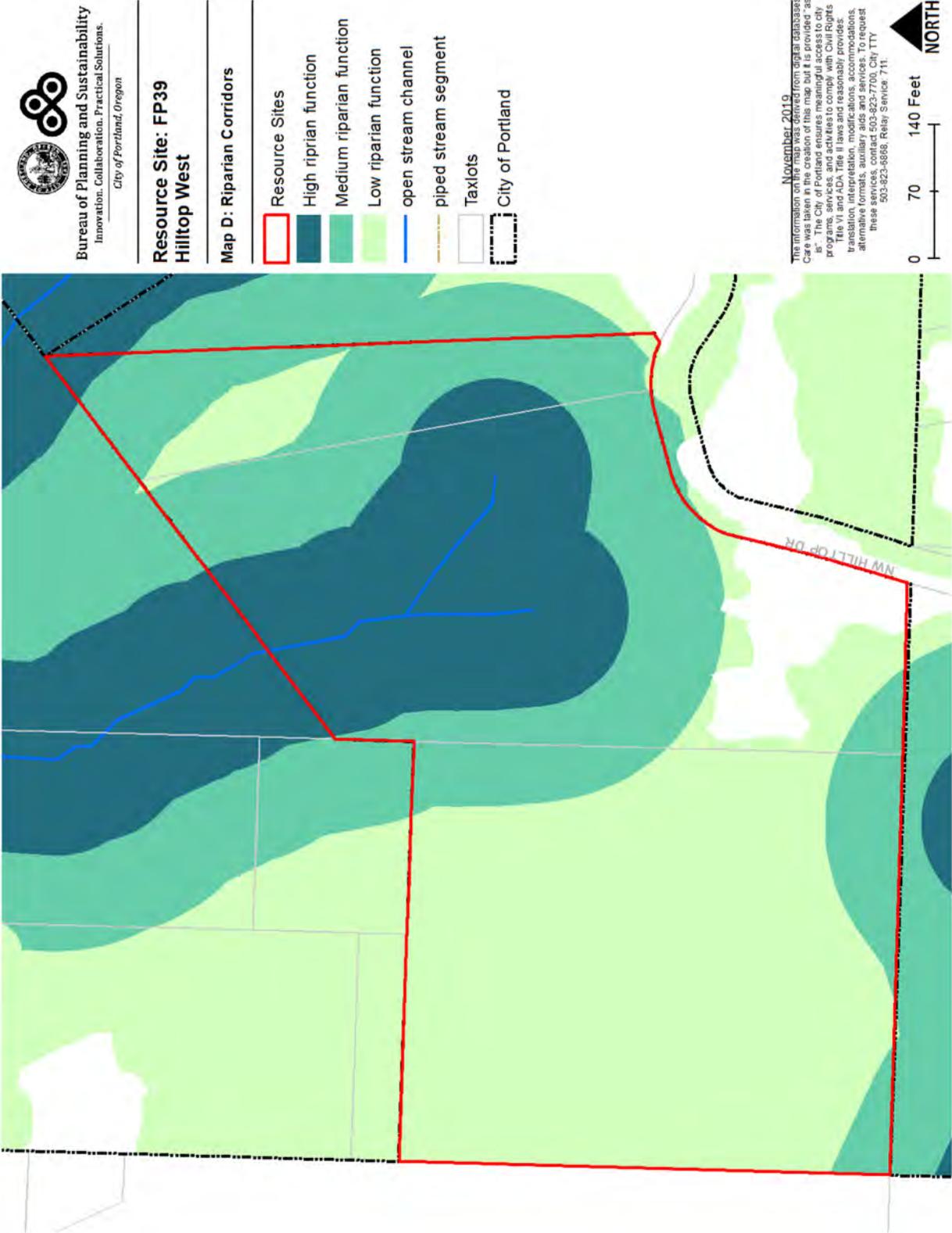
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation contiguous that are to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Strictly Limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 100 feet from stream top-of-bank.
4. *Strictly Limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

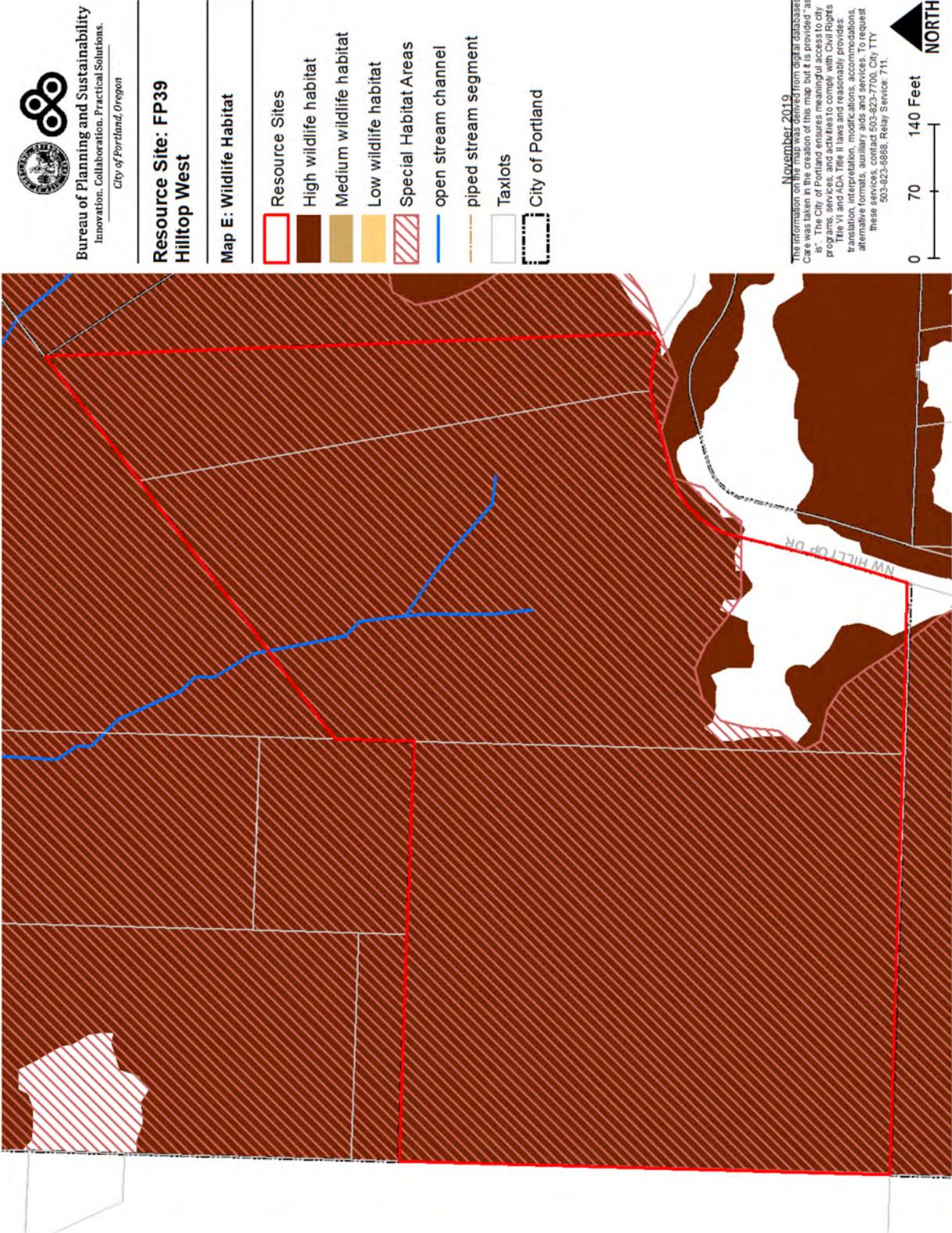
Table C: ESEE Decision for Resource Site FP39	
ESEE Decision	Acres
Strictly Limit	10.6
Limit	0.0
Allow	0.5

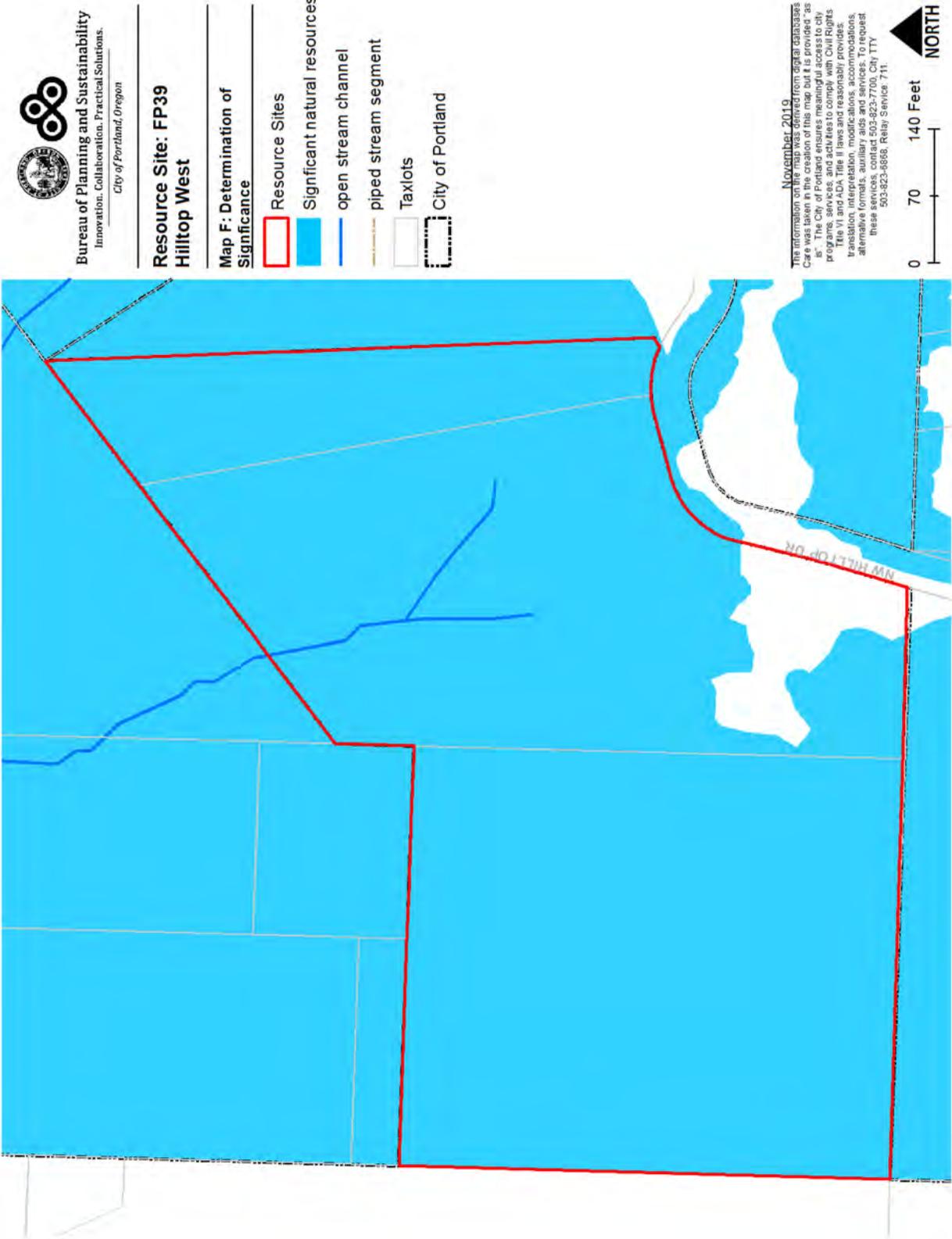












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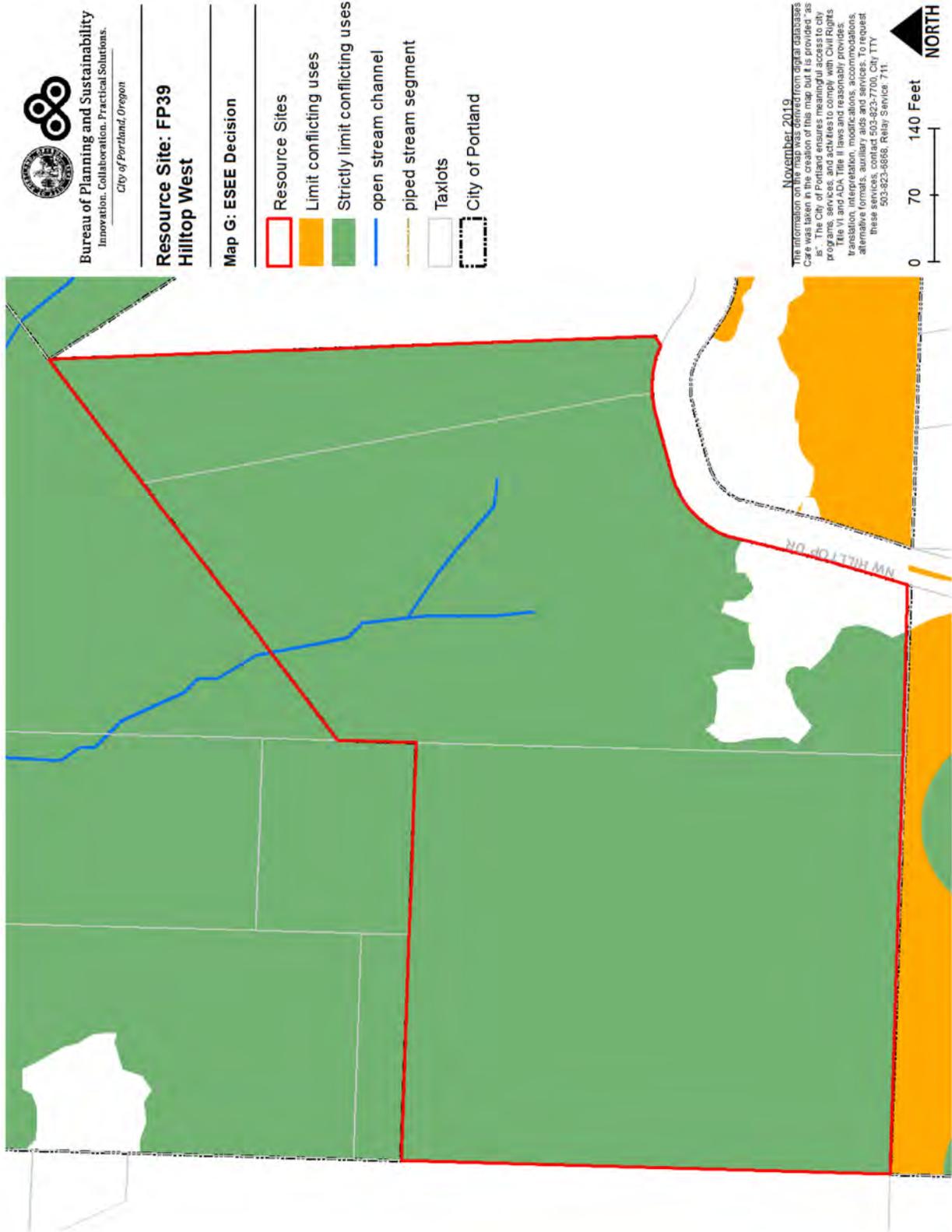
**Resource Site: FP39
Hilltop West**

**Map F: Determination of
Significance**

- Resource Sites
- Significant natural resources
- open stream channel
- piped stream segment
- Taxlots
- City of Portland

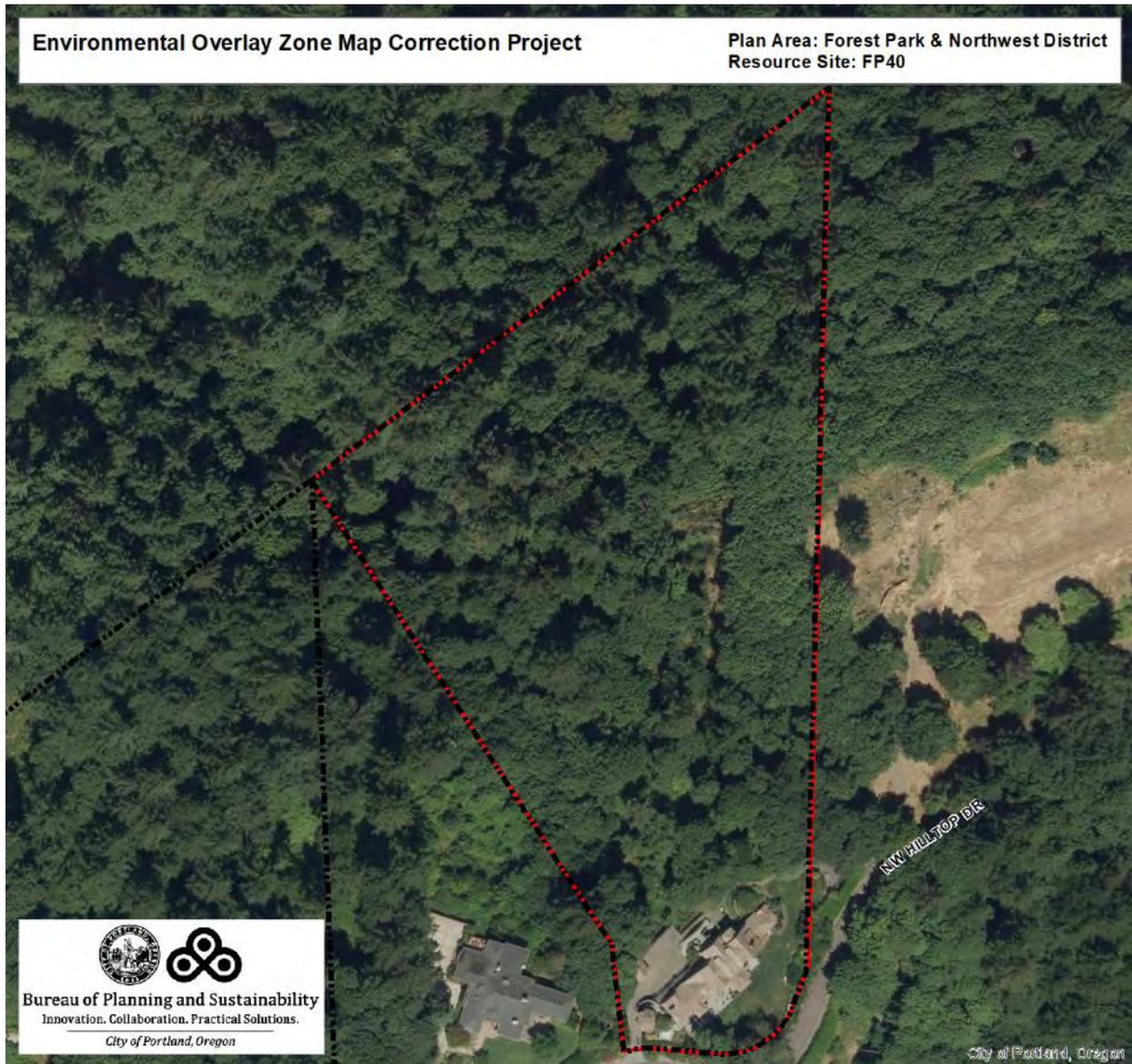
November 2019.
The information on this map was derived from digital databases. Care was taken in the creation of this map but it is provided "as is". The City of Portland ensures meaningful access to city programs, services, and activities to comply with Civil Rights Title VI and ADA Title II laws and reasonably provides translation, interpretation, modifications, accommodations, alternative services, contact 503-823-7700, CH TTY: 503-823-8888, Relay Service: 711.





Resource Site No.: FP40 Resource Site Name: Hilltop East

Previous Plan: Multnomah County Urban Lands Previous Resource Site No.: 111



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP40
		Study Area
Stream (Miles)		0.1
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		5.2
	Forest (acres)	5.2
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		5.6
Impervious Surface (acres)		0.1
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

This site is composed of a patchwork of three soil types: Cascade silt loam, Cascade-Urban land complex and Goble silt loam. The predominant soils are the Cascade silt loam and the Cascade Urban complex. Cascade soils are somewhat poorly drained soils formed from silty materials. A two- to four-foot thick fragipan exists at a depth of 20 to 30 inches. A fragipan is a compacted layer of soil that creates a hard, impervious layer difficult for water and roots to penetrate. In winter and spring, it creates a perched water table; in summer, it creates a nearly rock-hard layer. The wetness of this layer can reduce the effectiveness of septic tank absorption fields and increases the likelihood of erosion. In addition, the shallow depth to the fragipan makes installation of some drainage systems difficult.

The Cascade-Urban complex consists of Cascade soils mixed with soils disturbed by urban development. Urban development alters the soil through excavation, filling and grading, creating a patchwork of soil characteristics. Mostly undisturbed sites have the properties of Cascade silt loam. More disturbed sites vary in their permeability and erosion potential.

Goble silt loams are located primarily in UIAs # 0, 7 and 8, on 30 to 60 percent slopes which are some of the steeper parts of the site. This is a very deep and moderately well-drained soil formed from silt and ash. Goble soils also have a thin (up to 12 inches thick) fragipan at a depth of approximately 30 to 48 inches, making it slightly less limiting for plant growth and excavation. The soil above the fragipan is moderately permeable, and the water table in winter and spring is within four feet of the surface. The steep slopes and seasonal saturation of the soil combine to make the potential for erosion and slumps high where this soil exists.

All of the parcels within the Sylvan site are located along the ridge and slopes of the Tualatin Mountains. Slopes on the east side of the ridge are generally steeper, contributing to increased slide potential. West-side slopes are also subject to slides. Shallow rooting depth, a product of the fragipan, increases

tree windfalls and slope instability. Where erosion or urban development exposes the fragipan, establishment of vegetation is difficult, compounding erosion problems.

Located on a forested ridge-top above the Willamette Valley, the plant community at this site is characteristic of the Western Hemlock vegetation zone (Franklin and Dymess 1988). The forest generally ranges in age from 50- to 120-year old second growth in a mid-seral stage of succession. With young shade-tolerant cedars well established in the understory, the older forest has entered the understory re-initiation stage (Oliver and Larson 1996).

The forest community is characterized by Douglas fir and bigleaf maple in the canopy layer, with mature western red cedar more common near Balch Creek and along Miller Road. Grand fir, red alder, bitter cherry and western hemlock are common overstory associates. Less common are Pacific dogwood and two invasive aliens, English holly and European hawthorn. In the understory, vine maple occurs in association with Indian plum, red elderberry, Oregon grape, western hazel, oceanspray, snowberry and cedar saplings. The ground layer is typically dominated by sword fern, though Pacific waterleaf and inside-out flower are occasional dominants. Several areas, most notably along Highway 26, are overrun by the exotic English ivy. Other common ground vegetation includes lady fern (on moist slopes and along streams), bracken fern, miner's lettuce, Hooker fairy-bell, false Solomon's seal, fringecup, western trillium and stream violet.

Large forest tracts within the site provide high quality habitat for a diverse wildlife assemblage. Abundant quantities of large woody debris and a thick organic layer on the forest floor provide habitat and foraging grounds for birds, reptiles, amphibians and small mammals. In most cases, the understory is a thick, diverse assemblage of berry and nut-bearing native shrubs that wildlife depend upon for forage as well as cover, especially during winter months. Other valuable habitat features within these forests include snags, large boulders, ravines and seeps.

Many species of birds were encountered during field surveys of the site: those most frequently observed include downy woodpecker, northern flicker, winter wren, black-capped chickadee, common bushtit, rufous-sided towhee, Wilson's warbler, Swainson's thrush and song sparrow. Due to the abundance of songbirds, sharp-shinned hawks and other forest-dwelling birds of prey such as great-horned owls are likely to occur within the site as well. The area is also potential foraging ground for peregrine falcons, which rely on other birds for the bulk of their diet.

Amphibians and reptiles, including western red-backed salamander, Pacific chorus frog and garter snakes, inhabit the site. Tree cavities serve as roosting and nesting sites for bats, voles, squirrels, weasels, raccoons and cavity-nesting birds, including pileated woodpecker. The abundant cover is essential for black-tail deer, coyote and other large mammals.

Balch Creek runs through a portion of this site. Resident cutthroat trout inhabit the creek; historically, other species inhabited the drainage as well. Balch and other creeks within the site flow through steep forested ravines, providing wildlife with a protected travel corridor, refuge from high summer temperatures and a permanent source of water. Thick riparian forests protect the creeks and the integrity of their banks and influence the quality of stream habitat located downstream. Large quantities of silt are present in several of the streams, providing evidence of the consequences of vegetation removal associated with previous upstream development. Other sources of silt include upstream landslides and bank failures related to new construction.

Special Status Species found in the resource site include:

- Pacific western big-eared bat
- Long-eared myotis
- Fringed myotis
- Long-legged myotis
- Pileated woodpecker
- Little willow flycatcher
- American peregrine falcon
- Olive-sided flycatcher
- Coast cutthroat trout
- Northern red-legged frog

Table B: Quality of Natural Resource Functions in Resource Site FP40				
Resource Site (acres) = 5.741617				
	High	Medium	Low	Total
Riparian Corridors*				
acres	2.0	1.6	1.6	5.2
percent total inventory site area	35.6%	28.4%	27.1%	91.2%
Wildlife Habitat*				
acres	5.2	0.0	0.0	5.2
percent total inventory site area	91.2%	0.0%	0.0%	91.2%
Special Habitat Areas**				
acres				5.3
percent total inventory site area				92.4%
Combined Total⁺				
acres	5.3	0.0	0.0	5.3
percent total inventory site area	92.4%	0.0%	0.0%	92.4%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. ⁺Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.</p>				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP40 the following significant features and functions are present:

Significant Natural Resource Features: open stream, forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; woodland, shrubland and herbaceous vegetation within 300 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish and wildlife species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP40, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk

species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

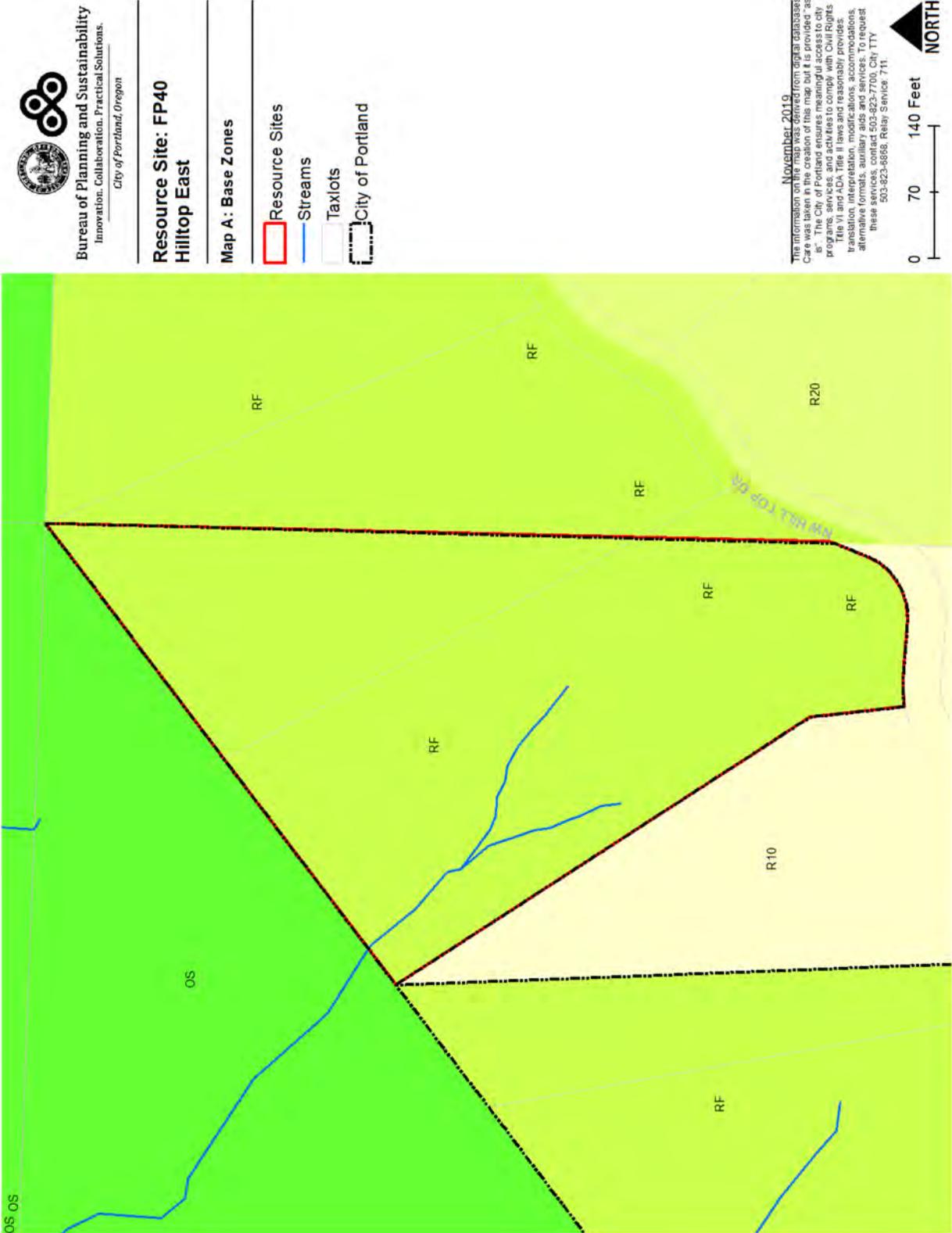
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

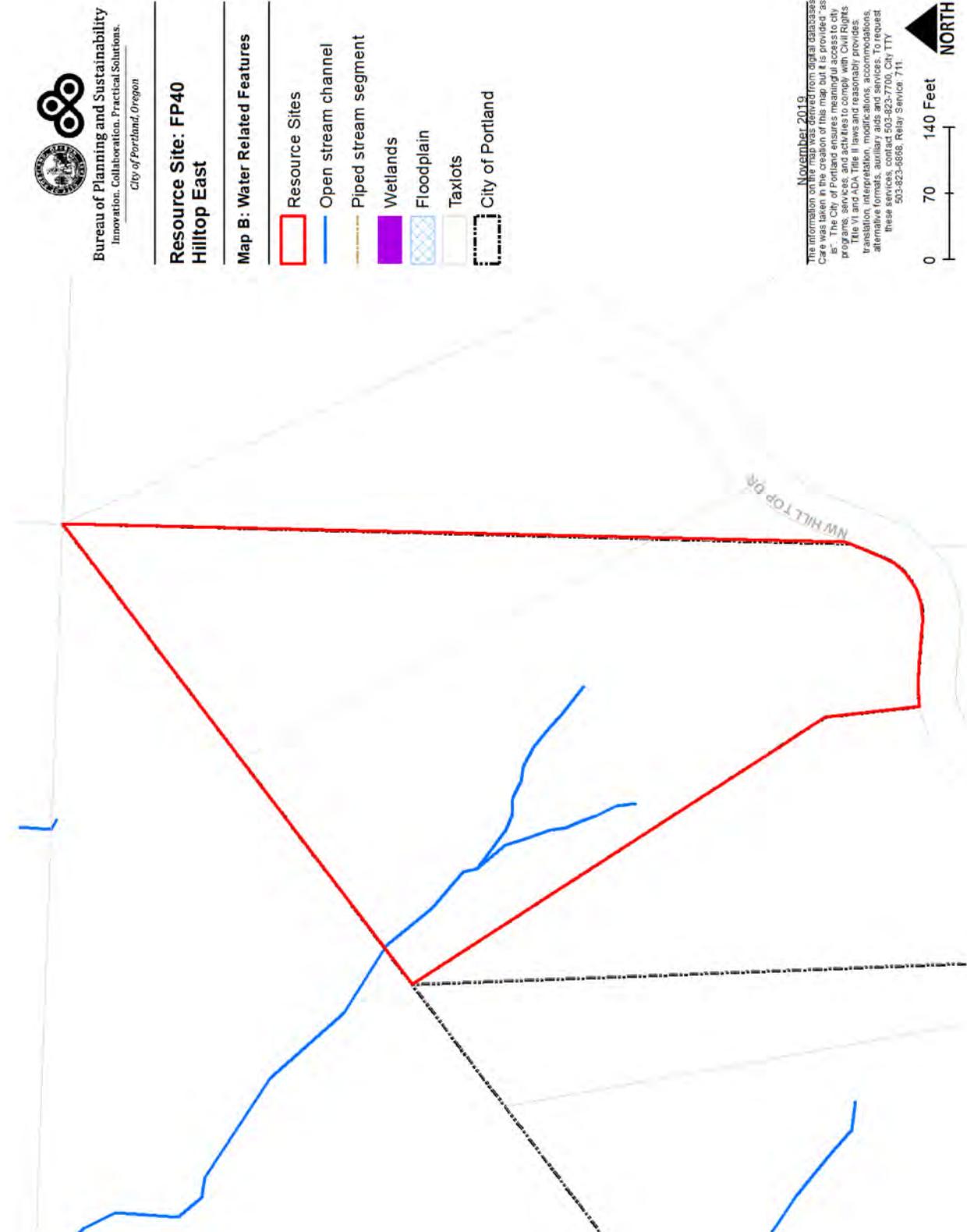
ESEE Decisions

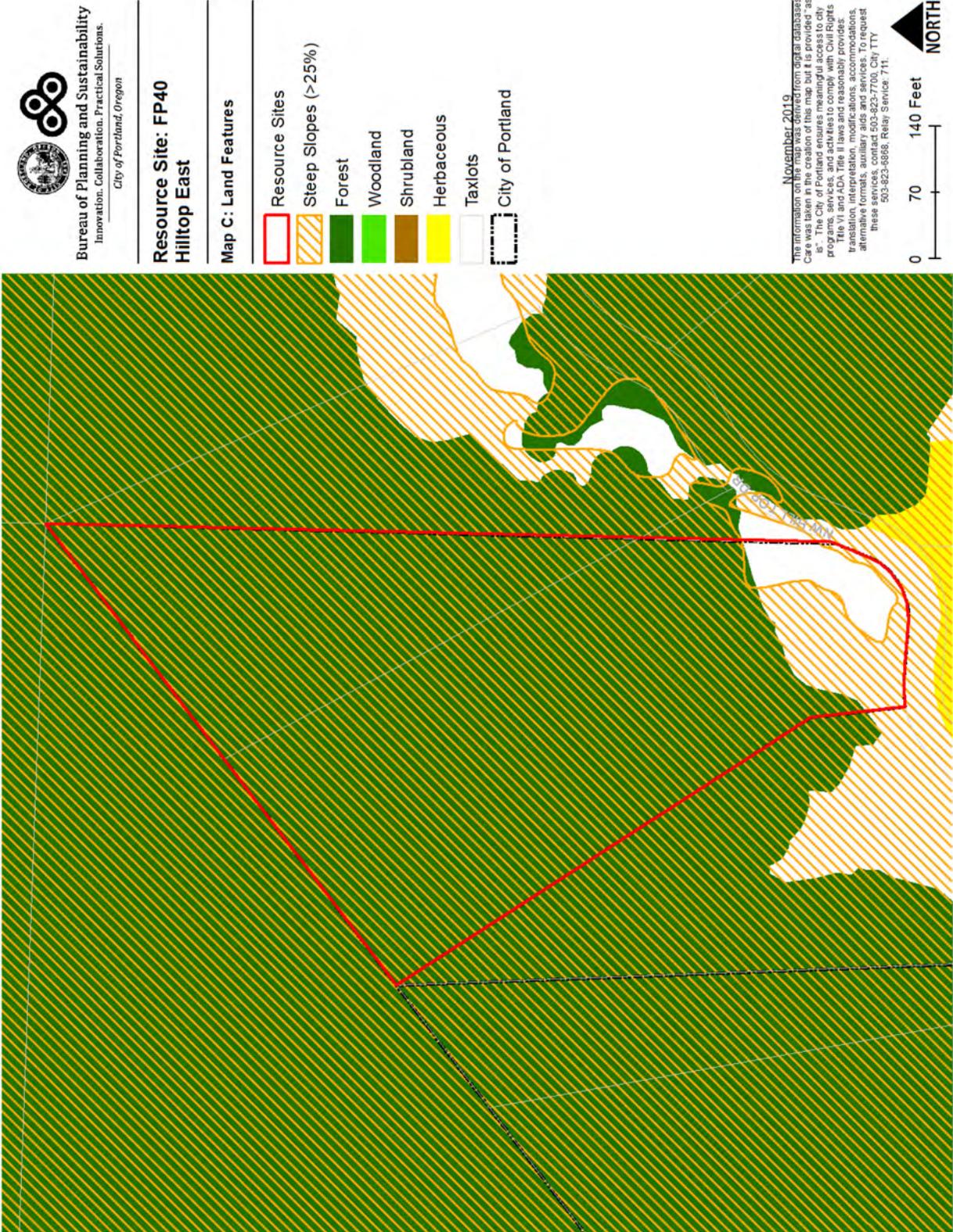
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP40 are:

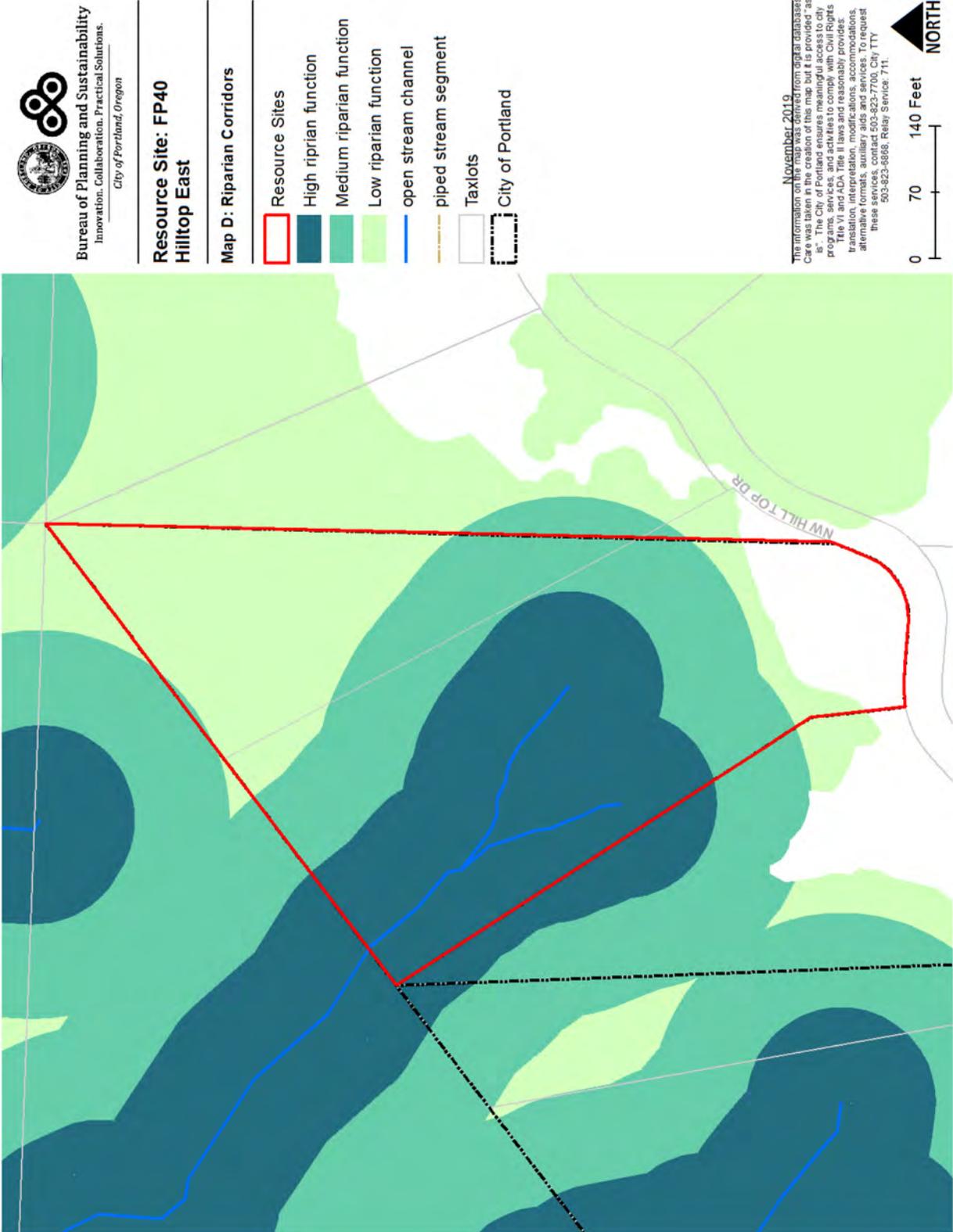
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation contiguous that are to but more than 50 feet from stream top-of-bank extending to 100 feet from top-of-bank.
3. *Strictly Limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 100 feet from stream top-of-bank.
4. *Strictly Limit* conflicting uses within areas of forest or woodland vegetation located on steep slopes and contiguous to but more than 100 feet from stream top-of-bank.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

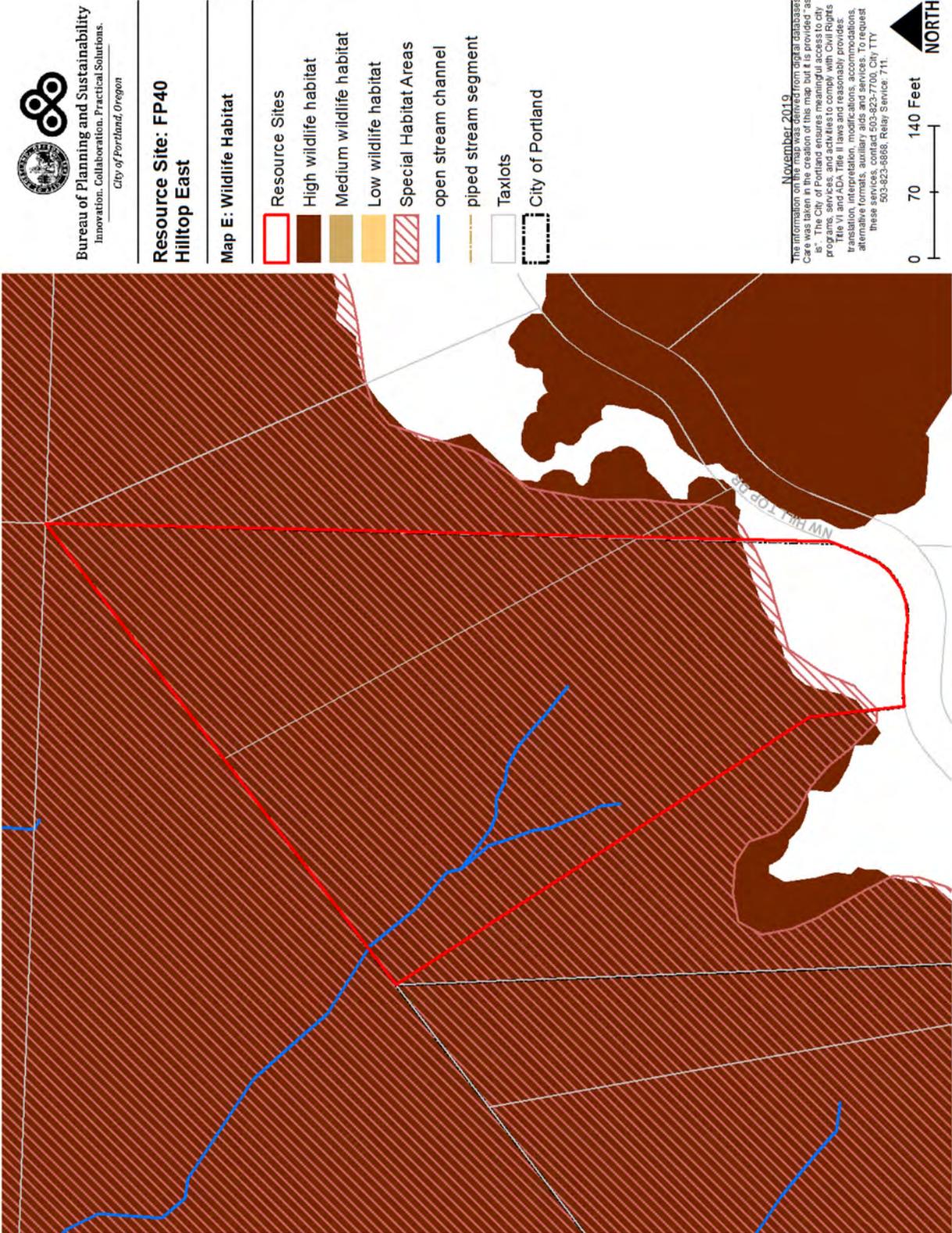
Table C: ESEE Decision for Resource Site FP40	
ESEE Decision	Acres
Strictly Limit	5.2
Limit	0.0
Allow	0.5

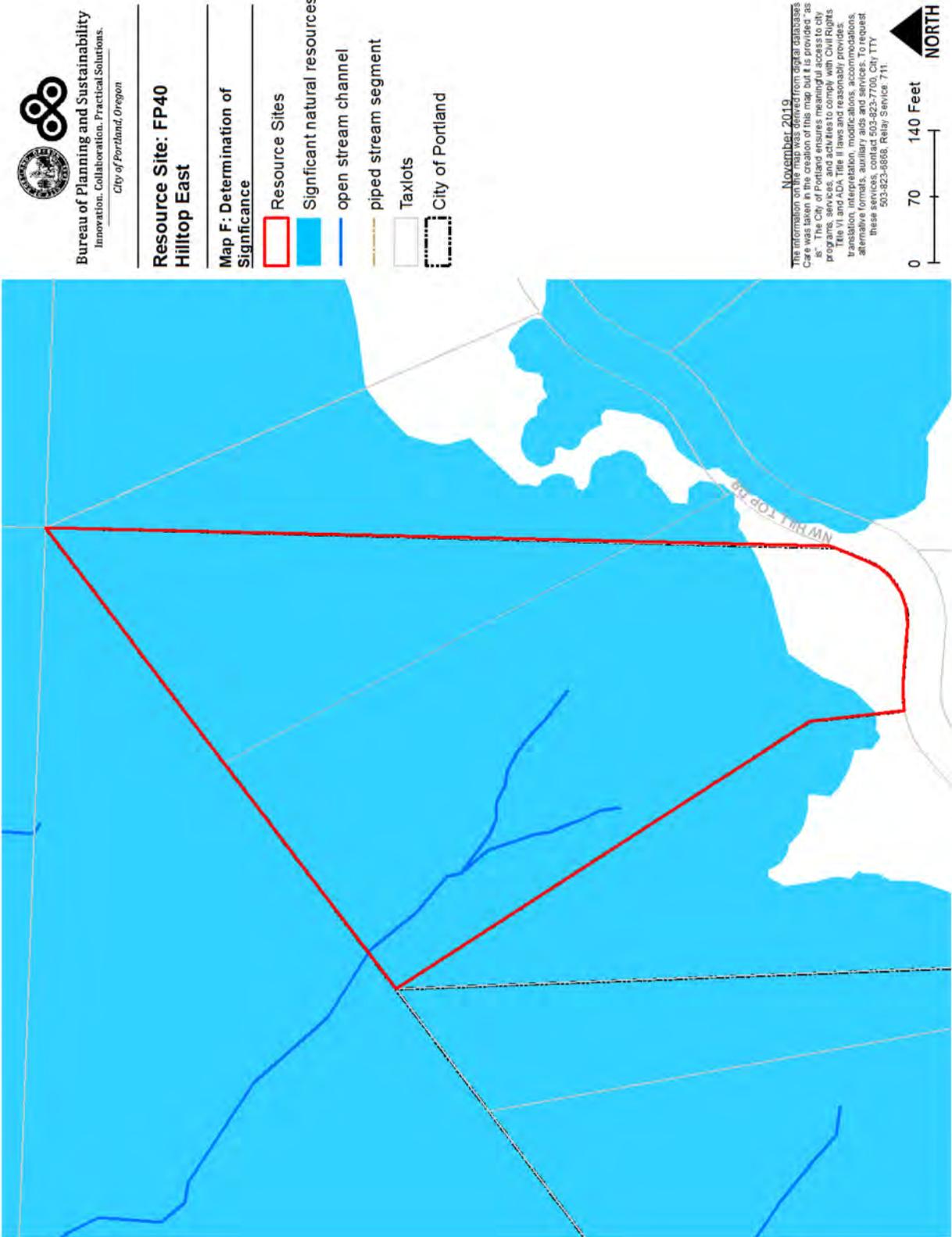


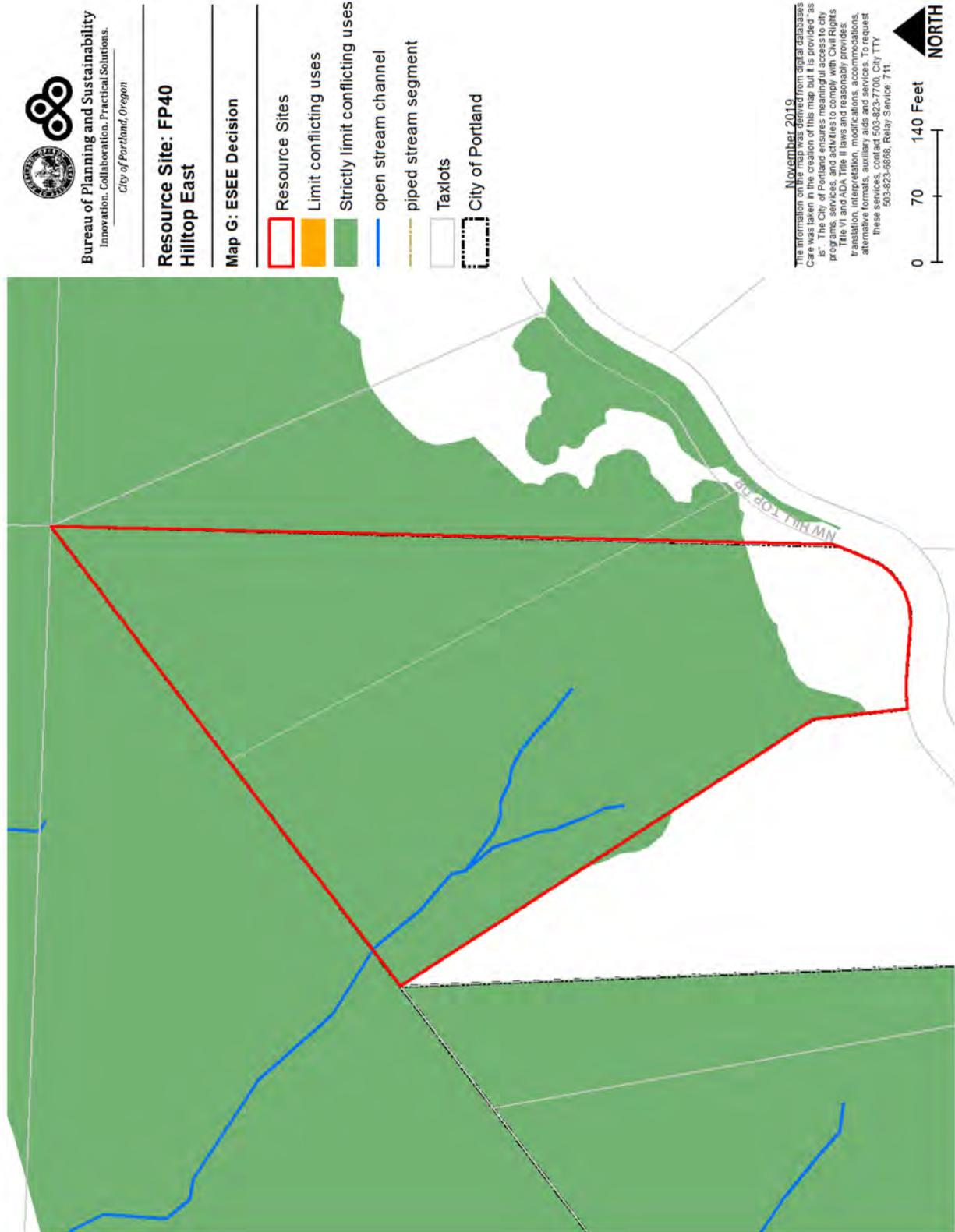




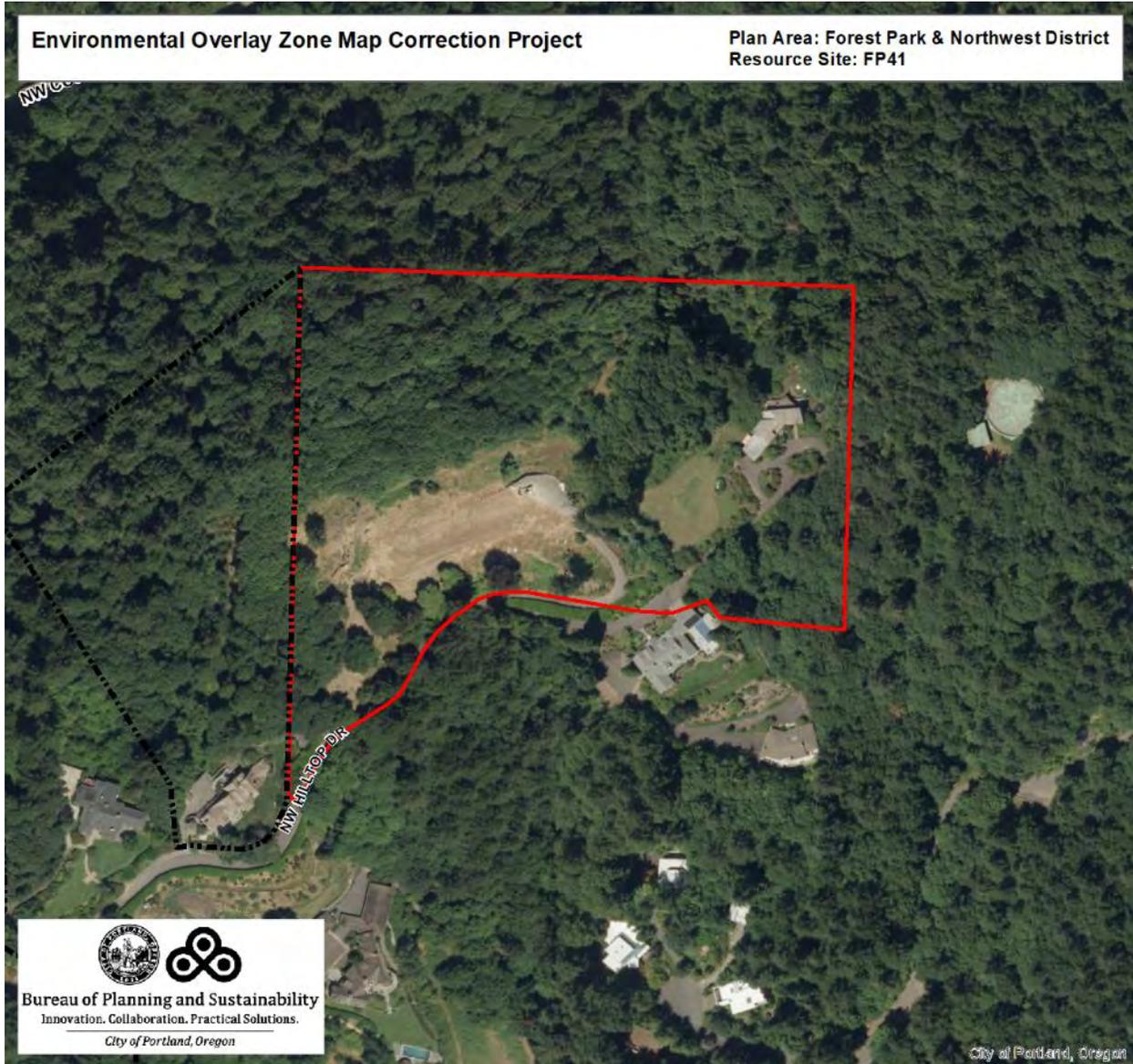








Resource Site No.: FP41 **Resource Site Name:** Upper Hilltop Dr.
Previous Plan: Balch Creek Watershed Protection Plan **Previous Resource Site No.:** 79



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP41
		Study Area
Stream (Miles)		2.2
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		7.9
	Forest (acres)	7.9
	Woodland (acres)	0.0
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		9.6
Impervious Surface (acres)		0.6
* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.		
**Slopes are derived from LiDAR. Steep slopes are area with a slope greater than 25%.		

The bedrock of Portland’s West Hills is largely composed of uplifted Columbia Flood Basalt, which is overlaid with silt layers that are wind and water deposited, which may be up to 100 feet. The presence of these silts has important implications for land use and development. The silt becomes very unstable when wet and the potential for slope failure is particularly high after winter rains have saturated the soil. These slope failures, often associated with logging and building activities, have substantially altered the face of the hillside over the last century.

Most soils in the West Hills drain poorly. The subsoil usually includes a fragipan, which is a layer less permeable to water than the upper layers. Fragipans limit the rooting depth of many plants. A seasonal water table is perched on top of fragipans every winter. The typical soil profile amounts to high erosion and slumping hazard due to the seasonal water table, slow permeability, low strength, and the tendency of the upper layers to slide over the fragipan whenever they become saturated. Slumping is common in the West Hills, especially when bare soil is exposed to rainfall or when soil is cut or filled. Several major landslides have occurred in the West Hills. The instability of the soil is a major reason why much of the West Hills have not been developed and is now included in parkland, wildlife sanctuaries, open space, farm, and forest zones. Extreme care must be taken when disturbing these soils, and vegetation must be reestablished quickly on disturbed areas to prevent erosion, sliding, and slumping.

Balch Creek summer flows are low, but sufficient to support a population of 2,000 to 4,000 cutthroat trout. These trout have been isolated since the replacement of lower Balch Creek by a sewer in 1921. Balch Creek cutthroat cannot migrate to any other water body and other fish cannot enter Balch Creek through the sewer. The Oregon Fish and Wildlife Commission does not allow fishing in Balch Creek because cutthroat trout are the only fish species present. The existence of these trout is threatened by land development.

The stream is surrounded by forest on steep slopes, this provides cover and habitat for wildlife. The trees on steep slopes help maintain slope stability, reducing the risk of landslides and erosion. The trees also capture and use rainwater, reducing overland flow that contributes to stream bank erosion and downstream flooding.

Table B: Quality of Natural Resource Functions in Resource Site FP41				
Resource Site (acres) = 11.229917				
	High	Medium	Low	Total
Riparian Corridors*				
acres	1.0	1.7	5.3	7.9
percent total inventory site area	9.0%	14.9%	46.9%	70.7%
Wildlife Habitat*				
acres	7.9	0.0	0.0	7.9
percent total inventory site area	70.7%	0.0%	0.0%	70.7%
Special Habitat Areas**				
acres				8.3
percent total inventory site area				73.9%
Combined Total⁺				
acres	9.0	0.0	0.0	9.0
percent total inventory site area	80.5%	0.0%	0.0%	80.5%
* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water. ** Special Habitat Areas rank high for wildlife habitat. +Because riparian resources, Special Habitat Areas, and wildlife Habitat overlap, the results cannot be added together to determine the combined results.				

Determination of Significance

Natural resource features mapped in the resource site that provide functions identified in the Natural Resources Inventory are determined to be significant (Map F). Within resource site FP41 the following significant features and functions are present:

Significant Natural Resource Features: open stream; forest vegetation within 300 feet of waterbodies; forest vegetation on steep slopes (>25% slope) contiguous to and within 780 feet of waterbodies; developed land within 50 feet of waterbodies; forest patches and associated and contiguous woodland patches two acres in size or larger; and Special Habitat Areas.

Significant Riparian Corridor Functions: microclimate and shade; stream flow moderation and water storage; bank function and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and riparian wildlife movement corridor.

Significant Wildlife Habitat Functions: interior area; food and water; resting, denning, nesting and rearing; movement and migration; reduction of noise, light and vibration; and habitat patches that support special status fish species.

Resource Site Specific ESEE

The General ESEE analysis, Volume 2, describes the conflicting uses and provides an overarching analysis of the economic, social, environmental and energy consequences of prohibiting, limiting or allowing the conflicting uses within areas of significant natural resources. In addition to the General ESEE analysis, the following resource site-specific consequences are considered.

Conflicting Uses

The common impact of conflicting uses in the resource site include clearing vegetation; grading activities and soil compaction; add impervious surface; modifying streams and flood areas; generating pollution; landscaping with non-native or invasive vegetation; building fences or other wildlife barriers; and other impacts such as noise, light, litter and pets.

Within the resource site residential uses are allowed outright or conditionally in the RF base zones. Development of new uses may involve vegetation clearing, grading, filing, and soil compaction, as well as the addition of impervious surfaces and landscaping with non-native plants, with associated impacts on the natural resources. Basic utilities and other infrastructure are allowed in all base zones. New or upgraded utility corridors may be cleared of vegetation and may fragment wildlife habitat.

ESEE Analysis

The analysis of economic, social, environmental and energy consequences provided in Volume 2 is confirmed for resource site FP41, with the following additional information that clarifies the analysis.

Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams and wetlands, maintaining vegetation on steep slopes, and maintaining the stormwater management and

air-cooling functions of the tree canopy. Mitigation for negative consequences of additional development in areas of high or medium ranked natural resources should be required. New or expanded development should be setback from a minimum distance streams and wetlands.

Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resource Site FP41 are:

1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank.
2. *Strictly limit* conflicting uses within areas of forest vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Strictly limit* conflicting uses within areas of forest vegetation located on steep slopes and contiguous to but more than 50 feet from stream top-of-bank.
4. *Allow* conflicting uses within all other areas containing significant natural resources.

Table C: ESEE Decision for Resource Site FP41	
ESEE Decision	Acres
Strictly Limit	7.9
Limit	0.0
Allow	3.3





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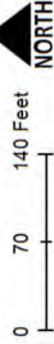
**Resource Site: FP41
Upper Hilltop Dr**

Map B: Water Related Features

-  Resource Sites
-  Open stream channel
-  Piped stream segment
-  Wetlands
-  Floodplain
-  Taxlots
-  City of Portland



November 2019.
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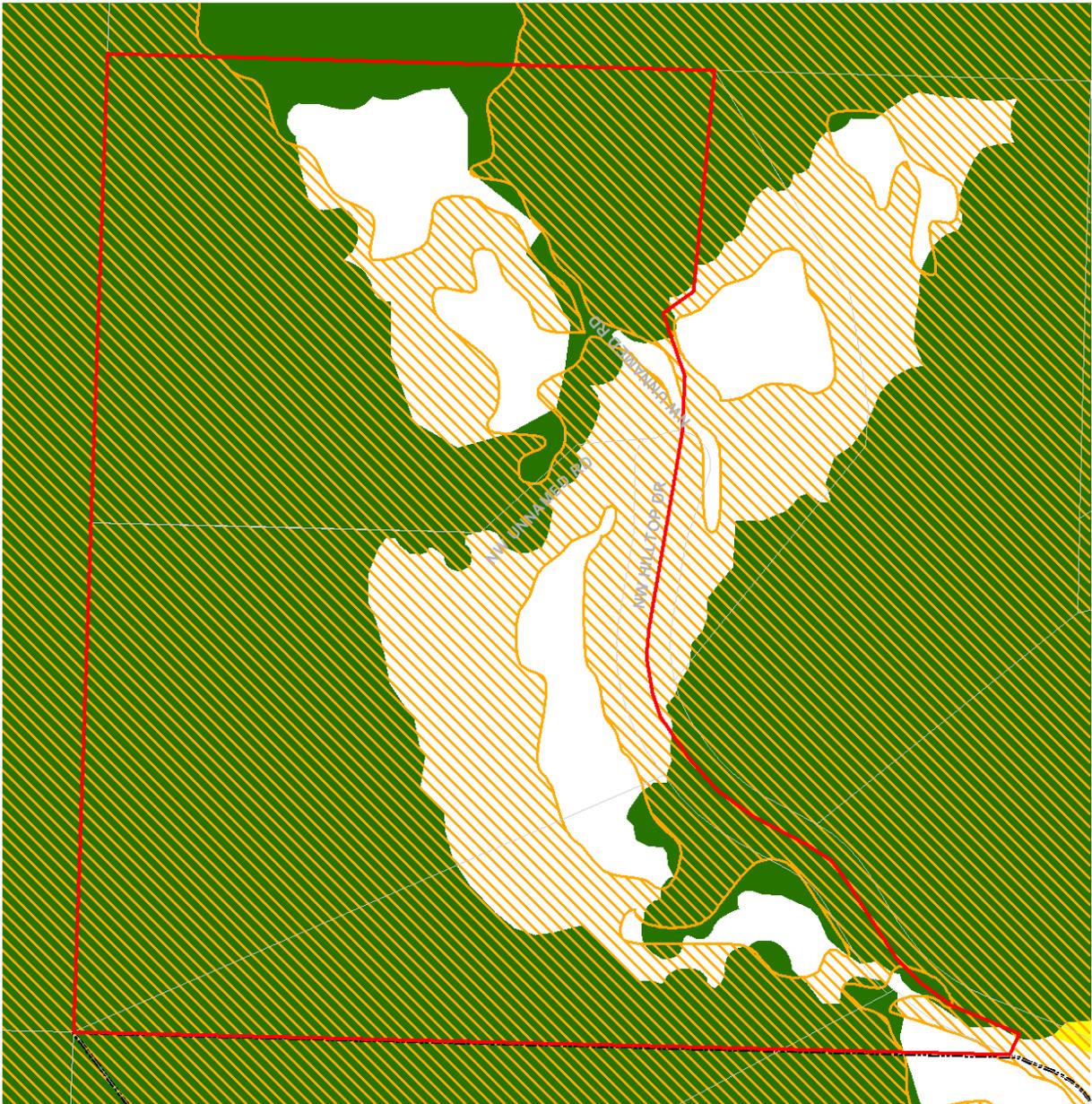


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**Resource Site: FP41
Upper Hilltop Dr**

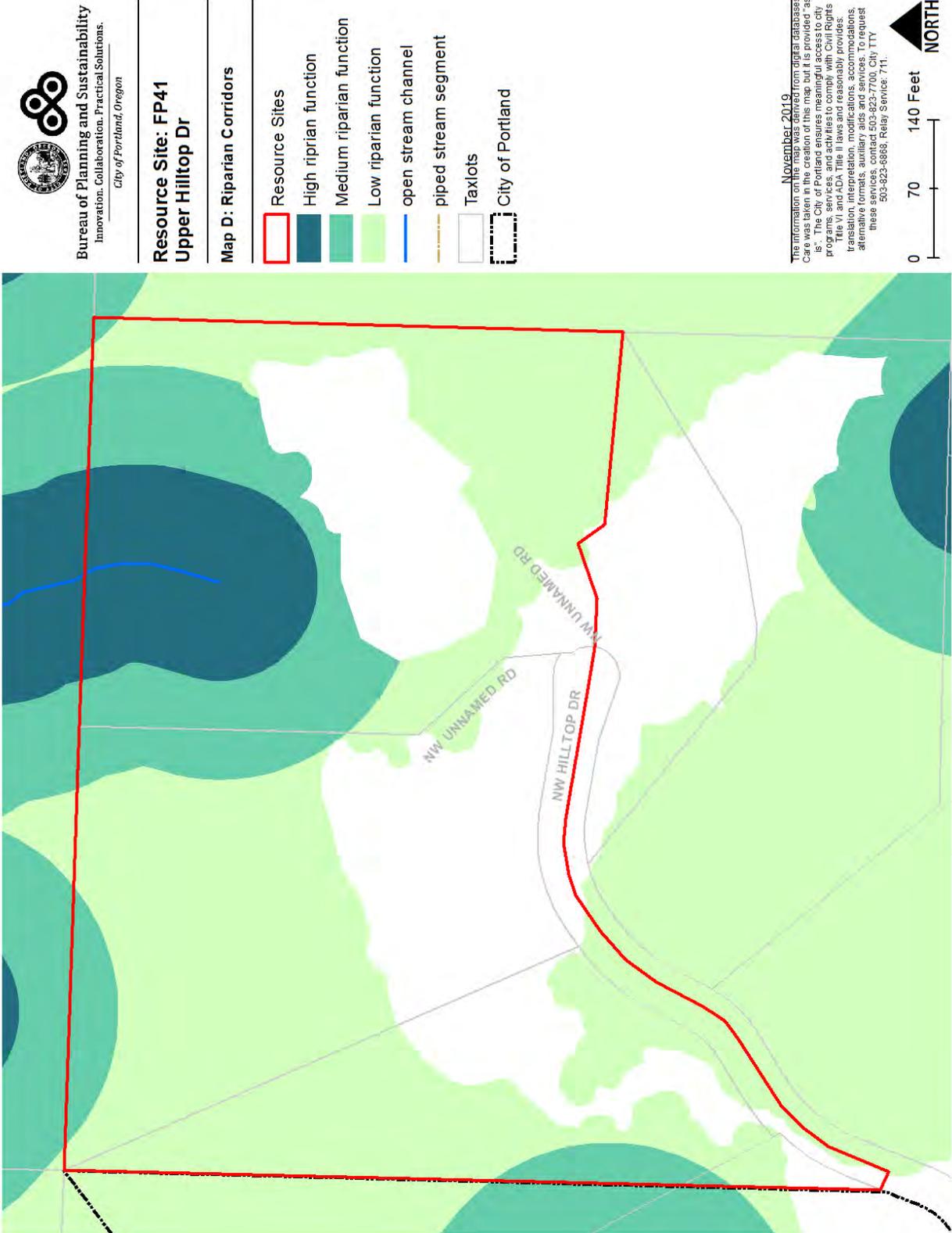
Map C: Land Features

-  Resource Sites
-  Steep Slopes (>25%)
-  Forest
-  Woodland
-  Shrubland
-  Herbaceous
-  Taxlots
-  City of Portland



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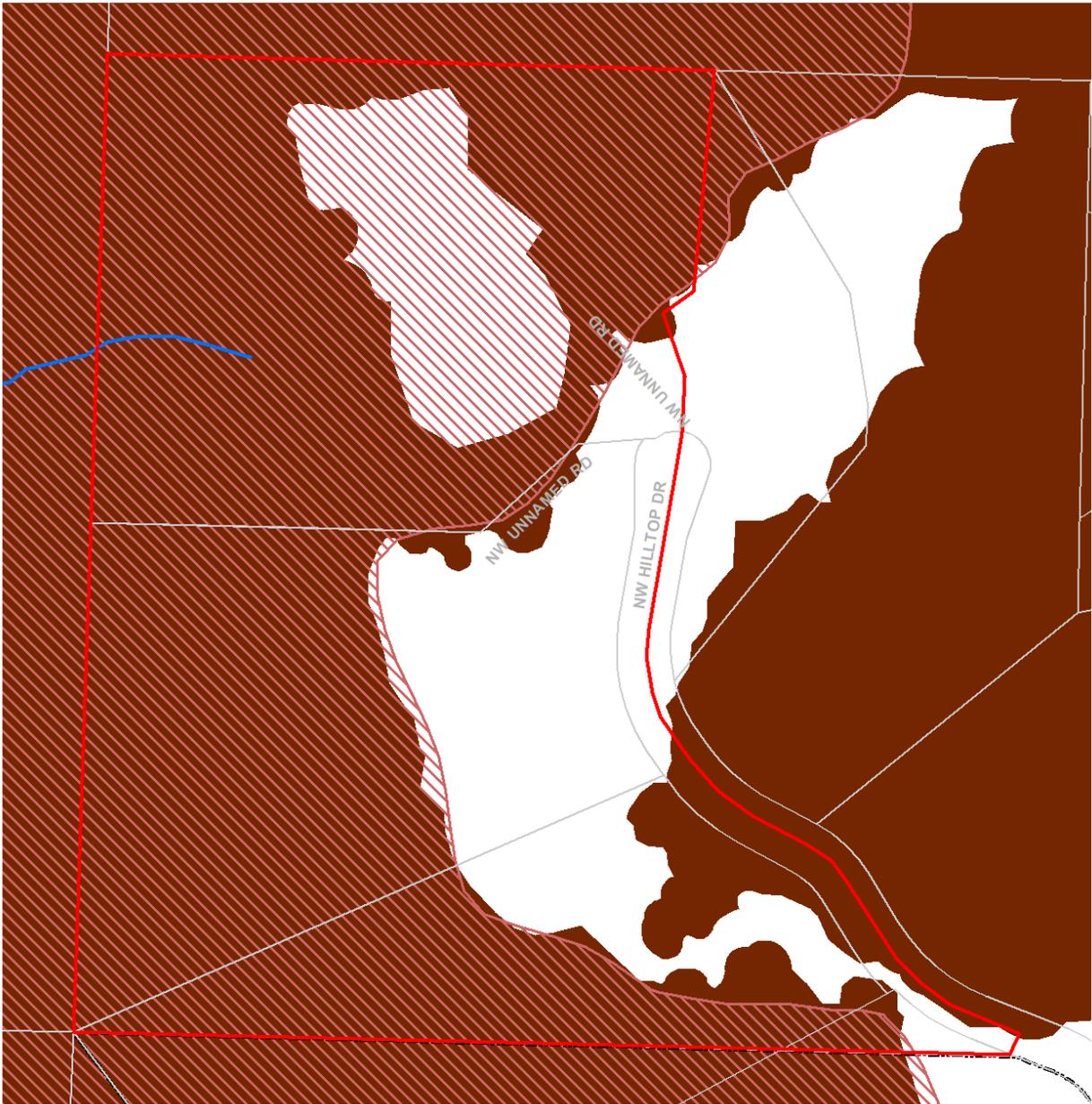


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**Resource Site: FP41
Upper Hilltop Dr**

Map E: Wildlife Habitat

- Resource Sites
- High wildlife habitat
- Medium wildlife habitat
- Low wildlife habitat
- Special Habitat Areas
- open stream channel
- piped stream segment
- Taxlots
- City of Portland



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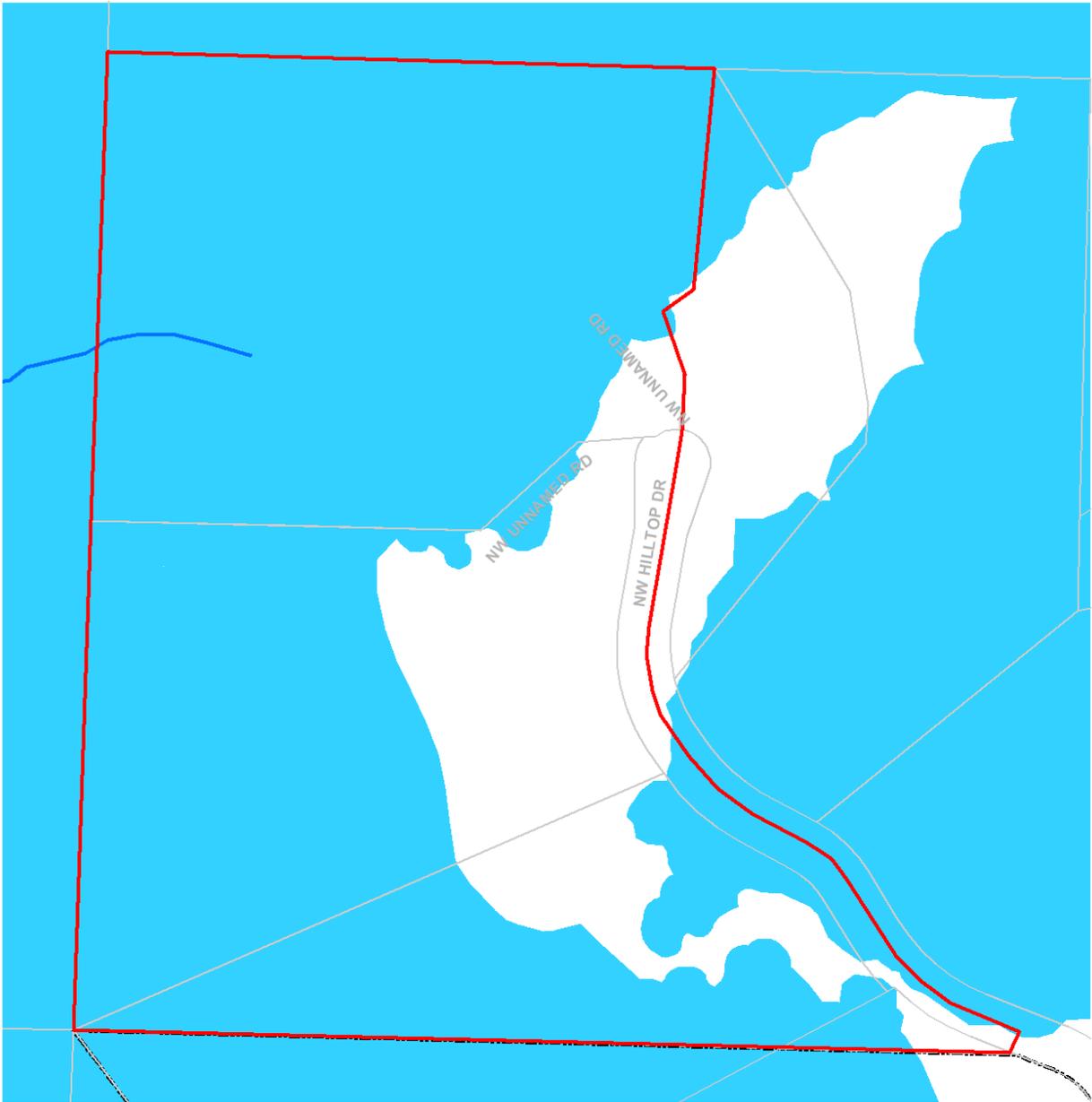


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**Resource Site: FP41
Upper Hilltop Dr**

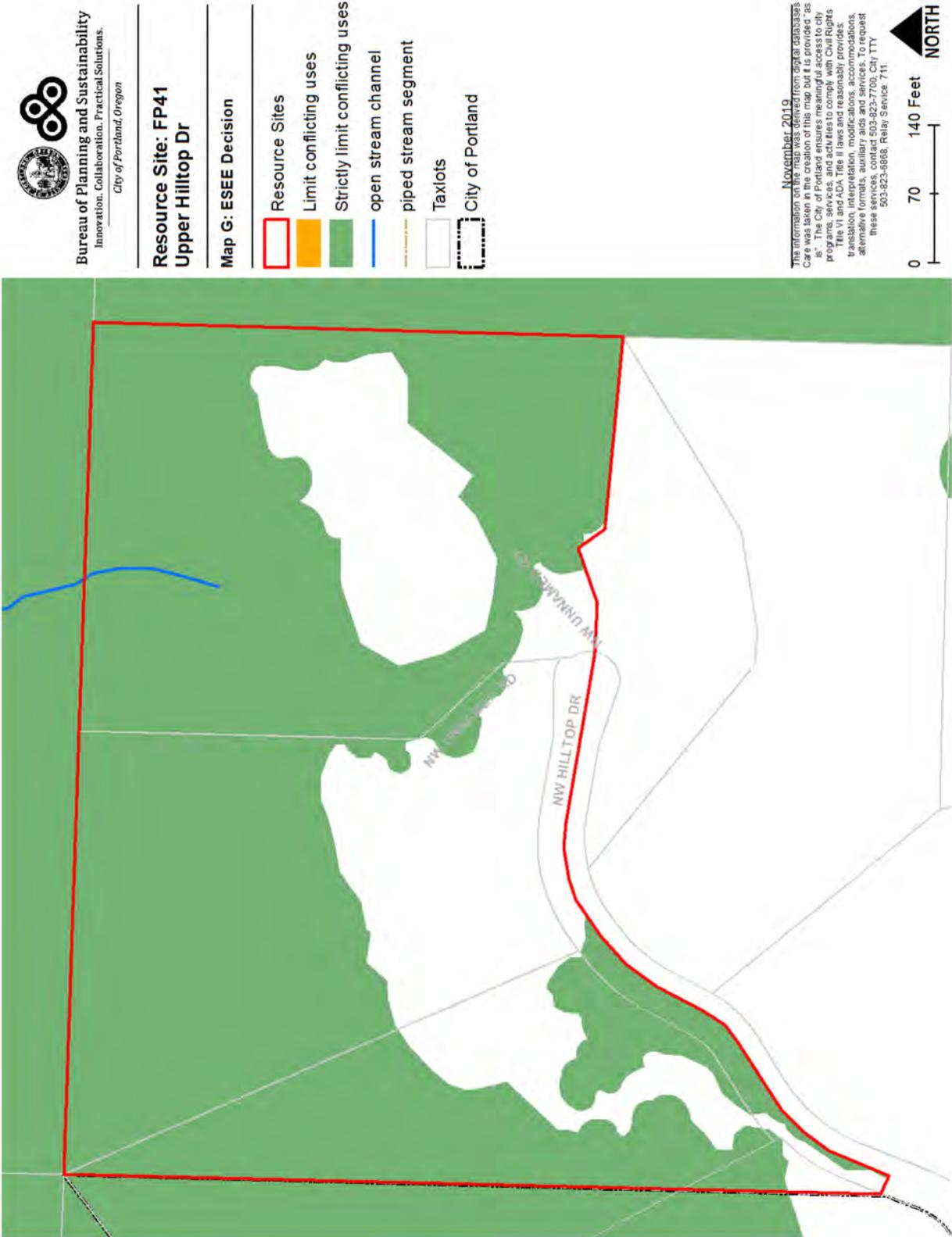
**Map F: Determination of
Significance**

-  Resource Sites
-  Significant natural resources
-  open stream channel
-  piped stream segment
-  Taxlots
-  City of Portland



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The *Environmental Overlay Zone Map Correction Project* plan documents:

Volume 1 – Project Report, Summary of Results and Implementation

The purpose of the Project Report is to document the overall project approach and methodology, summarize public engagement, provide an at-a-glance summary of the results by resource site, and present the updated zoning code maps and refinements to zoning code chapter 33.430, Environmental Zones.

Volume 2 – General Economic, Social, Environmental and Energy Analysis

The General ESEE evaluates the tradeoffs between protecting natural resources and other city goals for economic development, housing, public health, etc. The General ESEE provides an overall recommendation regarding which natural resource features should be protected. The General ESEE recommendations are then affirmed, clarified or modified for each resource site based on resource site-specific circumstances. The resource site-specific ESEEs are presented in Volume 3, Part A-H.

Volume 3 – Resource Site Inventory and ESEE Decisions

For each of the geographies listed below, each document presents an inventory of natural resource features and functions, a site-specific Economic, Social, Environmental and Energy Analysis (ESEE), and the ESEE decisions regarding which natural resource should be protected for each resource site.

Part A1 – Forest Park and Northwest District, Resource Sites 1 – 20

Part A2 – Forest Park and Northwest District, Resource Sites 21 – 41

Part B – Skyline West

Part C – Tryon Creek and Southwest Hills East

Part D – Fanno Creek

Part E – East Buttes and Terraces

Part F – Johnson Creek

Part G – Boring Lava Domes

Volume 4 – Appendices

Appendices include the Regulatory Context; 2012 NRI Project Report; stream, vegetation and wetland mapping protocols; and the at-risk species list.