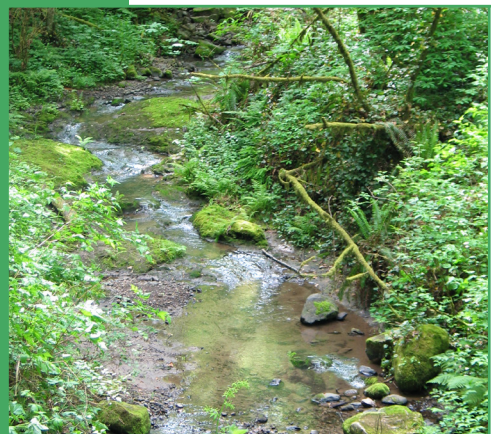
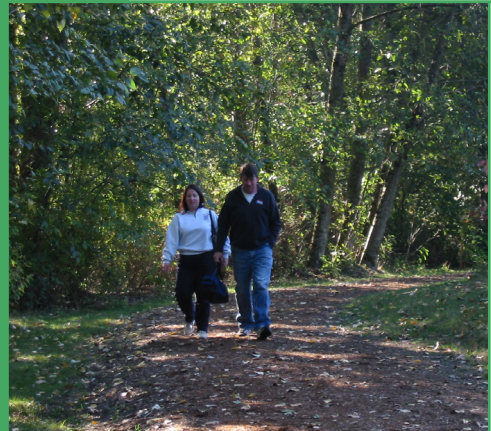


ENVIRONMENTAL OVERLAY ZONE MAP CORRECTION PROJECT

VOLUME 3, PART A1:
Forest Park & Northwest
District, Natural Resources
Inventory and ESEE Decisions
(Resource Sites 1-20)

Discussion Draft
November 2019



Bureau of Planning and Sustainability
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City of Portland, Oregon



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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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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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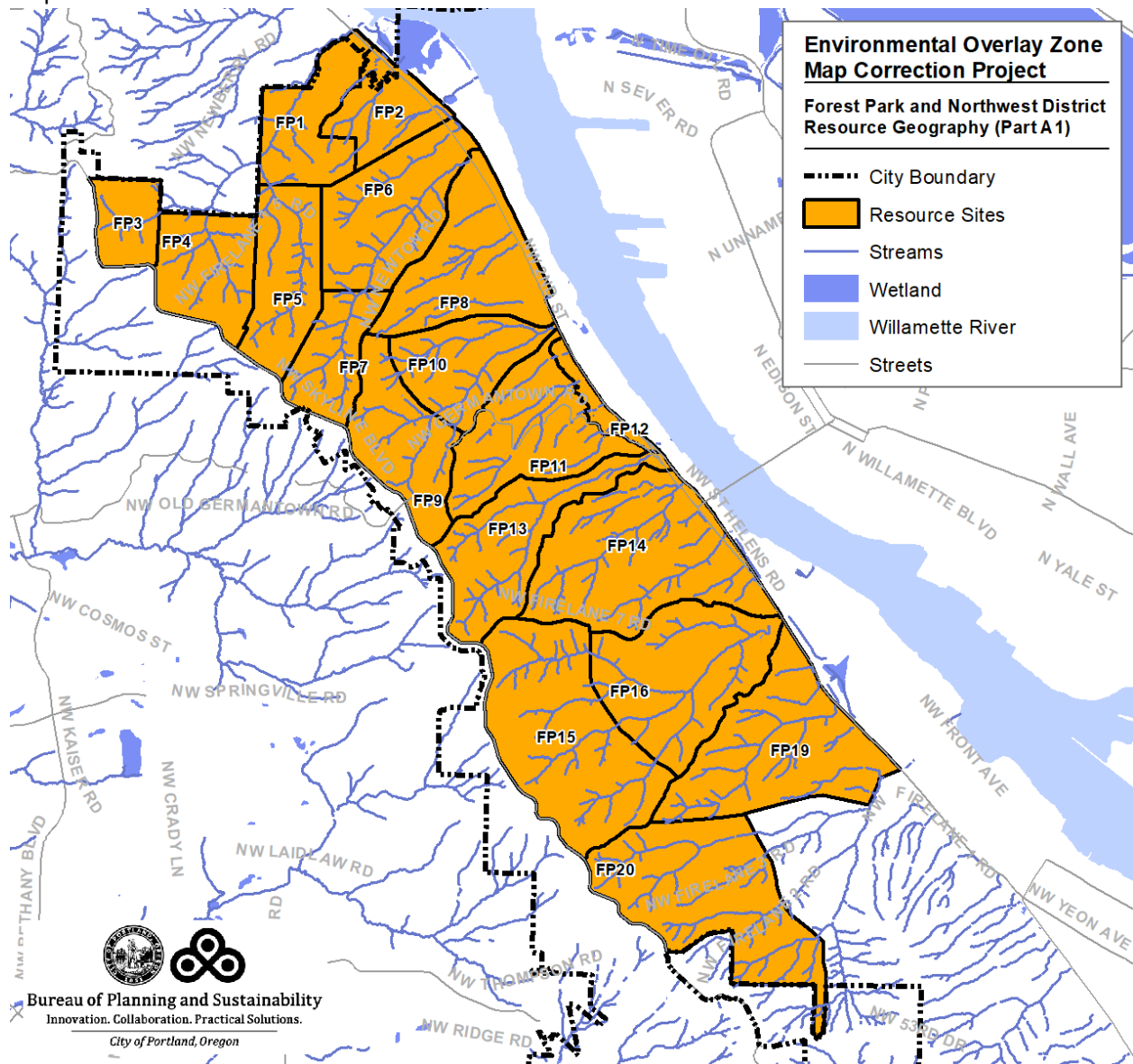
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A. Introduction

Volume 3, Part A1, includes the results for resource sites in the Forest Park and Northwest Hills geography, Resource Sites 1-20 (see Map 1). For each resource site the following is presented:

1. Natural resources inventory of riparian corridors and wildlife habitat pursuant to OAR 660-023-0030, 660-023-0090 and 660-023-0110.
2. Economic, Social, Environmental and Energy analysis pursuant to OAR 660-023-0040.
3. Economic, Social, Environmental and Energy decisions pursuant to OAR 660-023-0040.
4. Program implementation recommendations pursuant to OAR 660-023-0050.

The program to implement the inventory, ESEE decisions and recommendations are the updated zoning maps and codes found in Volume 1.



Map 1: Forest Park and Northwest District Resource Geography (Resources Sites 1 – 20)

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 (Appendix B) 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 (Appendix B), 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.

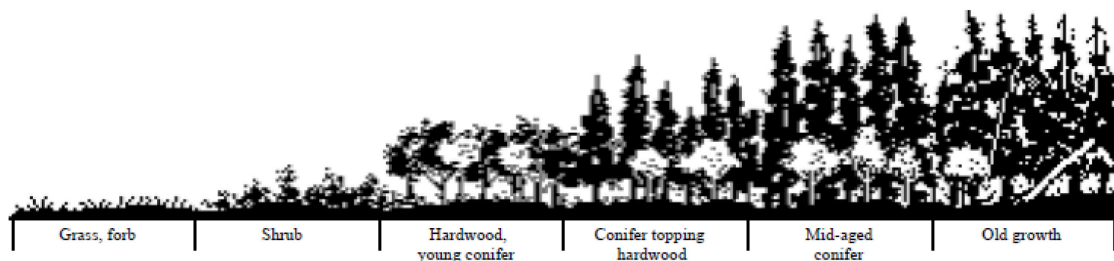


Figure 2. Stages of Northwest Hills forest succession

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 austini*), 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).

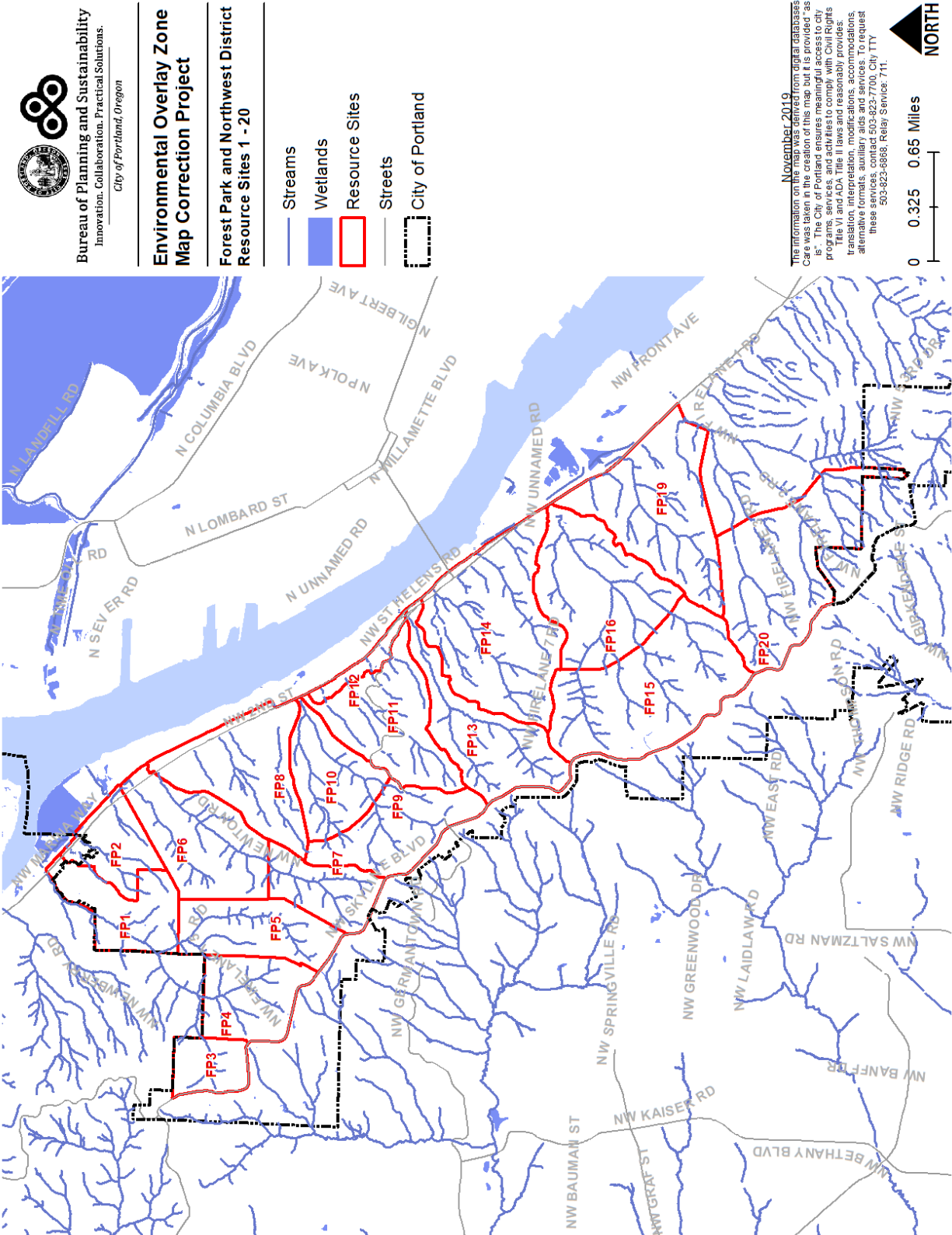
Several species of snakes and lizards are also found in the area. Undeveloped forest areas provide good breeding grounds for these non-poisonous, beneficial reptiles, serving as a source of replenishment to developed areas. Snakes are also an important source of food for birds of prey and carnivorous 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.

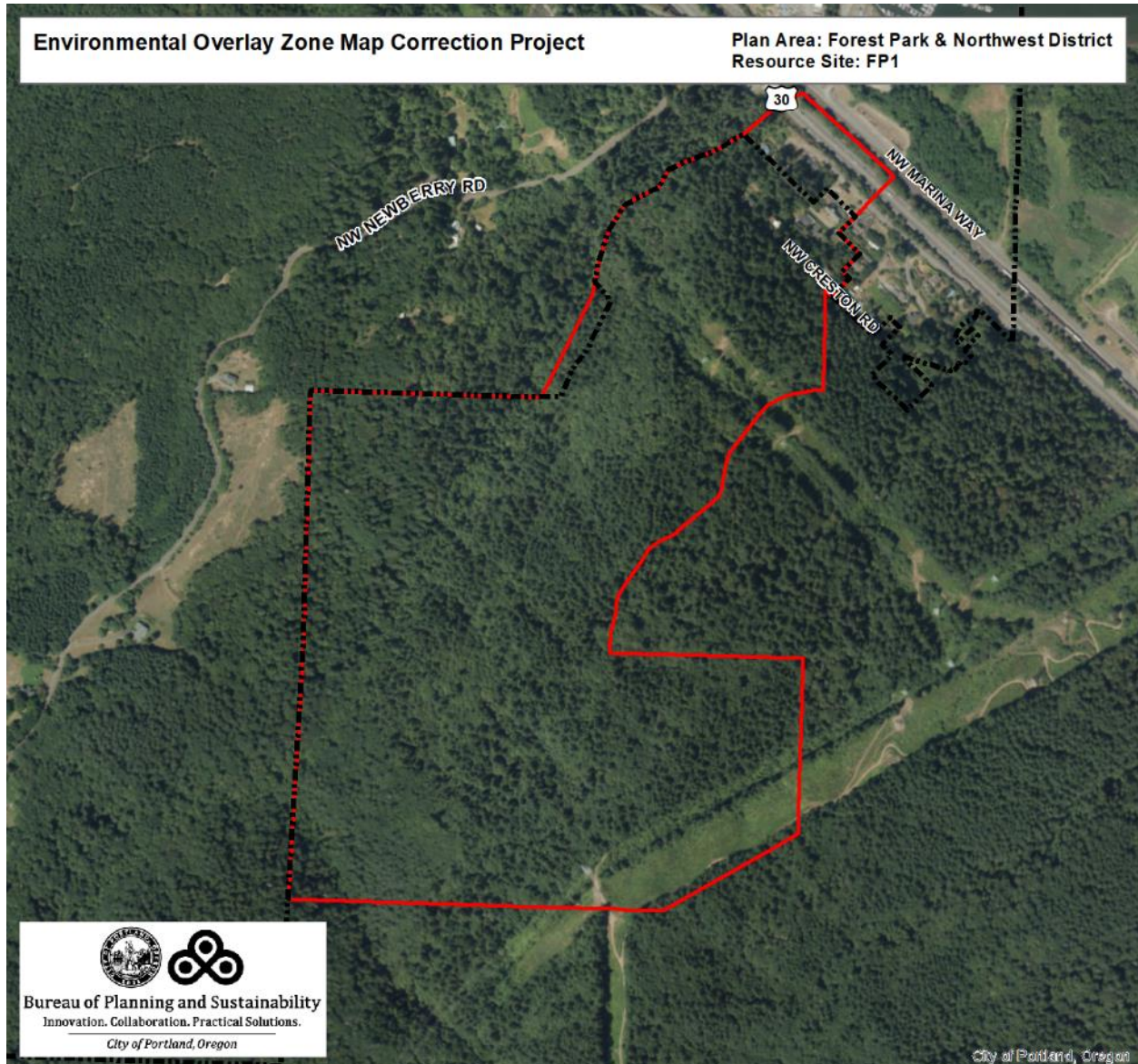
As many as 62 mammal species use the Northwest Hills forest habitat. These species include northern flying squirrel, Townsend's chipmunk, blacktailed deer, mountain beaver, bobcat, coyote and long tailed weasel. Tracks and droppings of black bear and cougar have also been observed in recent years. Many 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 1 - 20

Resource Site No.: FP1 **Resource Site Name:** Lower Miller Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 106



Natural Resources

Table A: Quantity of Natural Resource Features in Resource Site		FP1
		Study Area
Stream (Miles)		0.9
Wetlands (acres)		0.1
Vegetated Areas >= 1/2 acre (acres)		166.7
	Forest (acres)	152.2
	Woodland (acres)	14.4
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.0
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		166.1
Impervious Surface (acres)		17.6
* 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 site's vegetative cover is predominantly second growth forest with representative stands of each seral stage of the western hemlock upland forest community. A small stand of *old growth* Douglas fir is also present in the lower Miller Creek canyon. Climax forest species such as western hemlock, western red cedar and pacific yew are also well established at the site. 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. Western wahoo is a prominent component of the riparian plant community. Crane's bill has spread into the lower basin and threatens to dominate the mesic herb community.

The site's year-round creek provides habitat for a range of sensitive fauna species including coho salmon³⁰, cutthroat trout, steelhead, spotted and red-legged frogs.

The creek also supports a healthy population of macroinvertebrates. Mammalian species known to use the area include black bear, bobcat, beaver, coyote and deer. Bird species include pileated woodpecker, red-tailed hawk, great horned owl, great blue heron, band-tailed pigeon, bluebird and a variety of other songbirds. Interspersion with surrounding habitat allows for free migration of wildlife; game trails were identified running parallel and perpendicular to Miller Creek. This site may provide an important travel corridor for mammals to and from habitats north of the city. Traffic along Newberry Road poses a threat to migrating wildlife.

Table B: Quality of Natural Resource Functions in Resource Site FP1				
Resource Site (acres) = 172.530721				
	High	Medium	Low	Total
Riparian Corridors*				
acres	48.4	51.0	65.9	165.3
percent total inventory site area	28.1%	29.5%	38.2%	95.8%
Wildlife Habitat*				
acres	163.6	0.7	0.0	164.3
percent total inventory site area	94.8%	0.4%	0.0%	95.2%
Special Habitat Areas**				
acres				163.9
percent total inventory site area				95.0%
Combined Total⁺				
acres	164.7	0.7	0.3	165.7
percent total inventory site area	95.4%	0.4%	0.2%	96.1%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP1 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 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 and 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 FP1, 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 streams and wetlands.

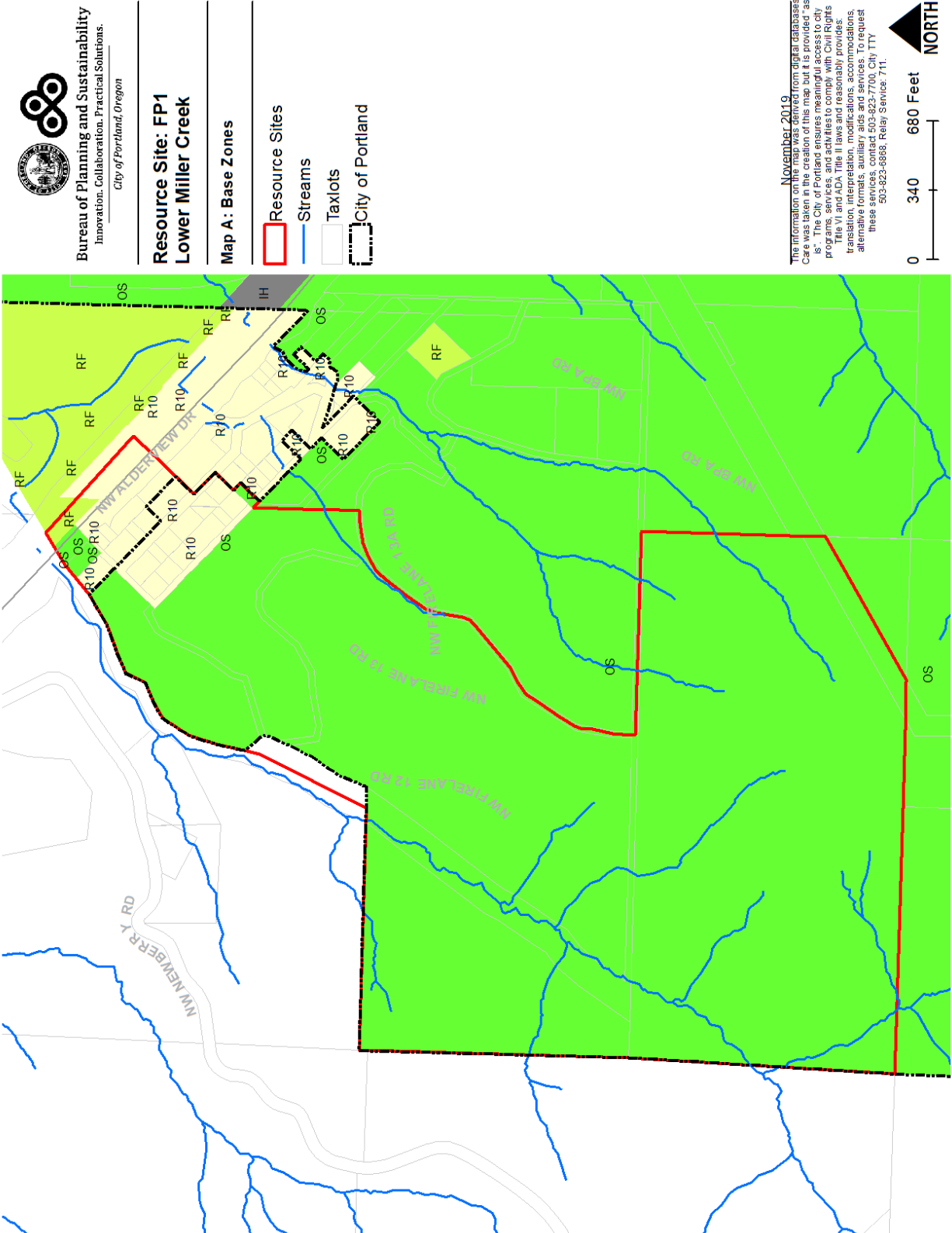
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

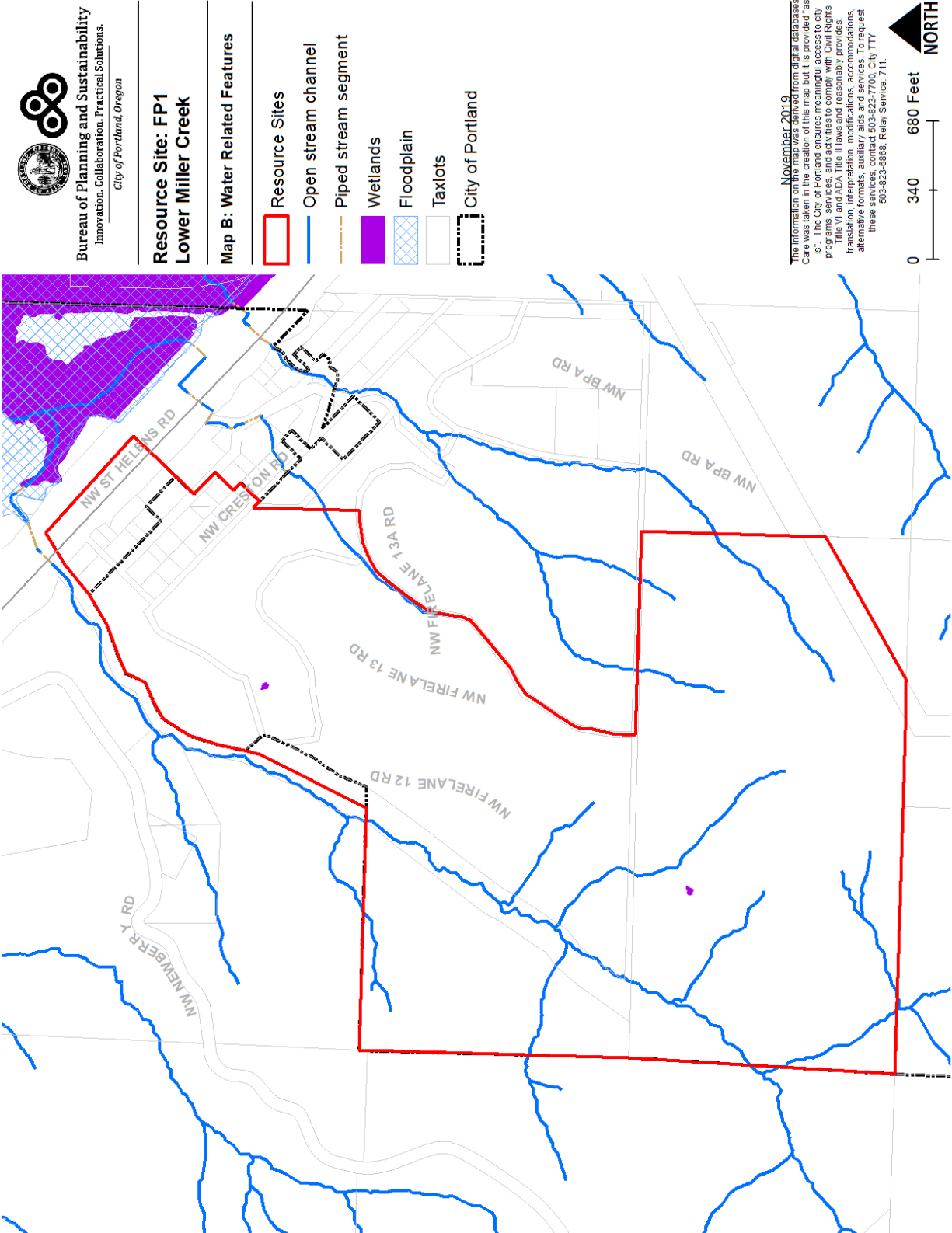
ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resource Site FP1 are:

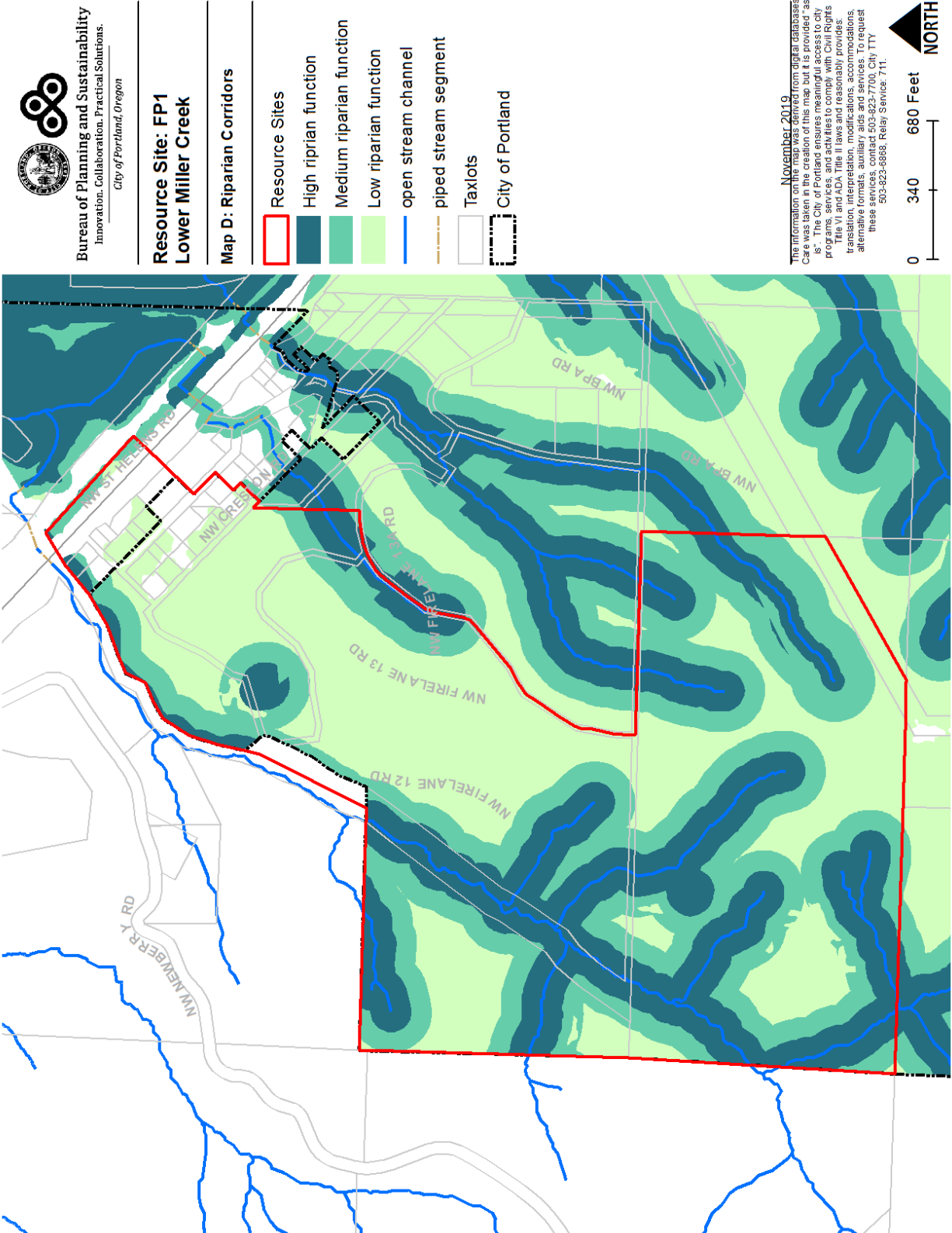
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank or wetlands and 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.
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 or wetlands.
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.

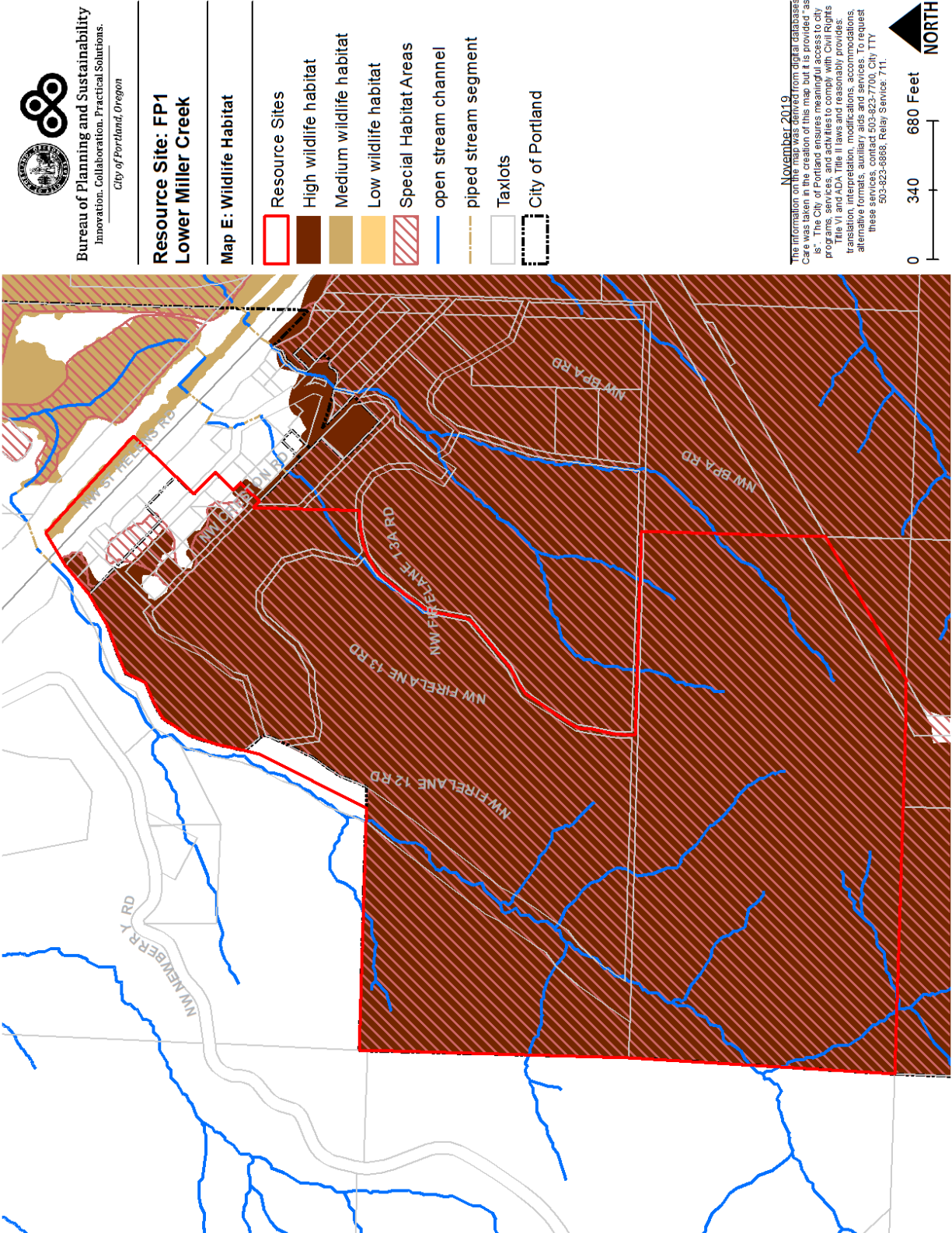
Table C: ESEE Decision for Resource Site FP1	
ESEE Decision	Acres
Strictly Limit	162.7
Limit	3.0
Allow	6.9

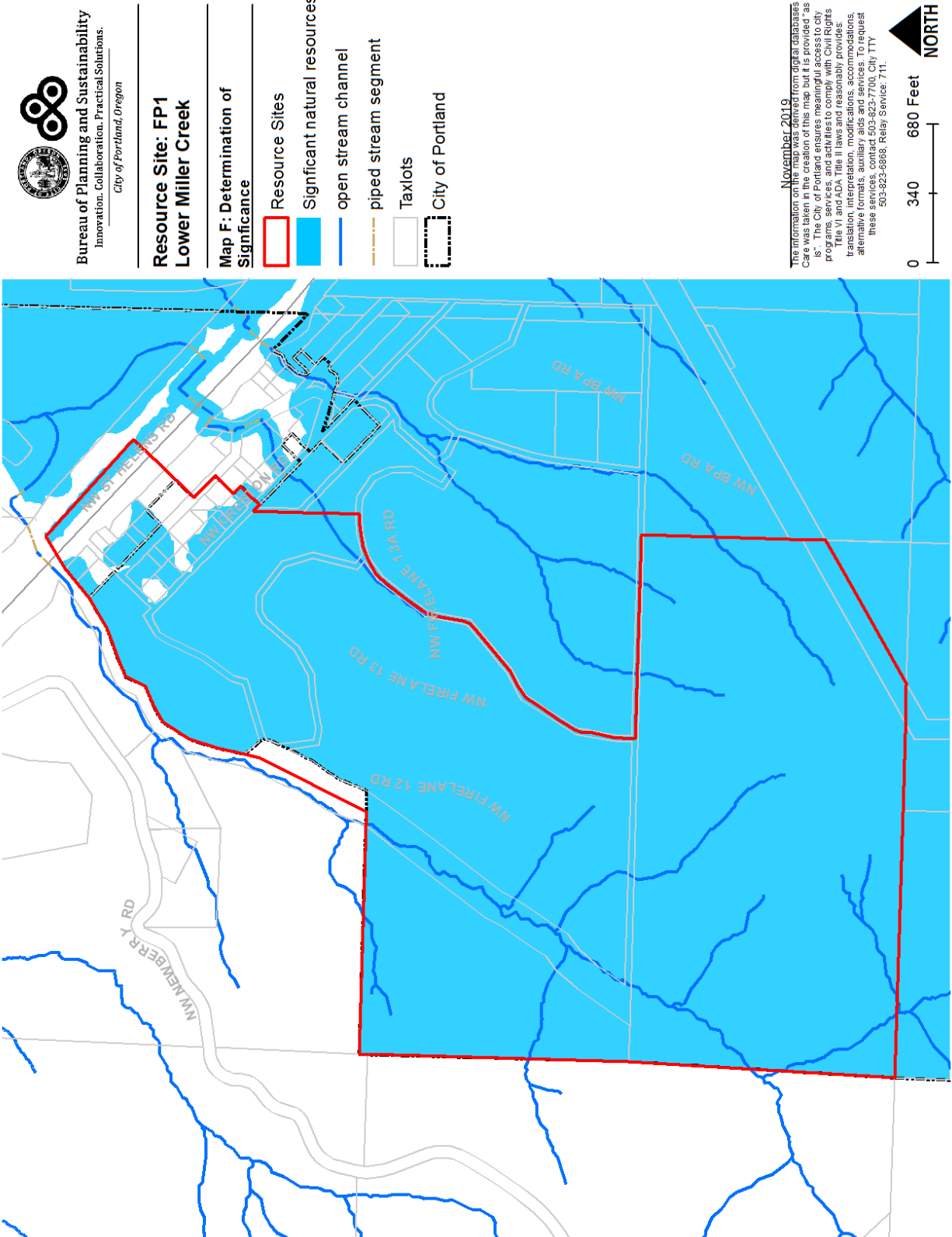


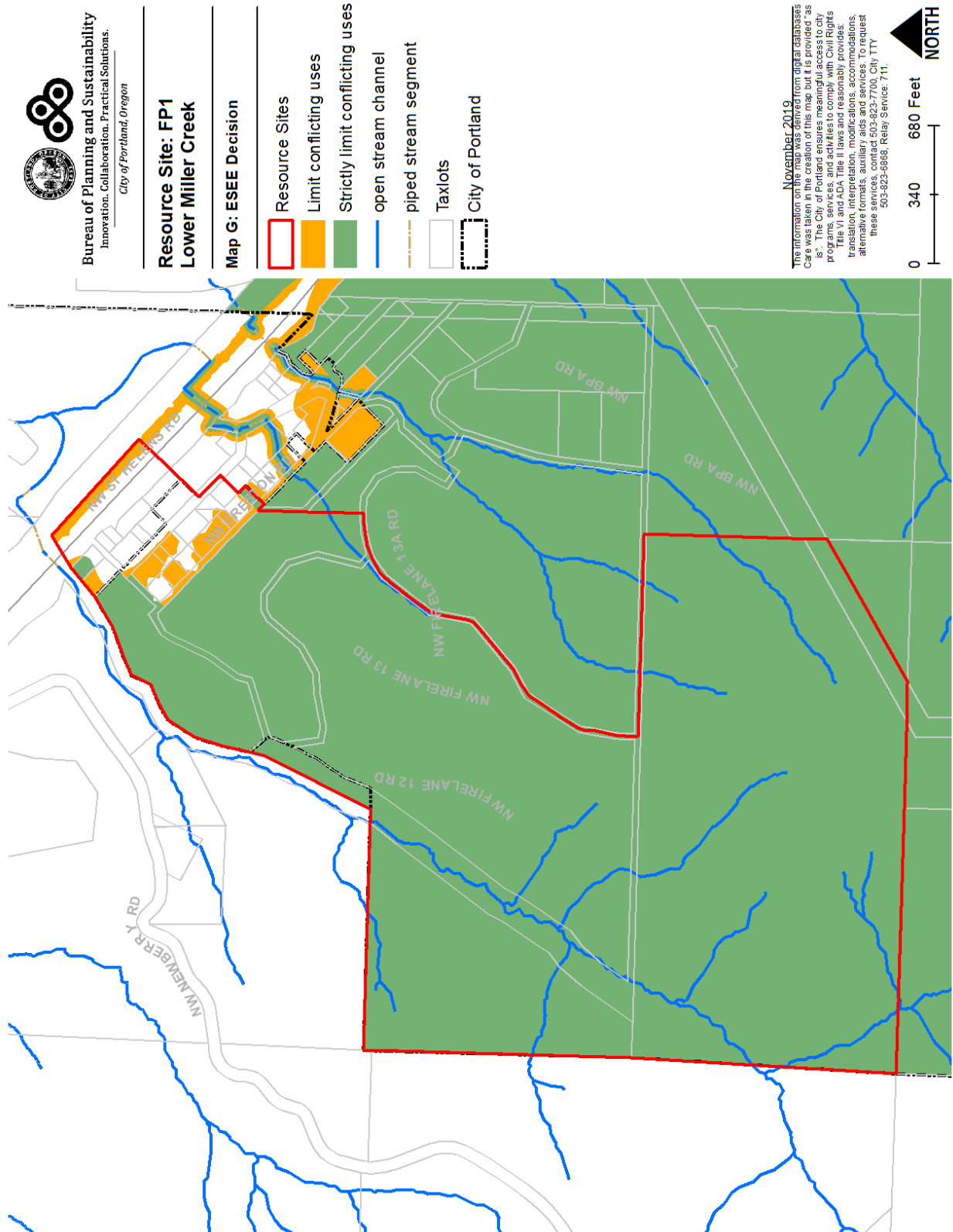






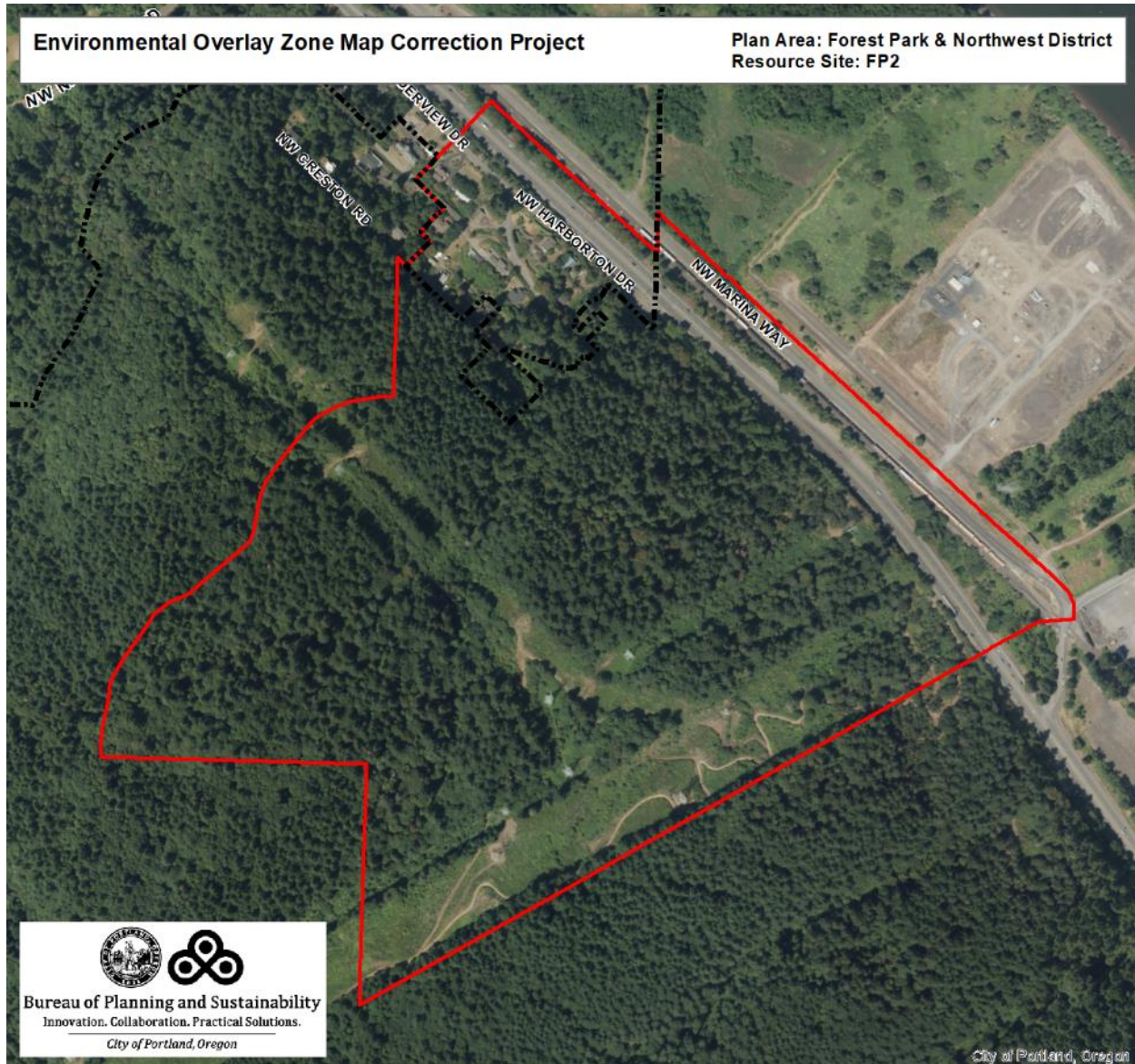






Resource Site No.: FP2 Resource Site Name: Upper Harborton

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 104



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP2
		Study Area
Stream (Miles)		1.0
Wetlands (acres)		1.1
Vegetated Areas >= 1/2 acre (acres)		112.1
	Forest (acres)	83.9
	Woodland (acres)	27.2
	Shrubland (acres)	0.0
	Herbaceous (acres)	0.9
Flood Area*		0.3
	Vegetated (acres)	0.3
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		116.8
Impervious Surface (acres)		38.2
* 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 vegetative community is predominantly second growth forest with representative stands of each seral stage of the western hemlock upland forest community. Structural diversity of the forest is generally high, though certain areas along the power line right-of-way and Newton Road lack development of multi-layered canopies. The *conifer topping hardwood* and *mid-aged conifer* stages of forest succession are widespread; climax species such as western hemlock, western red cedar and pacific yew are well established. 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. English ivy has spread into the maples and firs near St. Helens Road.

This site provides food, water and cover habitat for a broad range of birds including Oregon junco, rufous hummingbird, bushtit, Steller's jay and robin. The site provides feeding and breeding habitat for red-tailed hawk. Osprey was also sited near the lower end of Newton Road. Interspersion with surrounding habitat allows for free migration of wildlife to and from the site and increases the site's value as habitat.

The site includes a free-flowing seasonal creek that feeds a large palustrine wetland habitat area east of St. Helens Road. The creek provides an upland water source for terrestrial fauna.

Table B: Quality of Natural Resource Functions in Resource Site FP2				
Resource Site (acres) = 129.846963				
	High	Medium	Low	Total
Riparian Corridors*				
acres	33.3	39.2	43.3	115.7
percent total inventory site area	25.6%	30.2%	33.3%	89.1%
Wildlife Habitat*				
acres	106.0	3.4	0.0	109.4
percent total inventory site area	81.7%	2.6%	0.0%	84.2%
Special Habitat Areas**				
acres				100.1
percent total inventory site area				77.1%
Combined Total⁺				
acres	109.2	5.7	1.1	116.0
percent total inventory site area	84.1%	4.4%	0.8%	89.3%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP2 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 residential uses are allowed outright or conditionally in the R10 base zones. Industrial uses are allowed in the IH 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 FP1, 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*.

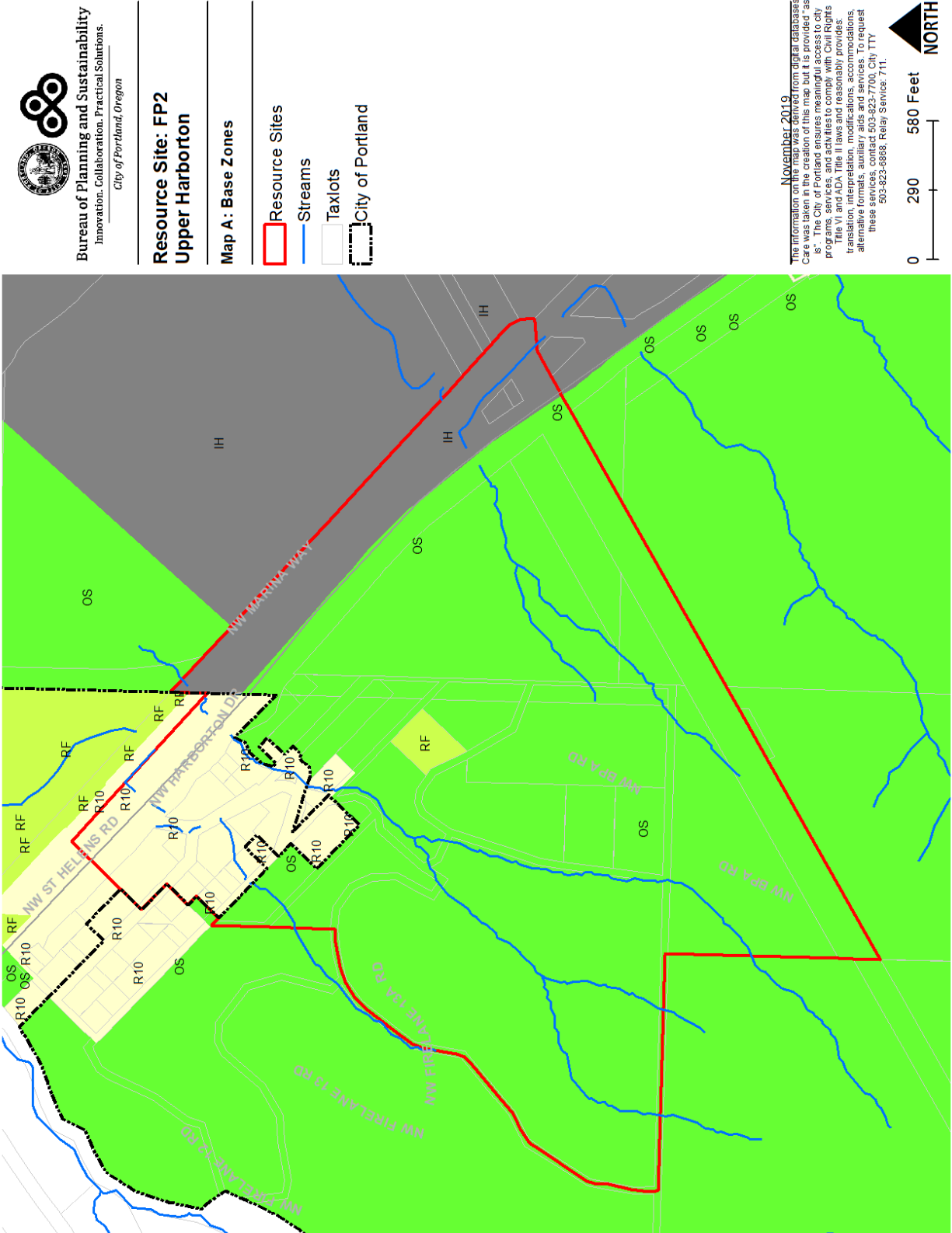
ESEE Decisions

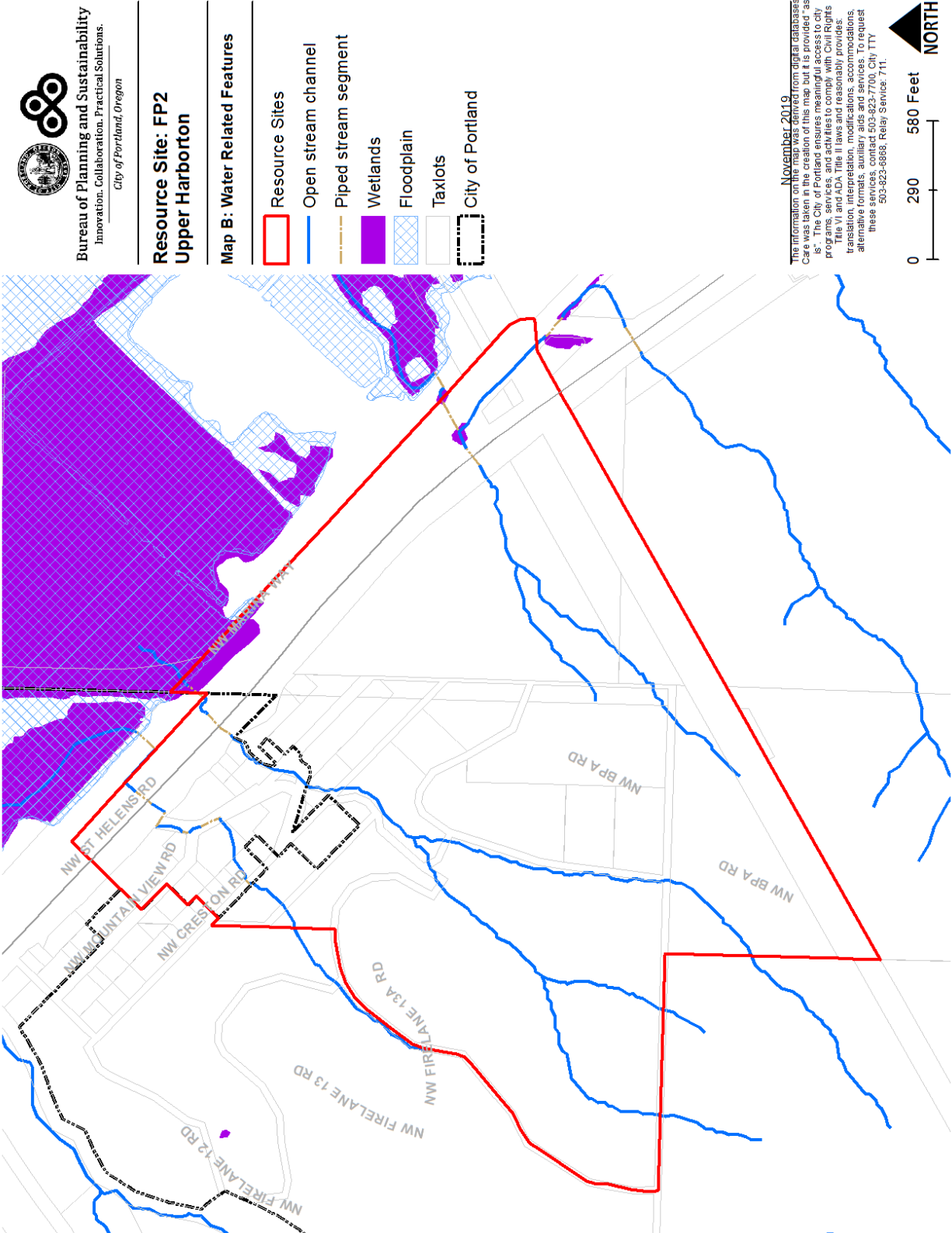
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP2 are:

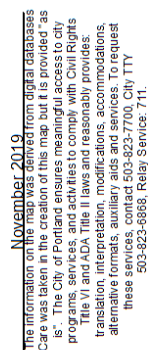
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank or wetlands and 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.
3. *Strictly limit* conflicting uses within areas of forest or woodland vegetation in the parcel zoned RF that is completely surrounded by Forest Park.
4. Outside public parks, *limit* conflicting uses between 25 and 50 feet from stream top-of-bank or wetlands and within areas of forest or woodland vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
5. *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.
6. *Allow* conflicting uses within all other areas containing significant natural resources.

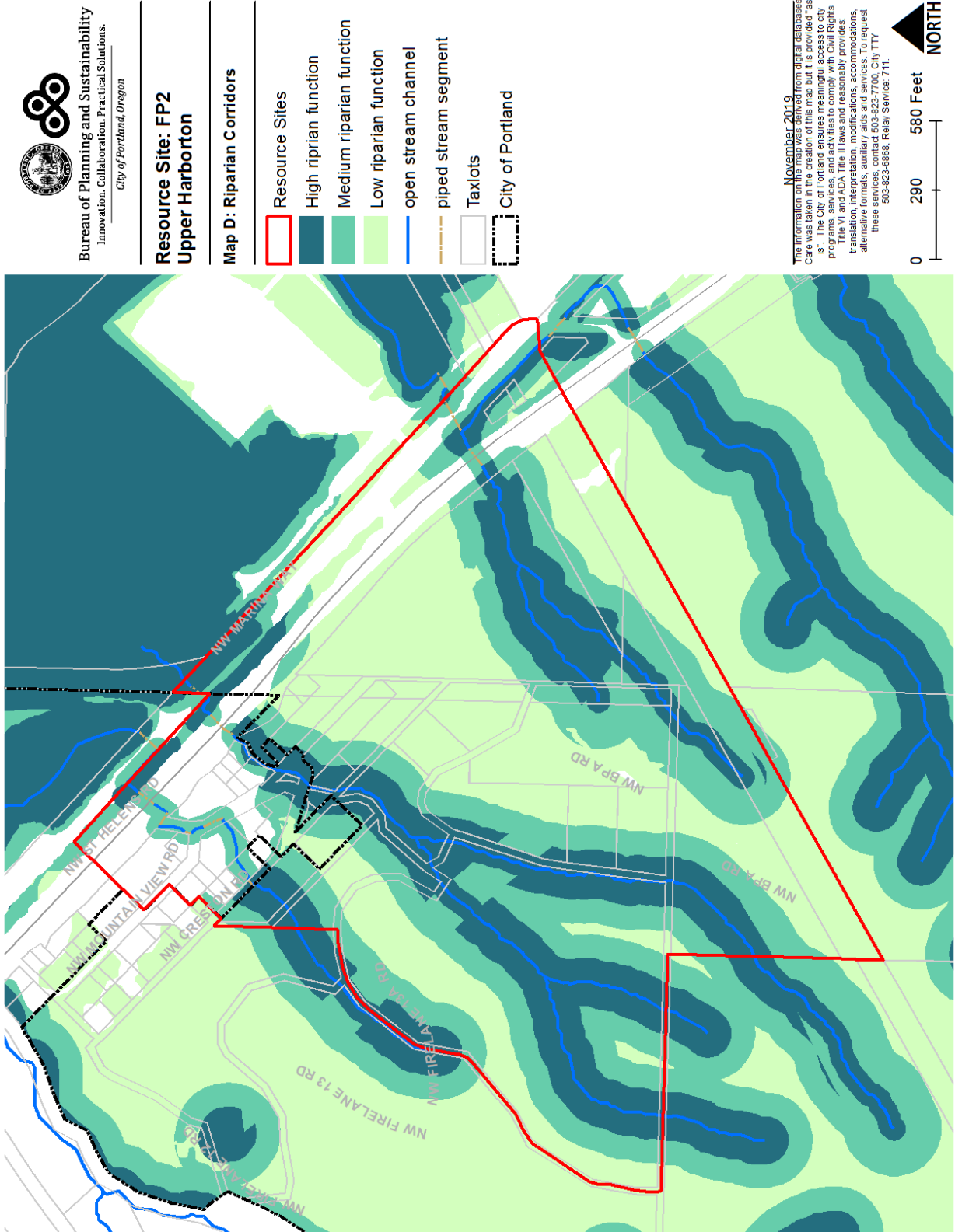
There one parcel zoned RF has the same significant features and provides the same significant functions as the features and functions in Forest Park. The parcel is surrounded on all sides by the park and contiguous forest canopy. Additional impacts to the forest canopy should be avoided. This parcel is substantively different than the parcels zoned RF that are along the perimeter of Forest Park and are not surrounded on all sides by contiguous tree canopy.

Table C: ESEE Decision for Resource Site FP2	
ESEE Decision	Acres
Strictly Limit	105.5
Limit	9.7
Allow	14.6



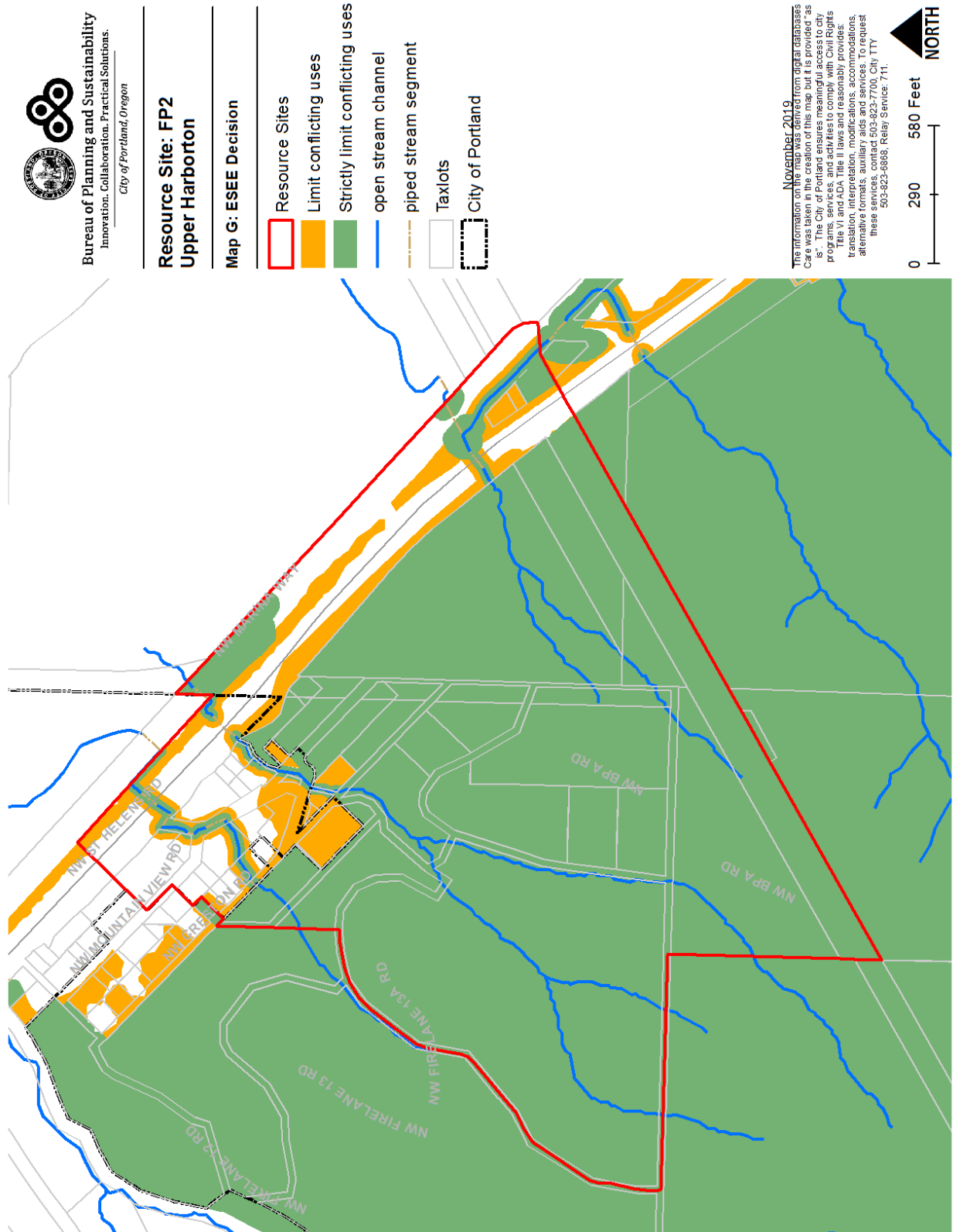






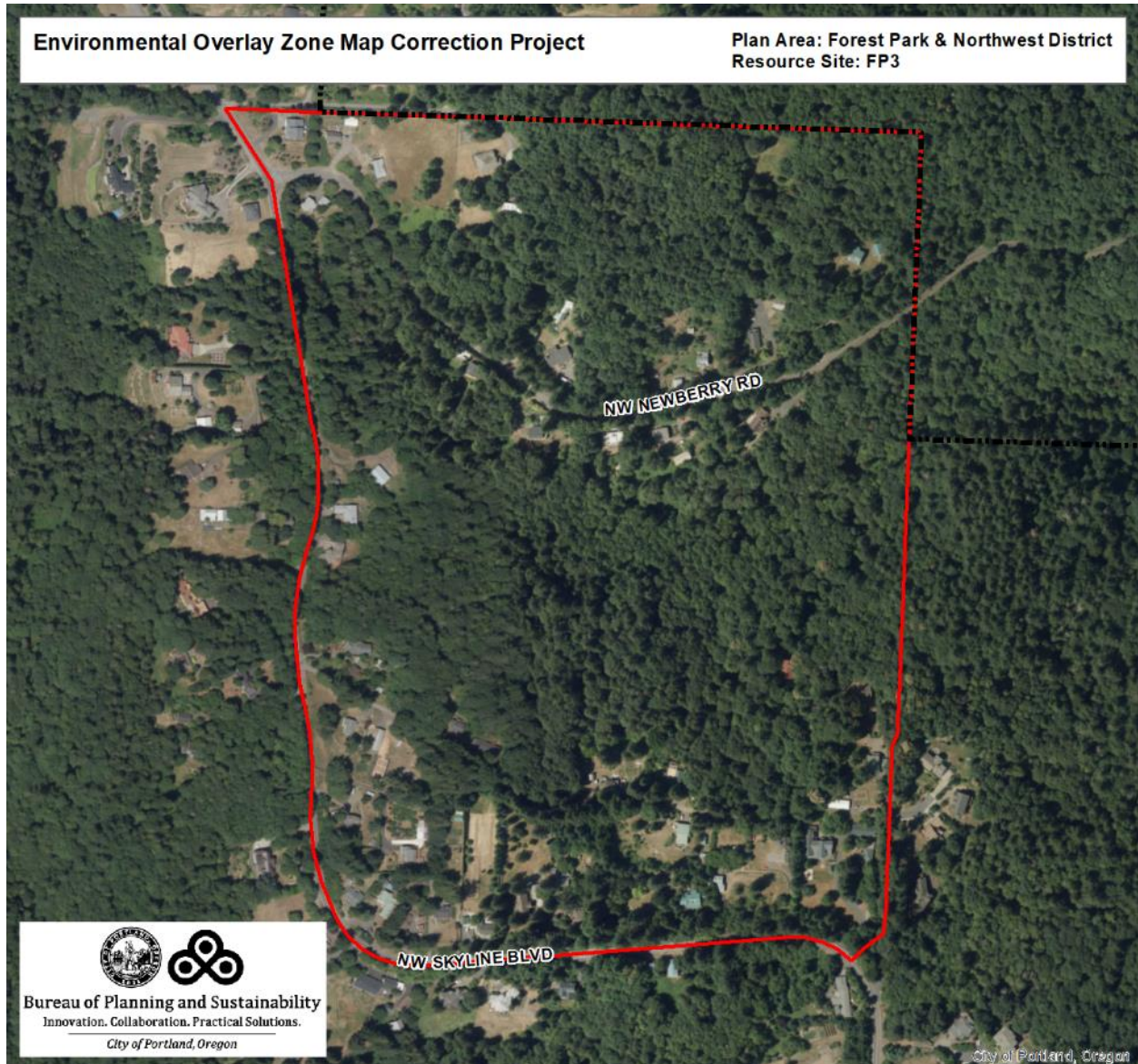






Resource Site No.: FP3 Resource Site Name: Miller Creek West

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 109



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP3
		Study Area
Stream (Miles)		2.4
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		76.7
	Forest (acres)	60.2
	Woodland (acres)	12.8
	Shrubland (acres)	0.0
	Herbaceous (acres)	3.6
Flood Area*		0.0
	Vegetated (acres)	0.0
	Non-vegetated (acres)	0.0
Steep Slopes (acres)**		63.4
Impervious Surface (acres)		11.5
* 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 situated in the Miller Creek headwaters area near the intersection of NW Newberry Road and Skyline Boulevard. One first-order branch of the creek system passes through the center of the site. The site's forest cover is composed primarily of *conifer topping hardwood*. Western hemlock, western red cedar and Douglas fir are well established in the *mid-aged conifer* forest near the center of the site. *Mature hardwood* occurs along the banks of the creek in the eastern portion of the site. The site's forest cover protects watershed resources, serves as habitat for wildlife and provides open space, scenic and recreational resources. English holly and Himalayan blackberry have infiltrated parts of the forest. Developed residential and agricultural areas are concentrated in the far northwest and southern portions of the site; individual homes are located along Skyline and Newberry Roads.

The site provides high quality food and cover for resident and migratory wildlife. The creek headwaters provide a seasonal water source for terrestrial vertebrates and serve a critical function in sustaining proper water quality, temperature and flow levels for fish, amphibian and macroinvertebrate species found in the Miller Creek system. Amphibians recorded include western toad and northwestern garter snake. Downstream from this site, sensitive coho salmon, cutthroat trout, steelhead, red-legged frog and spotted frog were identified. Bird species identified at this site include pileated woodpecker (markings and nests), red-tailed hawk, Wilson's warbler, winter wren, juncos and kinglets. Also recorded foraging at this site were bobcat and grey fox. The site's interspersed with adjacent forest allows migration of wildlife to and from habitats north of the city. Traffic along Skyline and Newberry Roads poses a threat to migrating wildlife.

Table B: Quality of Natural Resource Functions in Resource Site FP3				
Resource Site (acres) = 90.826399				
	High	Medium	Low	Total
Riparian Corridors*				
acres	20.8	15.0	28.9	64.7
percent total inventory site area	22.9%	16.5%	31.8%	71.2%
Wildlife Habitat*				
acres	60.2	0.0	0.0	60.2
percent total inventory site area	66.3%	0.0%	0.0%	66.3%
Special Habitat Areas**				
acres				4.8
percent total inventory site area				5.3%
Combined Total⁺				
acres	60.2	0.3	4.2	64.7
percent total inventory site area	66.3%	0.3%	4.6%	71.2%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP3 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. 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 FP3, 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.

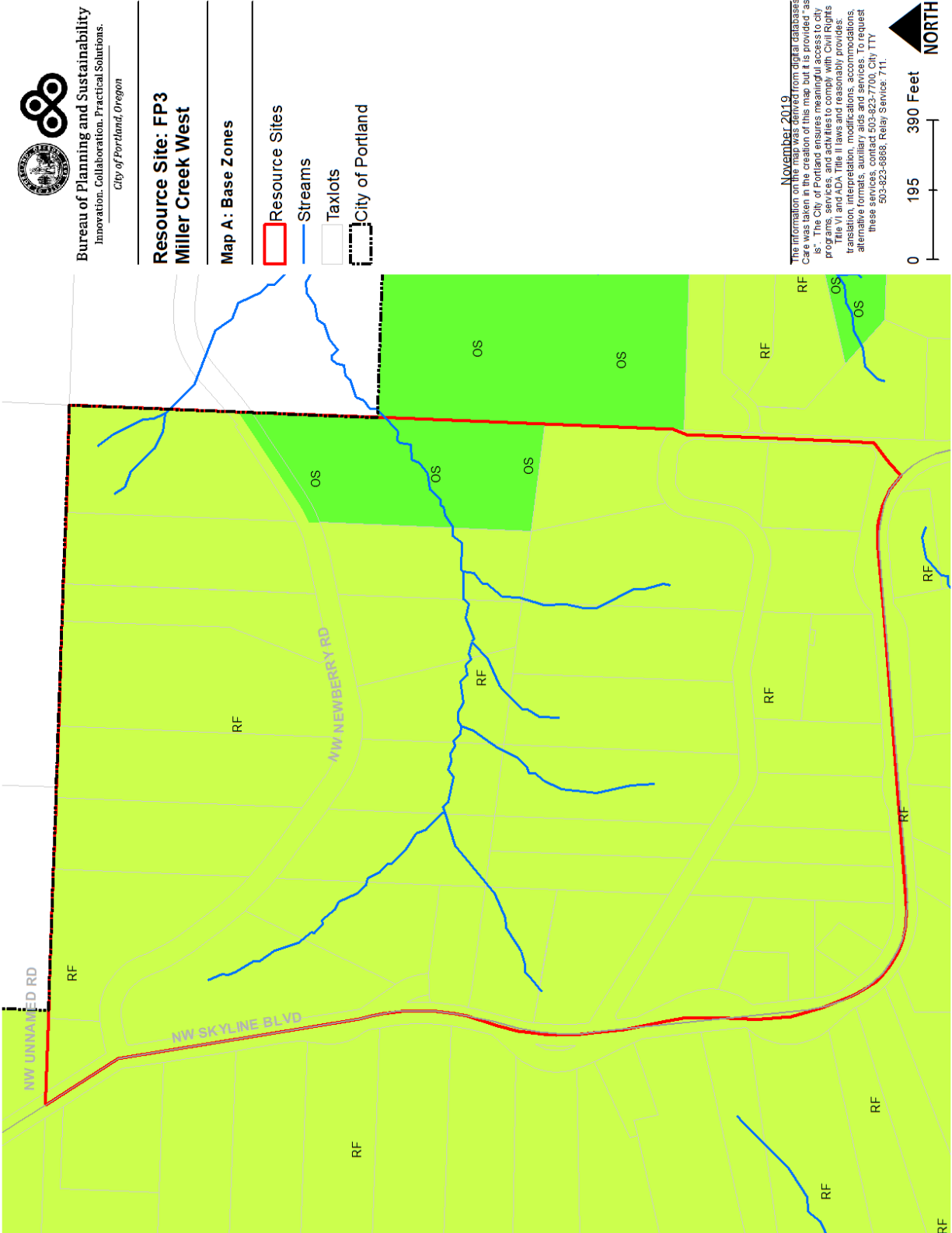
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

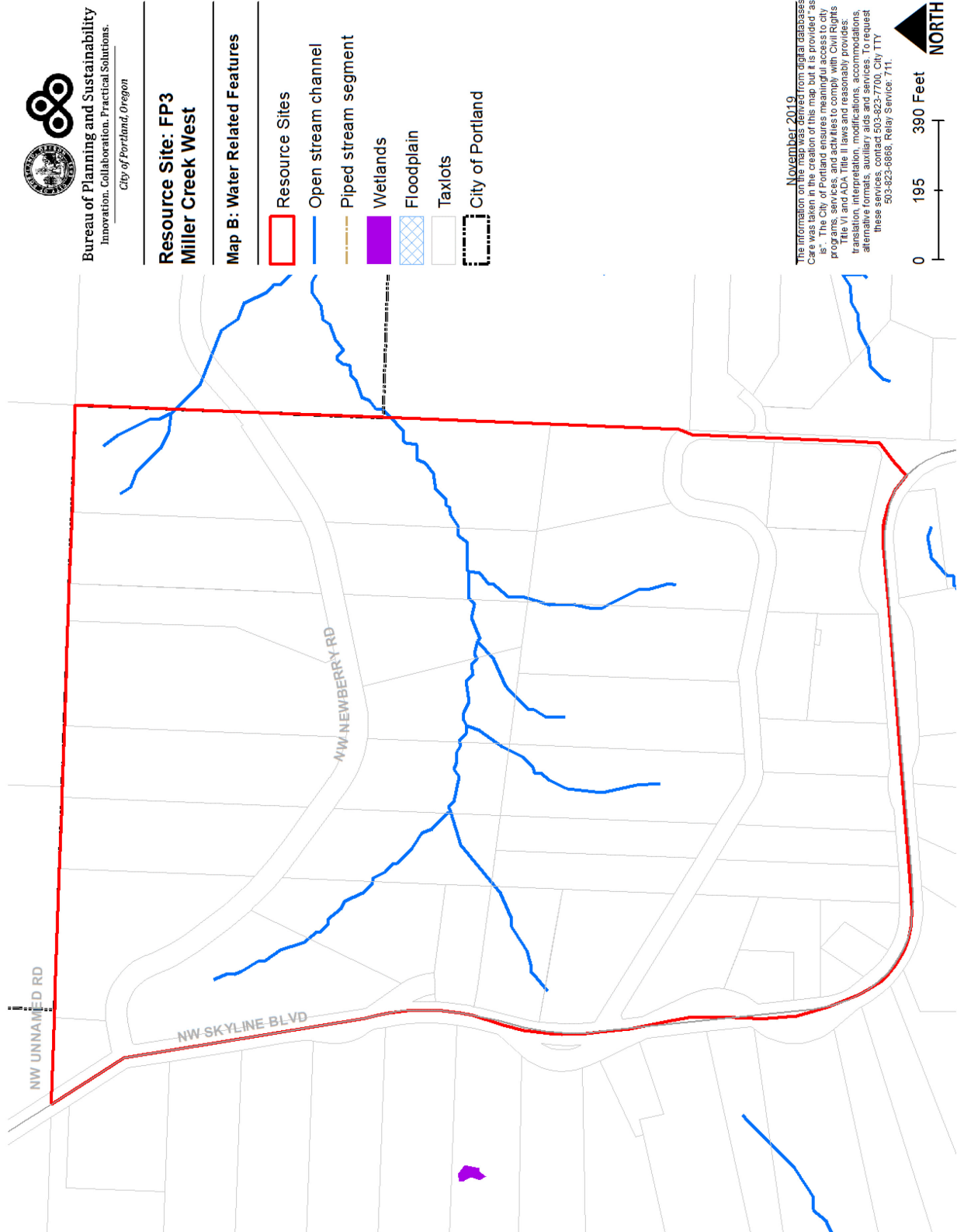
ESEE Decisions

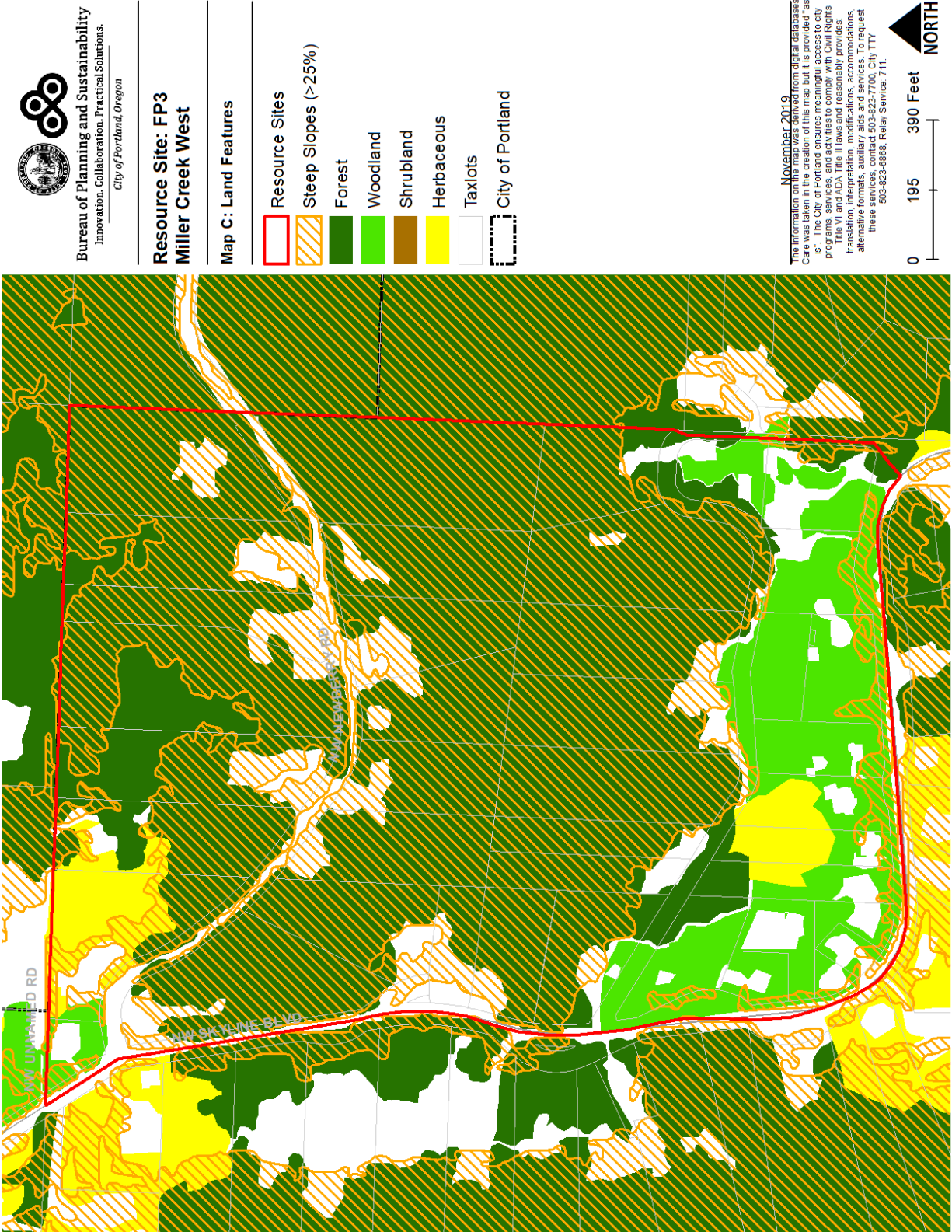
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP3 are:

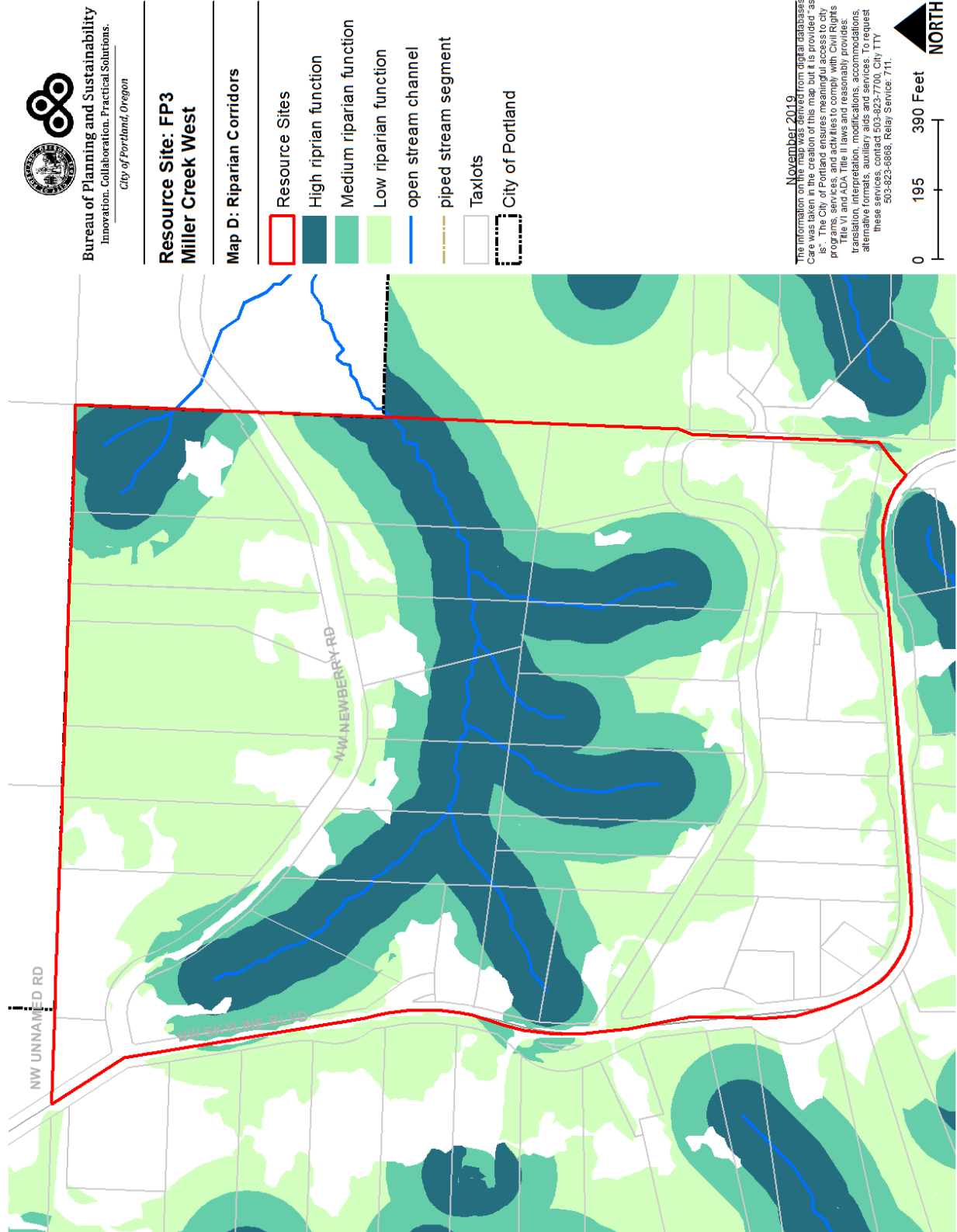
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 50 feet of stream top-of-bank.
2. Within public parks, areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. Outside public parks, *limit* conflicting uses 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.

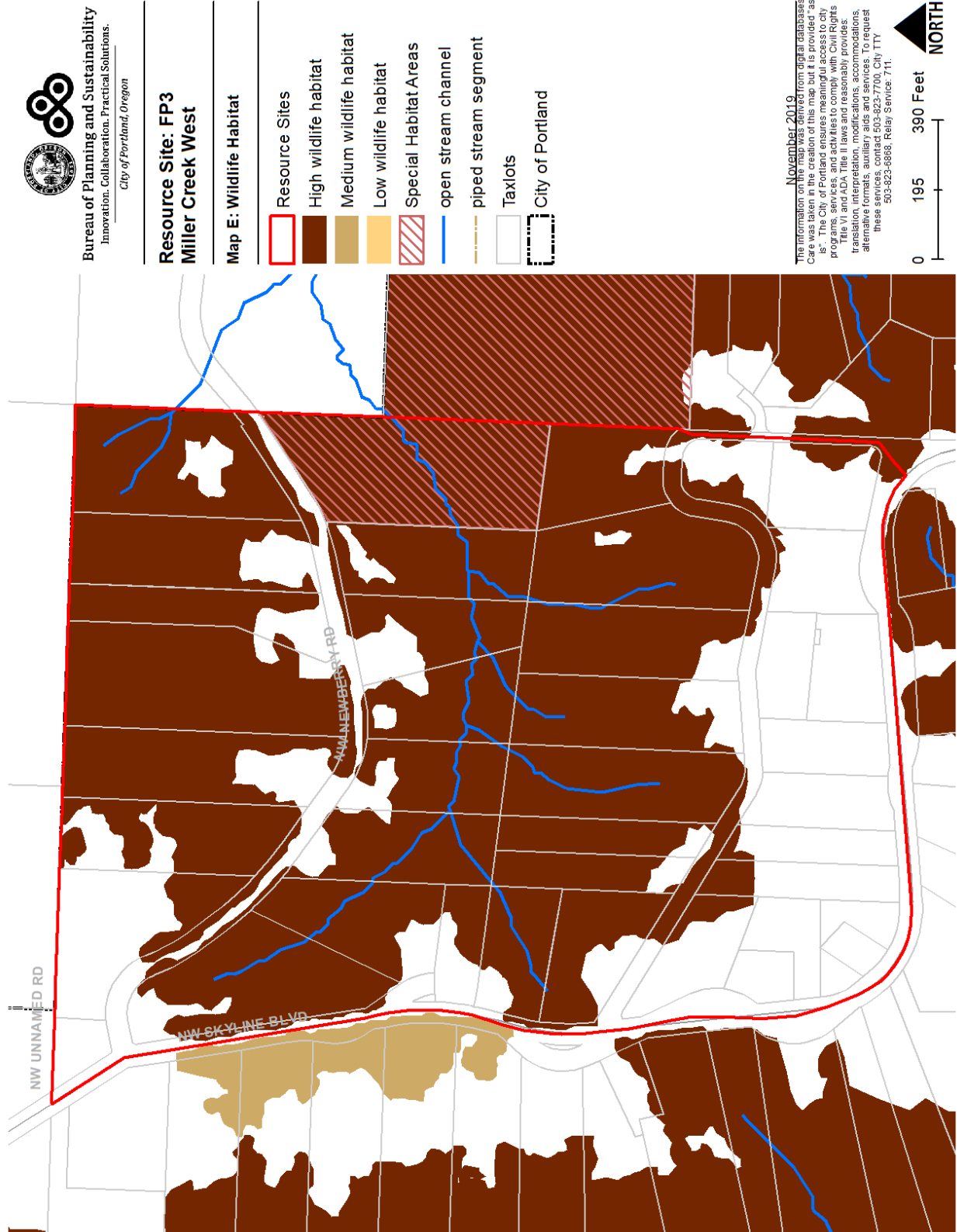
Table C: ESEE Decision for Resource Site FP3	
ESEE Decision	Acres
Strictly Limit	14.8
Limit	45.2
Allow	30.8

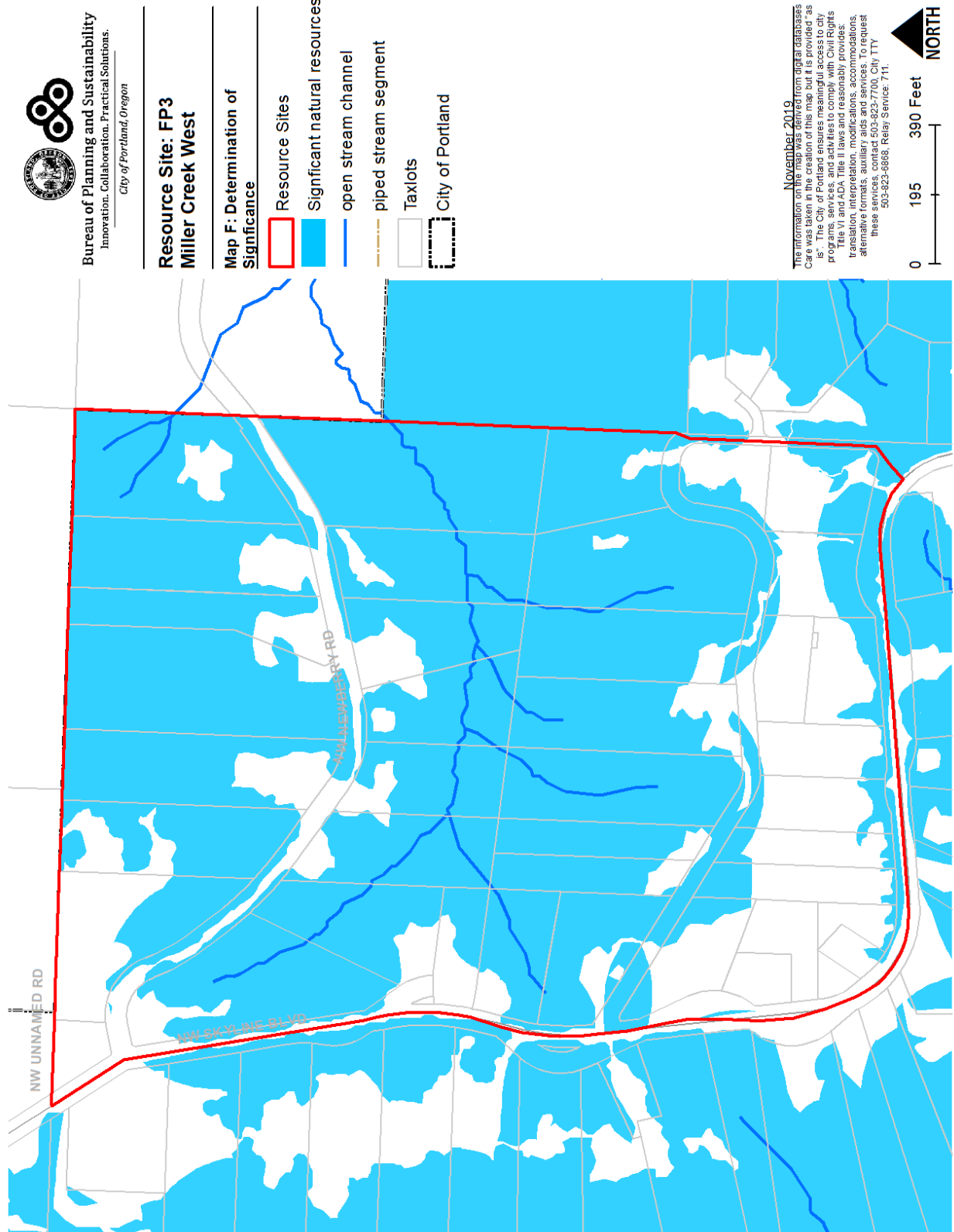


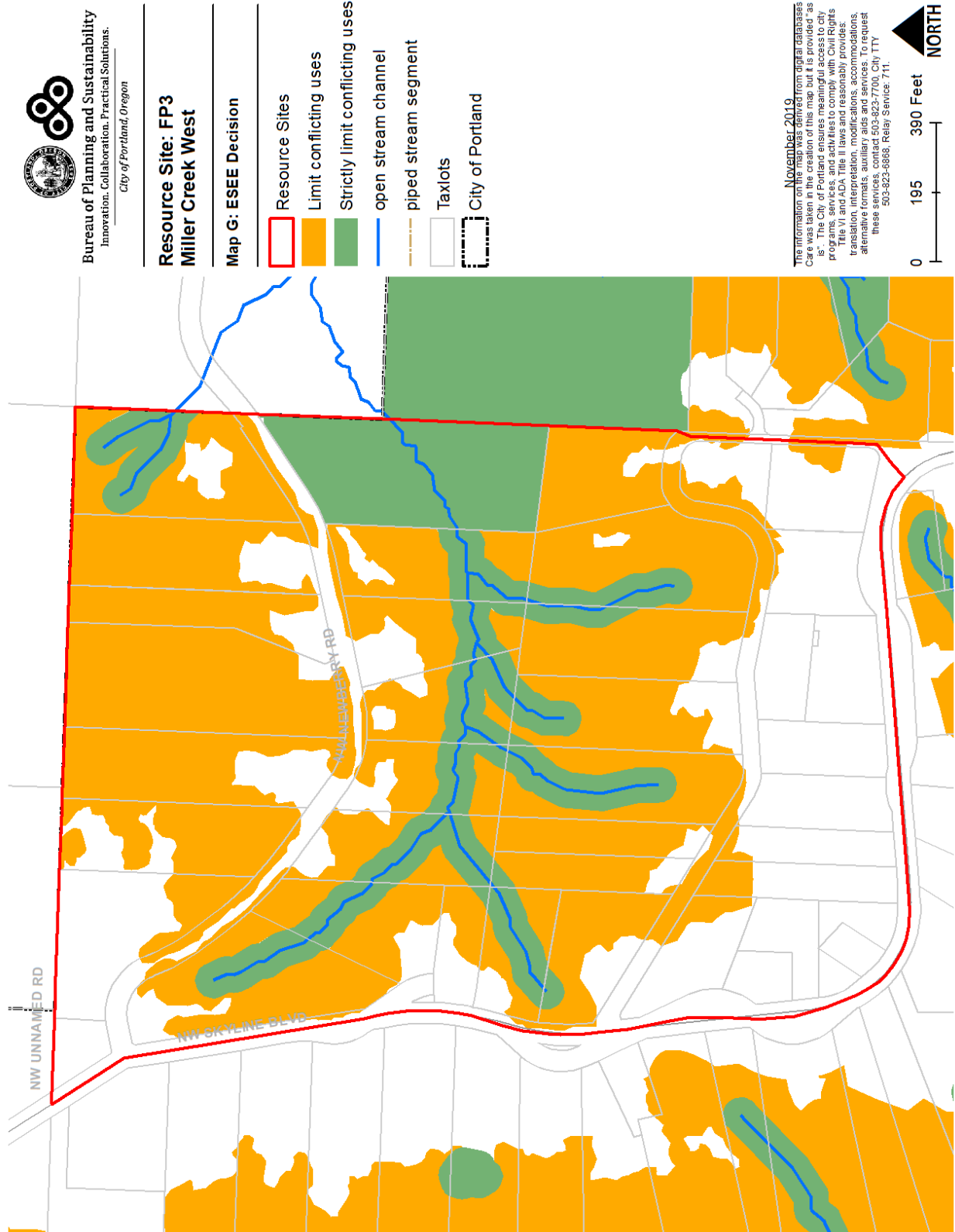






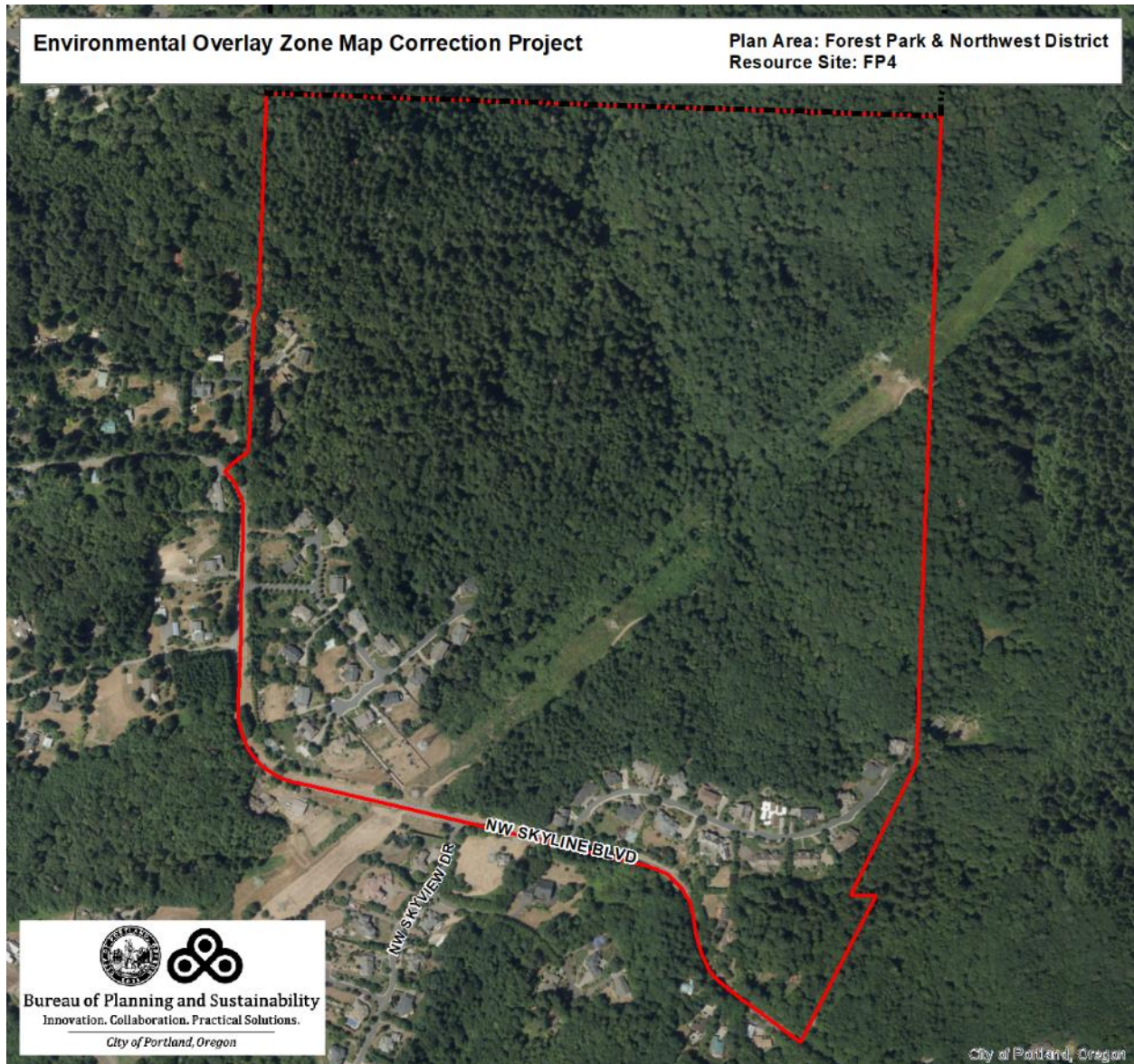






Resource Site No.: FP4 Resource Site Name: Miller Creek South

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 108



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP4
		Study Area
Stream (Miles)		0.6
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		164.1
Forest (acres)		142.6
Woodland (acres)		6.6
Shrubland (acres)		0.0
Herbaceous (acres)		15.0
Flood Area*		0.0
Vegetated (acres)		0.0
Non-vegetated (acres)		0.0
Steep Slopes (acres)**		144.5
Impervious Surface (acres)		6.6
* 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%.		

This site is situated at the headwaters of Miller Creek and includes one firstorder branch of the creek system. The site's forest cover is composed of a mix of vegetation types including *mid-aged conifer*, *conifer topping hardwood*, and *hardwood with young conifer*. *Mature hardwood* occurs along the banks of the creek at lower elevations. Climax tree species are well established within the *mid-aged conifer* stand; at higher elevations, mid-story vegetation is underrepresented. This site contains the only known specimen of western white pine (*Pinus monticola*) within the plan area. The site's forest cover provides open space, scenic and recreational resources; serves as habitat for wildlife; and helps to balance the local water regimen. Invasive English holly and Himalayan blackberry plants have infiltrated parts of the forest.

The site provides high quality food and cover for resident and migratory wildlife. The forested creek headwaters provide a seasonal water source for terrestrial vertebrates and serve a critical function in sustaining proper water quality, temperature and flow levels for fish, amphibian and macroinvertebrate species found in the Miller Creek system. Bird species identified at this site include Cooper's and sharp-shinned hawks, pileated woodpecker (nests), red tailed hawk, band-tailed pigeon and a variety of songbirds. Downstream from this site, sensitive coho salmon, cutthroat trout, steelhead, red-legged frog and spotted frog were identified. Game trails used by black-tailed deer, coyote and other mammals were identified at this site. This site is one of two principle deer crossing locations along Skyline identified in the study area. This site may provide an important travel corridor for mammals to and from habitats north of the city.

Table B: Quality of Natural Resource Functions in Resource Site FP4				
Resource Site (acres) = 178.88114				
	High	Medium	Low	Total
Riparian Corridors*				
acres	52.8	48.3	50.8	151.8
percent total inventory site area	29.5%	27.0%	28.4%	84.9%
Wildlife Habitat*				
acres	149.1	0.0	0.0	149.1
percent total inventory site area	83.3%	0.0%	0.0%	83.3%
Special Habitat Areas**				
acres				112.8
percent total inventory site area				63.0%
Combined Total⁺				
acres	150.0	0.2	5.4	155.6
percent total inventory site area	83.8%	0.1%	3.0%	87.0%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP4 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 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. 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 FP4, 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.

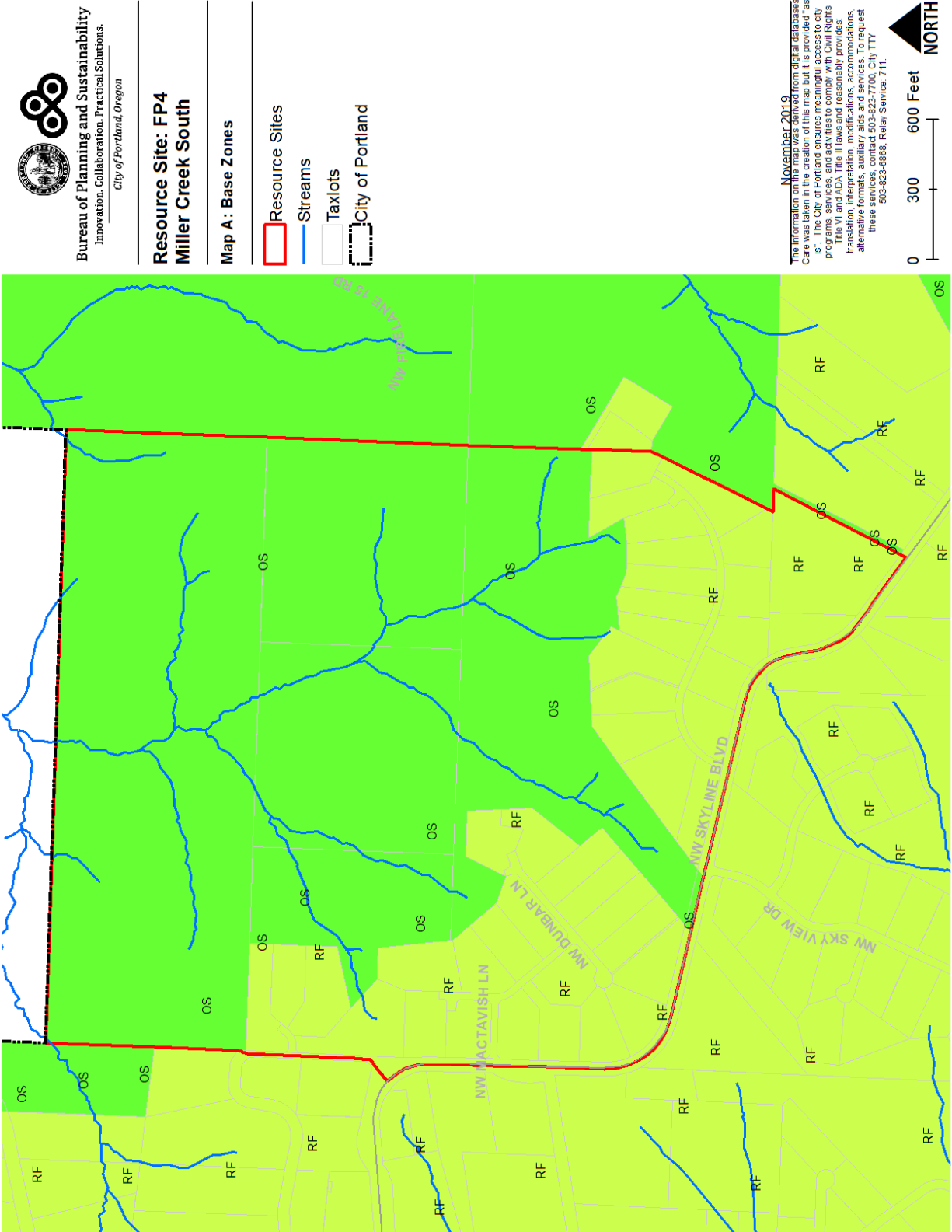
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

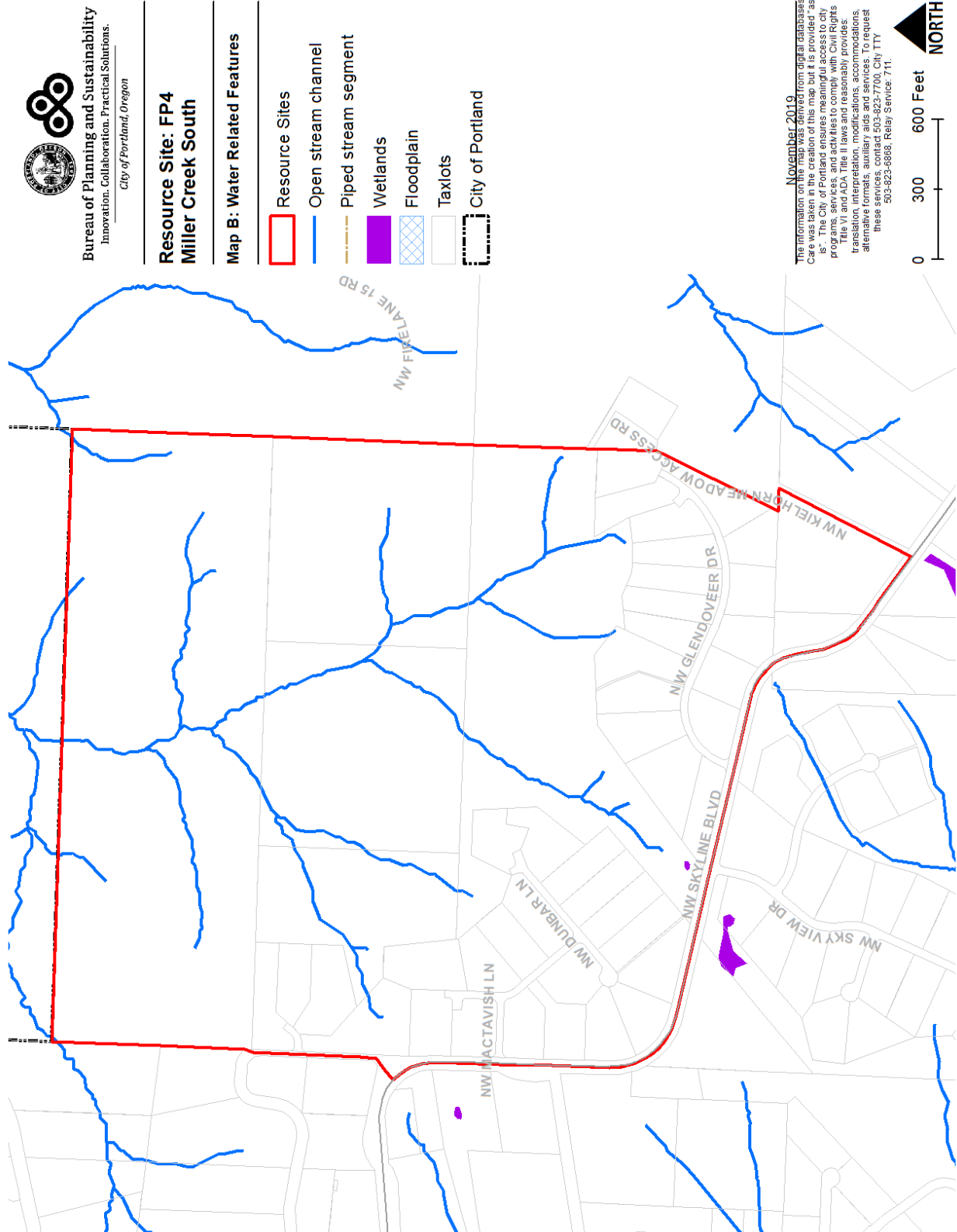
ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP4 are:

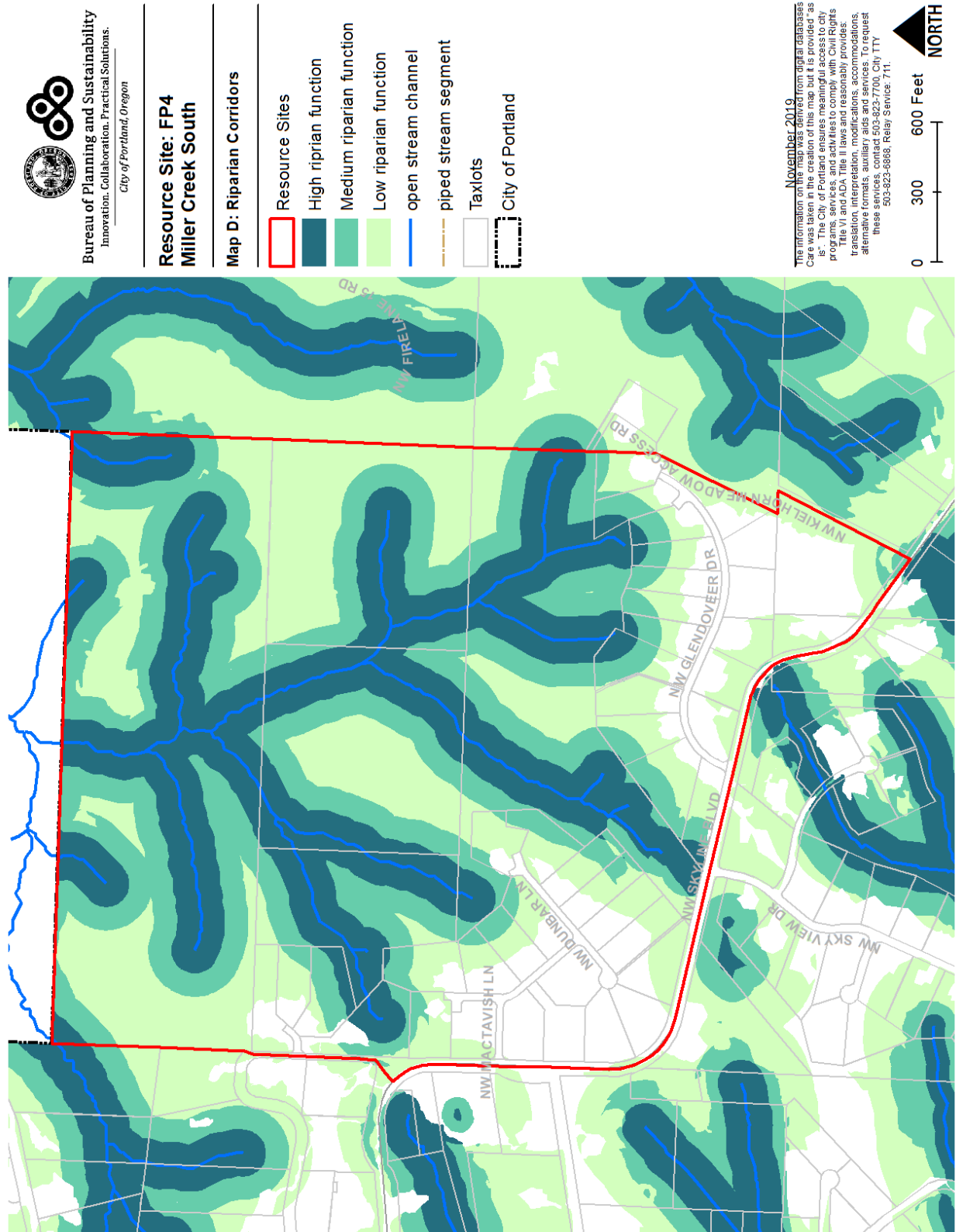
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 50 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
3. 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.
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.

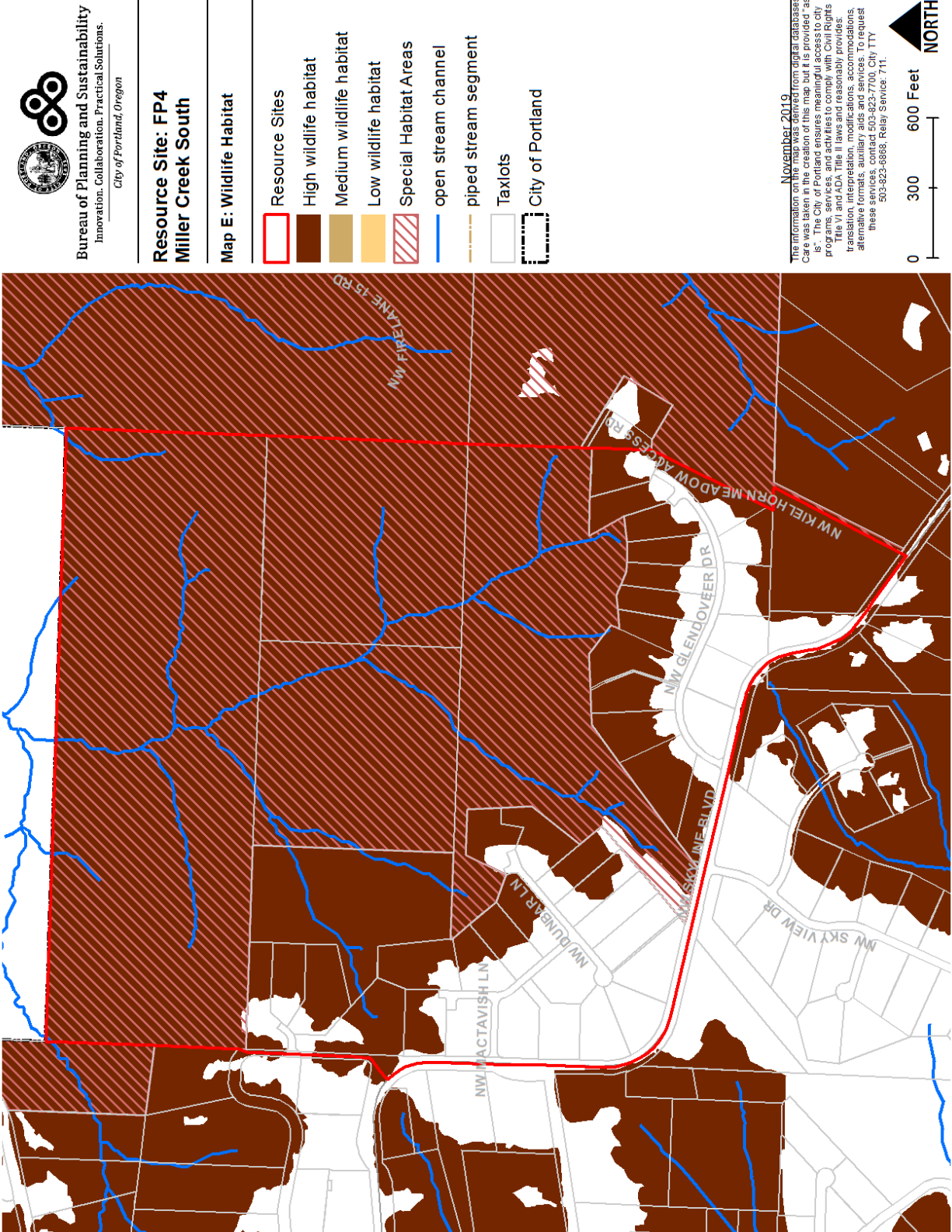
Table C: ESEE Decision for Resource Site FP4	
ESEE Decision	Acres
Strictly Limit	122.1
Limit	26.6
Allow	30.2

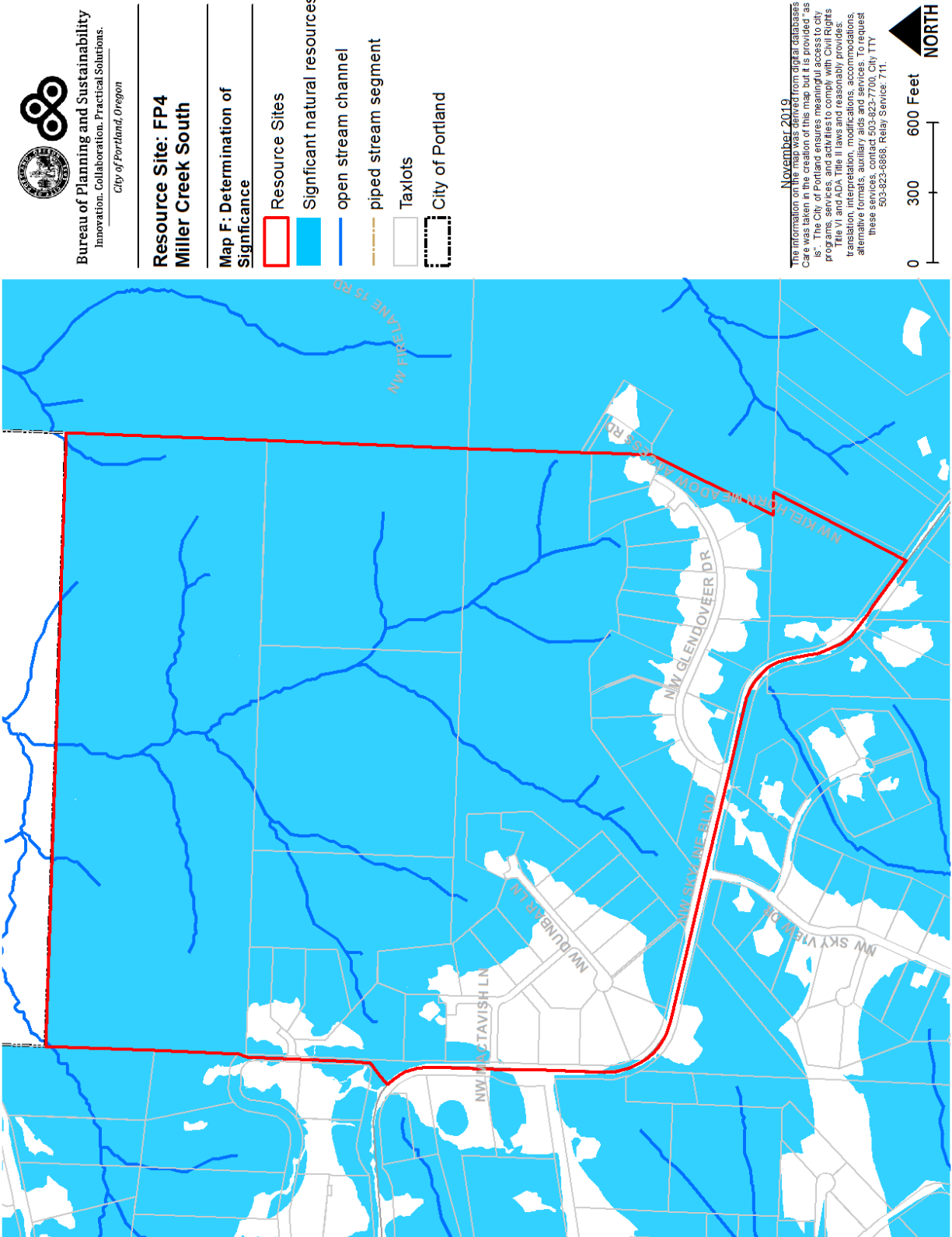


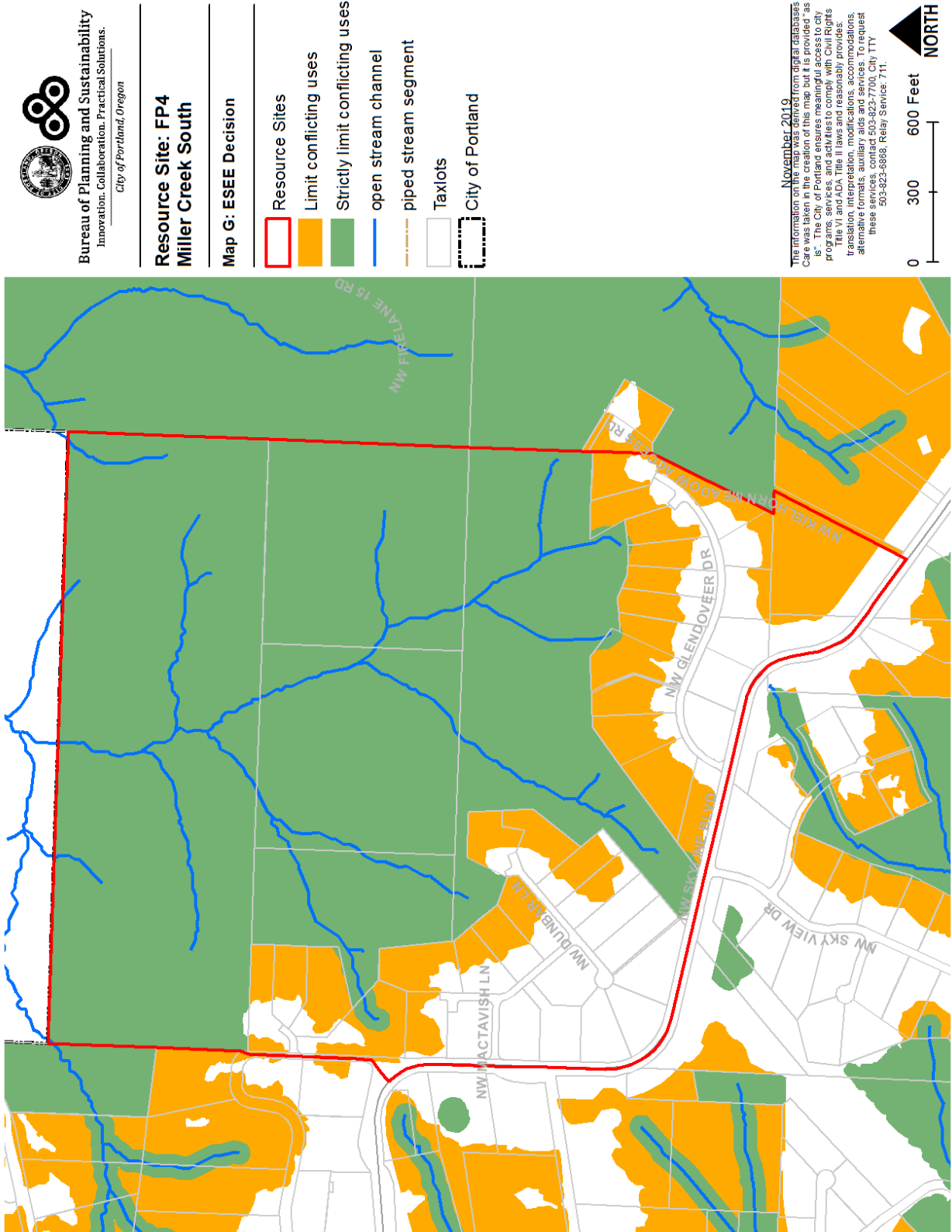






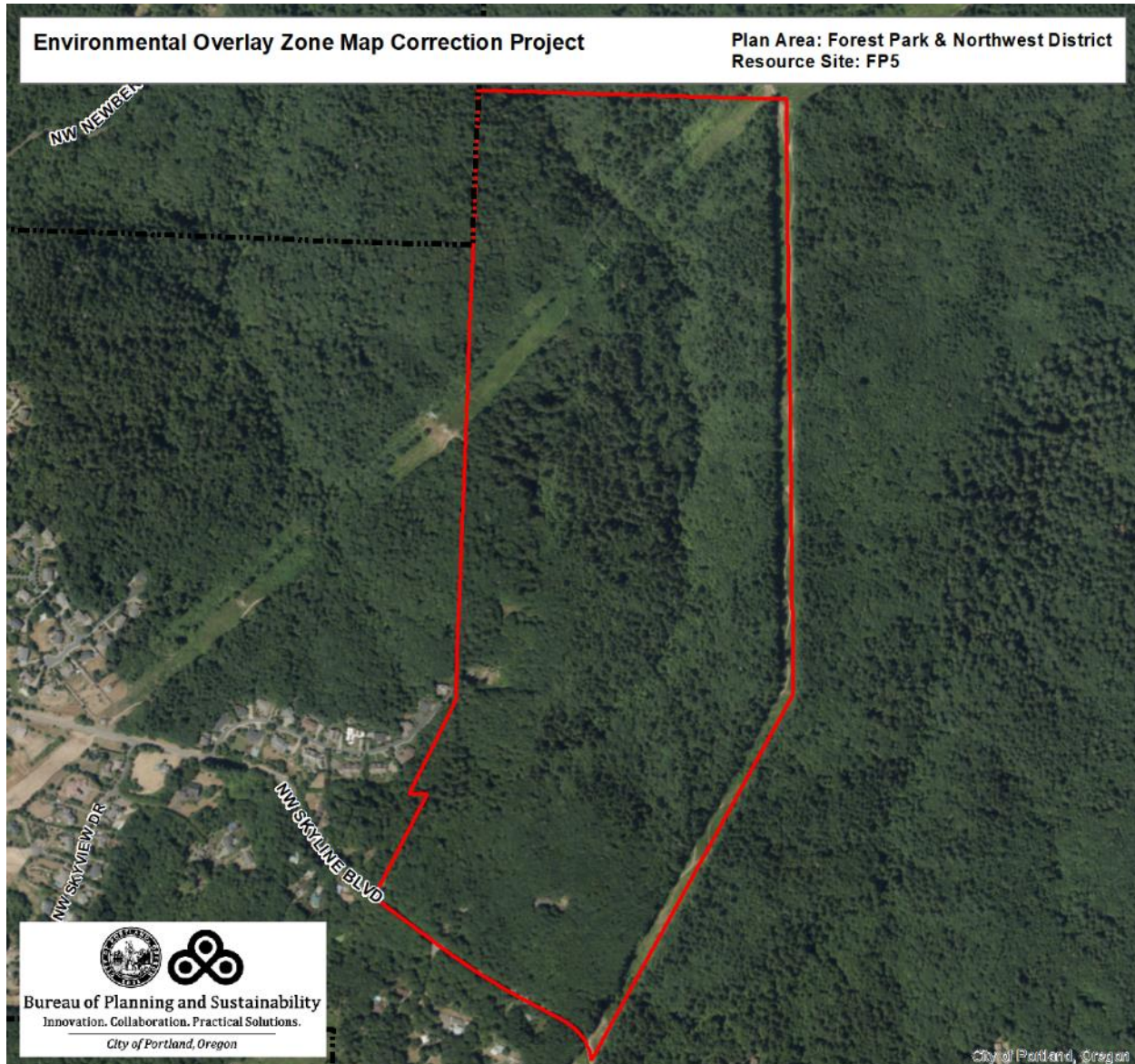






Resource Site No.: FP5 Resource Site Name: Miller Creek East

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 107



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP5
		Study Area
Stream (Miles)		0.8
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		195.3
Forest (acres)		169.1
Woodland (acres)		16.8
Shrubland (acres)		9.0
Herbaceous (acres)		0.4
Flood Area*		0.0
Vegetated (acres)		0.0
Non-vegetated (acres)		0.0
Steep Slopes (acres)**		175.1
Impervious Surface (acres)		7.1
* 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 forms the eastern headwaters of Miller Creek which supports runs of native Coho salmon, cutthroat trout and steelhead. Coho is a candidate for listing under the Endangered Species Act.

The site's vegetative cover is composed of three principle stages of second growth western hemlock forest: mid-aged conifer, conifer topping hardwood and hardwood with young conifer. Climax species such as western hemlock, western red cedar and pacific yew are well established in certain areas, particularly to the east. 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. A healthy stand of pacific dogwood is also present at the site. The only known specimens of two orchid family plants—giant rattlesnake-plantain (*Goodyera oblongifolia*) and spotted coral root (*Corallorhiza maculata*)--within the plan area reside at this site. Non-native plants are present in the cleared areas along the power line right-of-way.

The site provides high quality food and cover for resident and migratory wildlife. The forested creek headwaters provide a seasonal water source for terrestrial vertebrates and serve a critical function in sustaining proper water quality, temperature and flow levels for fish, amphibian and macroinvertebrate species found in the Miller Creek system. Bird species identified at the site include pileated woodpecker, sharp-shinned and red-tailed hawks, and a variety of songbirds. Animals sited in the area include bobcat, beaver and Townsend's chipmunk. The rare spotted frog (*Rana pretiosa*) was also recorded at this site. The site's interspersation with surrounding forest allows for free migration of wildlife and increases its value as habitat.

Table B: Quality of Natural Resource Functions in Resource Site FP5				
Resource Site (acres) = 197.125506				
	High	Medium	Low	Total
Riparian Corridors*				
acres	63.4	59.0	71.9	194.3
percent total inventory site area	32.2%	29.9%	36.5%	98.6%
Wildlife Habitat*				
acres	185.9	0.0	0.0	185.9
percent total inventory site area	94.3%	0.0%	0.0%	94.3%
Special Habitat Areas**				
acres				158.1
percent total inventory site area				80.2%
Combined Total⁺				
acres	193.6	0.4	1.2	195.2
percent total inventory site area	98.2%	0.2%	0.6%	99.0%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP5 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. 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 FP5, 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.

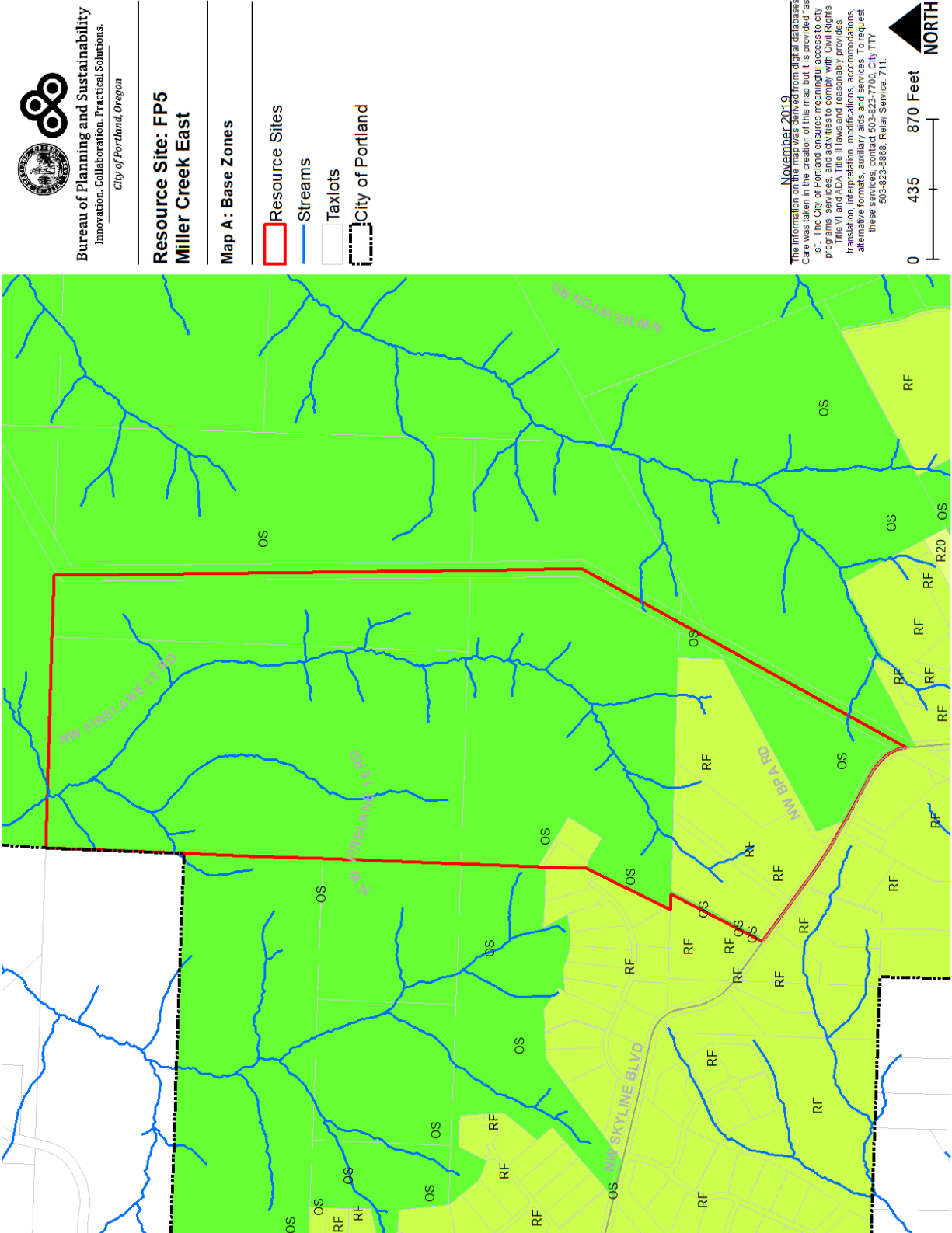
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

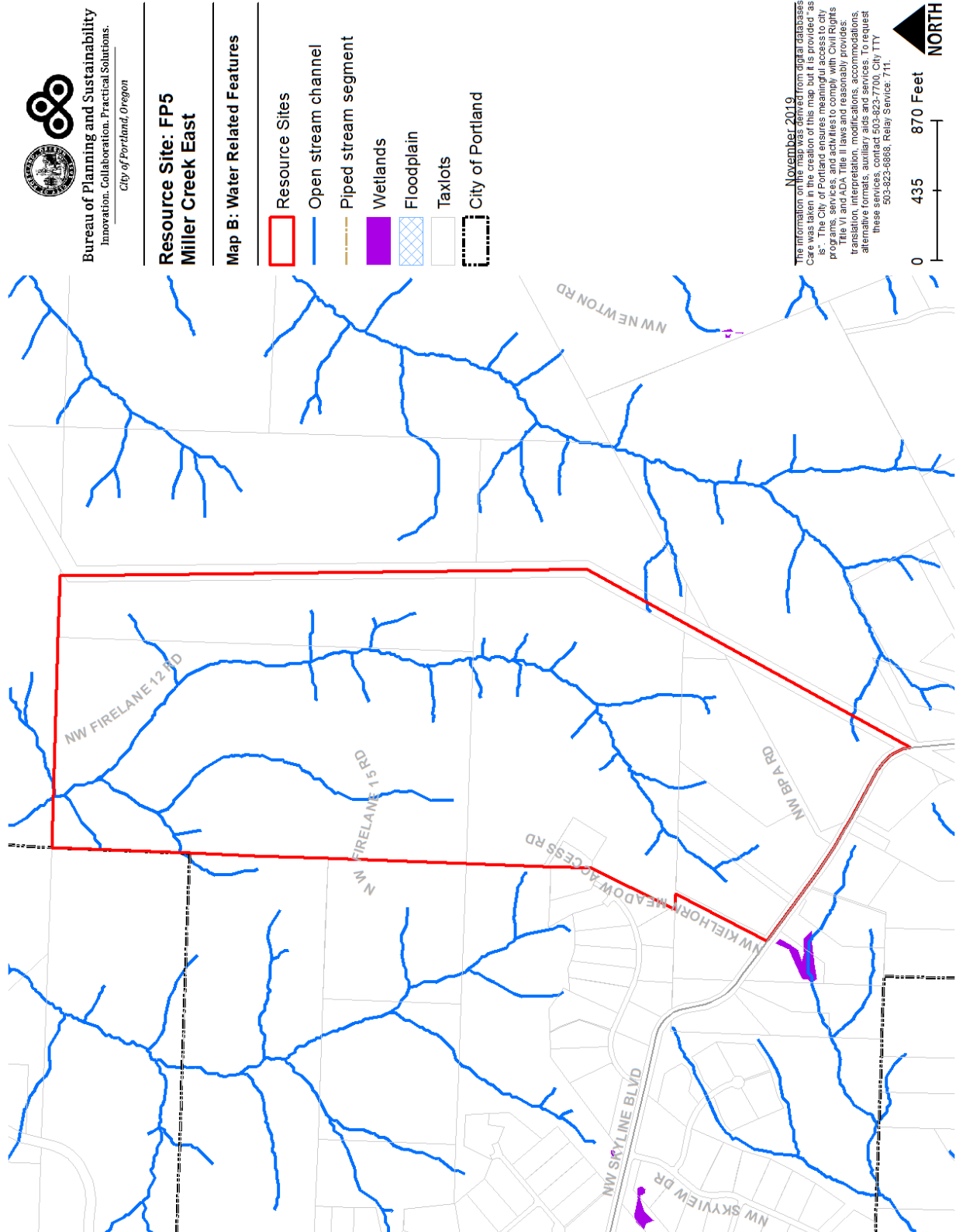
ESEE Decisions

Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP5 are:

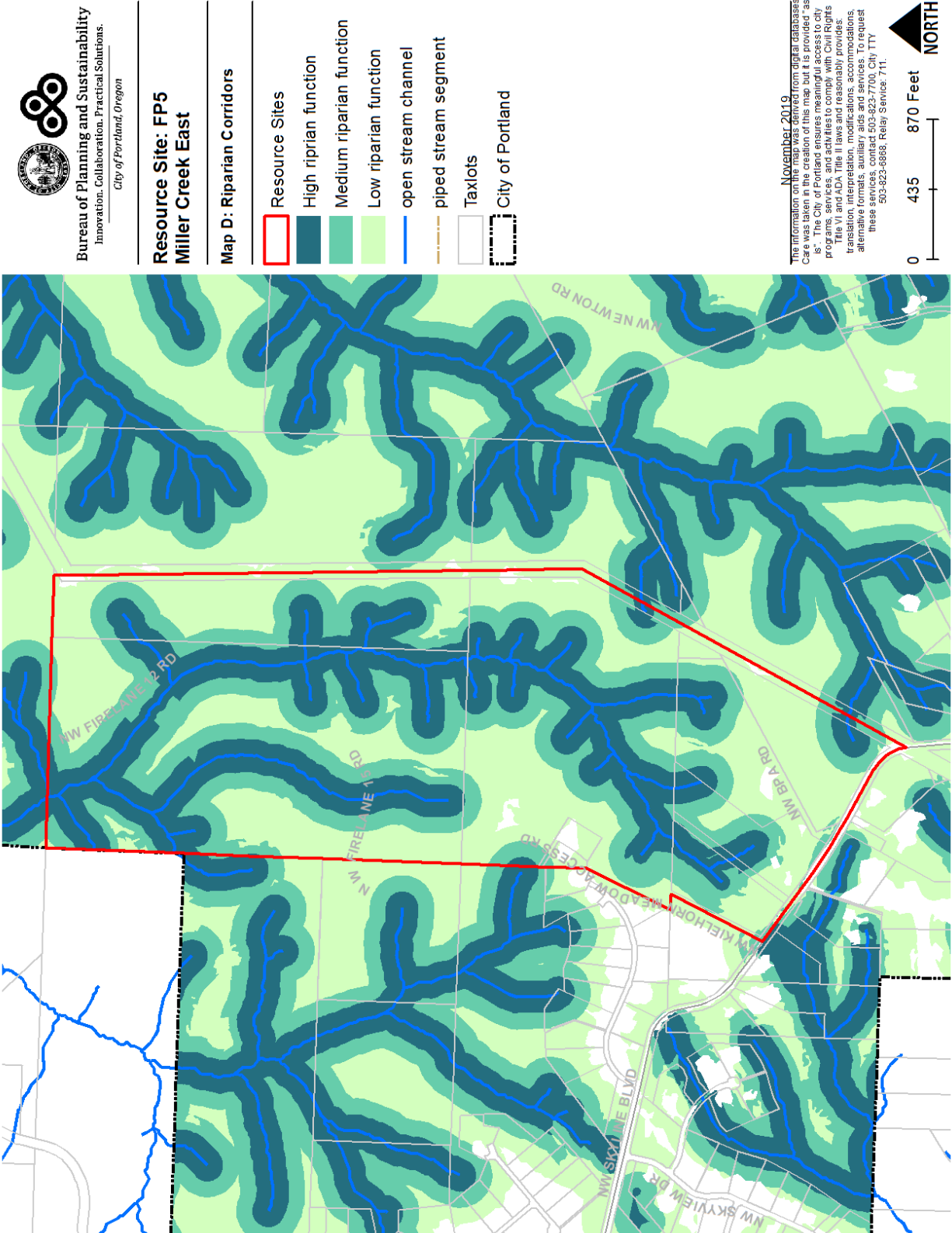
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 50 feet of stream top-of-bank,
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. 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.
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.

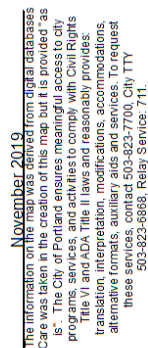
Table C: ESEE Decision for Resource Site FP5	
ESEE Decision	Acres
Strictly Limit	172.7
Limit	20.6
Allow	3.9

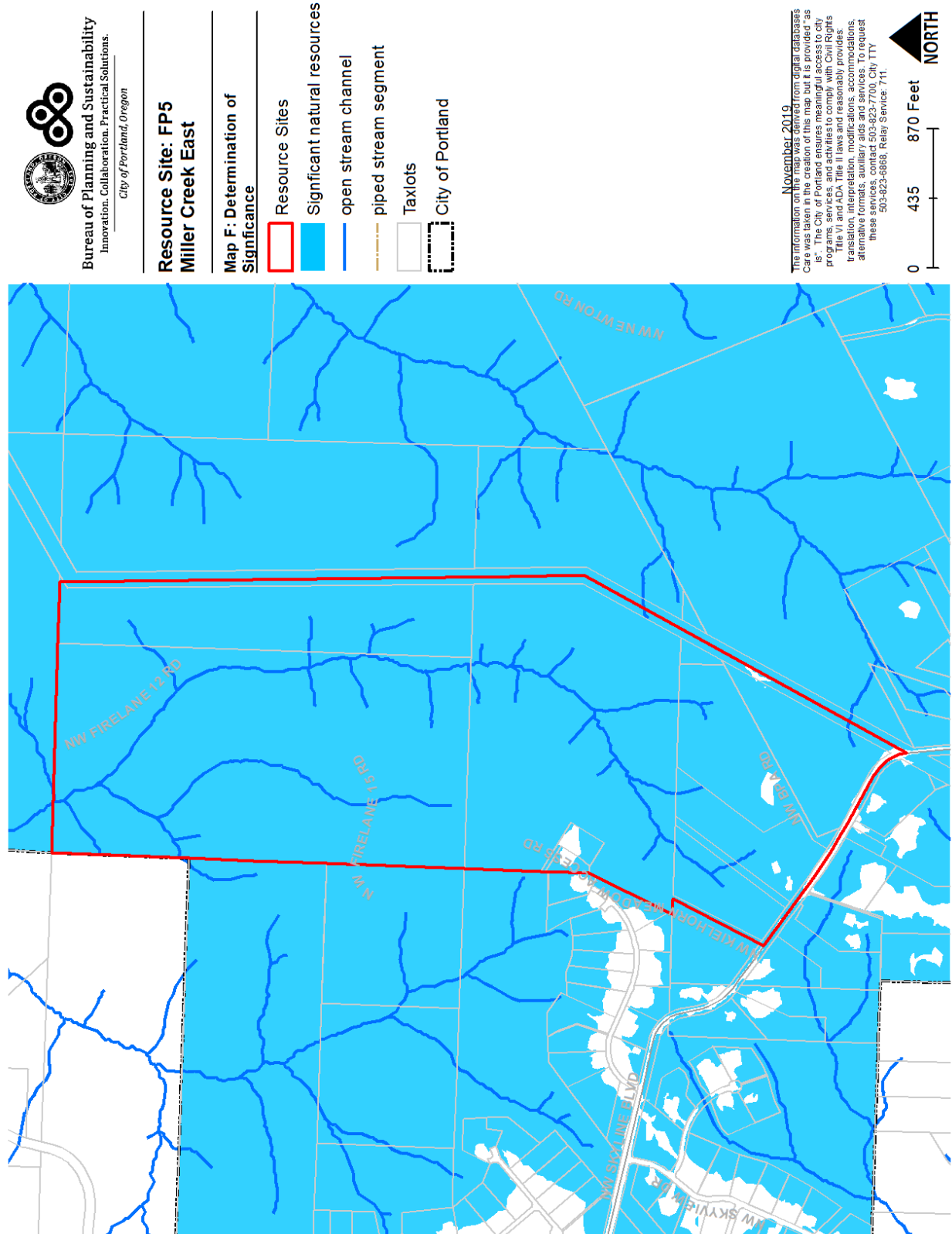


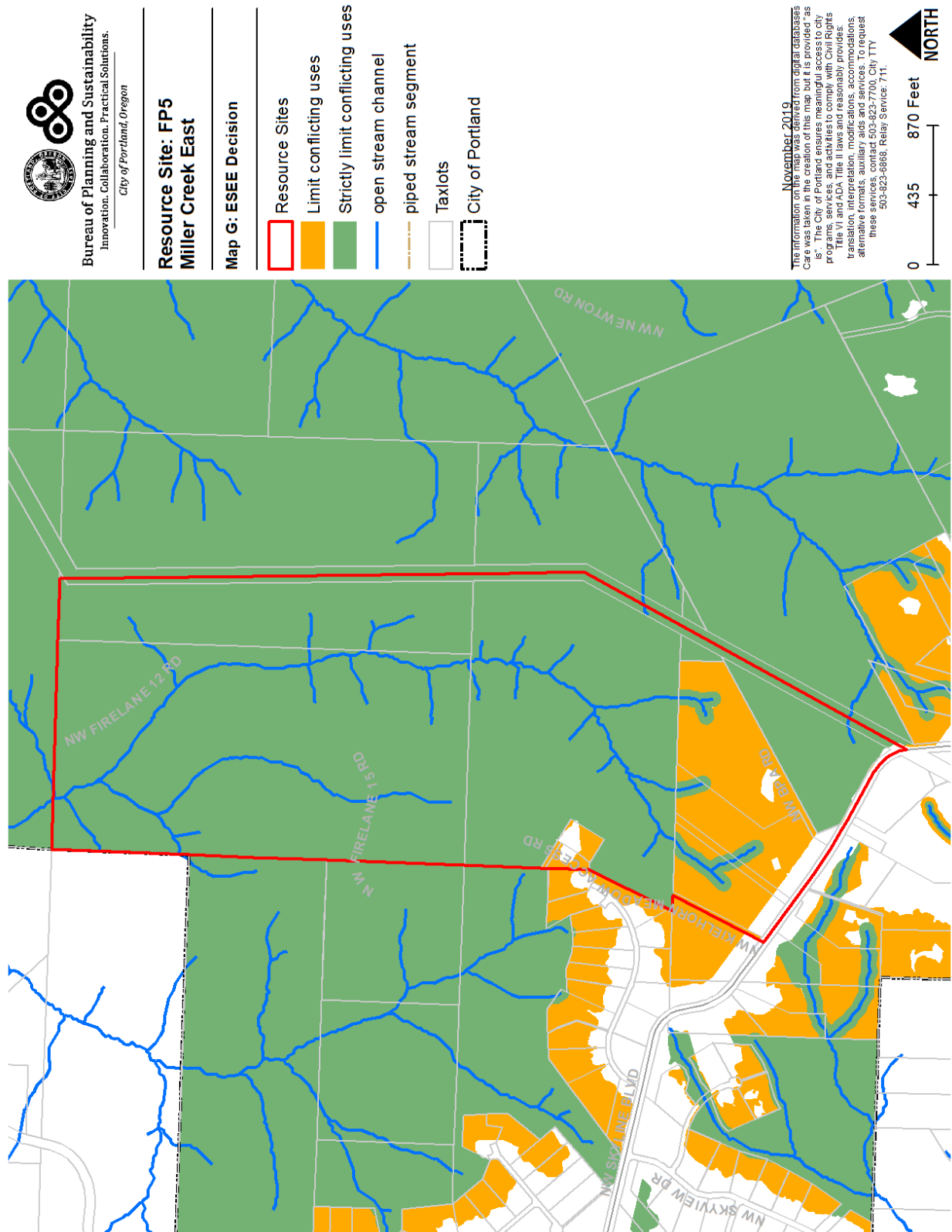






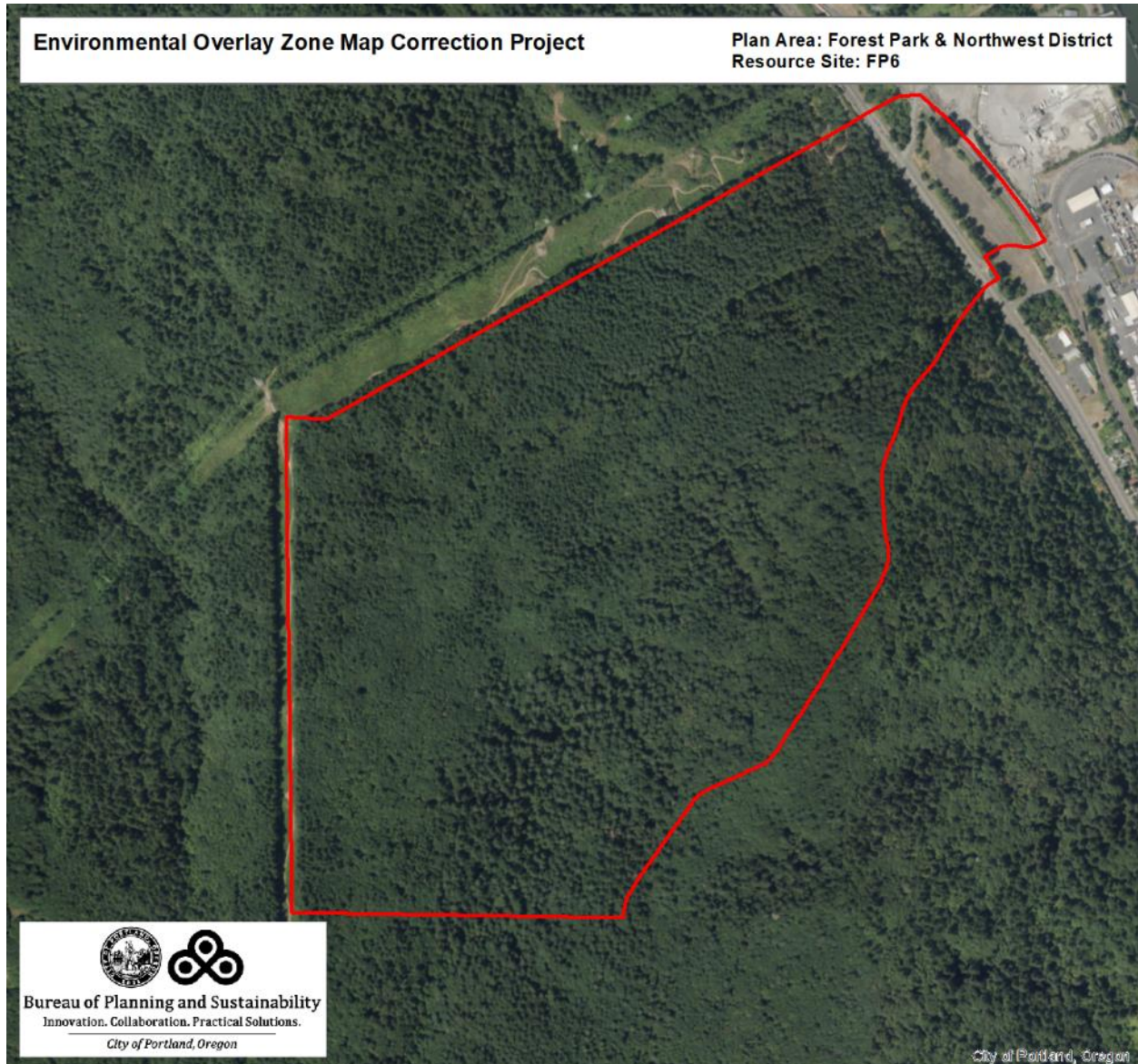






Resource Site No.: FP6 **Resource Site Name:** Lower Newton Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 103



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP6
		Study Area
Stream (Miles)		0.2
Wetlands (acres)		0.3
Vegetated Areas >= 1/2 acre (acres)		266.0
Forest (acres)		256.3
Woodland (acres)		5.0
Shrubland (acres)		3.7
Herbaceous (acres)		0.9
Flood Area*		0.0
Vegetated (acres)		0.0
Non-vegetated (acres)		0.0
Steep Slopes (acres)**		257.1
Impervious Surface (acres)		10.9
* 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%.		

This site contains the largest known stand of old growth Douglas fir within the City of Portland. One of the only native ponderosa pines (*Pinus ponderosa*) in the city also is present at this site. Other site vegetation includes a mixture of forest types, the most prominent of which are mid-aged conifer and conifer topping hardwood. At the western edge of the site is a large stand of mature hardwood which is bordered by hardwood with young conifer. Douglas fir, western hemlock and western red cedar are well established within the mid-aged conifer and old growth forest areas. The site's forest cover protects watershed resources, serves as habitat for wildlife and provides open space, scenic and recreational resources. Non-native plants (holly and ivy) and disturbances along the powerline corridors and St. Helens Road have degraded the quality of the native plant community locally.

This site provides high quality habitat for wildlife in the area, including five sensitive bird species: pileated woodpecker, screech owl, saw-whet owl, sharp shinned hawk and osprey. Interspersion with surrounding forest enhances the site's value as wildlife habitat; however, St. Helens Road impedes migration to the east.

Table B: Quality of Natural Resource Functions in Resource Site FP6				
Resource Site (acres) = 273.636999				
	High	Medium	Low	Total
Riparian Corridors*				
acres	89.9	78.2	98.2	266.3
percent total inventory site area	32.9%	28.6%	35.9%	97.3%
Wildlife Habitat*				
acres	258.9	0.0	0.0	258.9
percent total inventory site area	94.6%	0.0%	0.0%	94.6%
Special Habitat Areas**				
acres				262.1
percent total inventory site area				95.8%
Combined Total⁺				
acres	263.7	2.2	0.9	266.8
percent total inventory site area	96.4%	0.8%	0.3%	97.5%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP6 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 residential uses are allowed outright or conditionally in the R10 base zones. Industrial uses are allowed in the IH 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 FP6, 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.

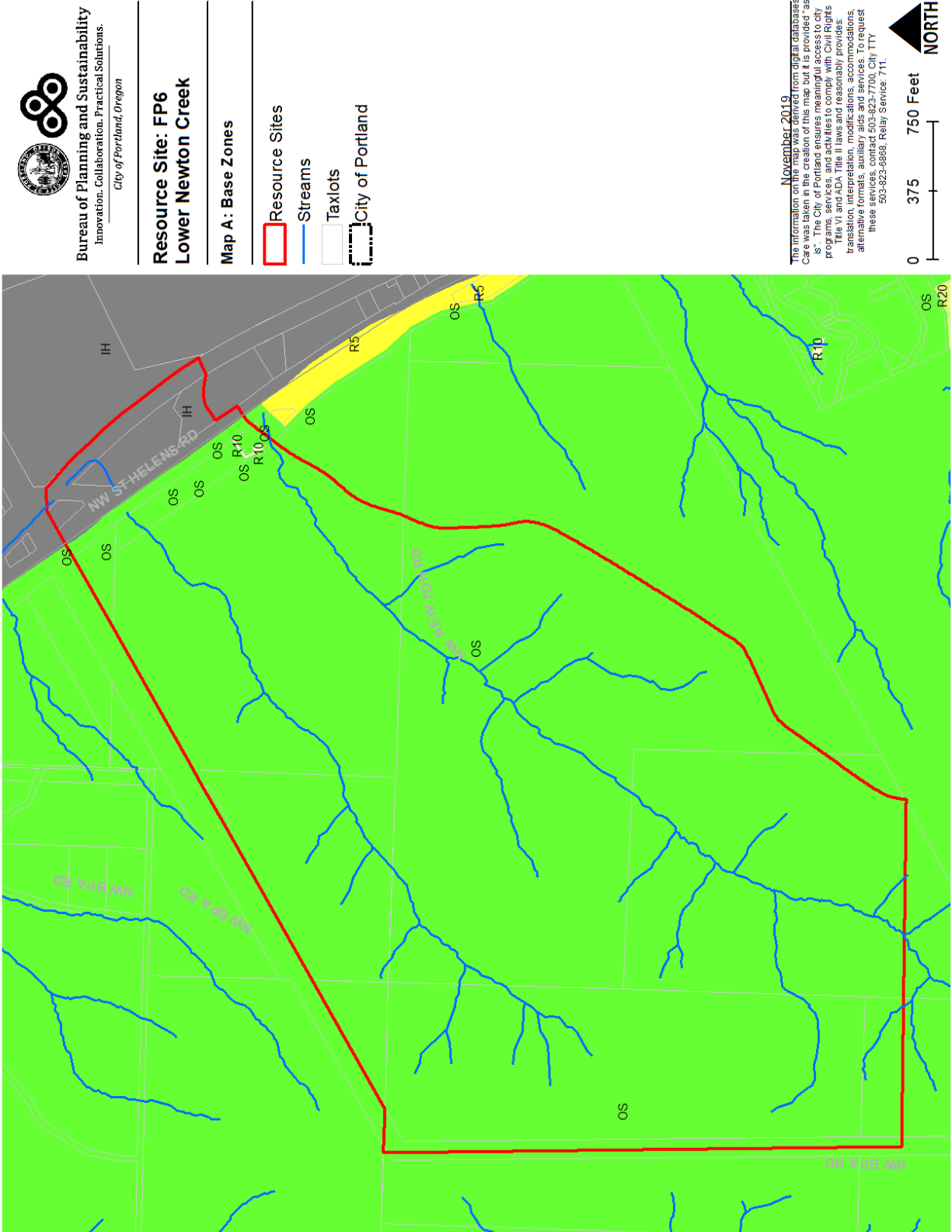
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

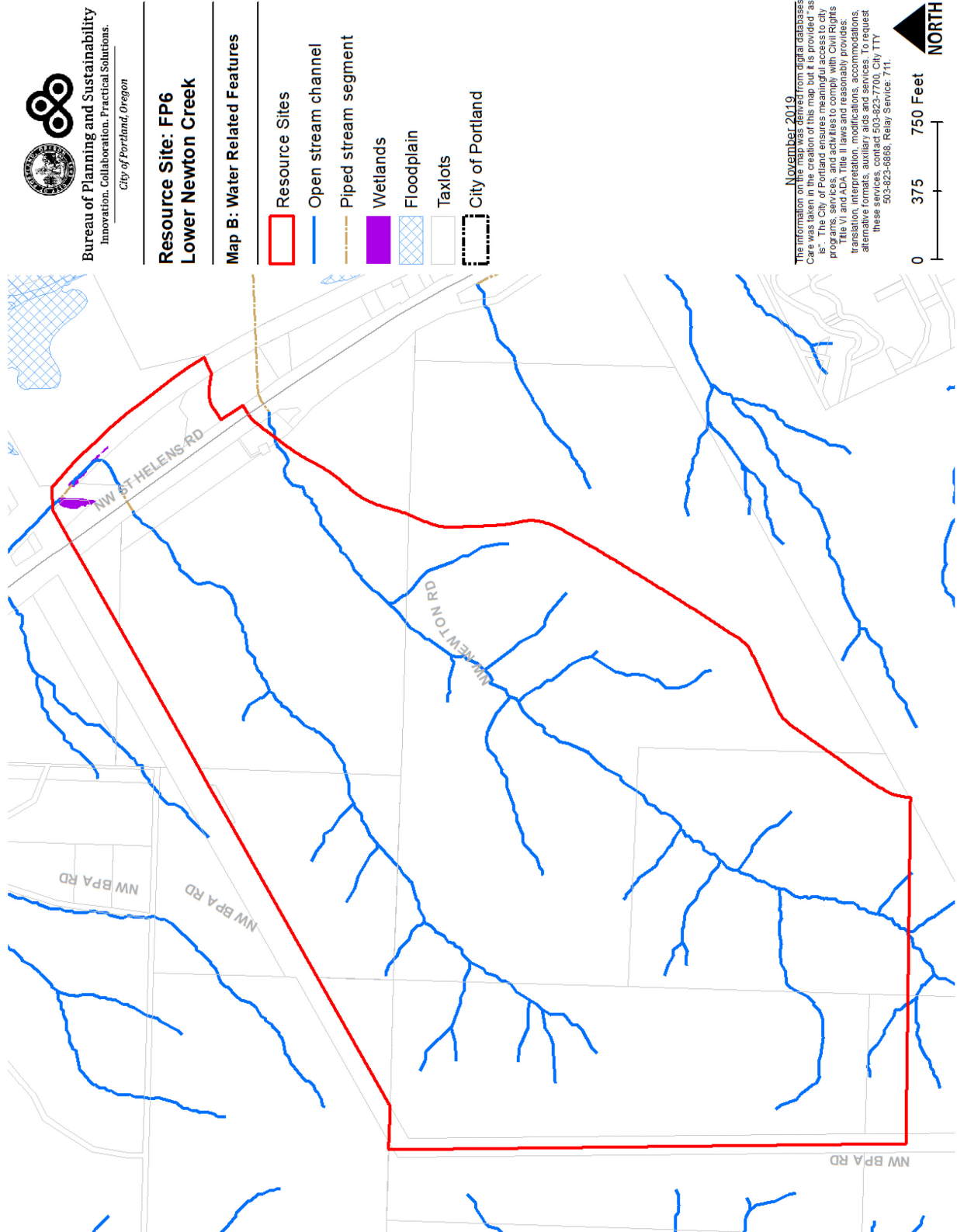
ESEE Decisions

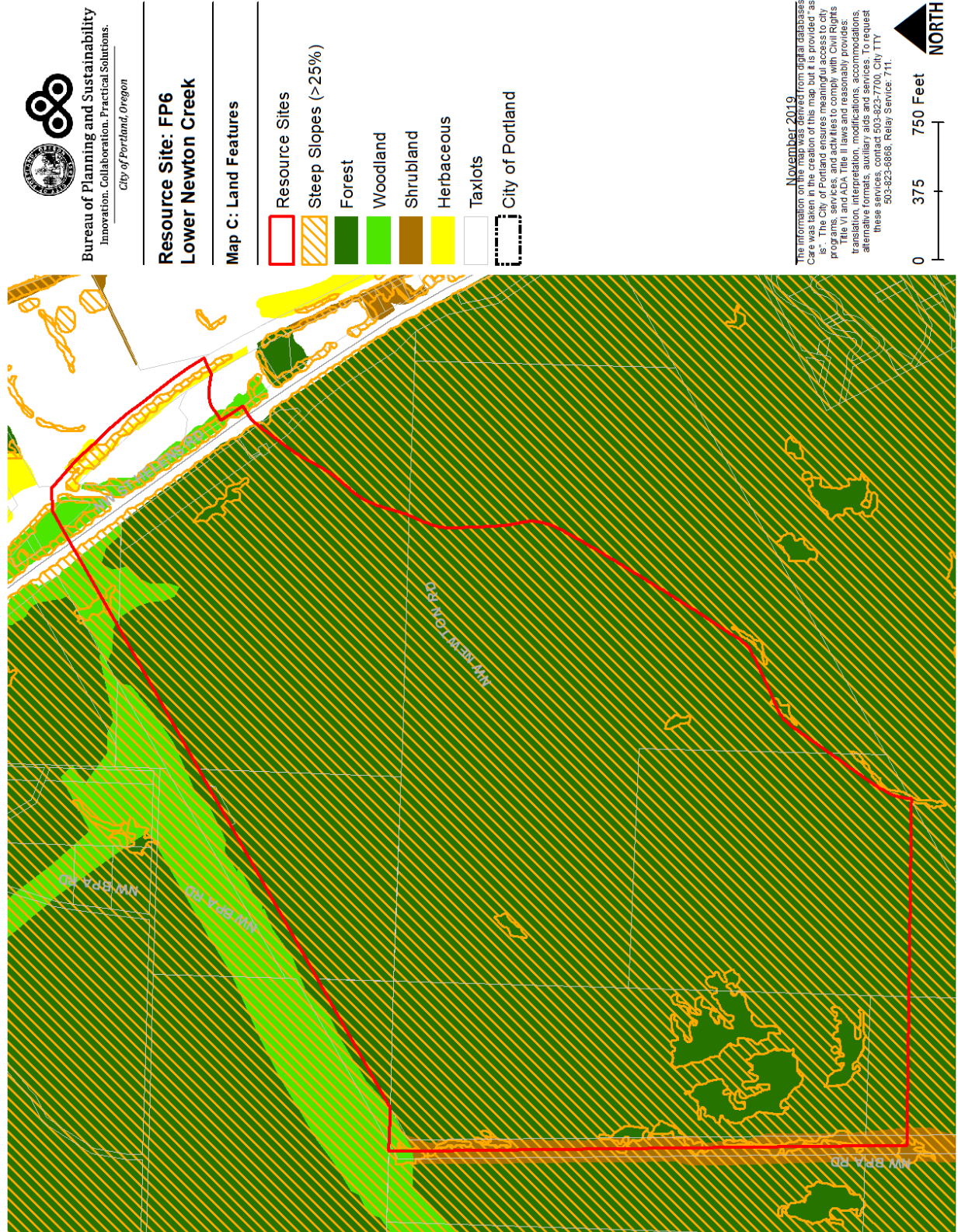
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP6 are:

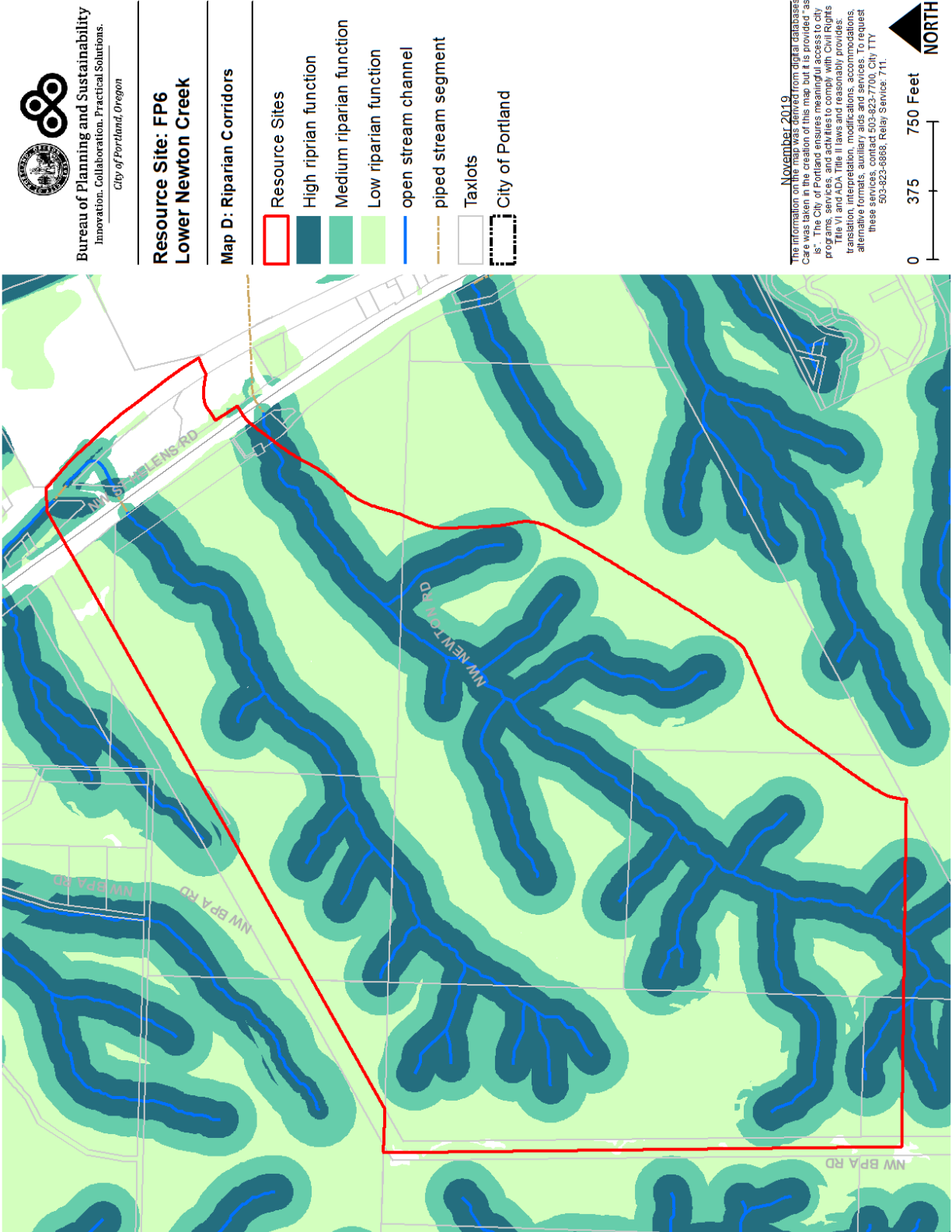
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
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.

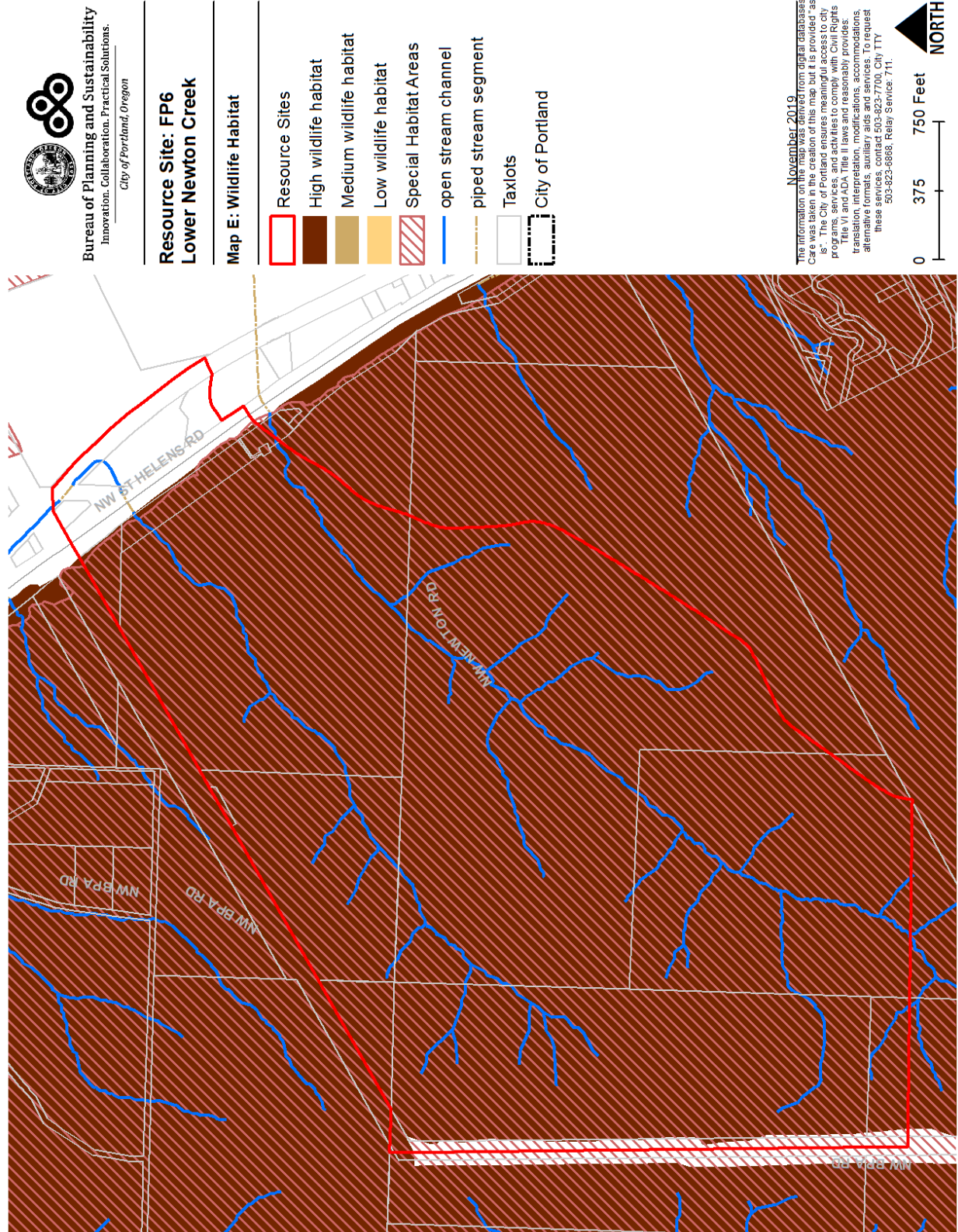
Table C: ESEE Decision for Resource Site FP6	
ESEE Decision	Acres
Strictly Limit	264.3
Limit	2.4
Allow	7.0

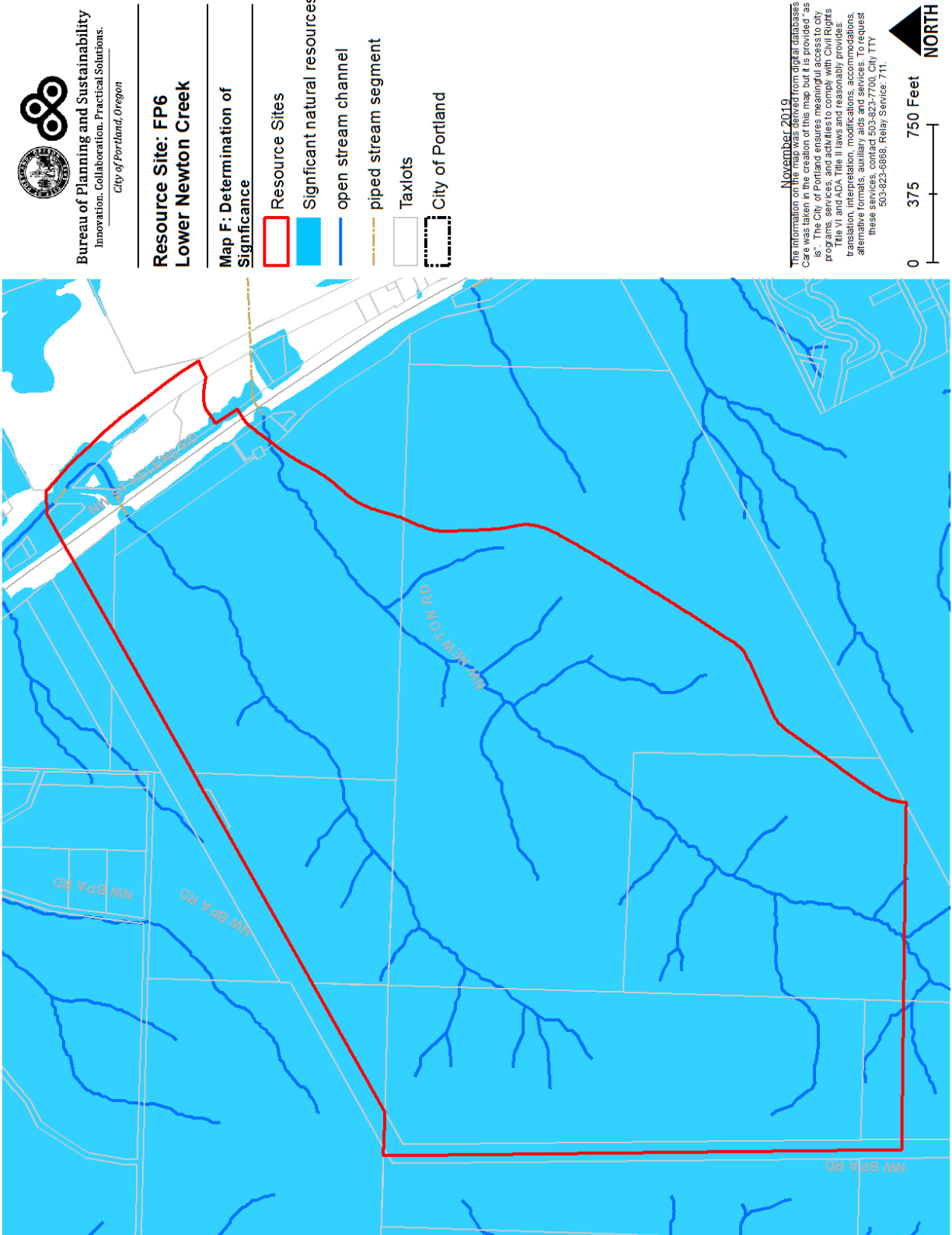


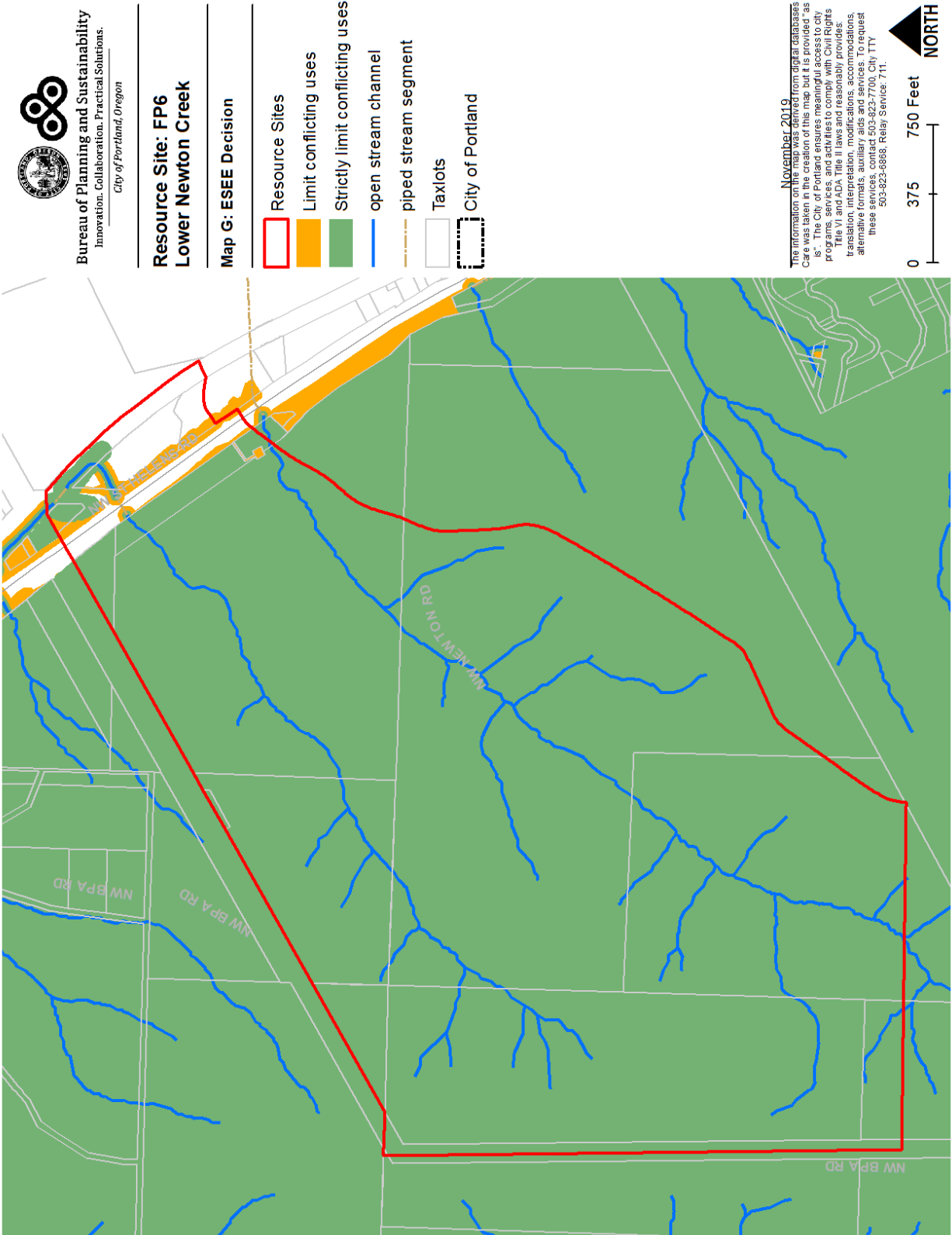






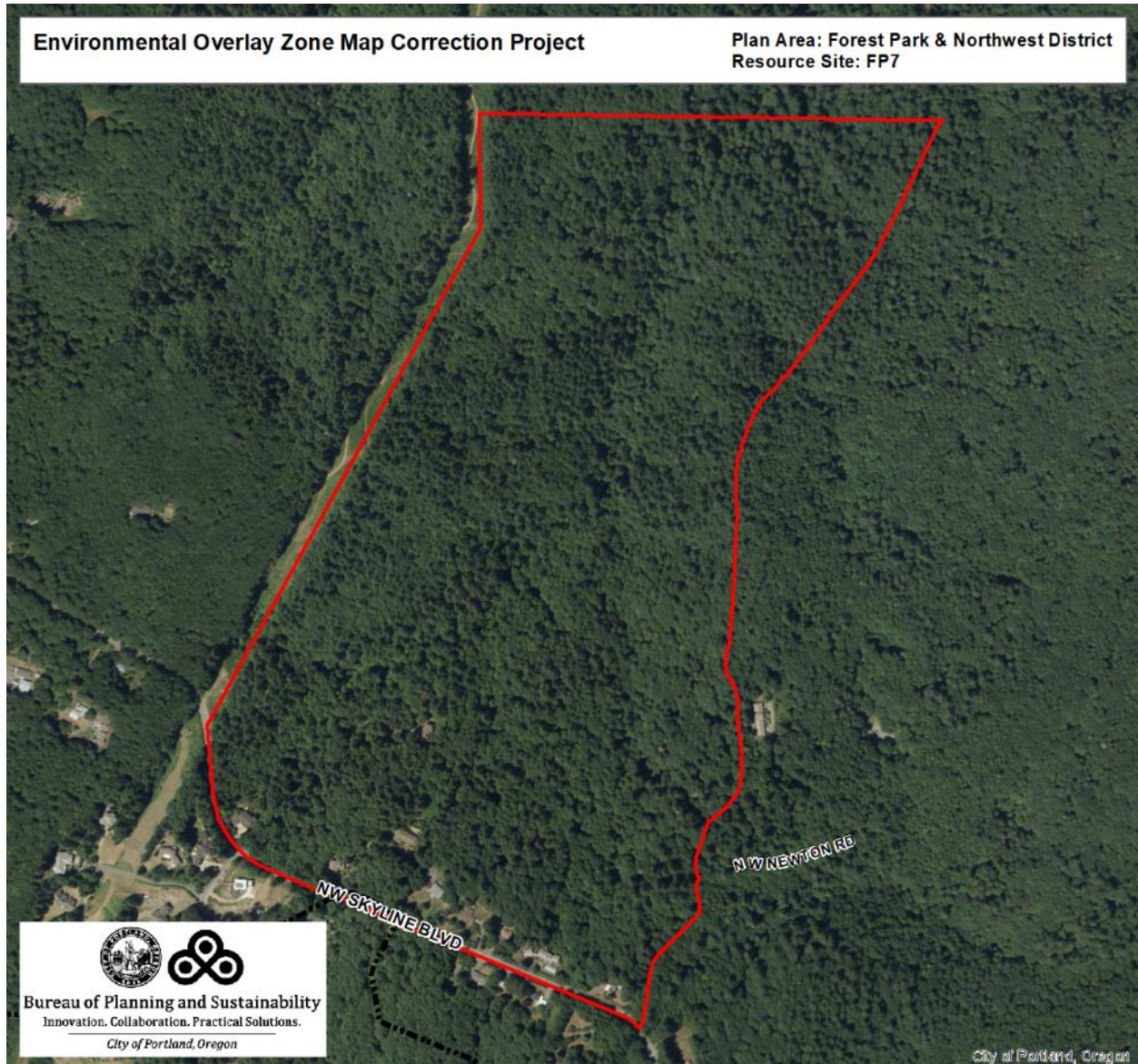






Resource Site No.: FP7 Resource Site Name: Newton Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 102



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP7	
	Study Area
Stream (Miles)	0.7
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	133.7
Forest (acres)	131.4
Woodland (acres)	0.0
Shrubland (acres)	2.3
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	130.1
Impervious Surface (acres)	6.0
* 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 headwaters area of Newton Creek. Forest cover at the site is a mix of seral stages of second growth western hemlock forest. The most prominent forest type is conifer topping hardwood. Mature hardwood is found along the upper reaches of the creek and stands of mid-aged conifer and hardwood with young conifer are present 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. Non-native plants are present in some of the cleared areas along Skyline Boulevard.

The site provides high quality food and cover for resident and migratory wildlife. The creek headwaters provide a seasonal water source for aquatic organisms, amphibians and terrestrial vertebrates. Bird species identified at the site include the protected bald eagle (adult), pileated woodpecker and a variety of songbirds. Other wildlife species observed include the rough-skinned newt and coyote. The site's interspersed with surrounding forest allows for free migration of wildlife and increases its value as habitat. Traffic along Skyline Boulevard impedes migration to the west.

Table B: Quality of Natural Resource Functions in Resource Site FP7				
Resource Site (acres) = 138.481941				
	High	Medium	Low	Total
Riparian Corridors*				
acres	53.8	42.4	37.4	133.6
percent total inventory site area	38.9%	30.6%	27.0%	96.5%
Wildlife Habitat*				
acres	131.2	0.0	0.0	131.2
percent total inventory site area	94.8%	0.0%	0.0%	94.8%
Special Habitat Areas**				
acres				81.6
percent total inventory site area				58.9%
Combined Total⁺				
acres	132.6	0.3	0.8	133.6
percent total inventory site area	95.7%	0.2%	0.6%	96.5%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP7 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 and R20 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 FP7, 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*.

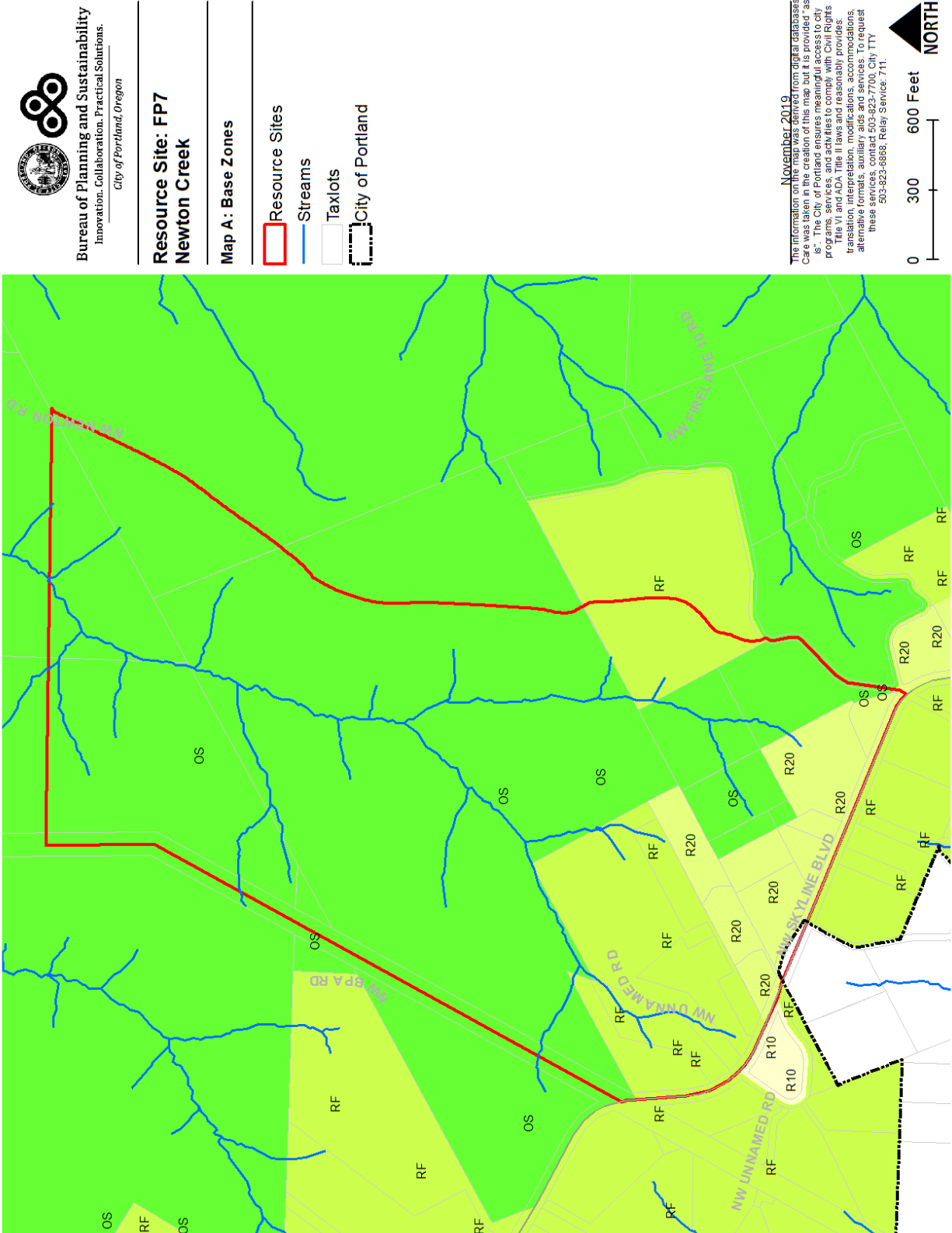
ESEE Decisions

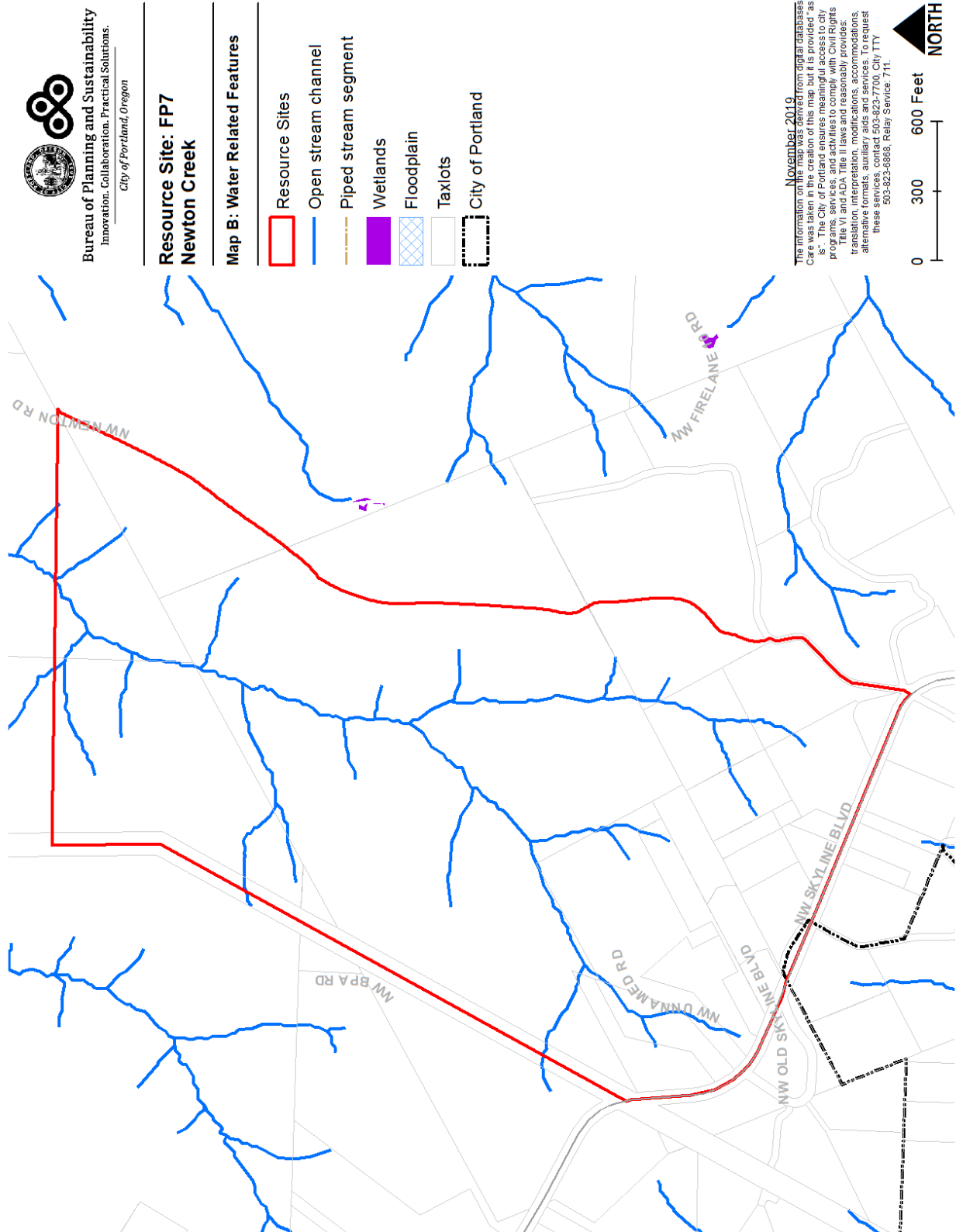
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP7 are:

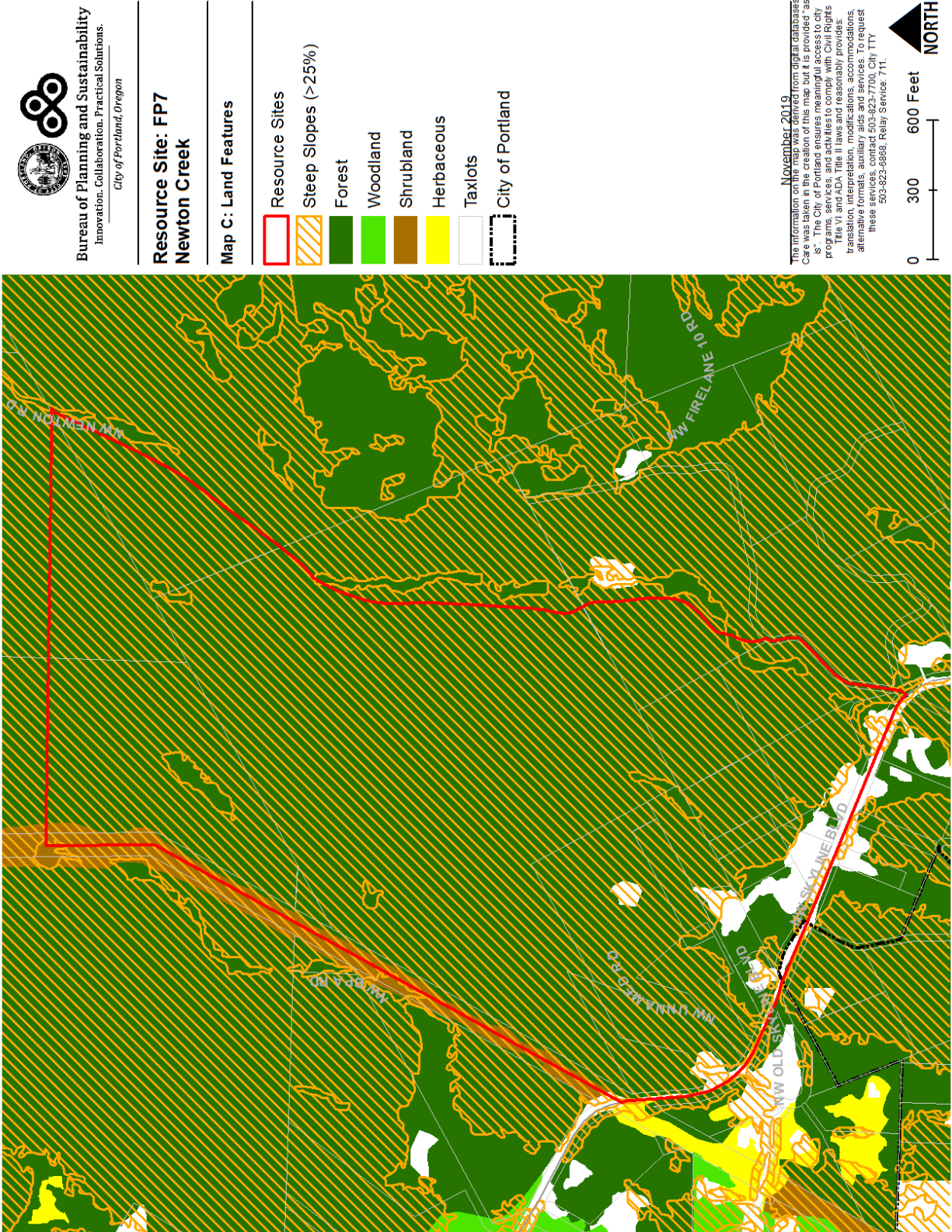
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 50 feet of stream top-of-bank.
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. *Strictly limit* conflicting uses within areas of forest or woodland vegetation in the parcel zoned RF that is completely surrounded by Forest Park.
4. Outside of public parks, *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.

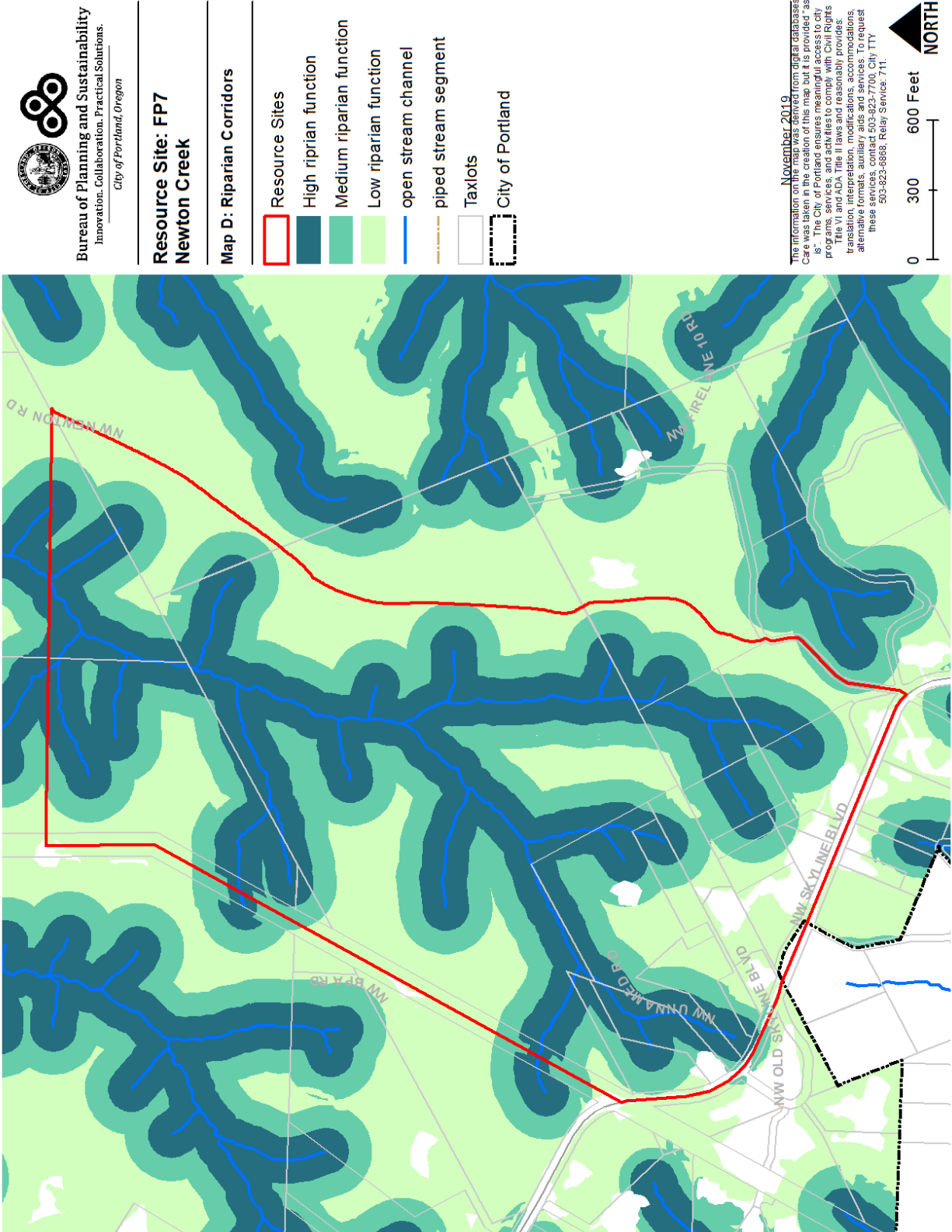
There one parcel zoned RF has the same significant features and provides the same significant functions as the features and functions in Forest Park. The parcel is surrounded on all sides by the park and contiguous forest canopy. Additional impacts to the forest canopy should be avoided. This parcel is substantively different than the parcels zoned RF that are along the perimeter of Forest Park and are not surrounded on all sides by contiguous tree canopy.

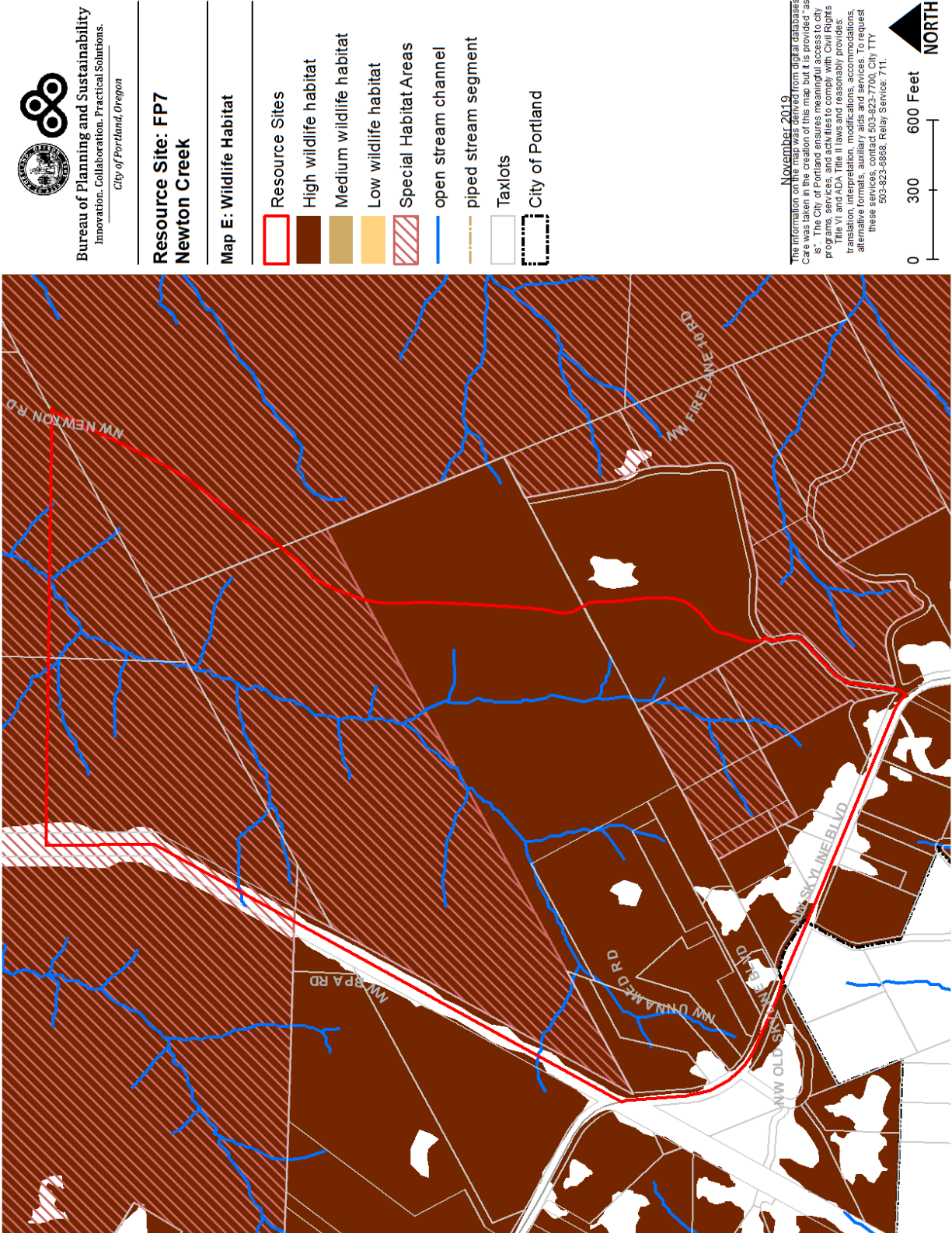
Table C: ESEE Decision for Resource Site FP7	
ESEE Decision	Acres
Strictly Limit	113.4
Limit	15.5
Allow	9.6

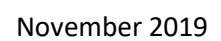


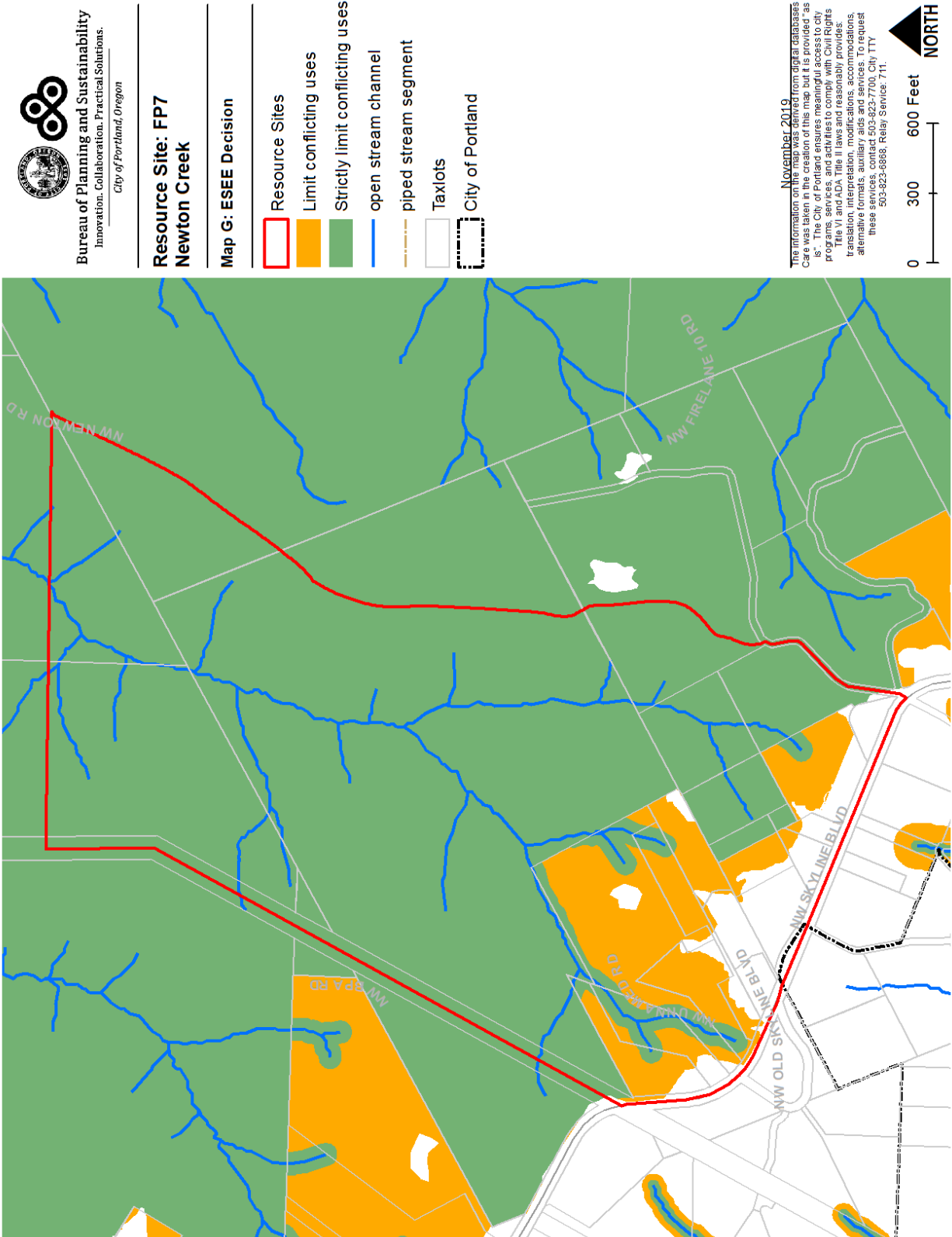












Resource Site No.: FP8 Resource Site Name: Linnton Park

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 101



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP8
		Study Area
Stream (Miles)		6.1
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		242.6
Forest (acres)		234.6
Woodland (acres)		1.9
Shrubland (acres)		3.5
Herbaceous (acres)		2.7
Flood Area*		0.0
Vegetated (acres)		0.0
Non-vegetated (acres)		0.0
Steep Slopes (acres)**		242.5
Impervious Surface (acres)		49.3
* 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 site's forest cover is composed of a mix of vegetation types, the most prominent of which is *conifer topping hardwood*. Also present are *shrub* (along St. Helens Rd.), *mature hardwood* (along the creek) and *mid-aged conifer* (scattered on the slopes). Climax tree species are well established within the *mid-aged conifer* forest, and within one such stand is a patch of *old growth* on the hillside above Linnton. 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. Non-native plants and industrial emissions have degraded the vitality of the plant community near St. Helens Rd.

This site provides high quality food and cover sources for wildlife in the area. Water is also available on a seasonal basis. A black bear with cubs was seen at this site in 1989 and additional evidence of bears was found in 1990. Identified bird species include pileated woodpecker, screech and saw-whet owls, and sharp-shinned hawk. Interspersion with surrounding forest enhances the site's value as wildlife habitat; however, St. Helens Road impedes migration to the east.

Table B: Quality of Natural Resource Functions in Resource Site FP8				
Resource Site (acres) = 283.445636				
	High	Medium	Low	Total
Riparian Corridors*				
acres	71.2	59.2	109.0	239.3
percent total inventory site area	25.1%	20.9%	38.5%	84.4%
Wildlife Habitat*				
acres	231.4	0.0	0.0	231.4
percent total inventory site area	81.6%	0.0%	0.0%	81.6%
Special Habitat Areas**				
acres				231.0
percent total inventory site area				81.5%
Combined Total⁺				
acres	236.2	1.1	4.4	241.7
percent total inventory site area	83.3%	0.4%	1.5%	85.3%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP8 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 R20, R10 and R5 base zones. Commercial uses are allowed in the CM2 and CE base zone. Employment and industrial uses are allowed in the EG2 and IH base zones. Open space use 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 FP8, with the following additional information that clarifies the analysis.

Linnton town center is located in this resource site. There are commercial uses along Highway 30 and residential development at the base of the hills. 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*.

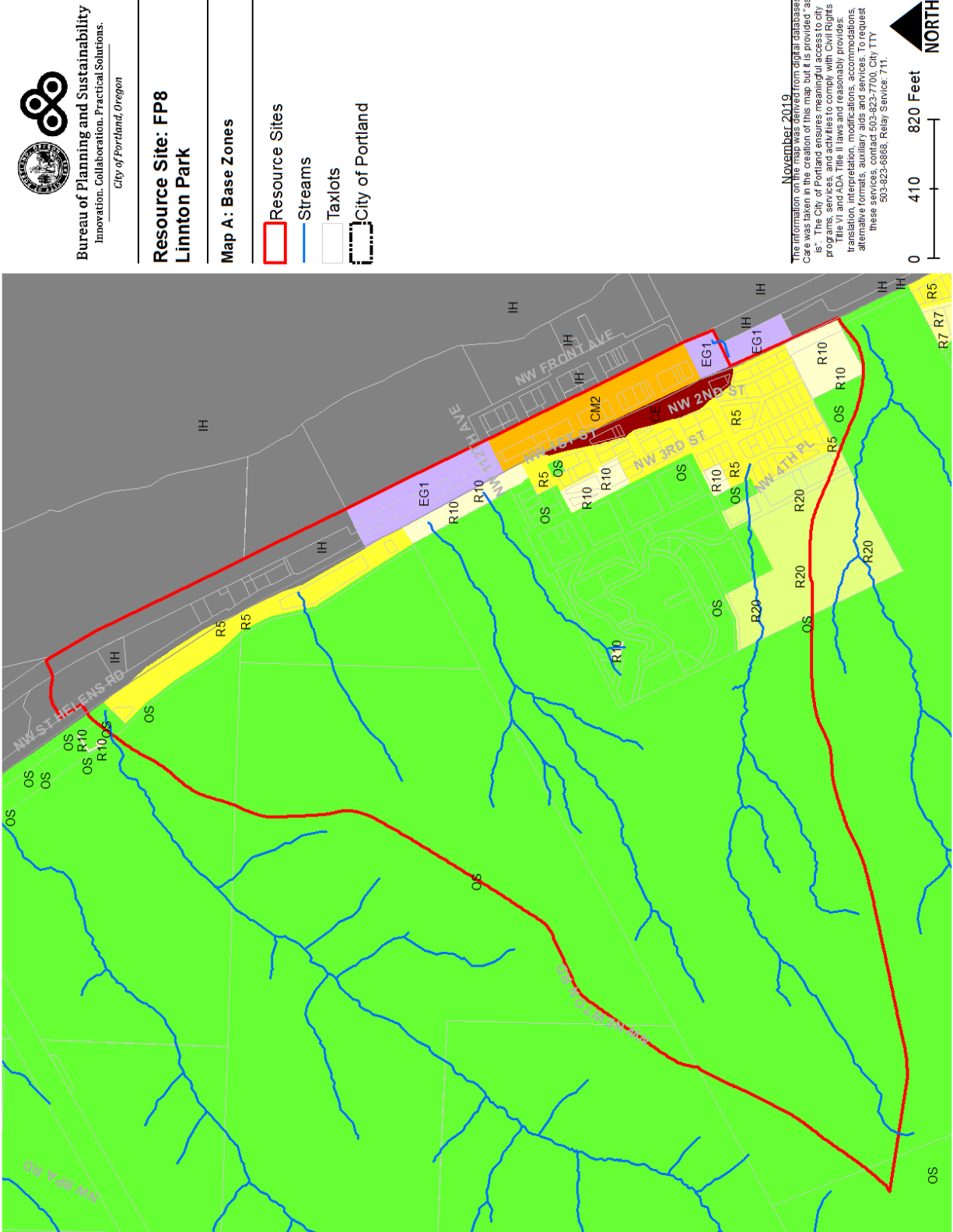
Strictly limiting or limiting conflicting uses generally would retain the riparian corridor and wildlife habitat functions of the significant natural resource features including maintaining habitat for at risk species, maintaining the flow moderation, water quality and flood control functions of streams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

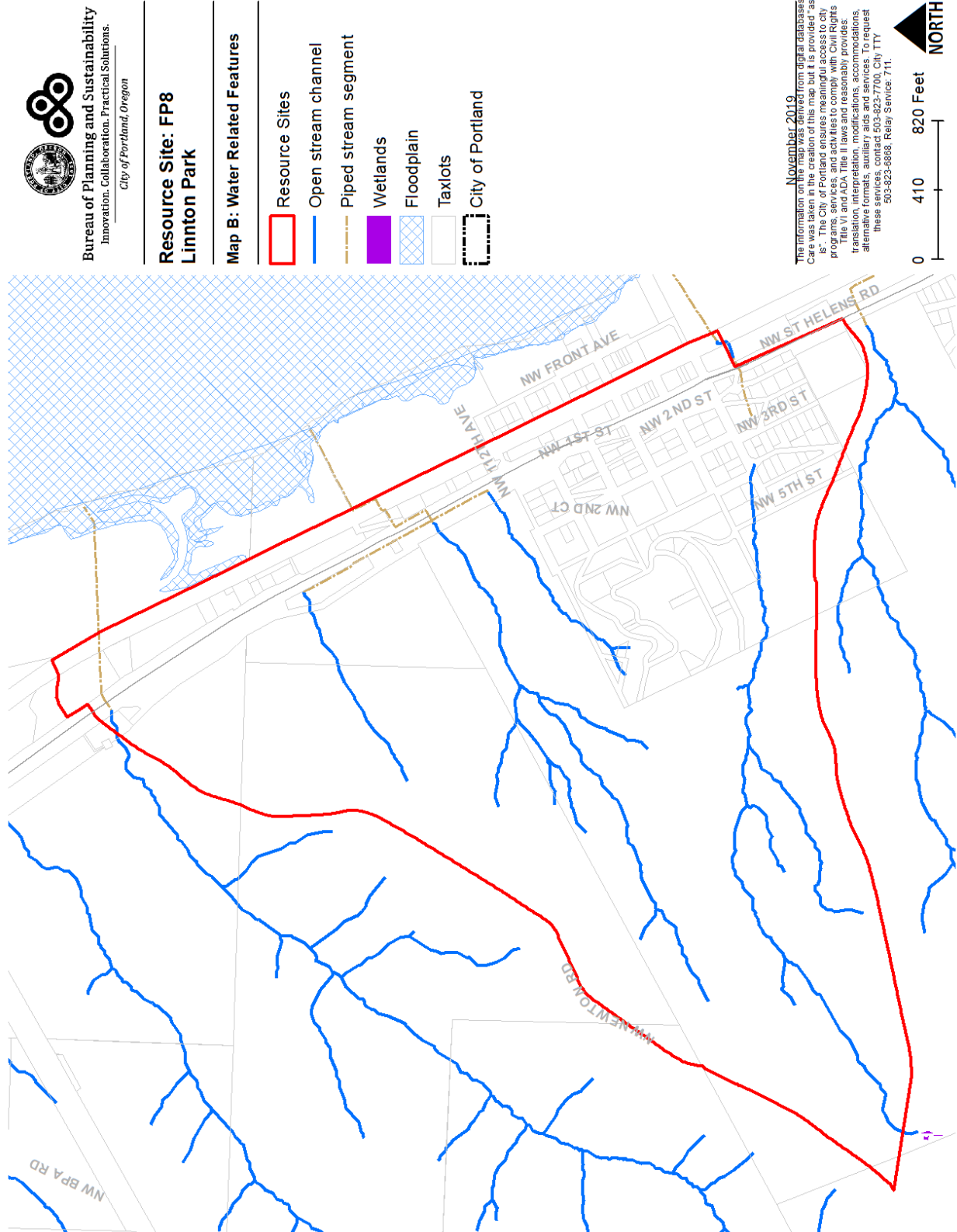
ESEE Decisions

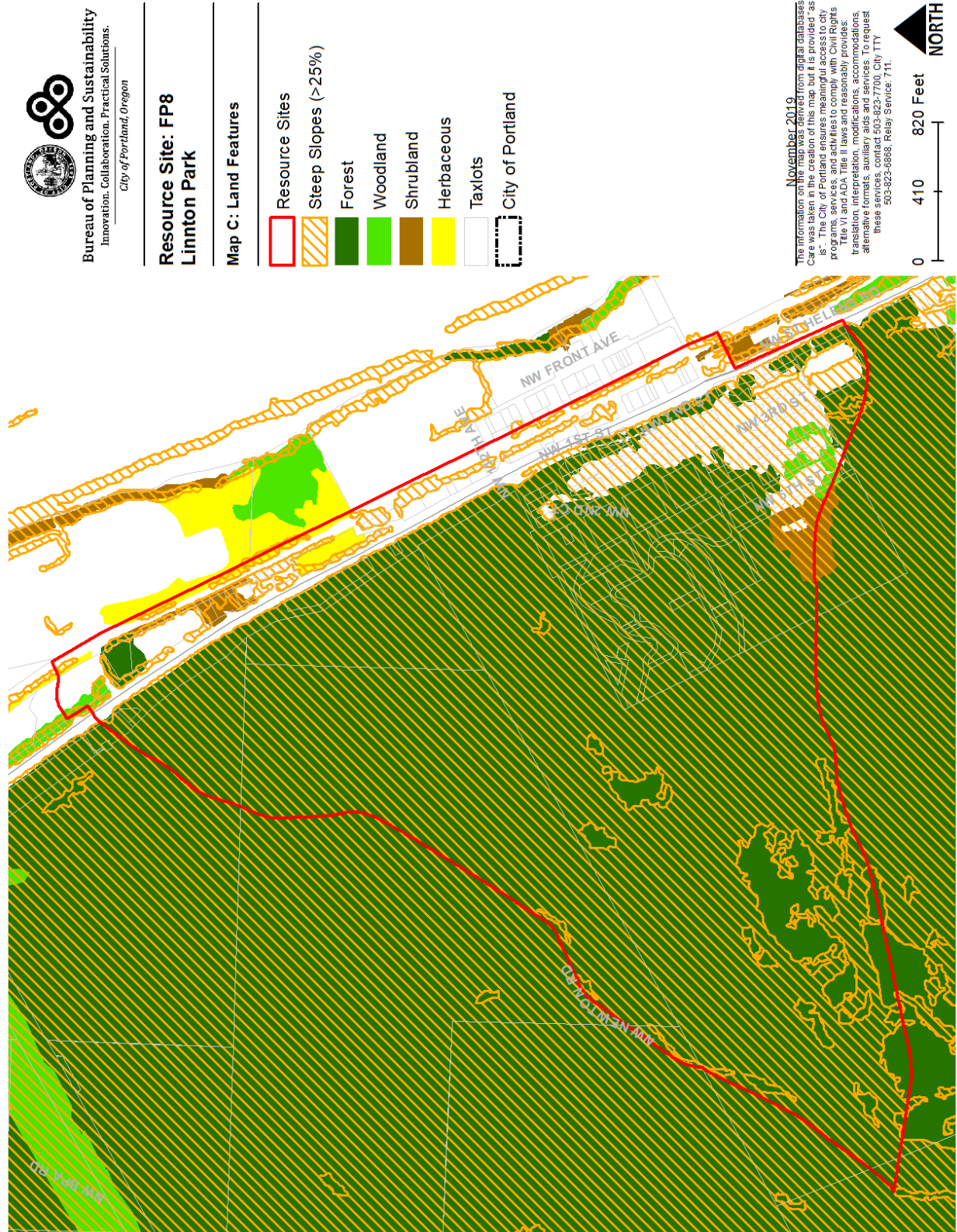
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP8 are:

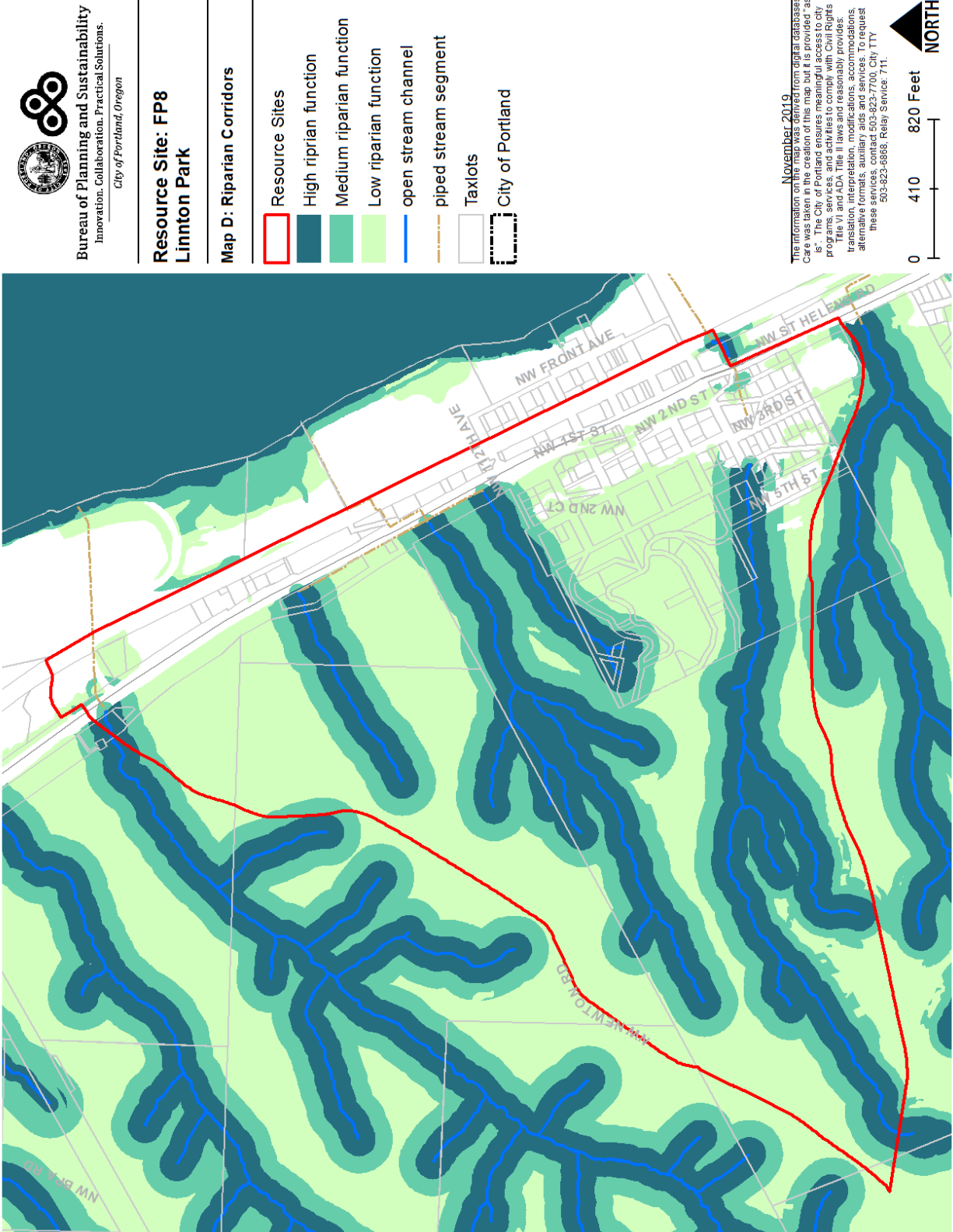
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 25 feet of stream top-of-bank.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within areas of forest, woodland, shrubland or 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.

Table C: ESEE Decision for Resource Site FP8	
ESEE Decision	Acres
Strictly Limit	225.1
Limit	9.5
Allow	48.8

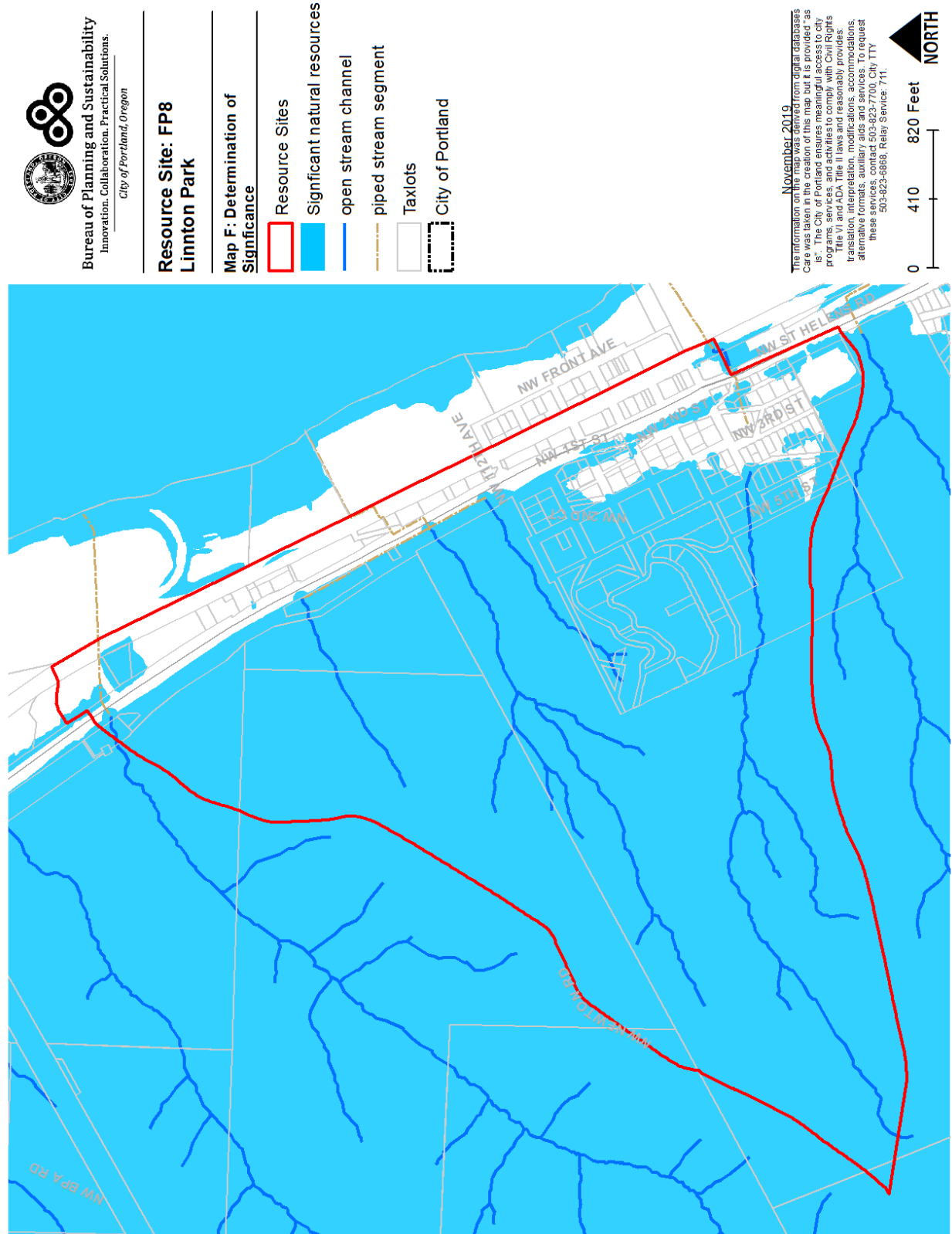


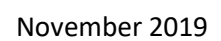






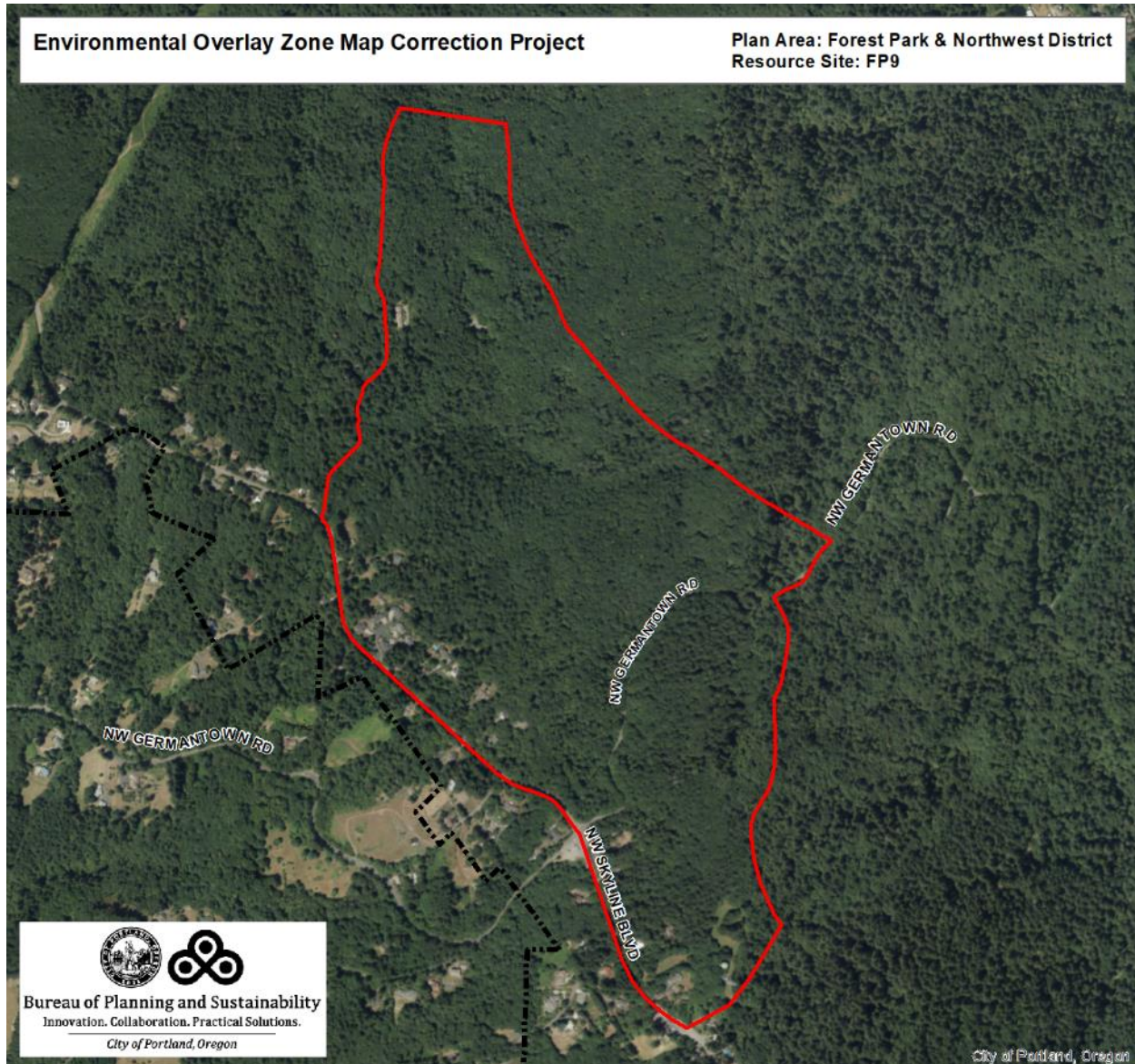






Resource Site No.: FP9 Resource Site Name: Linnton Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 99



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP9	
	Study Area
Stream (Miles)	0.5
Wetlands (acres)	0.1
Vegetated Areas >= 1/2 acre (acres)	195.8
Forest (acres)	194.0
Woodland (acres)	0.6
Shrubland (acres)	0.0
Herbaceous (acres)	1.1
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	156.1
Impervious Surface (acres)	14.3
* 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%.	

This site contains one of two forested seep wetland sites found nestled in the hillside slopes. Only three such wetlands are known to occur in Portland, making this the rarest wetland type within the city. Devil's club, skunk cabbage and small-fruited bulrush (a wetland obligate plant) were identified in the wetland area.

The site's vegetation is predominantly second growth western hemlock forest in the *hardwood with young conifer* successional stage. *Mid-aged conifer*, *conifer topping hardwood* and *shrub* stages are also represented at the site. 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, particularly in the headwaters region. Invasive, non-native plants are present and pose a potential threat to the vitality of the native plant community.

Bird species sited in the area include great horned owl, pileated and downy woodpeckers and a variety of songbirds. Animals sited in the area include black bear, cougar, coyote and chickaree. A herd of six elk with one buck was also sighted in the area. The 'Linnton Creek' headwaters and the palustrine wetland provide a valuable upland water source for terrestrial wildlife. Game trails are evident at this site and large mammals have been recorded using this site as a migration corridor to and from nearby foraging areas. Traffic along Germantown Road poses a significant threat the migrating wildlife.

Table B: Quality of Natural Resource Functions in Resource Site FP9				
Resource Site (acres) = 208.007899				
	High	Medium	Low	Total
Riparian Corridors*				
acres	60.9	51.1	82.9	194.8
percent total inventory site area	29.3%	24.6%	39.8%	93.7%
Wildlife Habitat*				
acres	191.7	0.1	0.0	191.8
percent total inventory site area	92.2%	0.0%	0.0%	92.2%
Special Habitat Areas**				
acres				151.2
percent total inventory site area				72.7%
Combined Total⁺				
acres	194.6	0.3	2.7	197.6
percent total inventory site area	93.5%	0.1%	1.3%	95.0%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP9 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 residential uses are allowed outright or conditionally in the RF and R20 base zones. Commercial uses are allowed in the CM1 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 FP9, 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*.

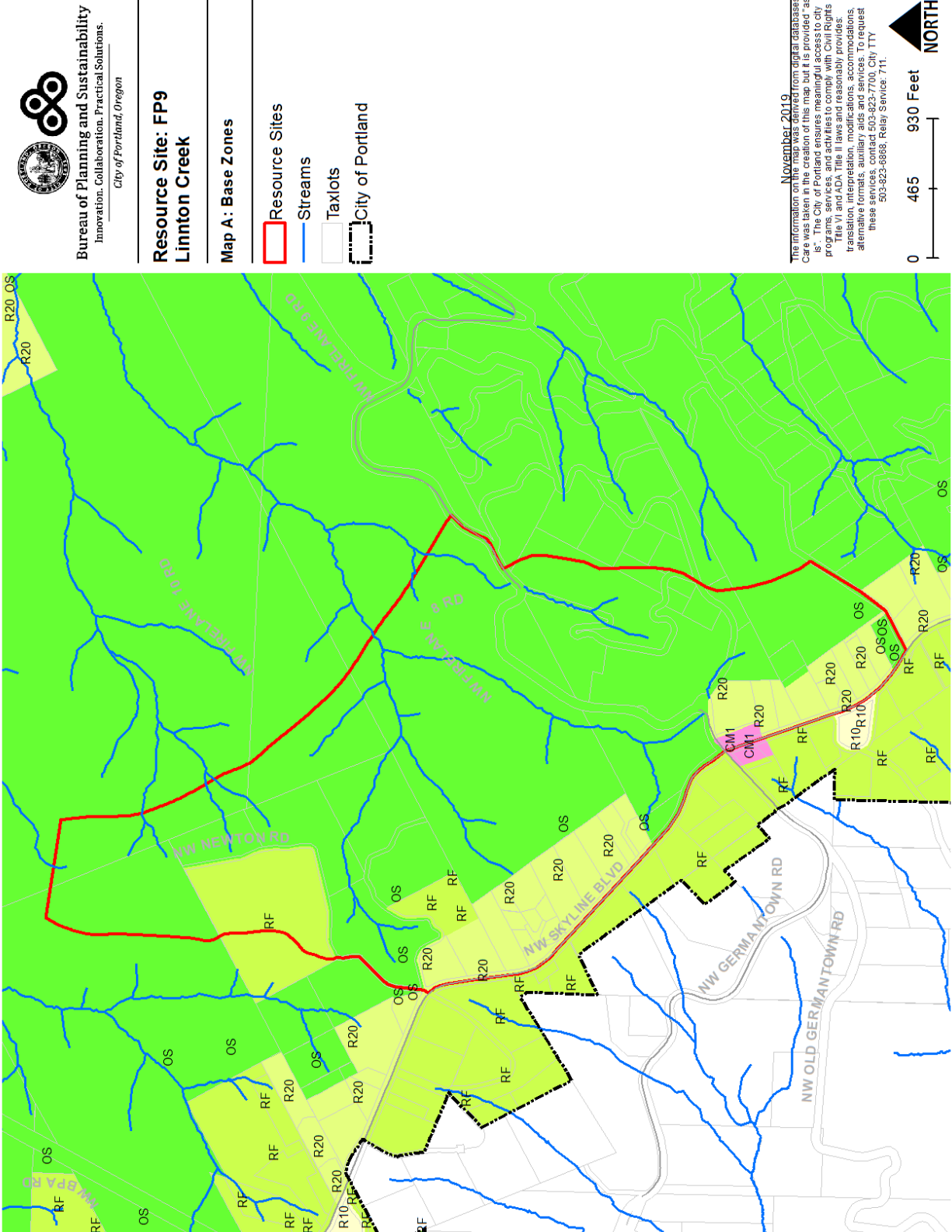
ESEE Decisions

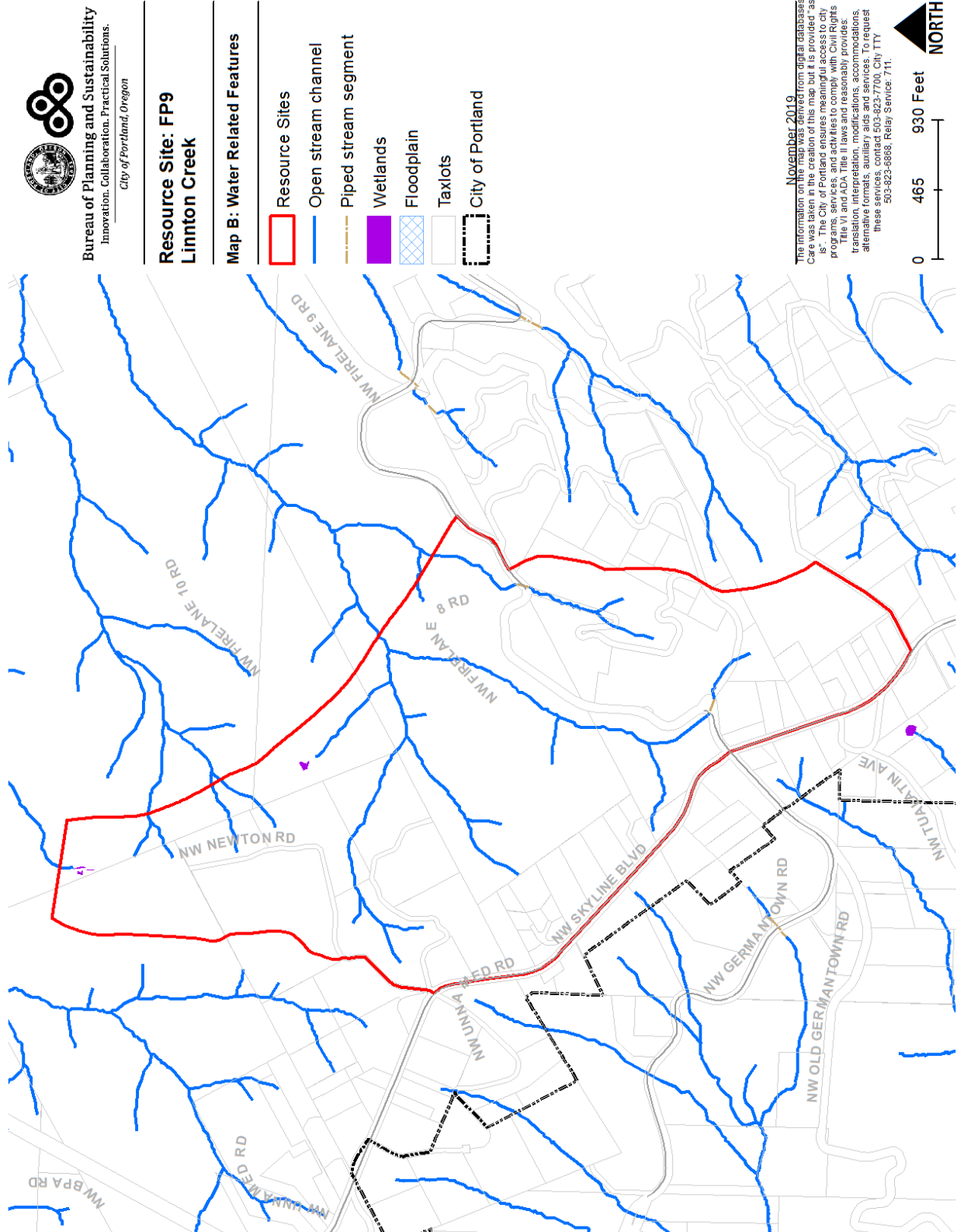
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP9 are:

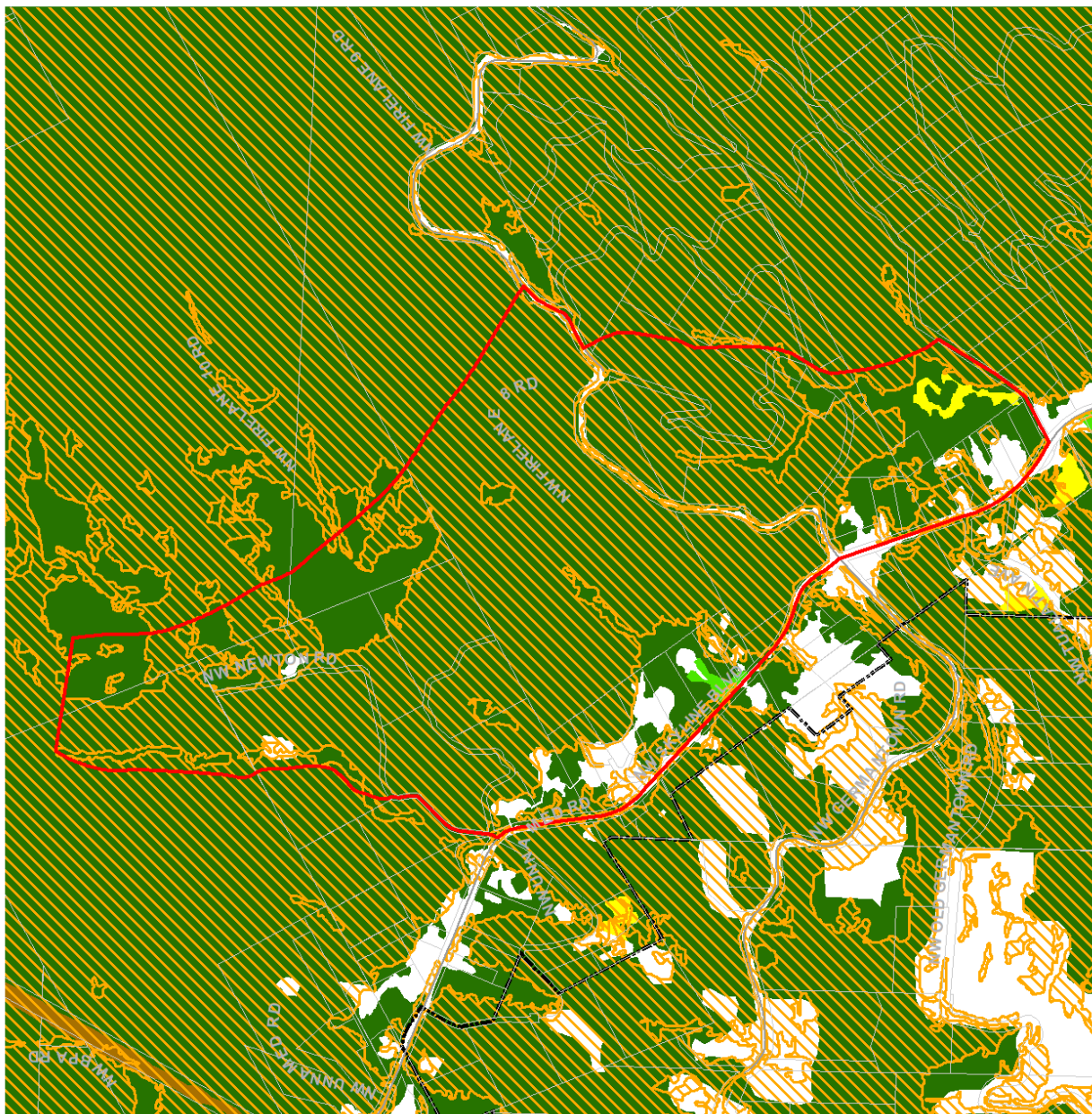
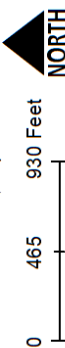
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 50 feet of stream top-of-bank or land within 50 feet of a wetland,
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
3. *Strictly limit* conflicting uses within areas of forest or woodland vegetation in the parcel zoned RF that is completely surrounded by Forest Park.
4. 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.
5. *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.
6. *Allow* conflicting uses within all other areas containing significant natural resources.

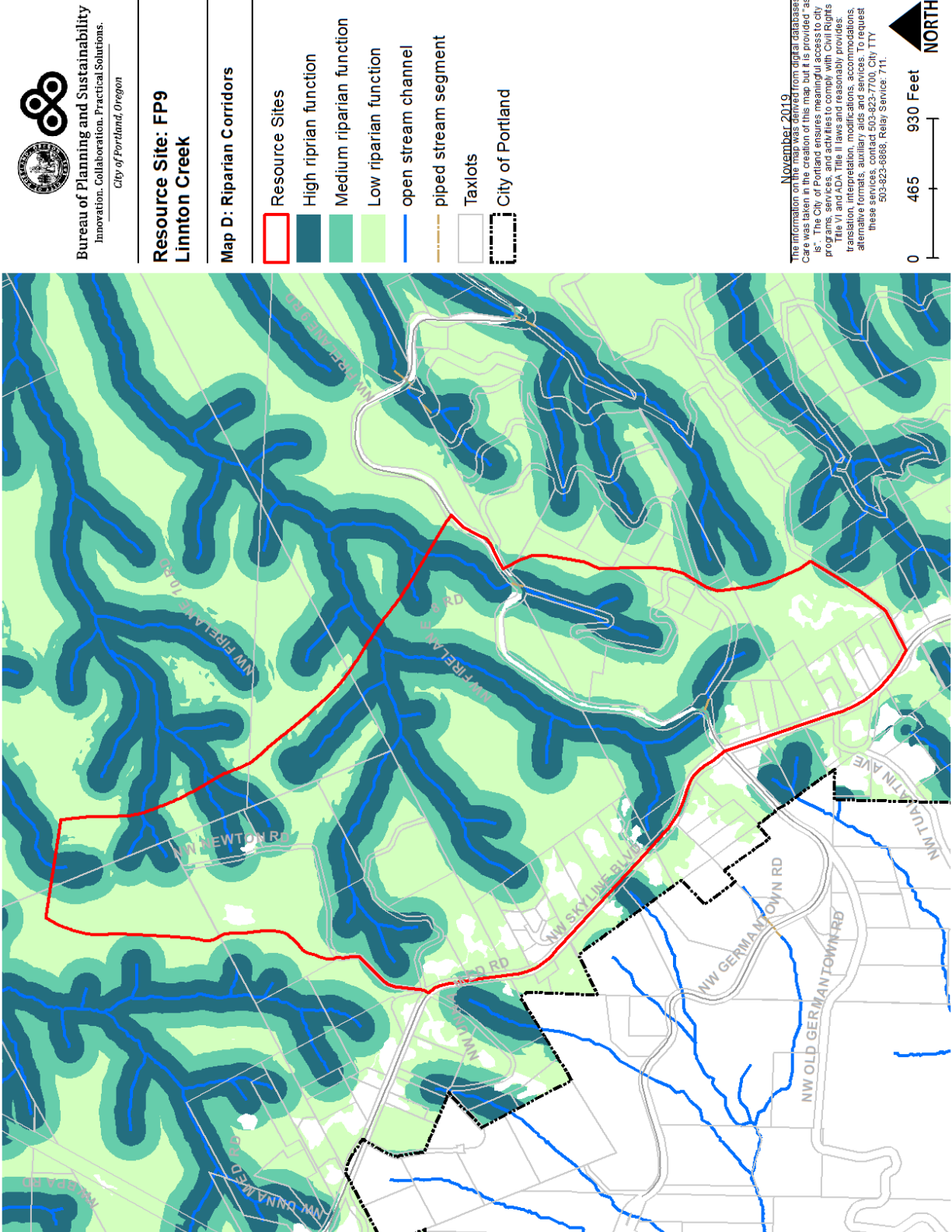
There is one parcel zoned RF has the same significant features and provides the same significant functions as the features and functions in Forest Park. The parcel is surrounded on all sides by the park and contiguous forest canopy. Additional impacts to the forest canopy should be avoided. This parcel is substantively different than the parcels zoned RF that are along the perimeter of Forest Park and are not surrounded on all sides by contiguous tree canopy.

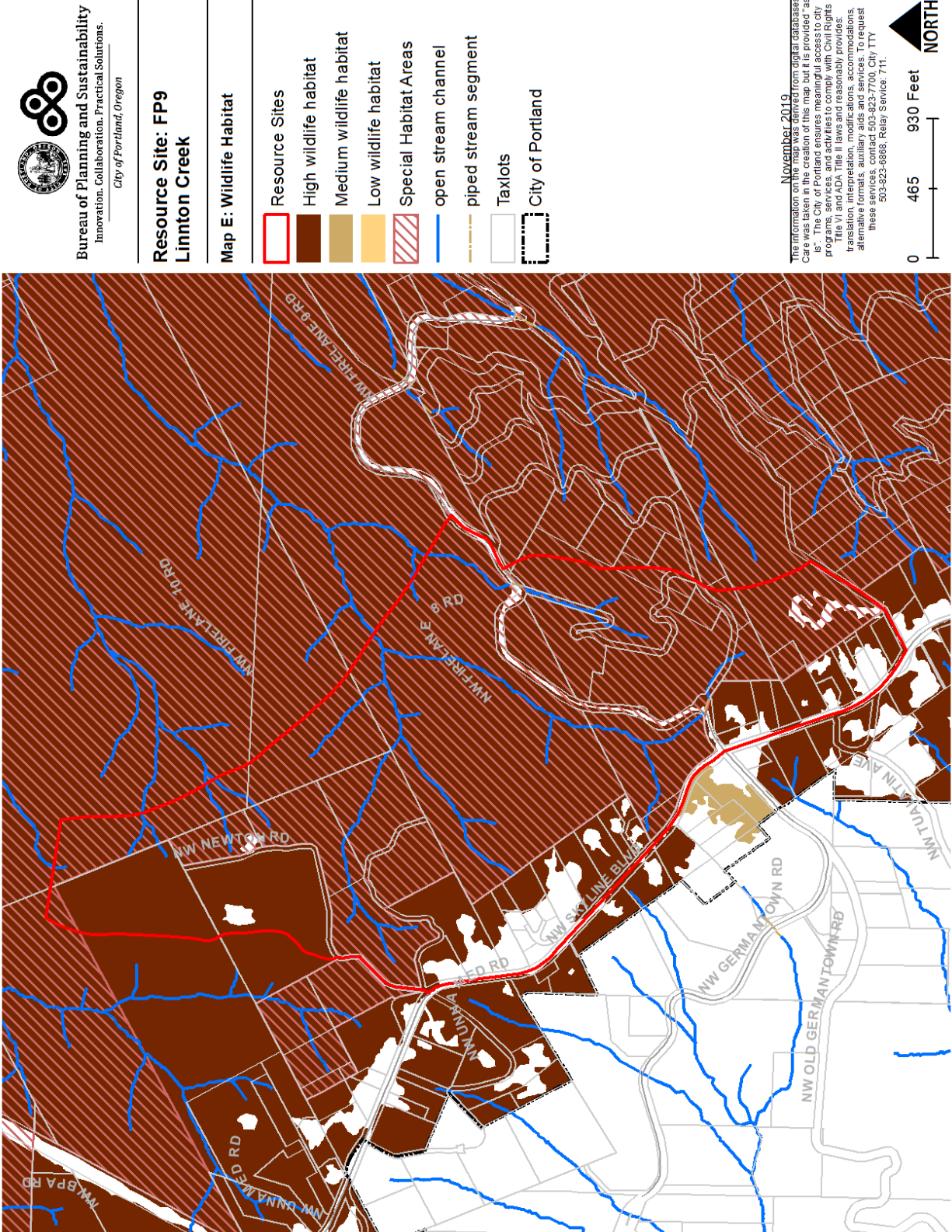
Table C: ESEE Decision for Resource Site FP9	
ESEE Decision	Acres
Strictly Limit	171.8
Limit	18.1
Allow	18.1

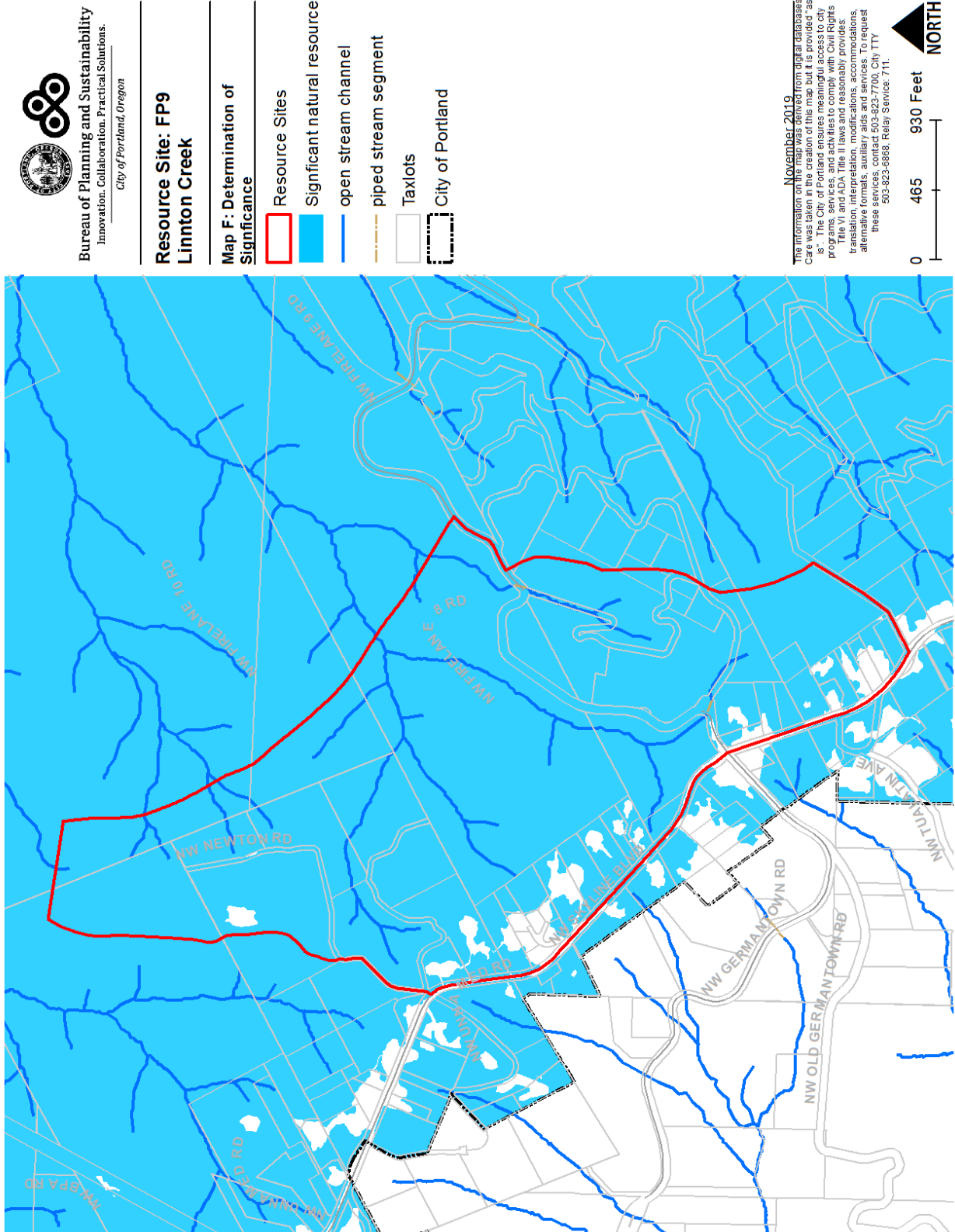


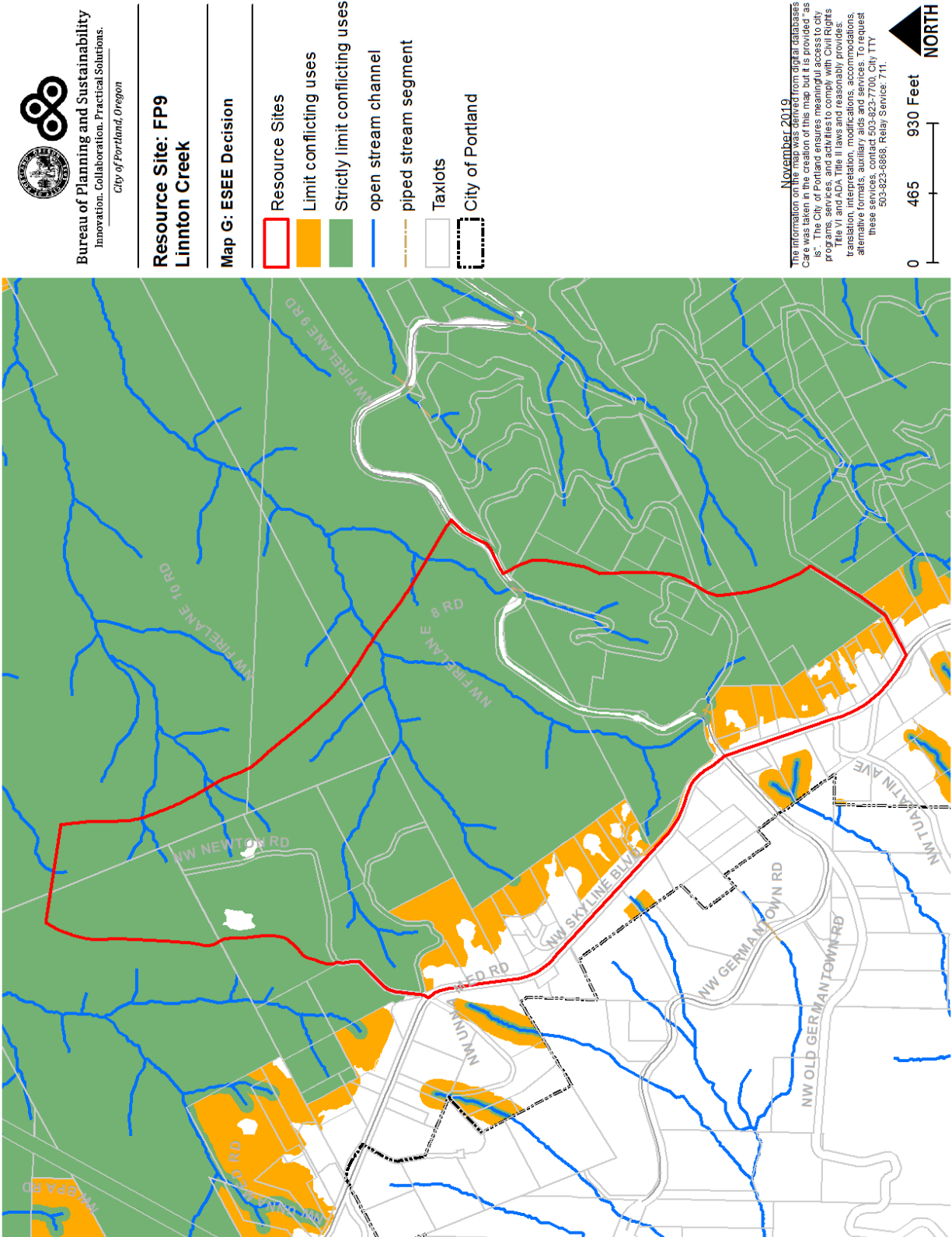






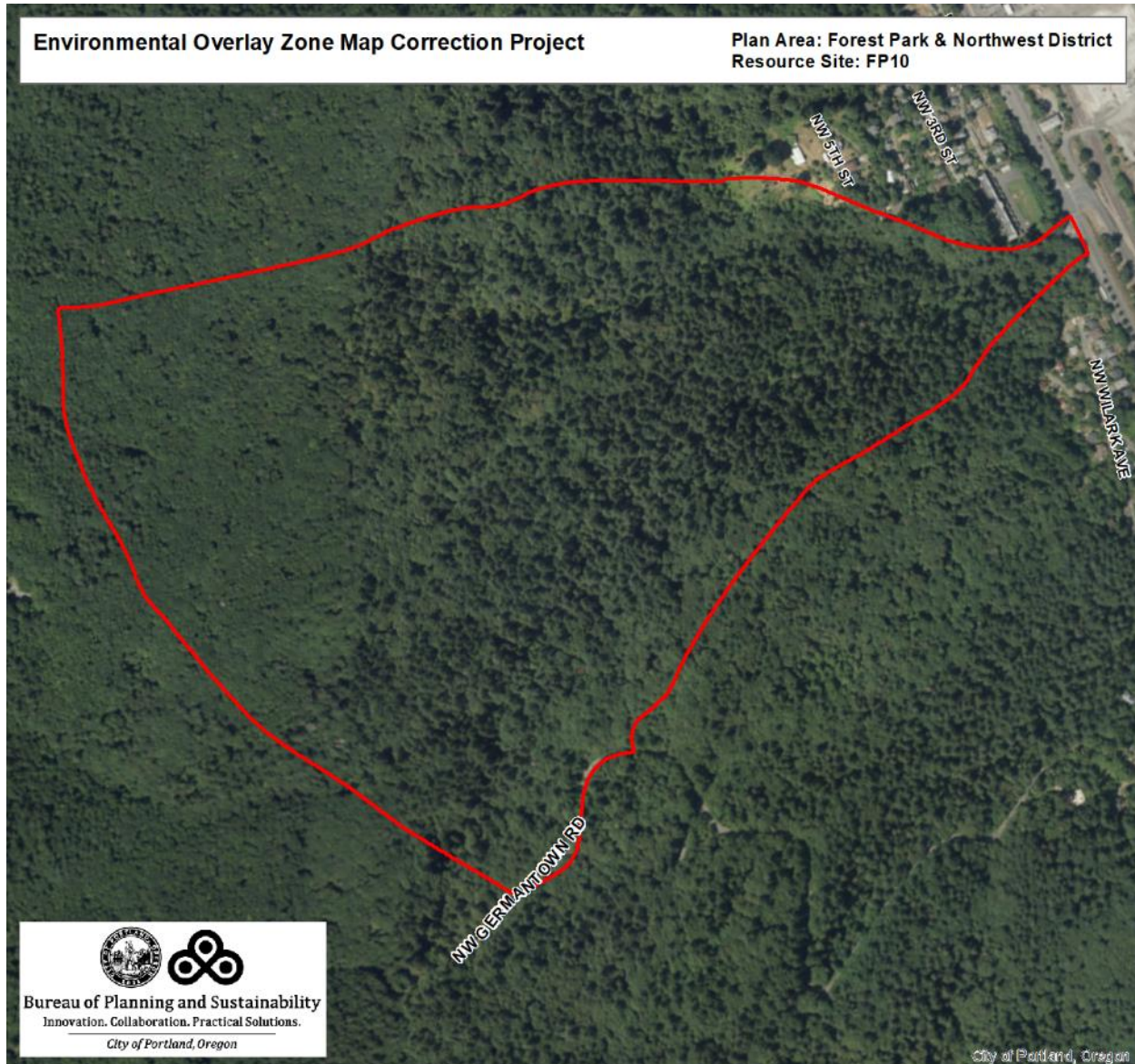






Resource Site No.: FP10 Resource Site Name: Lower Linnton Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 100



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site		FP10
		Study Area
Stream (Miles)		1.2
Wetlands (acres)		0.0
Vegetated Areas >= 1/2 acre (acres)		180.9
Forest (acres)		179.7
Woodland (acres)		0.1
Shrubland (acres)		1.1
Herbaceous (acres)		0.0
Flood Area*		0.0
Vegetated (acres)		0.0
Non-vegetated (acres)		0.0
Steep Slopes (acres)**		165.5
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%.		

This site contains one of two forested seep wetland sites found above the Willamette River lowlands, nestled in the hillside slopes. Only three such wetlands are known to occur in Portland, making this the rarest wetland type within the city. Skunk cabbage and both curled and broad-leaved pondweed (wetland obligates) are present in the wetland.

The vegetation community is a mosaic of different stages of second growth western hemlock forest. Mid-aged conifer, conifer topping hardwood and hardwood with young conifer are the three most common vegetation types; scattered amongst these stands along the drainageways are patches of mature hardwood forest. 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. Non-native holly and clematis plants pose a potential threat to the vitality of the native plant community.

This site provides high quality food, water and cover habitat for pileated and downy woodpeckers, sapsuckers, Swainson's thrush, evening grosbeaks, Bewick's wren, rufous-sided towhee, Oregon junco, grouse and finches. The forest, creek and seep wetlands provide valuable habitat for many species of terrestrial wildlife. The site's interspersions 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.

Table B: Quality of Natural Resource Functions in Resource Site FP10				
Resource Site (acres) = 181.271521				
	High	Medium	Low	Total
Riparian Corridors*				
acres	74.2	57.0	49.7	180.9
percent total inventory site area	40.9%	31.4%	27.4%	99.8%
Wildlife Habitat*				
acres	179.7	0.0	0.0	179.7
percent total inventory site area	99.2%	0.0%	0.0%	99.2%
Special Habitat Areas**				
acres				180.9
percent total inventory site area				99.8%
Combined Total⁺				
acres	181.0	0.1	0.0	181.1
percent total inventory site area	99.9%	0.0%	0.0%	99.9%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP10 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 R20 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 FP10, 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.

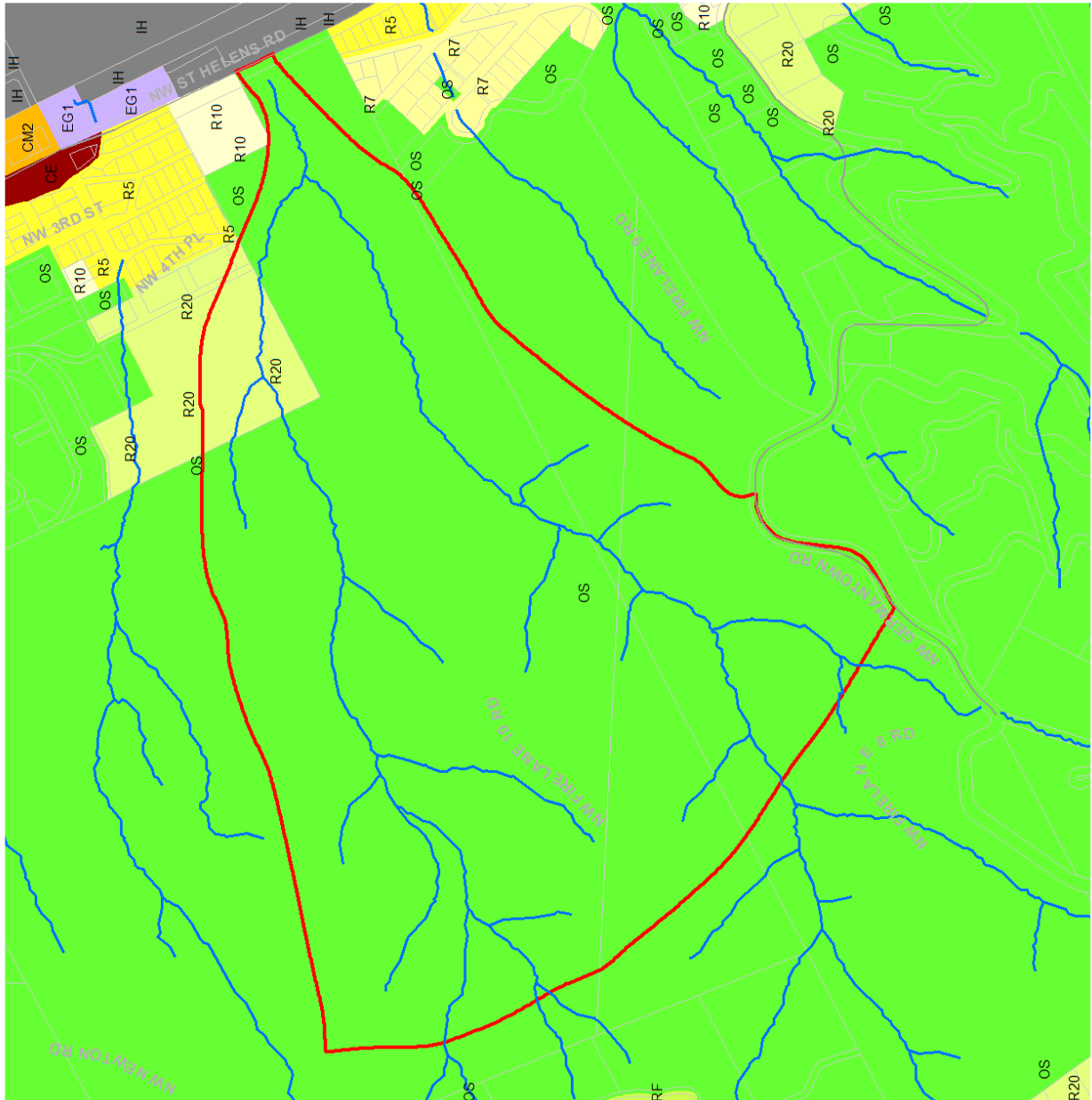
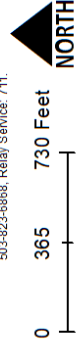
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

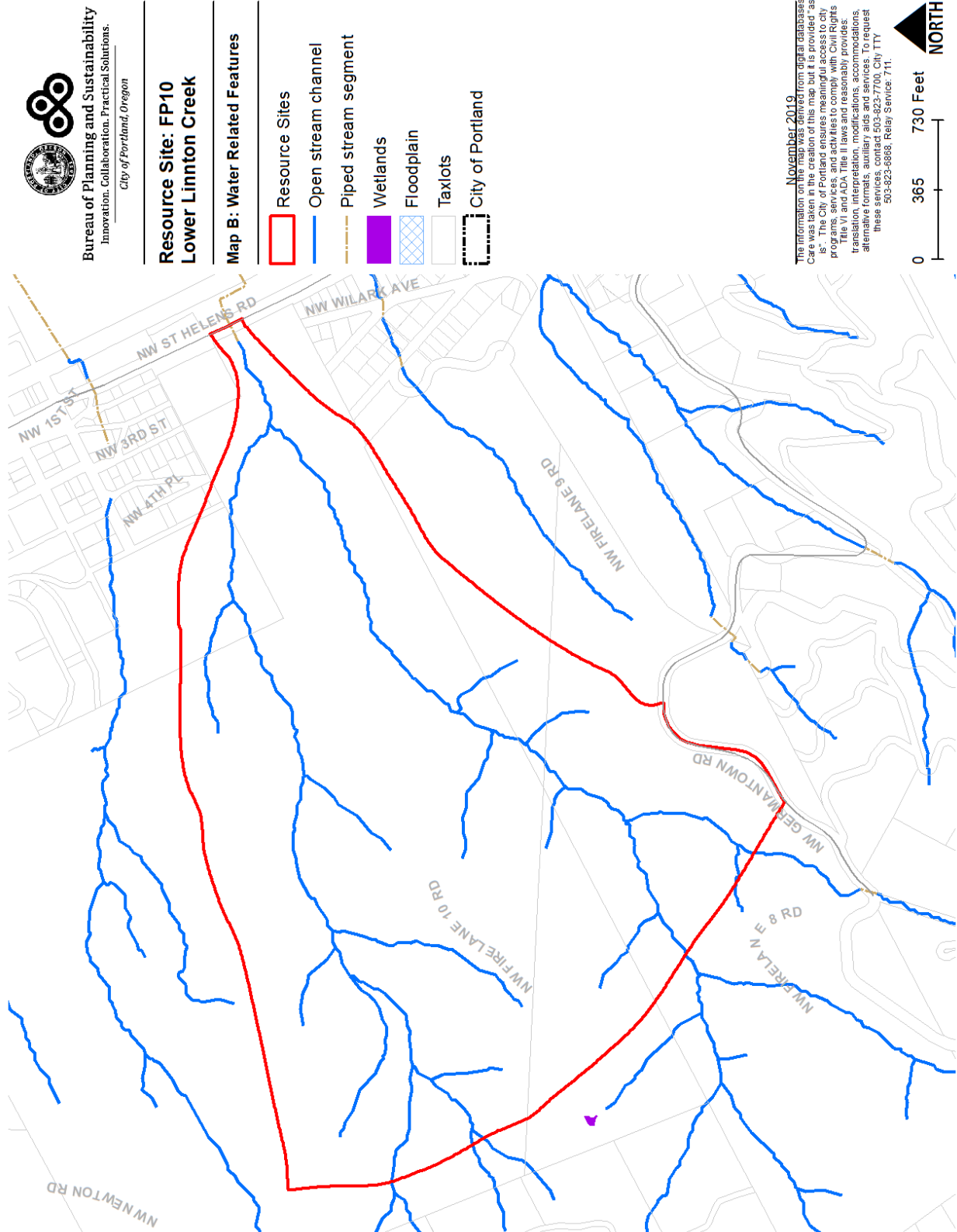
ESEE Decisions

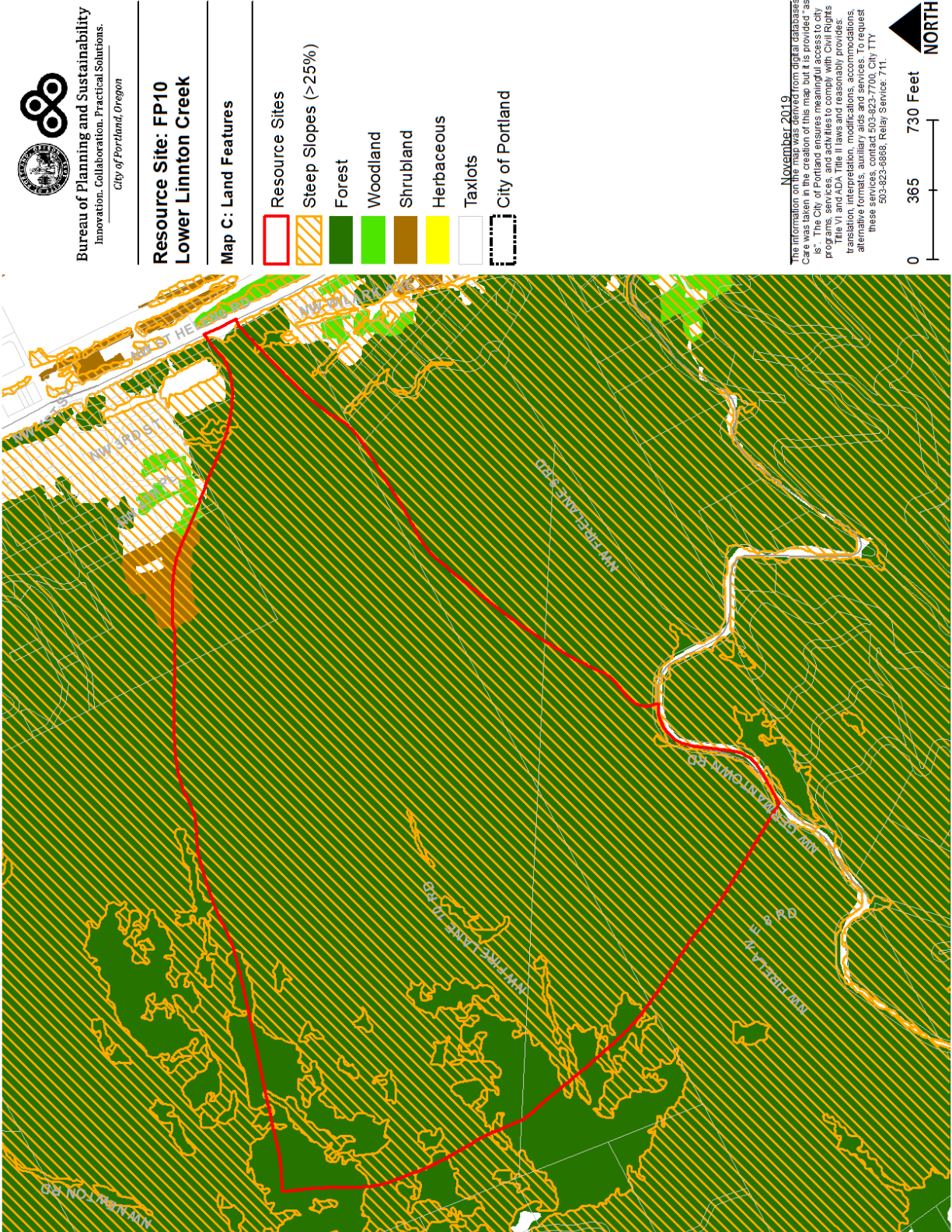
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP10 are:

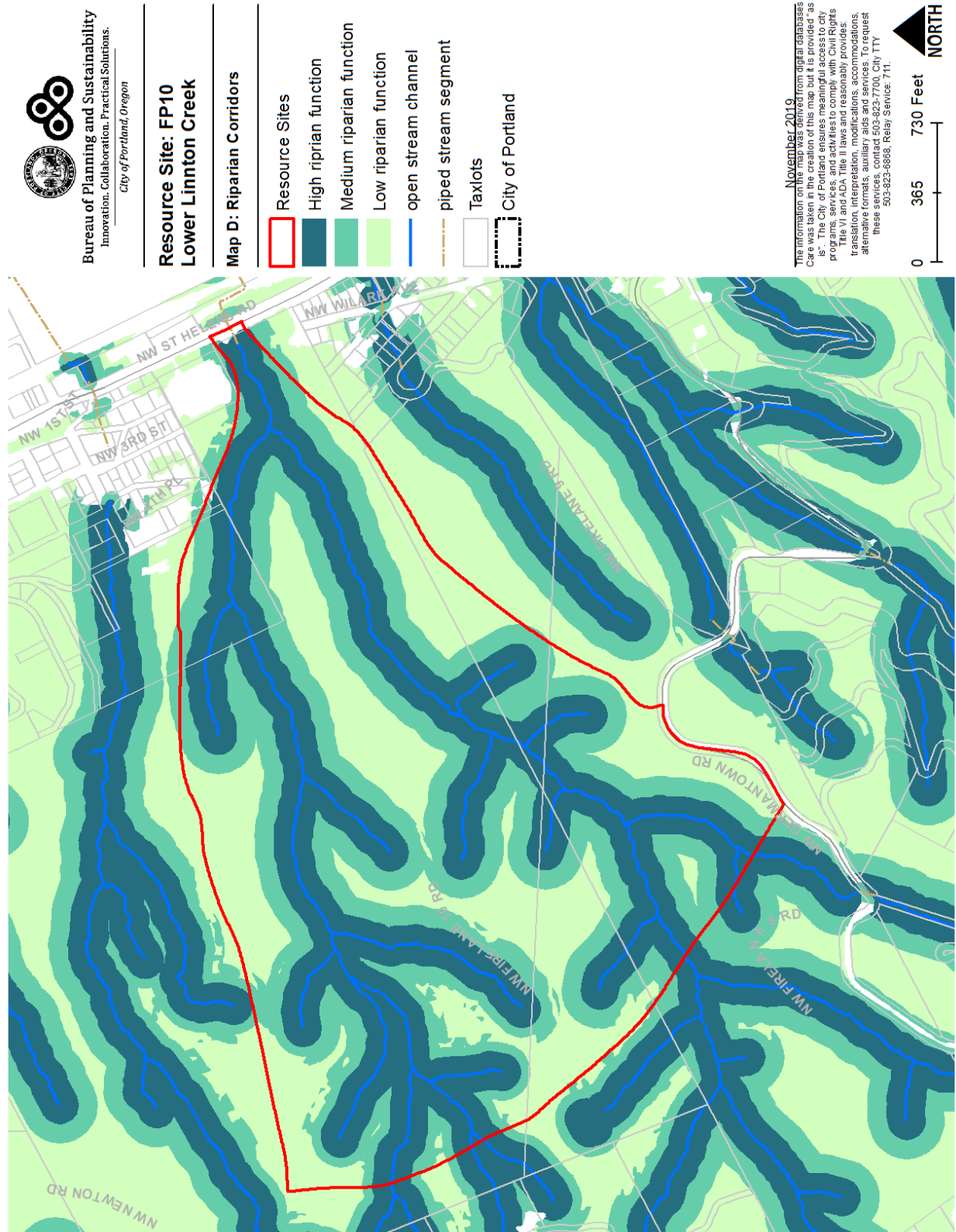
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, and land within 50 feet of stream top-of-bank or wetlands.
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. 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.
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.

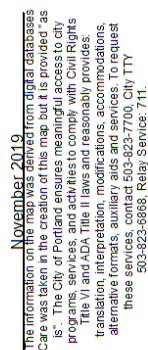
Table C: ESEE Decision for Resource Site FP10	
ESEE Decision	Acres
Strictly Limit	180.6
Limit	0.2
Allow	0.4

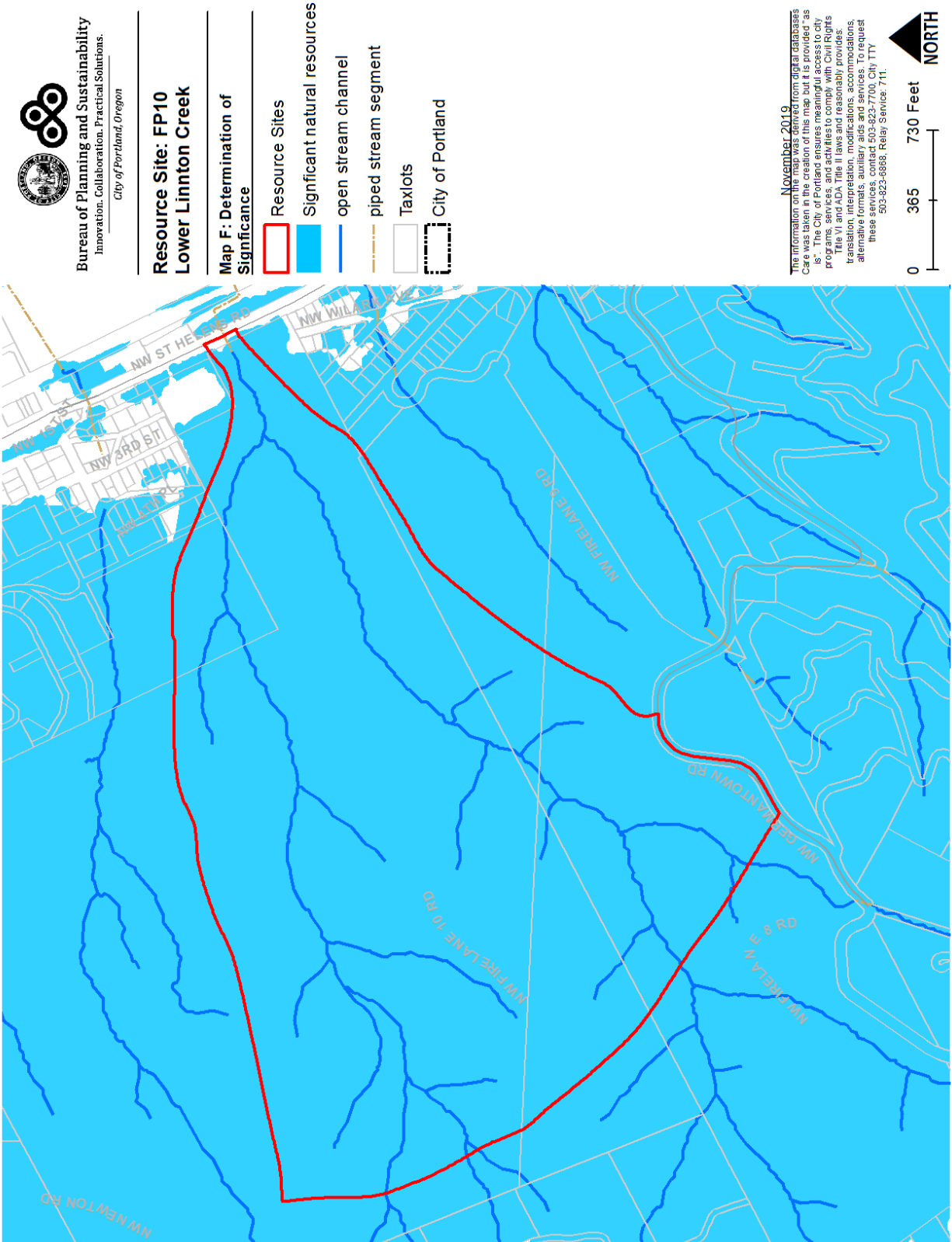


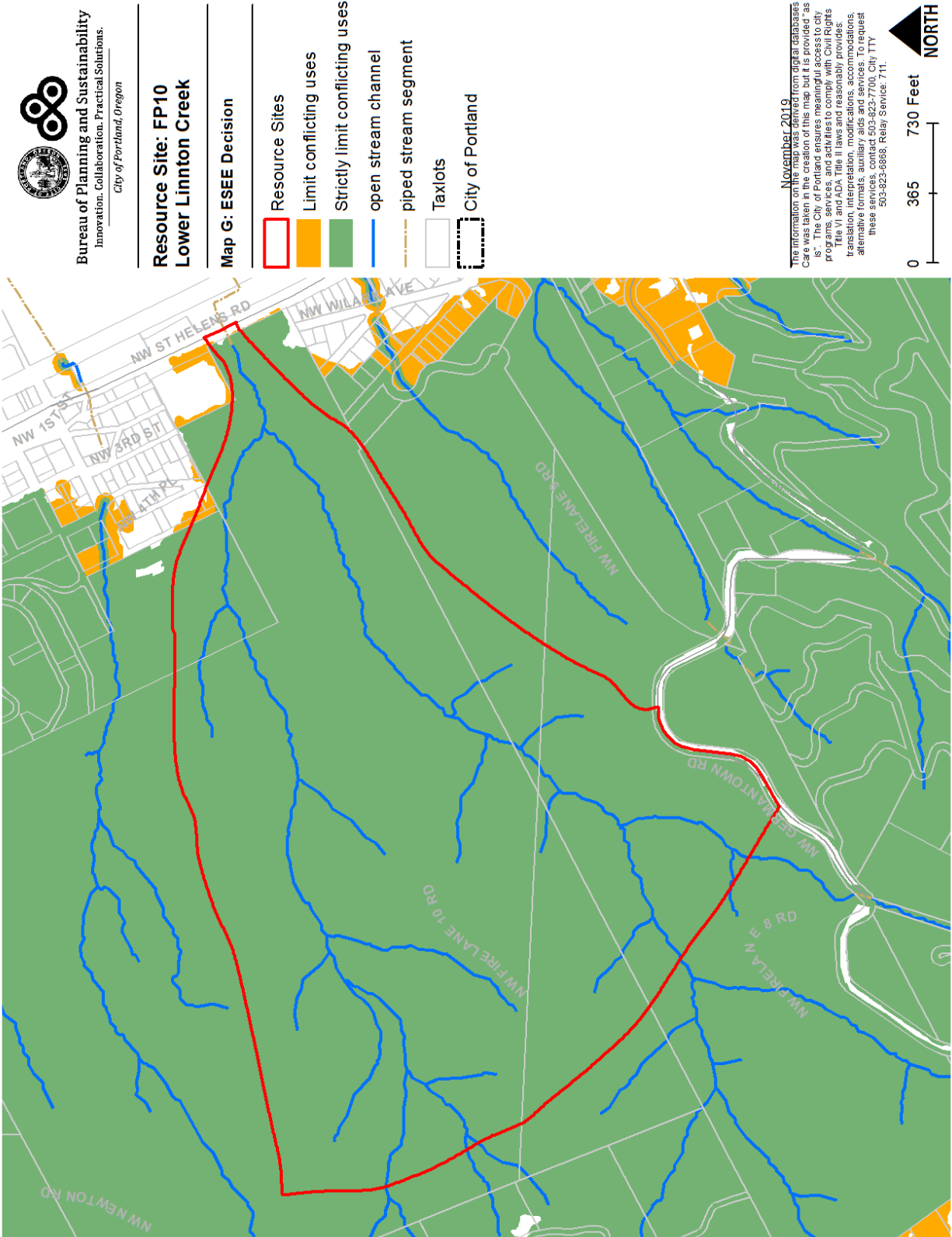












Resource Site No.: FP11 Resource Site Name: Upper Clark-Wilson Creek
Previous Plan: Northwest Hills Natural Areas Protection Plan Previous Resource Site No.: 98



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP11	
	Study Area
Stream (Miles)	4.9
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	257.9
Forest (acres)	255.4
Woodland (acres)	2.4
Shrubland (acres)	0.0
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	256.7
Impervious Surface (acres)	42.9
* 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%.	

A large stand of *mid-aged conifers* covers much of this basin. Western hemlock, western red cedar and pacific yew are well established within the stand. The stand surrounds four remnant stands of *old growth*. *Conifer topping hardwood* is the second most common vegetation type in the basin, followed by *mature hardwood* which typically occurs along the lower creek bed. 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. Exotic plants are a potential problem at the site.

This site provides high quality food and cover for wildlife. Recent signs of black bear, black tailed deer and coyote were found at the site. Screech owl, red tail hawk and a variety of songbirds were also identified at the site. The site's interspersion with surrounding forest allows for free migration of wildlife and increases its value as habitat.

Table B: Quality of Natural Resource Functions in Resource Site FP11				
Resource Site (acres) = 264.099415				
	High	Medium	Low	Total
Riparian Corridors*				
acres	84.9	77.9	95.5	258.3
percent total inventory site area	32.1%	29.5%	36.1%	97.8%
Wildlife Habitat*				
acres	257.9	0.0	0.0	257.9
percent total inventory site area	97.6%	0.0%	0.0%	97.6%
Special Habitat Areas**				
acres				262.8
percent total inventory site area				99.5%
Combined Total⁺				
acres	263.3	0.0	0.0	263.3
percent total inventory site area	99.7%	0.0%	0.0%	99.7%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP11 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 R20, R10 and 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 FP11, 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.

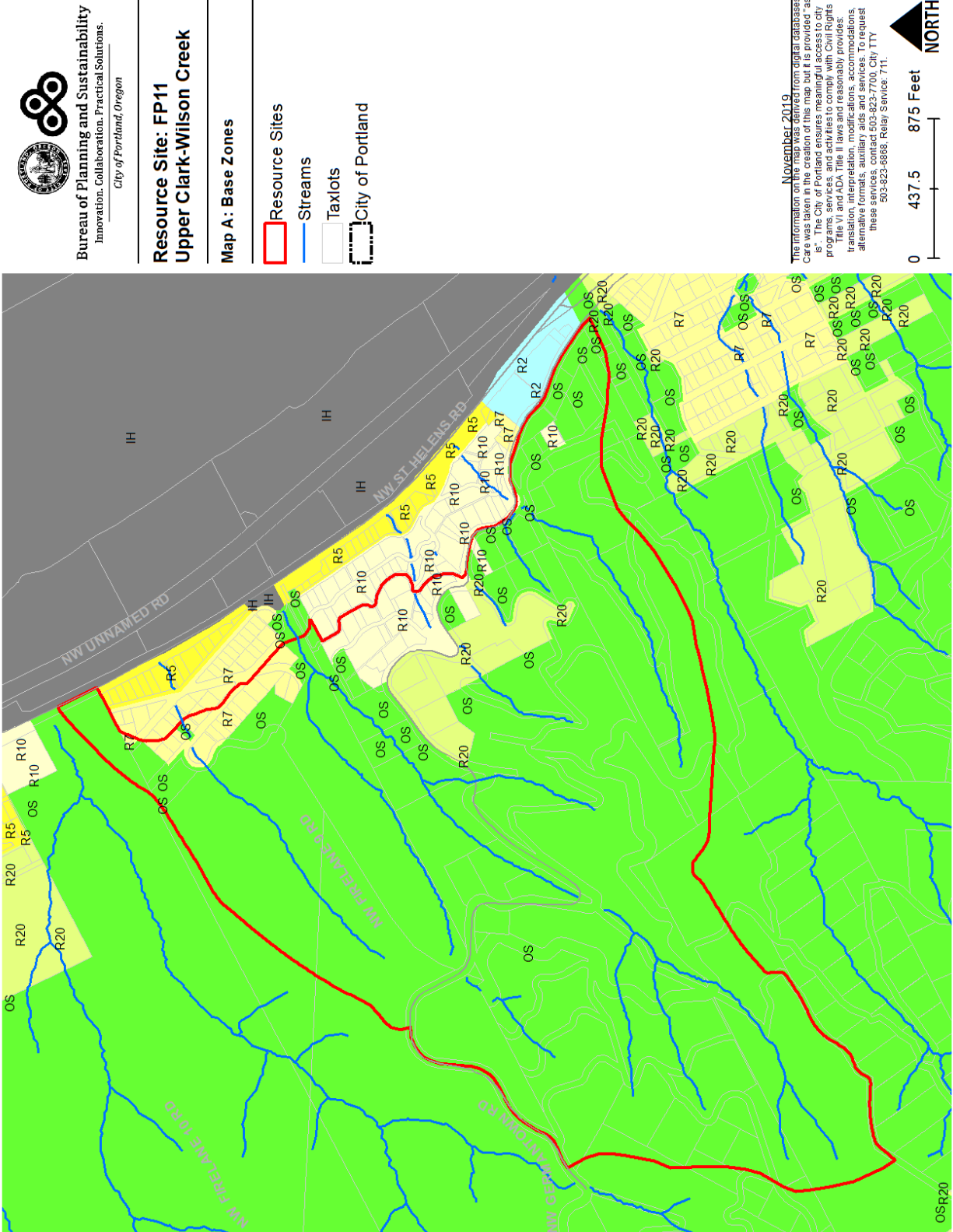
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

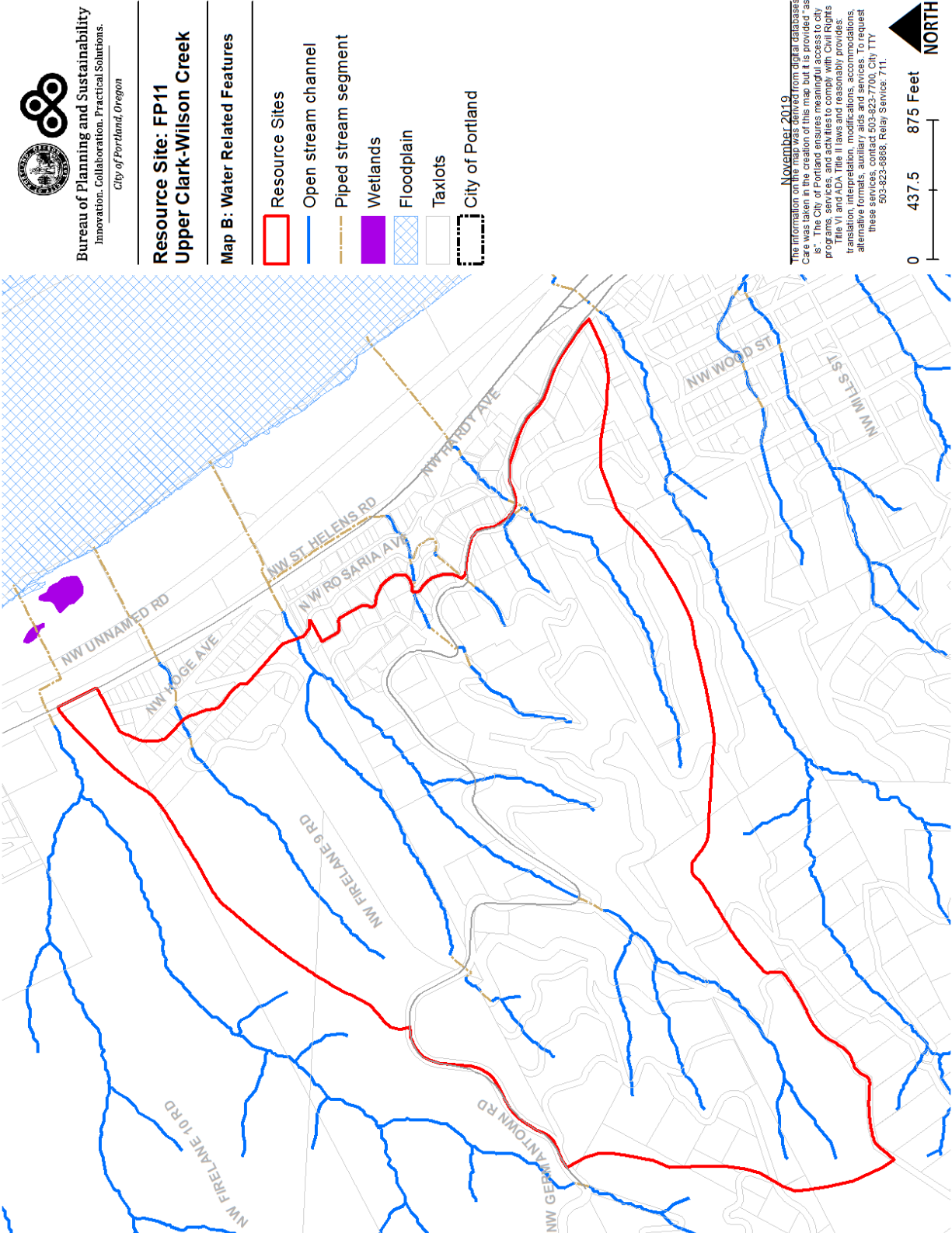
ESEE Decisions

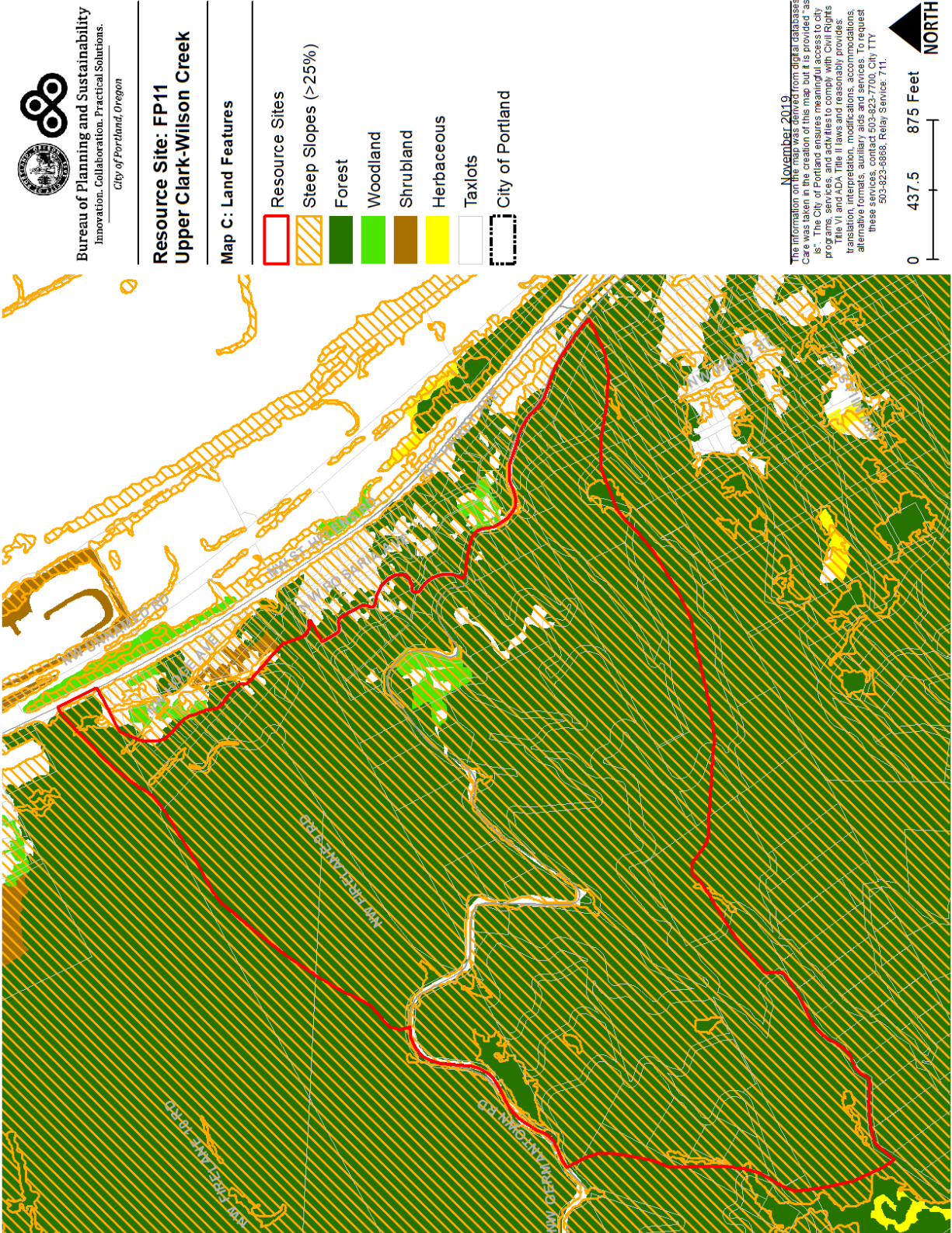
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP11 are:

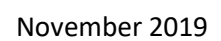
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, and land within 25 feet of stream top-of-bank or within 50 feet of wetlands.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within 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.

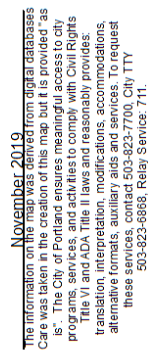
Table C: ESEE Decision for Resource Site FP11	
ESEE Decision	Acres
Strictly Limit	235.3
Limit	20.6
Allow	8.2



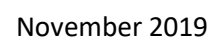












Resource Site No.: FP12 **Resource Site Name:** Lower Clark-Wilson Creek
Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 98



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP12	
	Study Area
Stream (Miles)	0.8
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	19.1
Forest (acres)	15.8
Woodland (acres)	2.2
Shrubland (acres)	1.2
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	32.8
Impervious Surface (acres)	18.4
* 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%.	

A large stand of *mid-aged conifers* covers much of this basin. Western hemlock, western red cedar and pacific yew are well established within the stand. The stand surrounds four remnant stands of *old growth*. *Conifer topping hardwood* is the second most common vegetation type in the basin, followed by *mature hardwood* which typically occurs along the lower creek bed. 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. Exotic plants are a potential problem at the site.

This site provides high quality food and cover for wildlife. Recent signs of black bear, black tailed deer and coyote were found at the site. Screech owl, red tail hawk and a variety of songbirds were also identified at the site. The site's interspersion with surrounding forest allows for free migration of wildlife and increases its value as habitat. Roads and residences to the east impede wildlife movement between the forest and the Willamette River Greenway.

Table B: Quality of Natural Resource Functions in Resource Site FP12				
Resource Site (acres) = 38.445778				
	High	Medium	Low	Total
Riparian Corridors*				
acres	6.8	6.7	6.4	19.9
percent total inventory site area	17.6%	17.6%	16.7%	51.9%
Wildlife Habitat*				
acres	15.9	0.0	0.0	15.9
percent total inventory site area	41.4%	0.0%	0.0%	41.4%
Special Habitat Areas**				
acres				20.3
percent total inventory site area				52.7%
Combined Total⁺				
acres	23.0	0.9	1.1	25.0
percent total inventory site area	59.9%	2.3%	2.9%	65.1%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP12 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, R7, R5 and R2 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 FP12, 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.

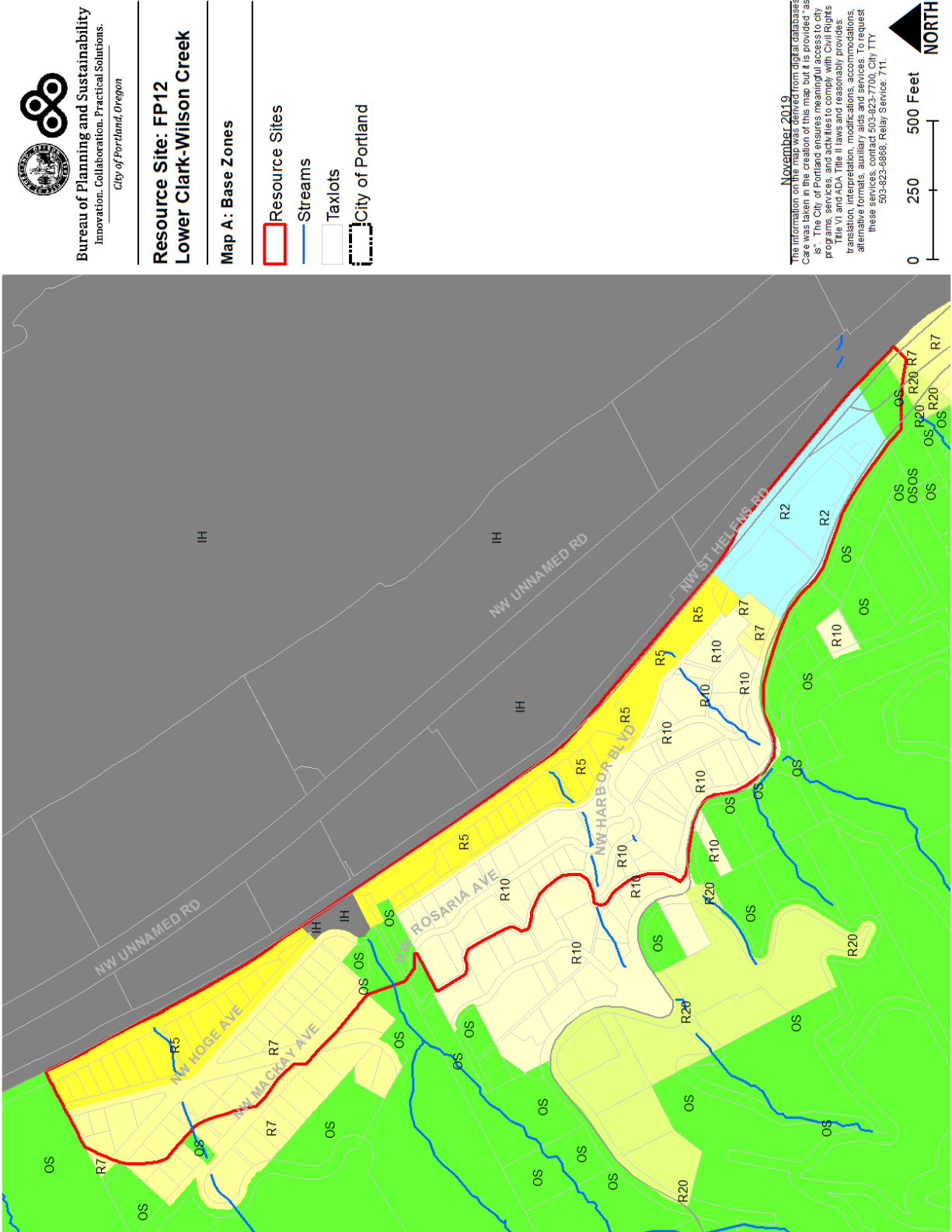
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

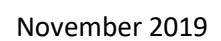
ESEE Decisions

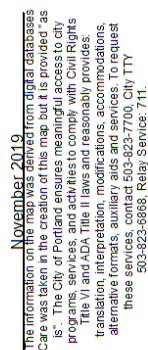
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP12 are:

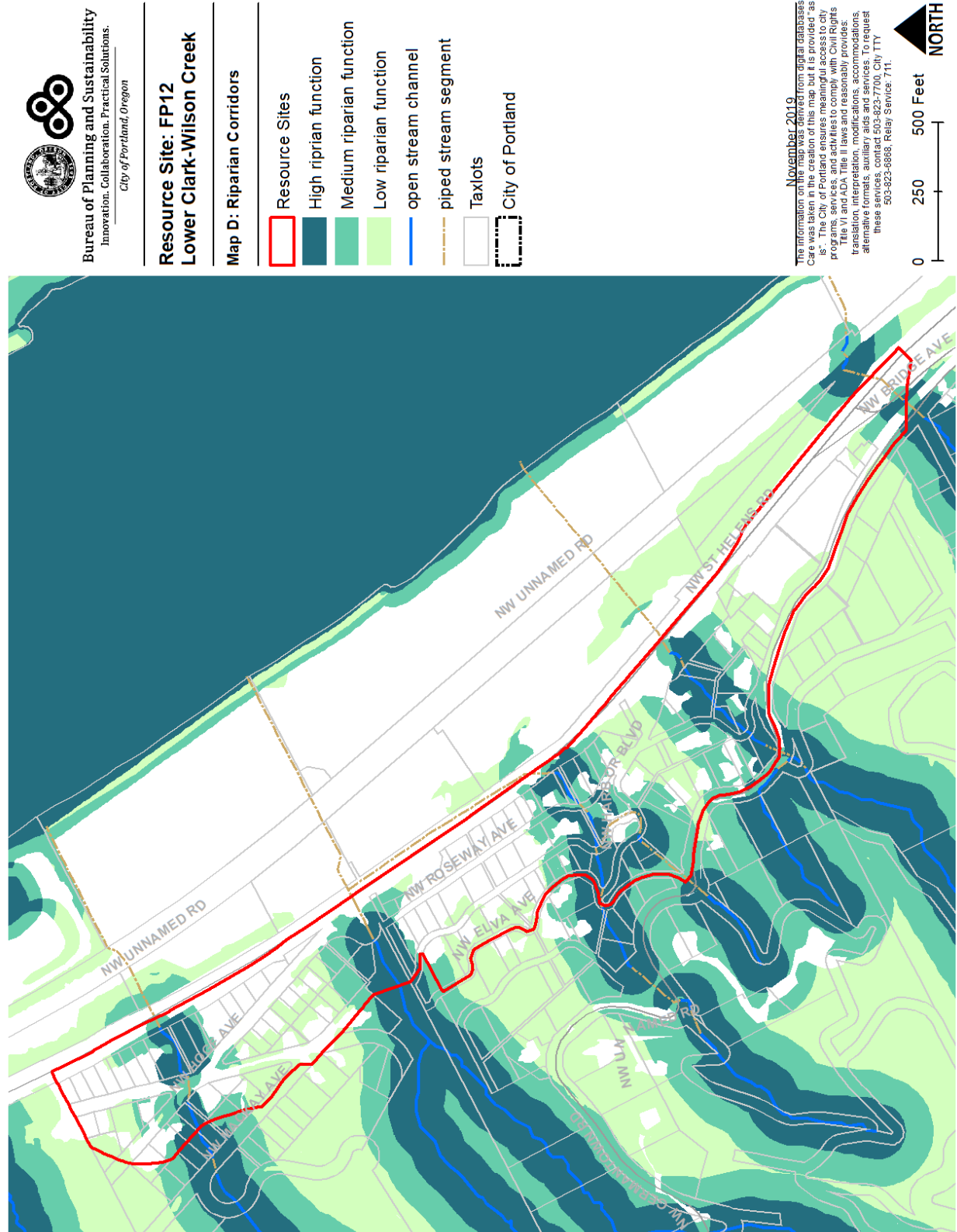
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of wetlands.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within 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.
4. *Allow* conflicting uses within all other areas containing significant natural resources.

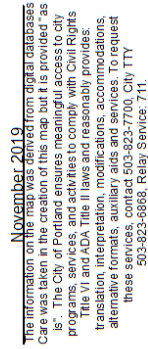
Table C: ESEE Decision for Resource Site FP12	
ESEE Decision	Acres
Strictly Limit	3.1
Limit	2.2
Allow	33.1

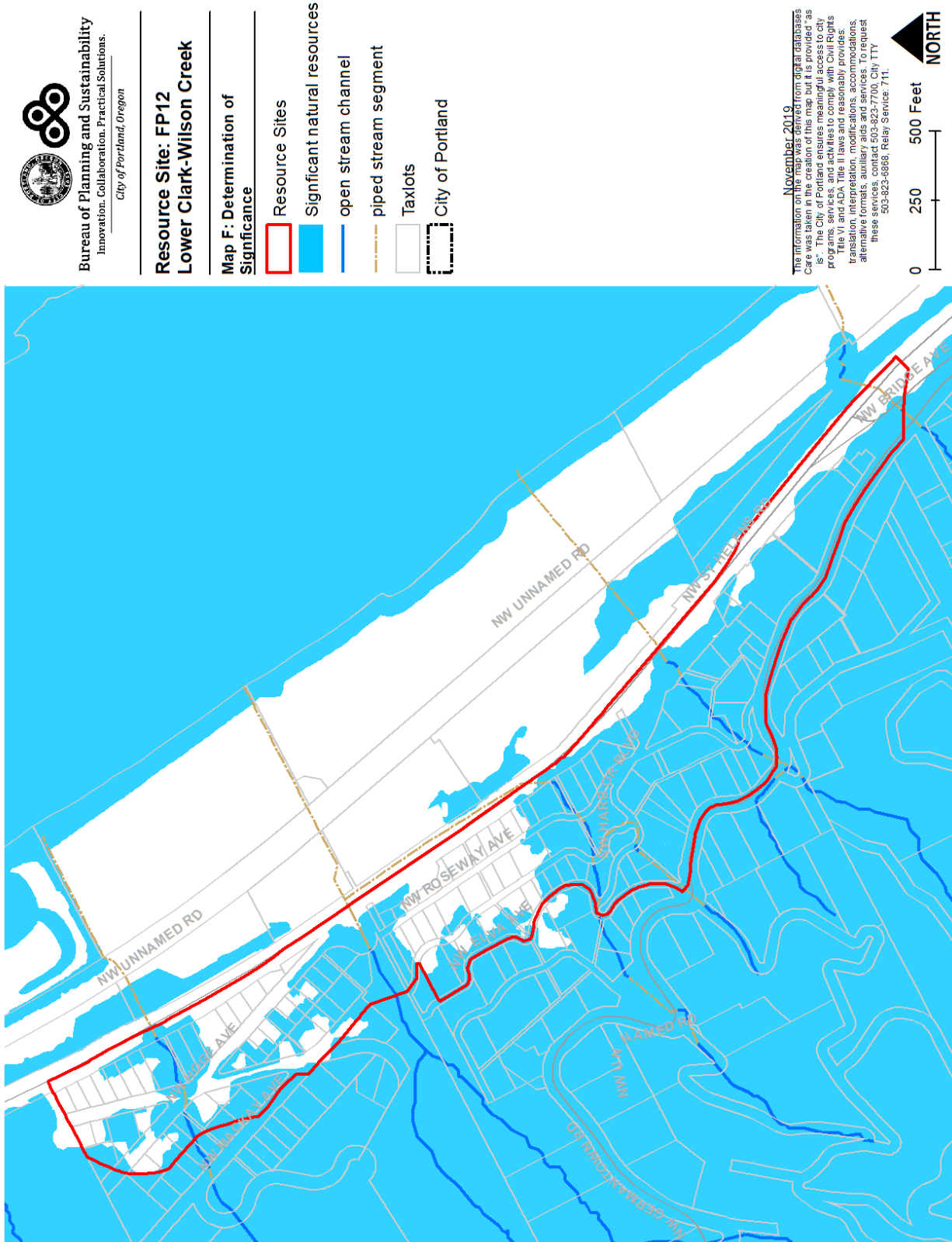


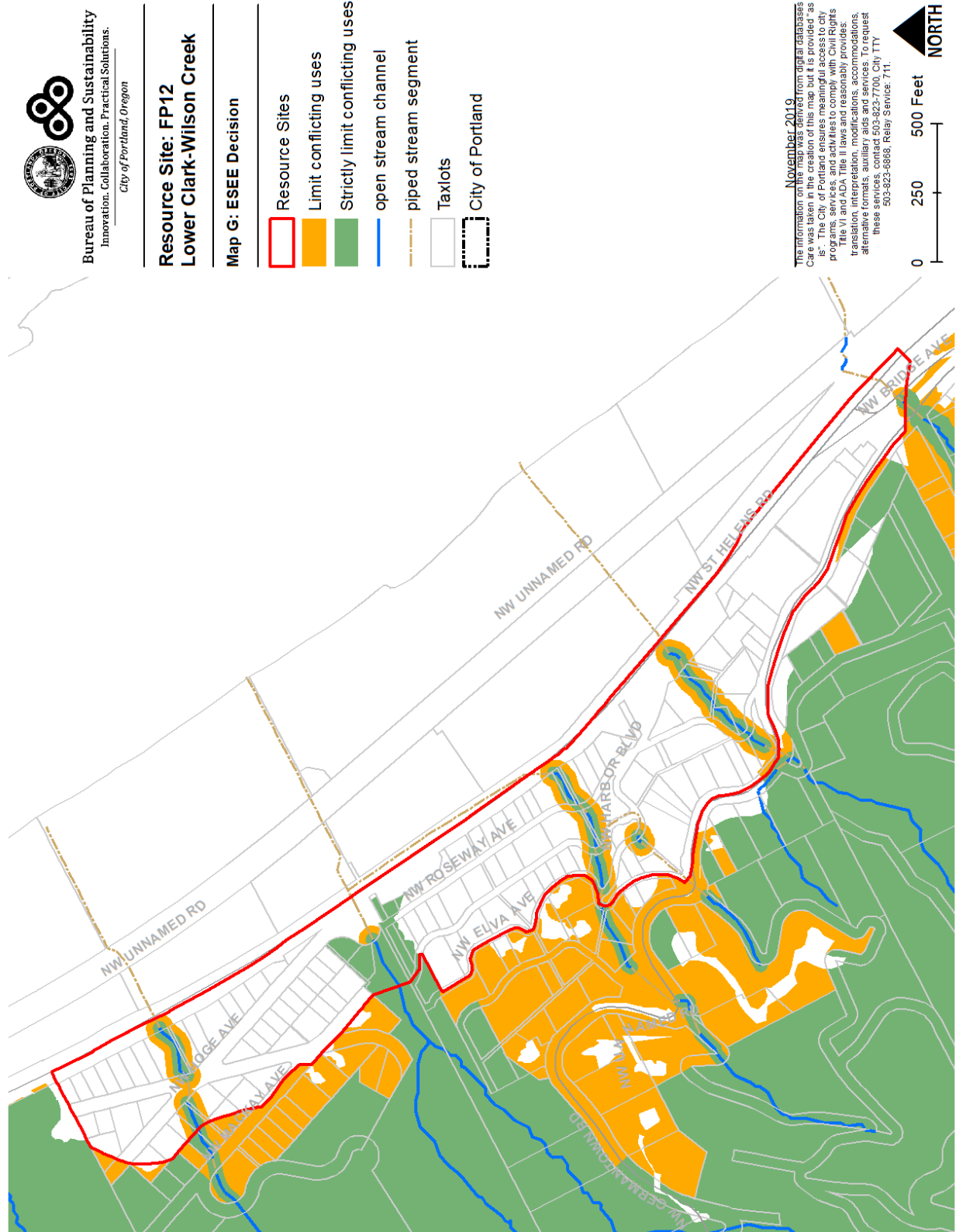






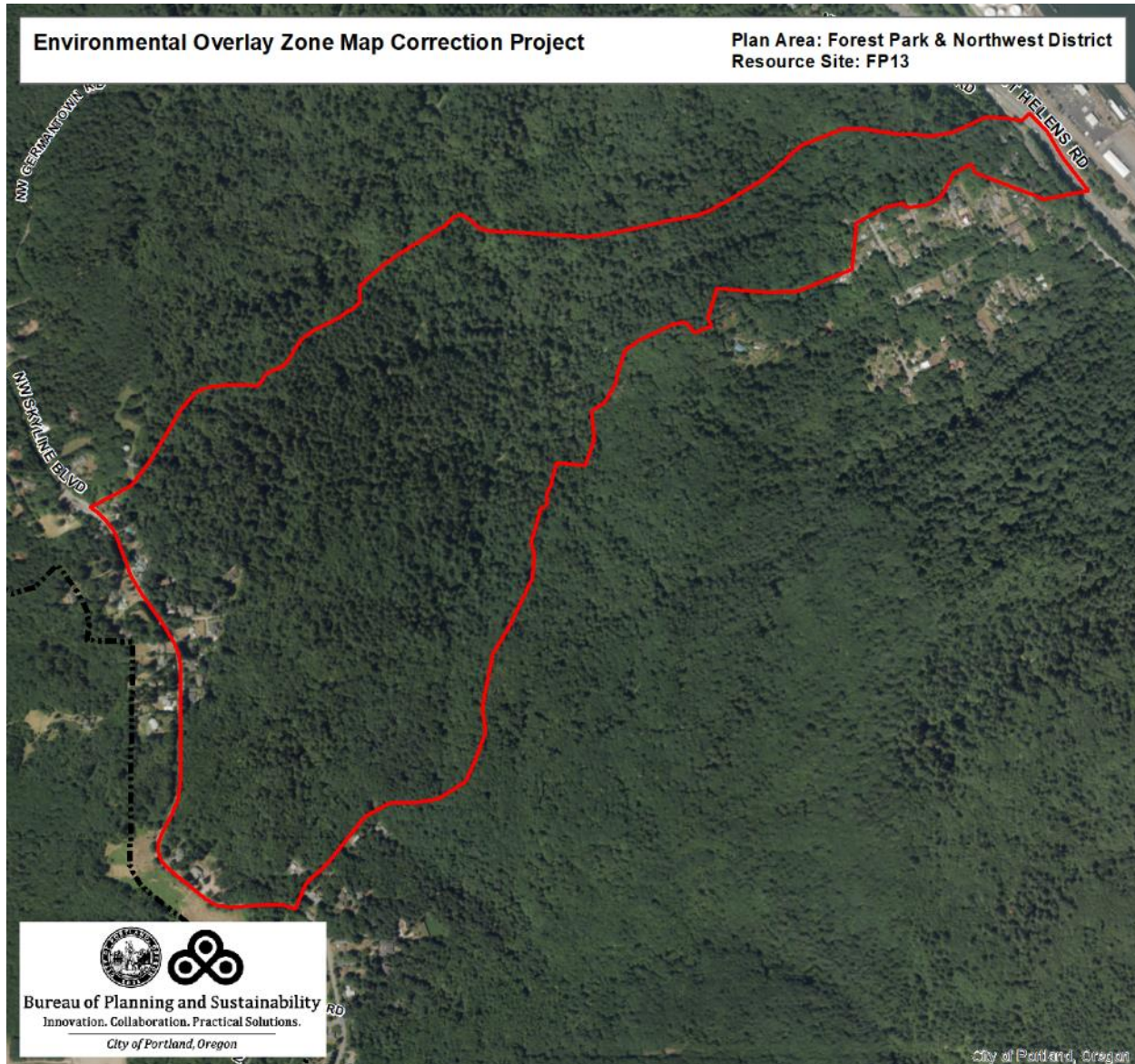






Resource Site No.: FP13 Resource Site Name: Springville Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 97



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP13	
	Study Area
Stream (Miles)	0.9
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	240.5
Forest (acres)	240.5
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)**	234.4
Impervious Surface (acres)	30.7
* 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%.	

This site forms the drainage basin of ‘Springville Creek.’ The mid-aged conifer stage of secondary forest succession covers most of the basin. Western hemlock, western red cedar and pacific yew are well established within this area, together with a diverse population of herb and shrub species. In the site’s largest stand of mid-aged conifer are two remnant stands of old growth. Nearby, the only known occurrence of big huckleberry (*Vaccinium membranaceum*) in Portland can be found. *Conifer topping hardwood* is the second most common vegetation type in the basin. 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, particularly in the headwaters region. Invasive species such as ivy and holly have infiltrated the site at both ends of the basin.

The forest provides habitat for a variety of songbirds including Oregon junco, kinglets and rufous-sided towhee. Raptors known to frequent the area include red-tailed hawk and screech owl. Black bear forage on apples, Indian plum, blackberry and Oregon grape that grow in the area. Bobcat have also been sited in the area. Interspersion with surrounding forest habitat permits free migration of wildlife to and from the site and increases the site’s value as habitat.

Table B: Quality of Natural Resource Functions in Resource Site FP13				
Resource Site (acres) = 250.923211				
	High	Medium	Low	Total
Riparian Corridors*				
acres	89.2	77.1	74.3	240.5
percent total inventory site area	35.5%	30.7%	29.6%	95.9%
Wildlife Habitat*				
acres	238.2	2.1	0.0	240.4
percent total inventory site area	94.9%	0.8%	0.0%	95.8%
Special Habitat Areas**				
acres				231.2
percent total inventory site area				92.1%
Combined Total⁺				
acres	243.1	0.0	0.0	243.1
percent total inventory site area	96.9%	0.0%	0.0%	96.9%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP13 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, R20, and 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 FP13, 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.

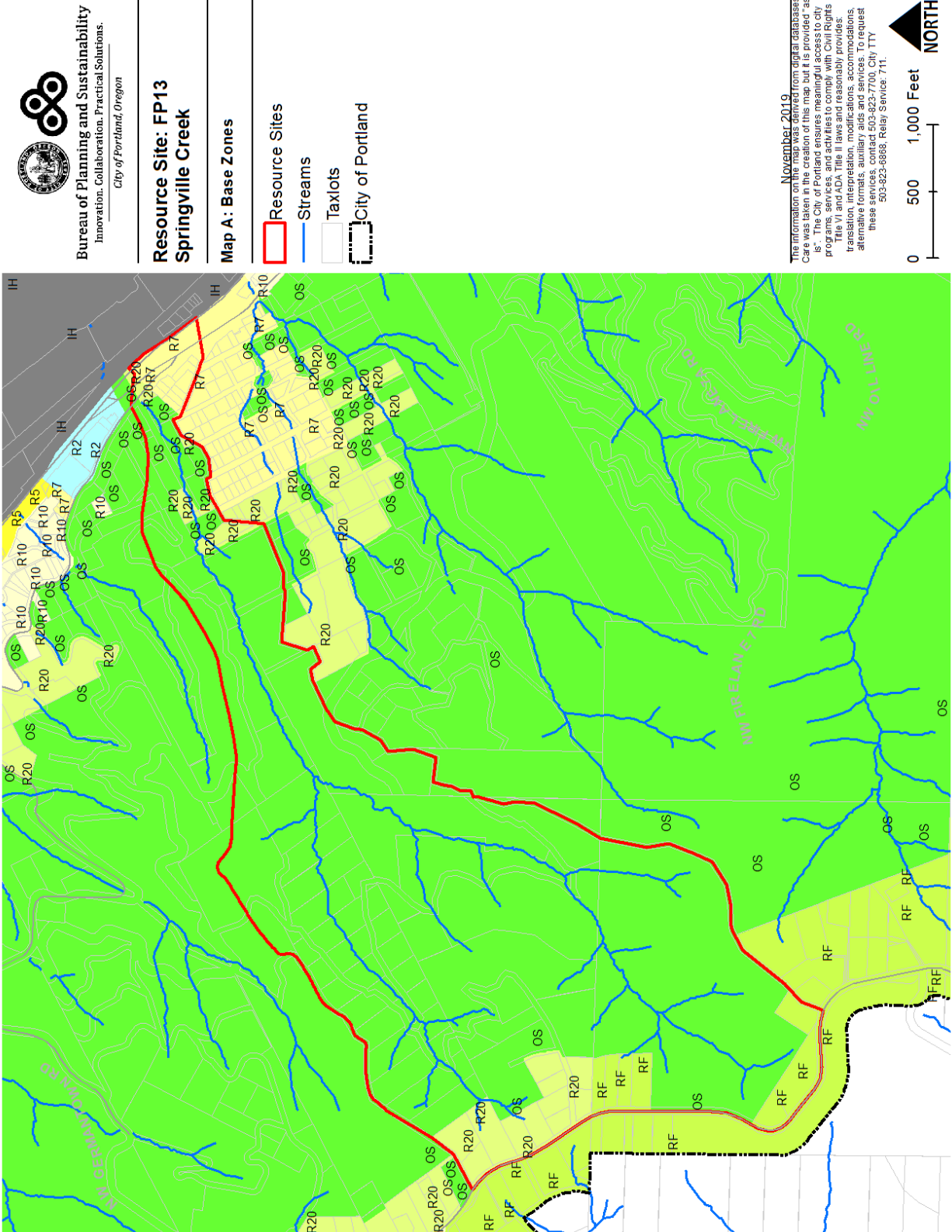
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

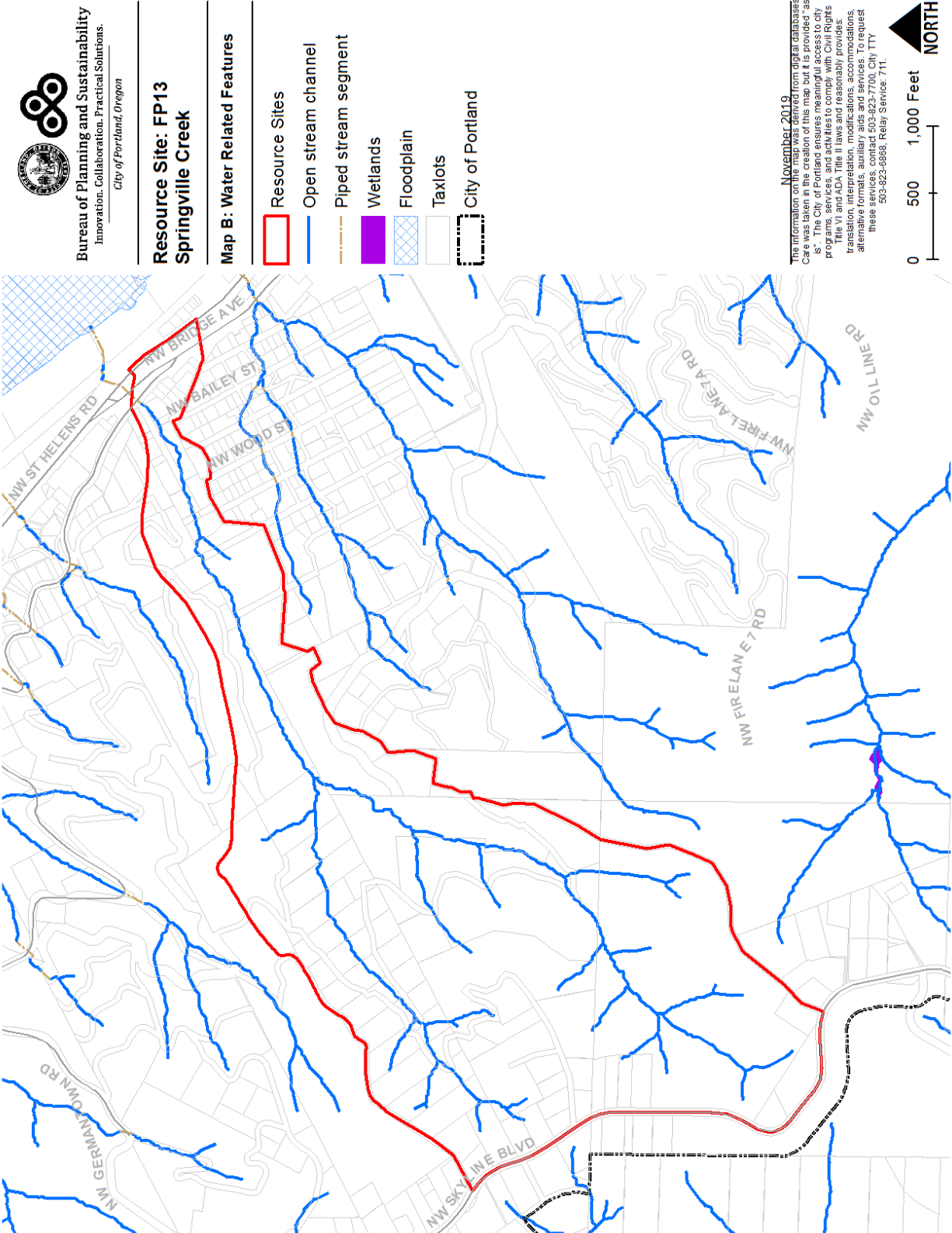
ESEE Decisions

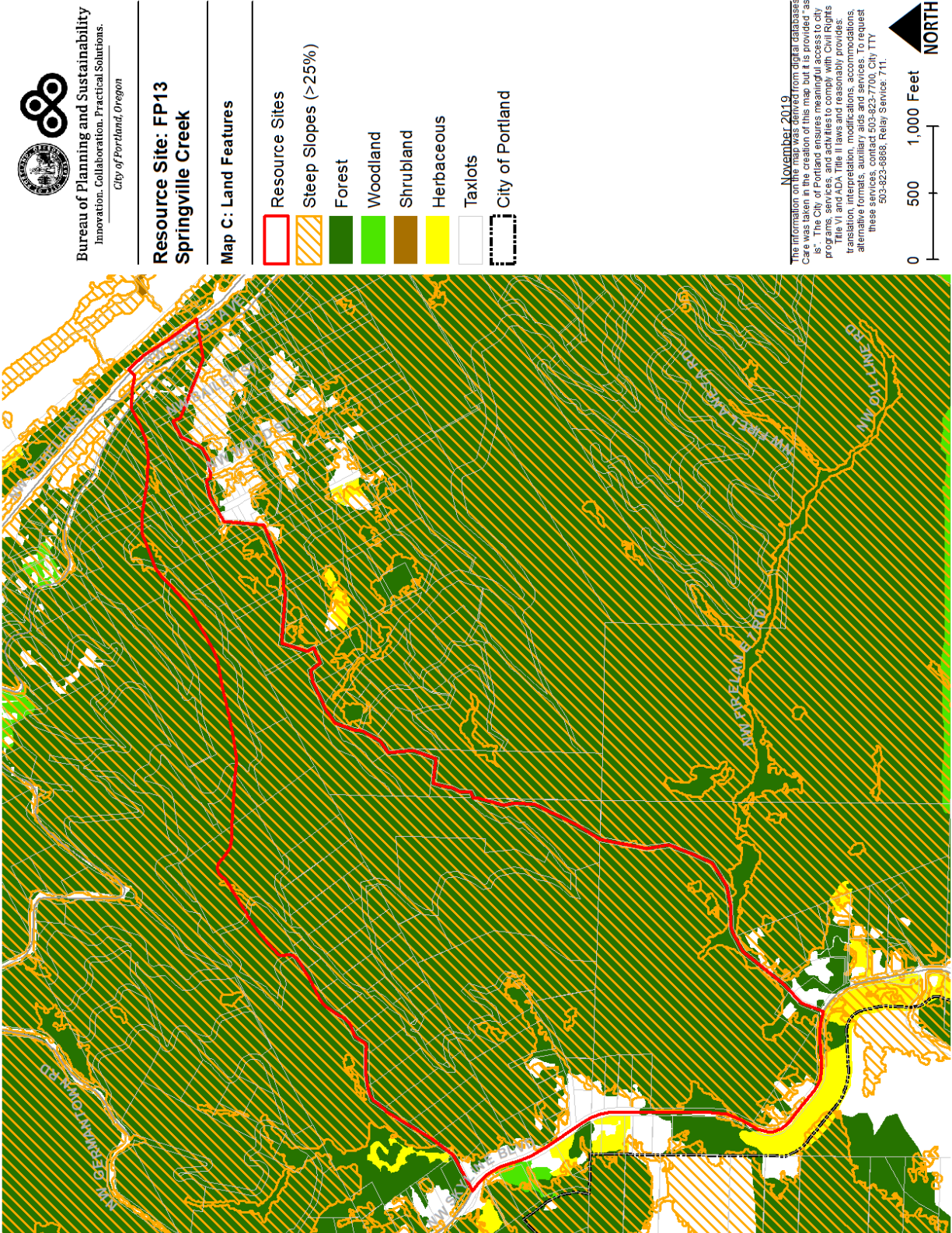
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP13 are:

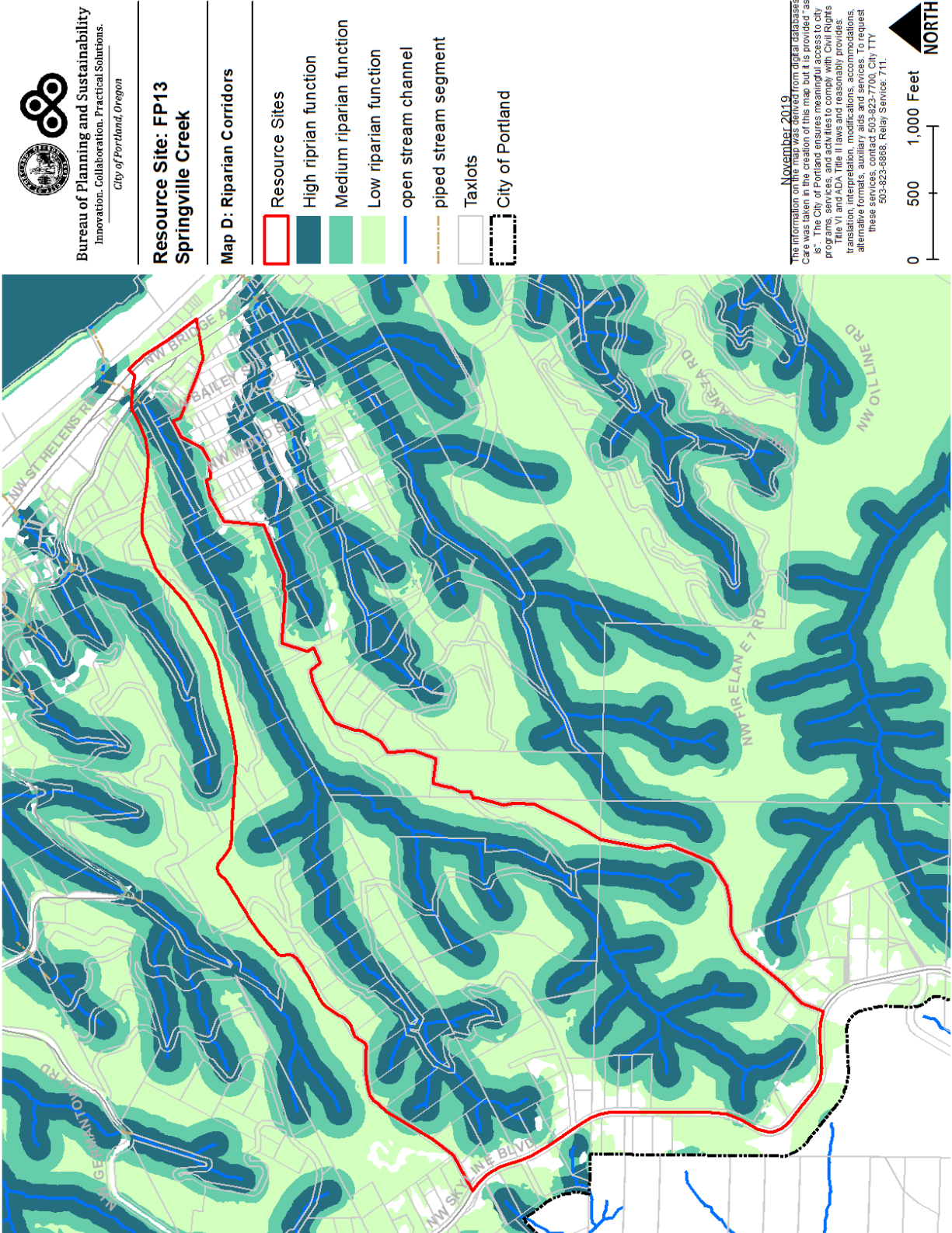
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank or wetlands, and land within 50 feet of stream top-of-bank or 50 feet of wetlands.
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank.
3. 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.
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.

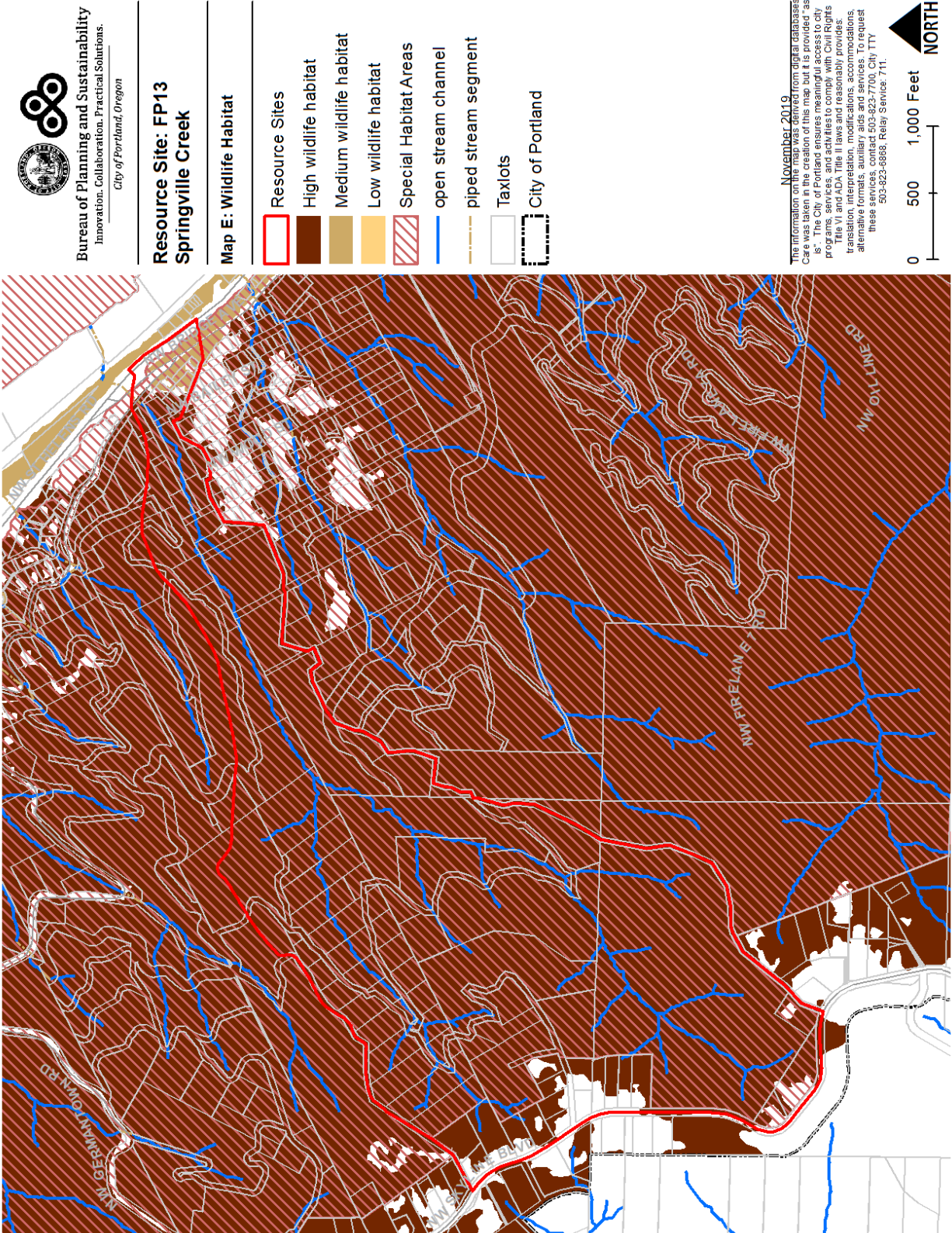
Table C: ESEE Decision for Resource Site FP13	
ESEE Decision	Acres
Strictly Limit	219.8
Limit	17.8
Allow	13.3

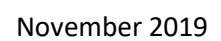












Resource Site No.: FP14 Resource Site Name: Firelane 7 – North

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 96



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP14	
	Study Area
Stream (Miles)	2.1
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	414.1
Forest (acres)	412.7
Woodland (acres)	0.0
Shrubland (acres)	0.0
Herbaceous (acres)	1.4
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	413.7
Impervious Surface (acres)	88.6
* 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%.	

This site is dominated by a mid-aged conifer forest with some older Douglas fir approaching 200 years of age. This large forest stand is structurally diverse and offers variety within each canopy layer. Conifer topping hardwood, hardwood with young conifer and mature hardwood also occur in small patches at elevations above 500 mean sea level. 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. An abandoned apple orchard is located on a hillside clearing in the northwest portion of the site. Nonnative plants and industrial emissions have degraded the vitality of the plant community near St. Helens Road. Non-native plants have also escaped from the residential area near Springville Road.

This site provides high quality food and cover sources for wildlife in the area. Water is also available on a seasonal basis. Among the bird species observed using this site were the protected bald eagle, the sensitive pileated woodpecker and the winter wren. Evidence of black bear was found near the apple orchard. Other mammals identified at the site include short-tailed weasel, Trowbridge shrew, shrew mole and deer mouse. Interspersion with surrounding forest enhances the site's value as wildlife habitat. The St. John's Bridge ramp and St. Helens Road impede wildlife migration to the east.

Table B: Quality of Natural Resource Functions in Resource Site FP14				
Resource Site (acres) = 439.249283				
	High	Medium	Low	Total
Riparian Corridors*				
acres	147.3	123.5	144.8	415.6
percent total inventory site area	33.5%	28.1%	33.0%	94.6%
Wildlife Habitat*				
acres	403.0	9.7	0.0	412.7
percent total inventory site area	91.7%	2.2%	0.0%	94.0%
Special Habitat Areas**				
acres				431.8
percent total inventory site area				98.3%
Combined Total⁺				
acres	432.2	0.6	0.0	432.8
percent total inventory site area	98.4%	0.1%	0.0%	98.5%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP14 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 R20, R10 and 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 FP14, 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.

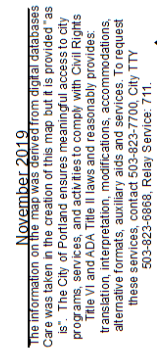
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

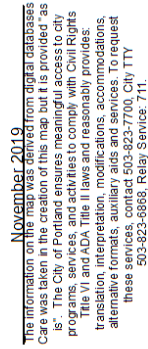
ESEE Decisions

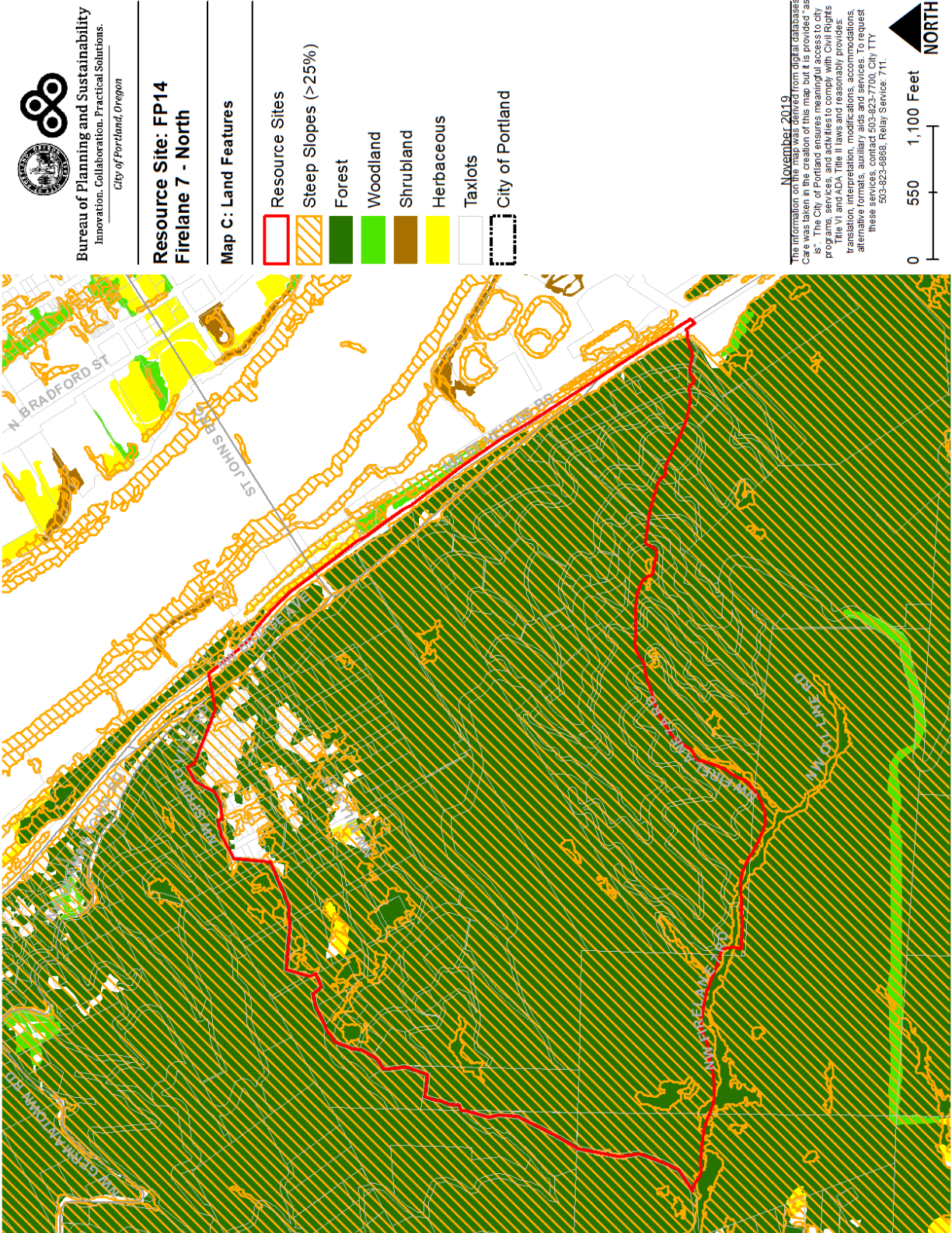
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP14 are:

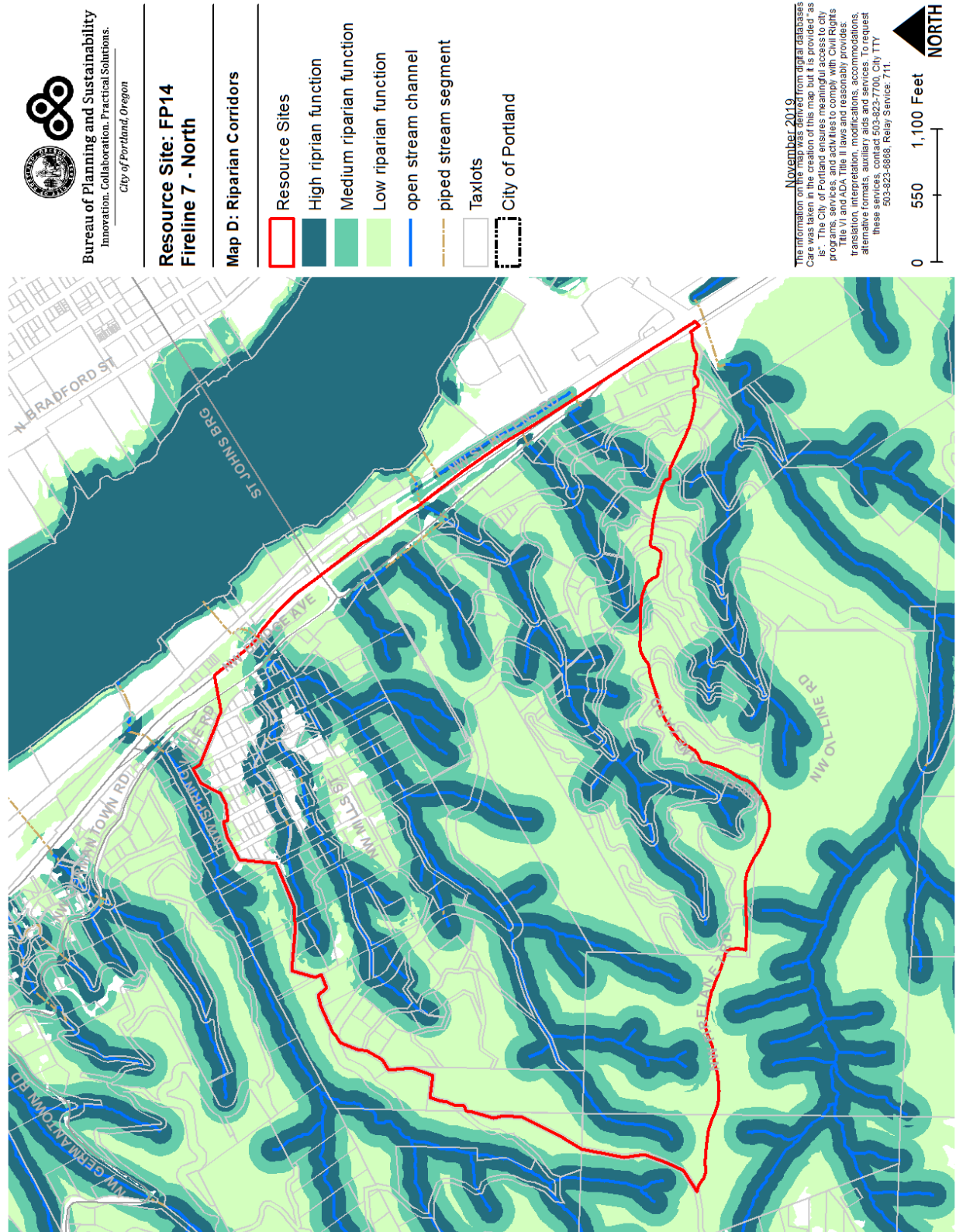
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank or wetlands, and land within 25 feet of stream top-of-bank or within 50 feet of wetlands.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within 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.

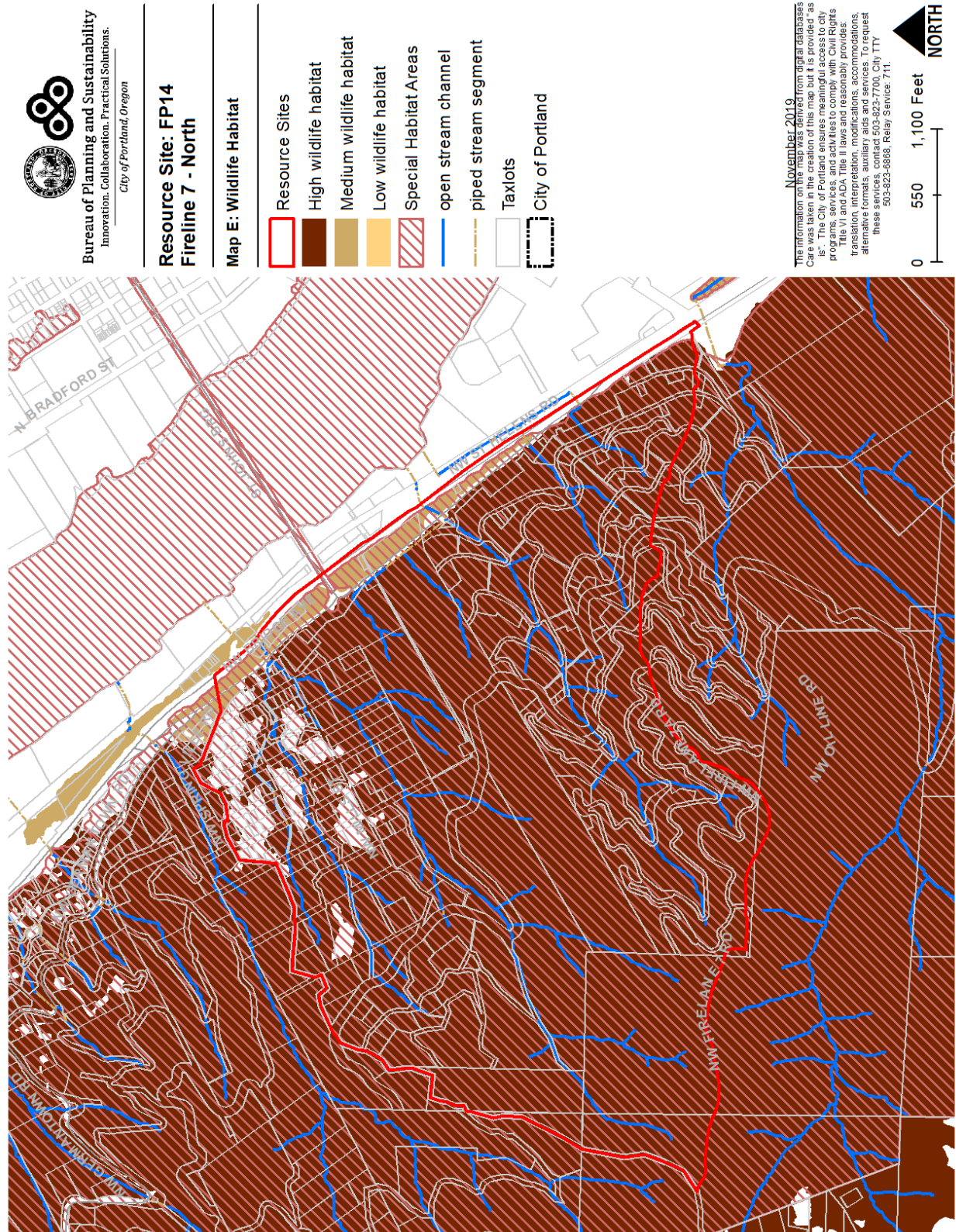
Table C: ESEE Decision for Resource Site FP14	
ESEE Decision	Acres
Strictly Limit	380.2
Limit	33.6
Allow	25.5

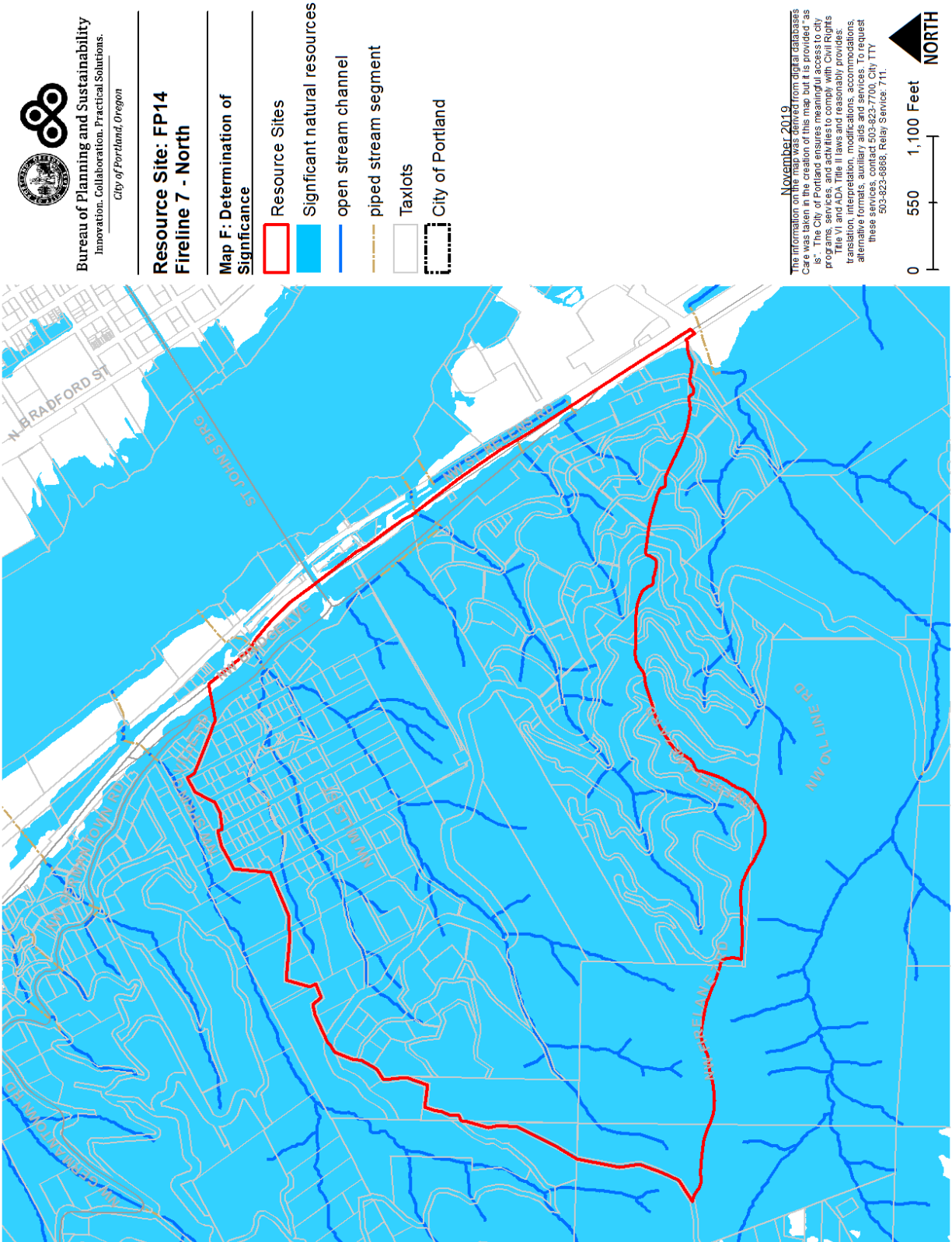


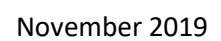




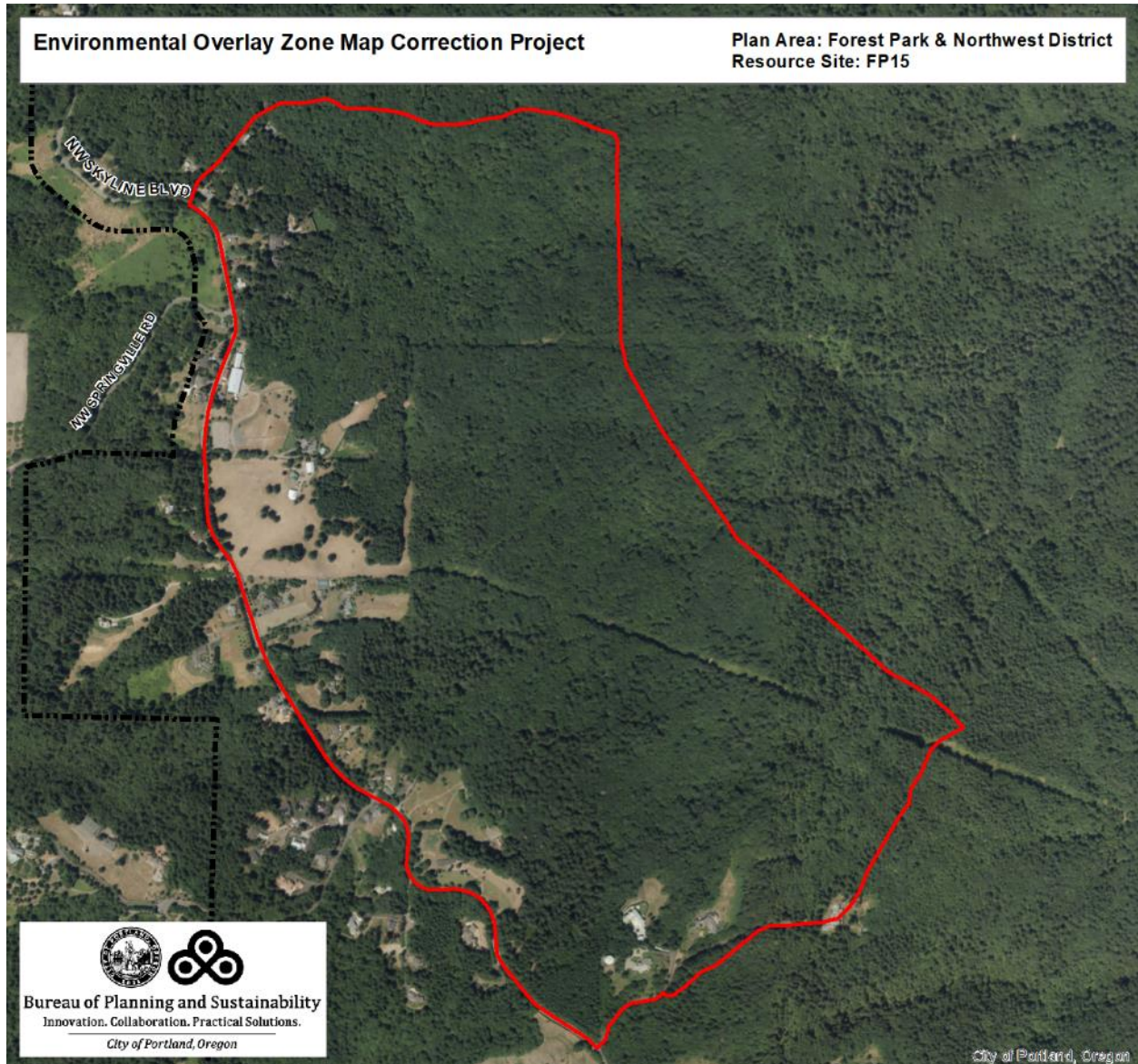








Resource Site No.: FP15 Resource Site Name: Doane Creek Headwaters
Previous Plan: Northwest Hills Natural Areas Protection Plan Previous Resource Site No.: 95



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP15	
	Study Area
Stream (Miles)	0.3
Wetlands (acres)	0.9
Vegetated Areas >= 1/2 acre (acres)	425.1
Forest (acres)	365.2
Woodland (acres)	13.7
Shrubland (acres)	2.6
Herbaceous (acres)	43.6
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	359.9
Impervious Surface (acres)	13.2
* 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%.	

This site forms the upper Doane Creek watershed. Most of the basin of this year-round creek is in forest cover, composed of three principle vegetation types: midaged conifer, conifer topping hardwood and hardwood with young conifer. Interspersed with these forest stages are small stands of mature hardwood; linear shrub stands follow the power line rights-of-way. 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, particularly in the headwaters region. Large areas of cleared residential, pasture and cropland are located along Skyline Boulevard. Nonnative plants have begun to spread into the forest.

The site provides medium to high quality food and cover for resident and migratory wildlife. The creek headwaters serve a critical function in sustaining water quality for sensitive amphibian species such as the red-legged frog which inhabit the watershed. The upper Doane Creek drainages also provide a seasonal water source for terrestrial vertebrates such as bobcat and mountain beaver which reside at the site. Bird species identified at this site include pileated woodpecker, red-tailed hawk and winter wren. The site's interspersion with surrounding forest allows for free migration of wildlife and increases its value as habitat. This site is one of two principle deer crossing locations along Skyline Boulevard identified in the study area; Skyline Boulevard and adjacent development limit migratory opportunities to the west.

Table B: Quality of Natural Resource Functions in Resource Site FP15				
Resource Site (acres) = 443.397099				
	High	Medium	Low	Total
Riparian Corridors*				
acres	121.7	109.9	173.4	405.0
percent total inventory site area	27.5%	24.8%	39.1%	91.3%
Wildlife Habitat*				
acres	367.9	4.1	0.0	372.0
percent total inventory site area	83.0%	0.9%	0.0%	83.9%
Special Habitat Areas**				
acres				244.0
percent total inventory site area				55.0%
Combined Total⁺				
acres	372.0	10.5	23.1	405.7
percent total inventory site area	83.9%	2.4%	5.2%	91.5%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP15 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 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 FP15, 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.

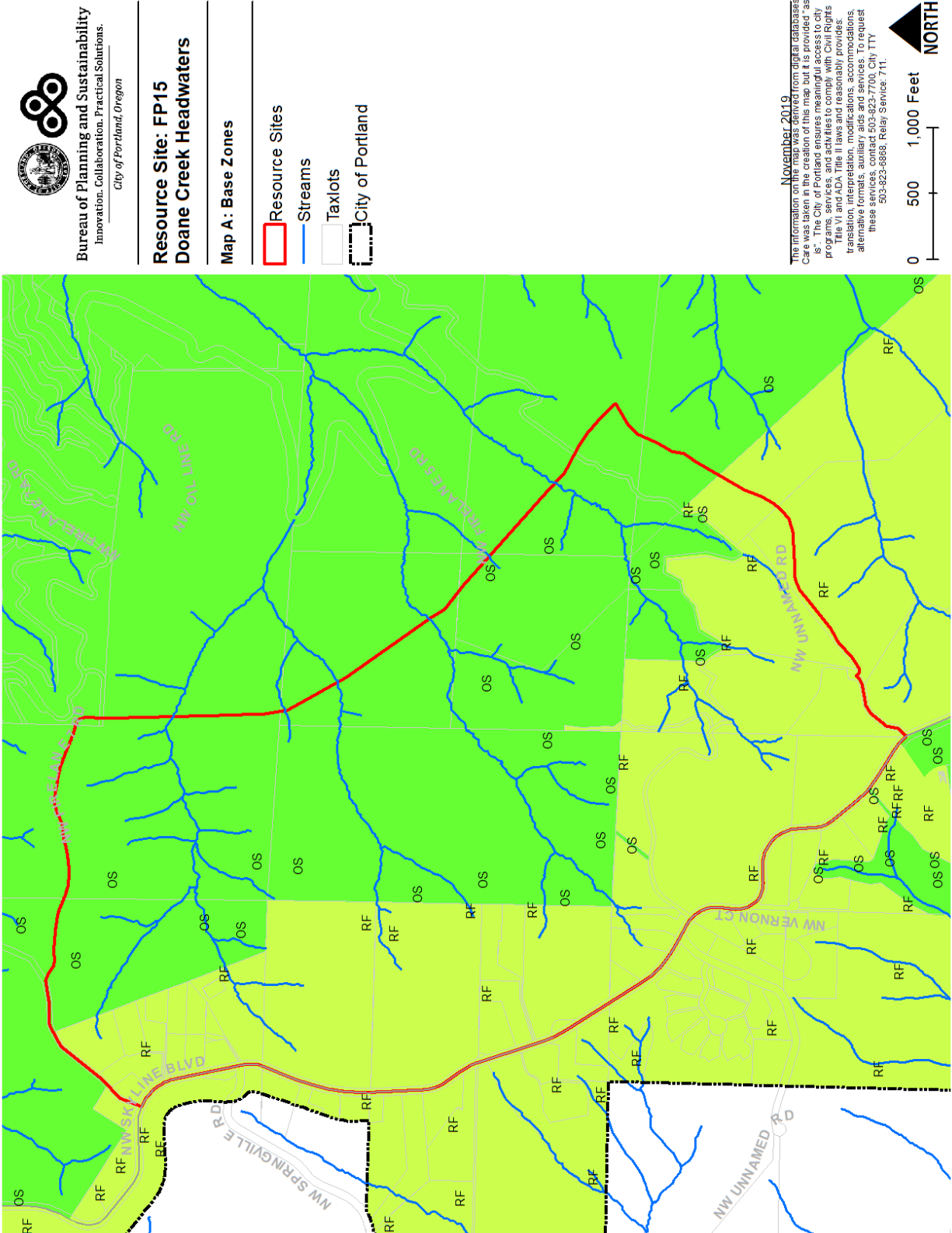
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

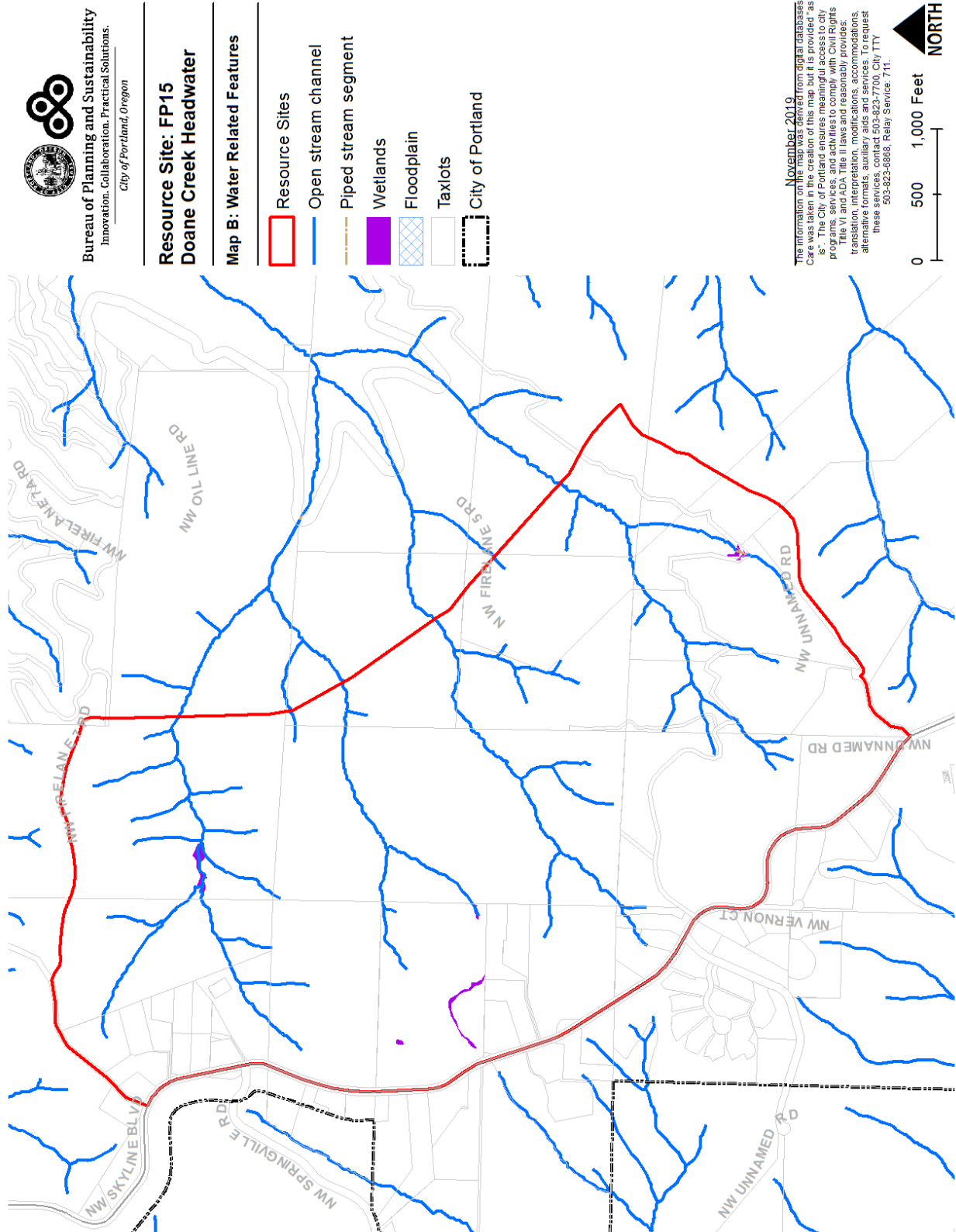
ESEE Decisions

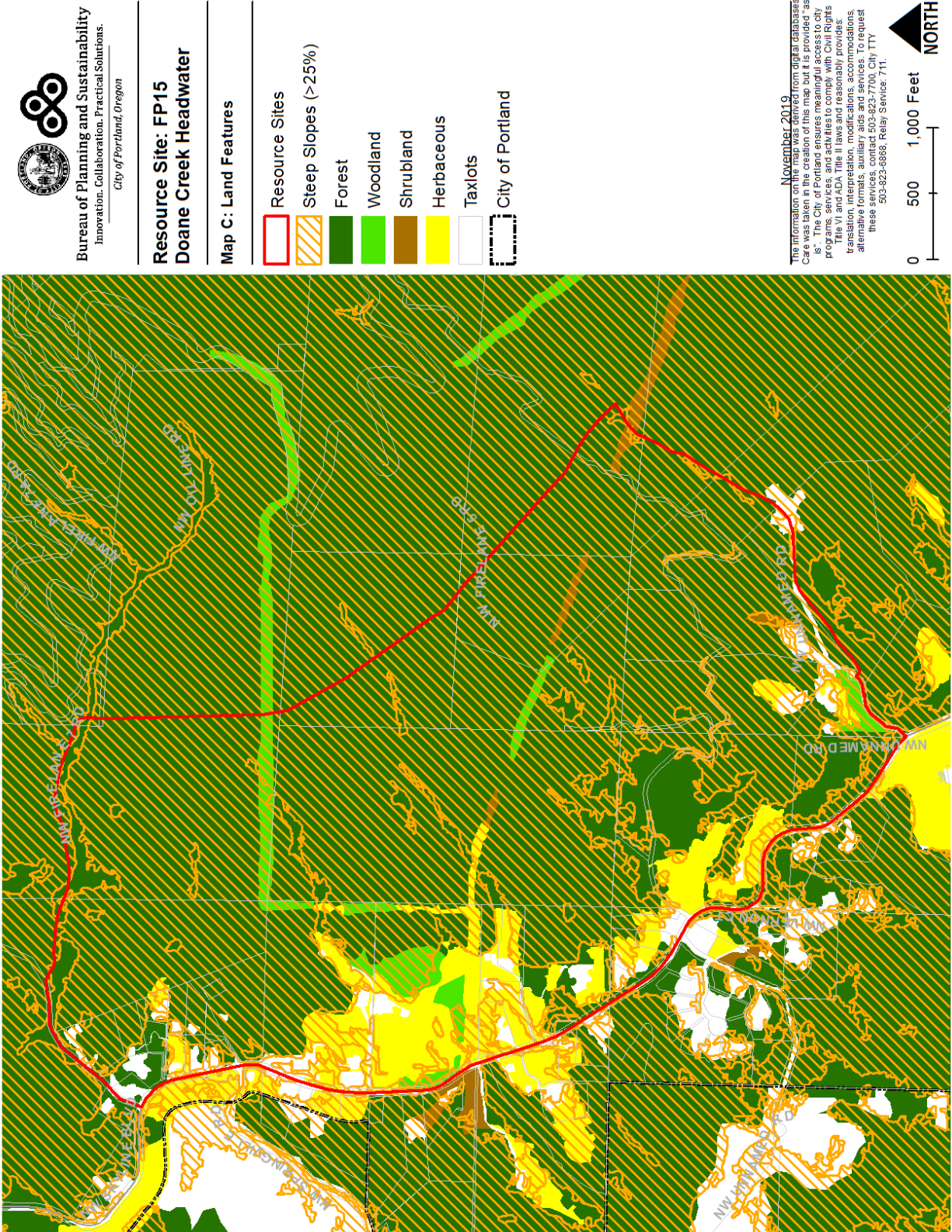
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP15 are:

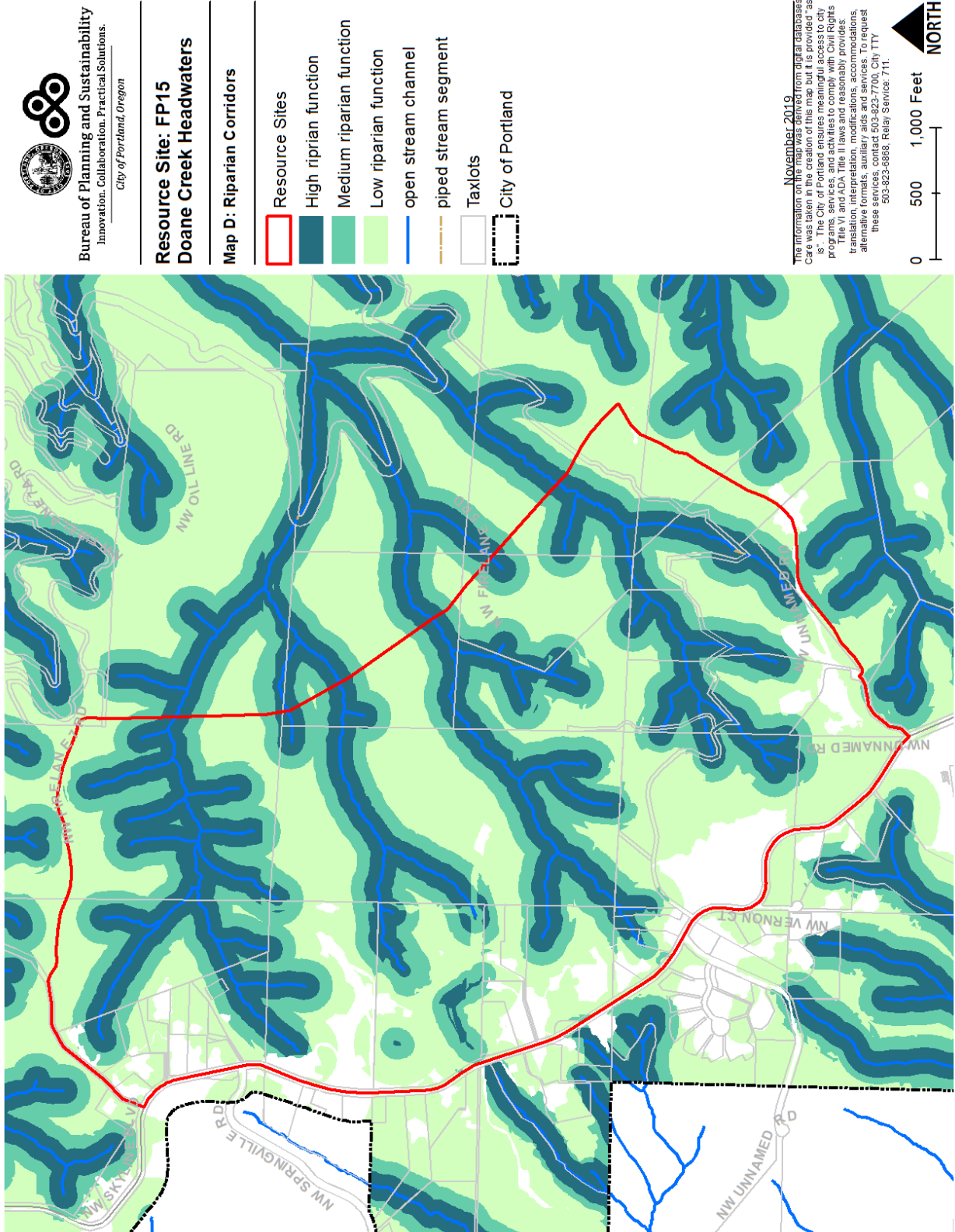
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 50 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
3. 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.
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.

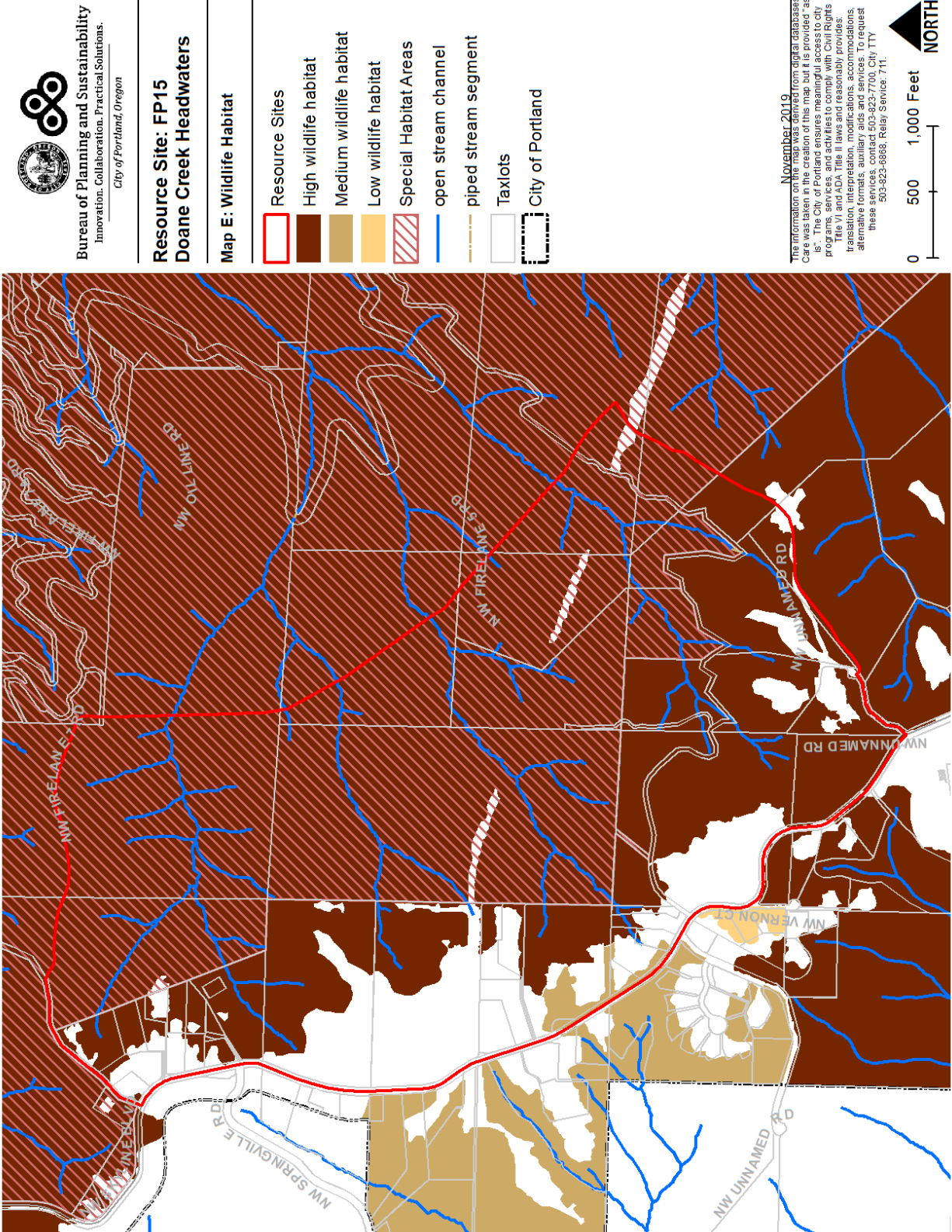
Table C: ESEE Decision for Resource Site FP15	
ESEE Decision	Acres
Strictly Limit	264.7
Limit	107.4
Allow	71.3

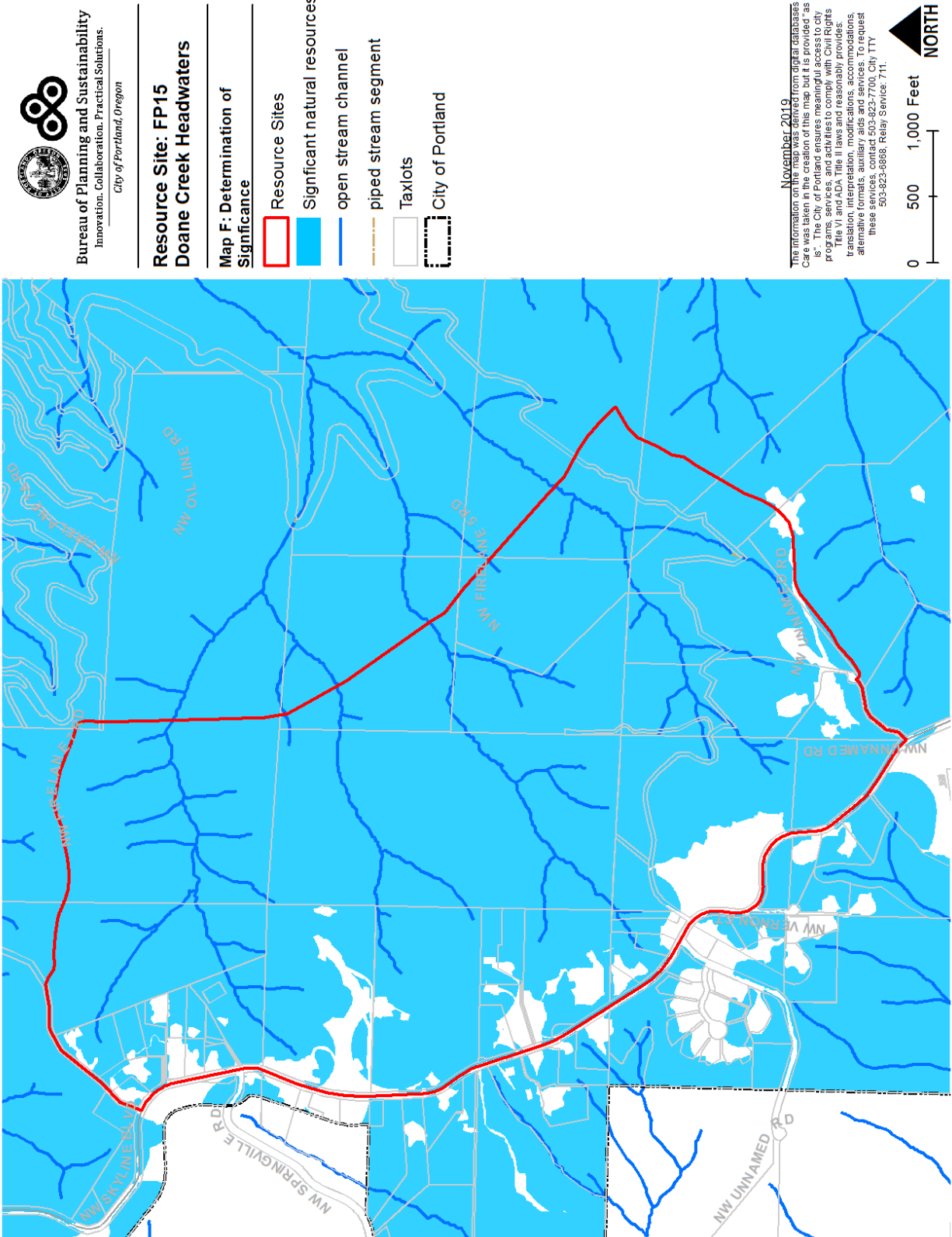


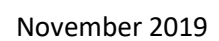




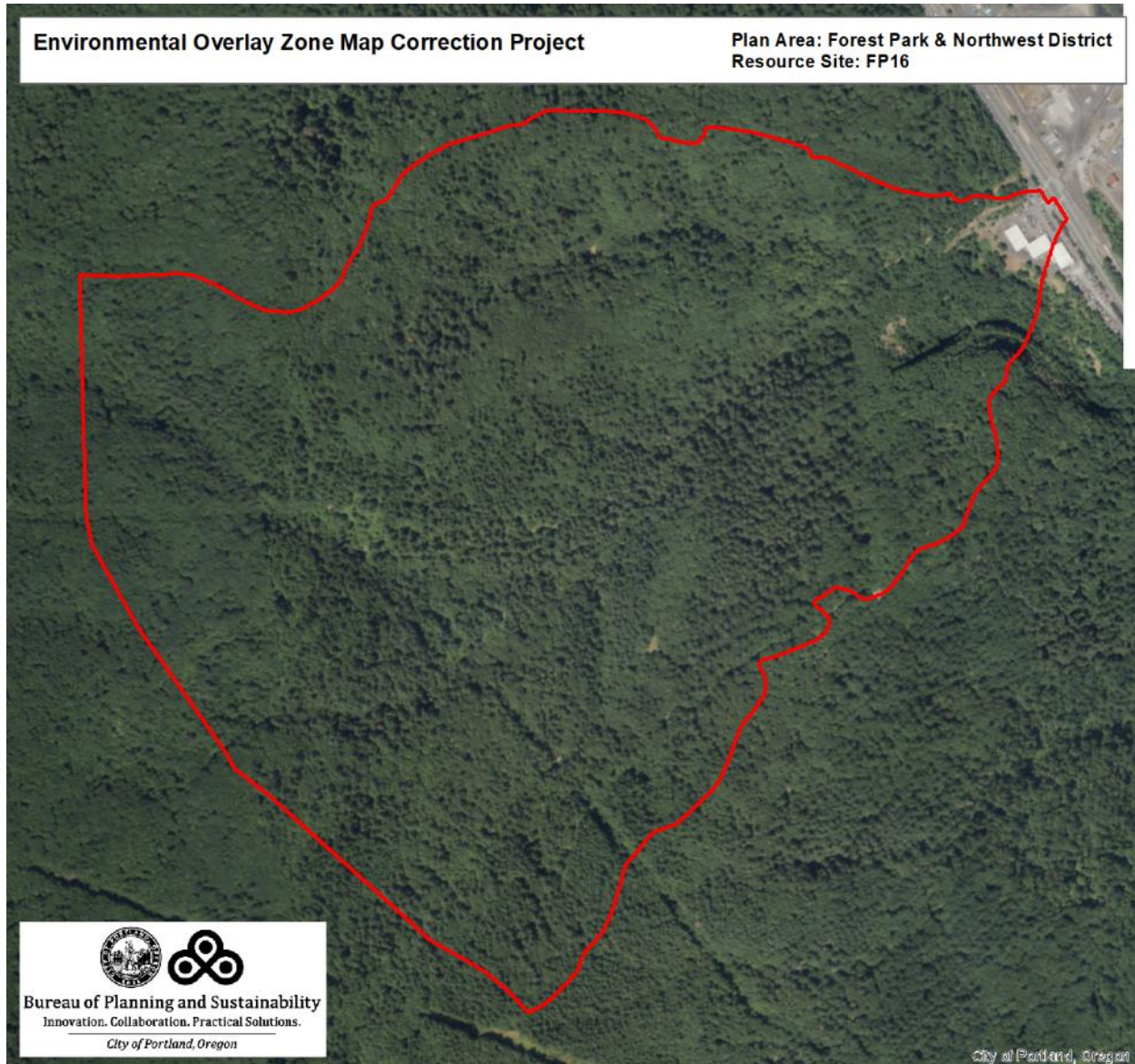








Resource Site No.: FP16 **Resource Site Name:** Doane Creek Watershed
Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 94



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP16	
	Study Area
Stream (Miles)	0.1
Wetlands (acres)	0.3
Vegetated Areas >= 1/2 acre (acres)	341.8
Forest (acres)	334.6
Woodland (acres)	7.2
Shrubland (acres)	0.0
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	336.8
Impervious Surface (acres)	32.2
* 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%.	

This site forms the lower portion of the Doane Creek watershed. Most of the basin of this year-round creek is in forest cover and elevated from the noises and traffic in the industrial area along St. Helens Road. At the bottom of the basin, however, the streambed and the natural hillside terrain have been highly disturbed by past mining activities. A small palustrine wetland has formed adjacent to Doane Creek in an abandoned quarry excavation.

This site has a diverse riparian habitat and climax conifer species are well established in the uplands. Western wahoo--on the 1976 Provisional List of Rare and Endangered Plants in Oregon--is present along the creek. Substantial down woody material has accumulated in the streambed and on the forest floor. *Conifer topping hardwood* and *mid-aged conifer* are the most common vegetation types at the site, though small patches of hardwood with young conifer, mature hardwood and shrub are also present. 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. Invasive species such as holly, ivy, laurel and western clematis threaten the plant community.

The wetland provides secluded habitat for a variety of songbirds and waterfowl. The site provides high quality food, water and cover habitat for wildlife. Fauna using this site include black bear, porcupines, pileated woodpecker, pygmy owl, red-tailed hawk and a variety of songbirds. Rare red legged frogs were observed along the creek (above the quarry). The abandoned, fenced-off quarry site and St. Helens Road impair wildlife migration through the forest and between the forest and the Willamette River. Game trails were observed along the creek above the quarry.

Table B: Quality of Natural Resource Functions in Resource Site FP16				
Resource Site (acres) = 344.21735				
	High	Medium	Low	Total
Riparian Corridors*				
acres	100.9	91.4	149.7	342.0
percent total inventory site area	29.3%	26.6%	43.5%	99.3%
Wildlife Habitat*				
acres	341.8	0.0	0.0	341.8
percent total inventory site area	99.3%	0.0%	0.0%	99.3%
Special Habitat Areas**				
acres				341.9
percent total inventory site area				99.3%
Combined Total⁺				
acres	342.1	0.0	0.0	342.1
percent total inventory site area	99.4%	0.0%	0.0%	99.4%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP16 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 FP16, 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.

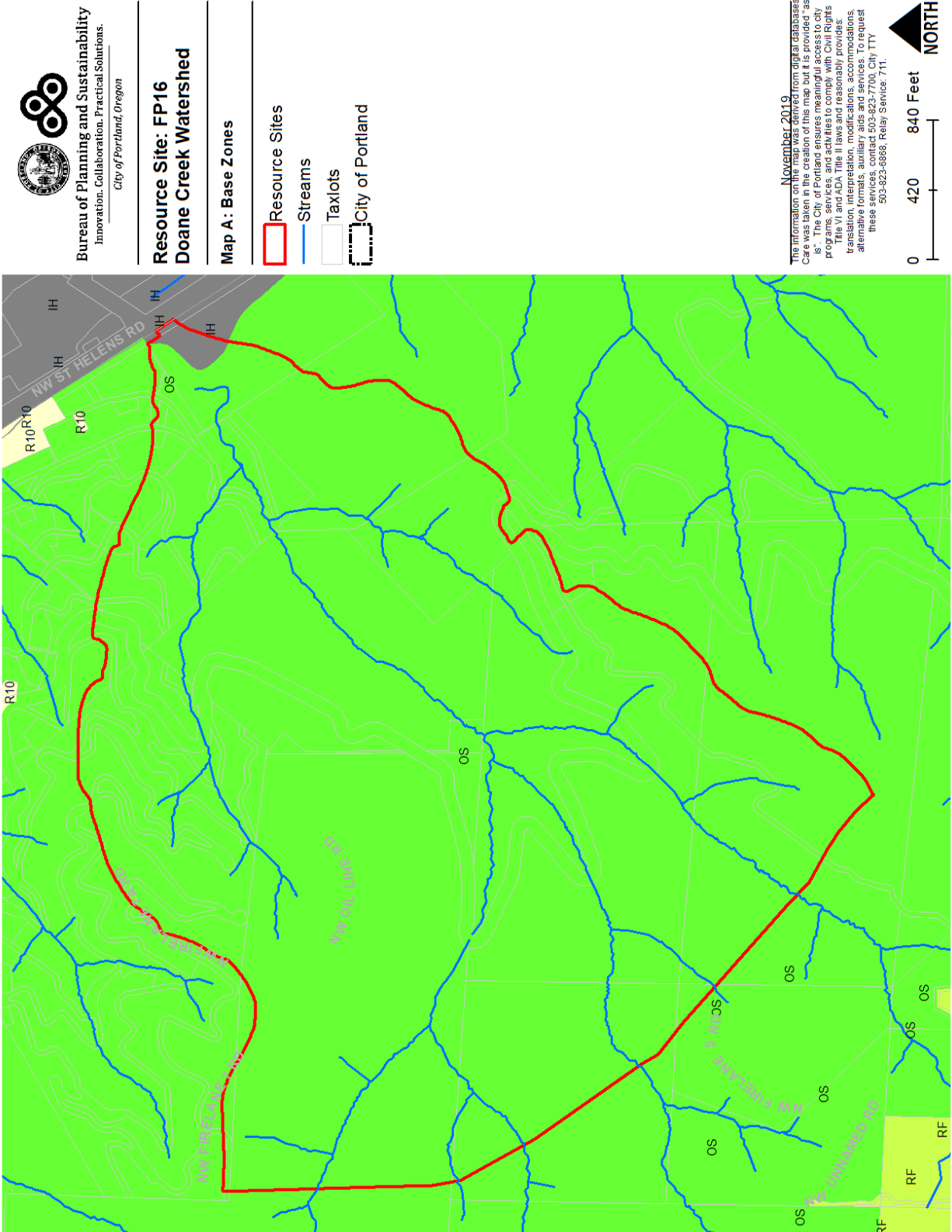
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

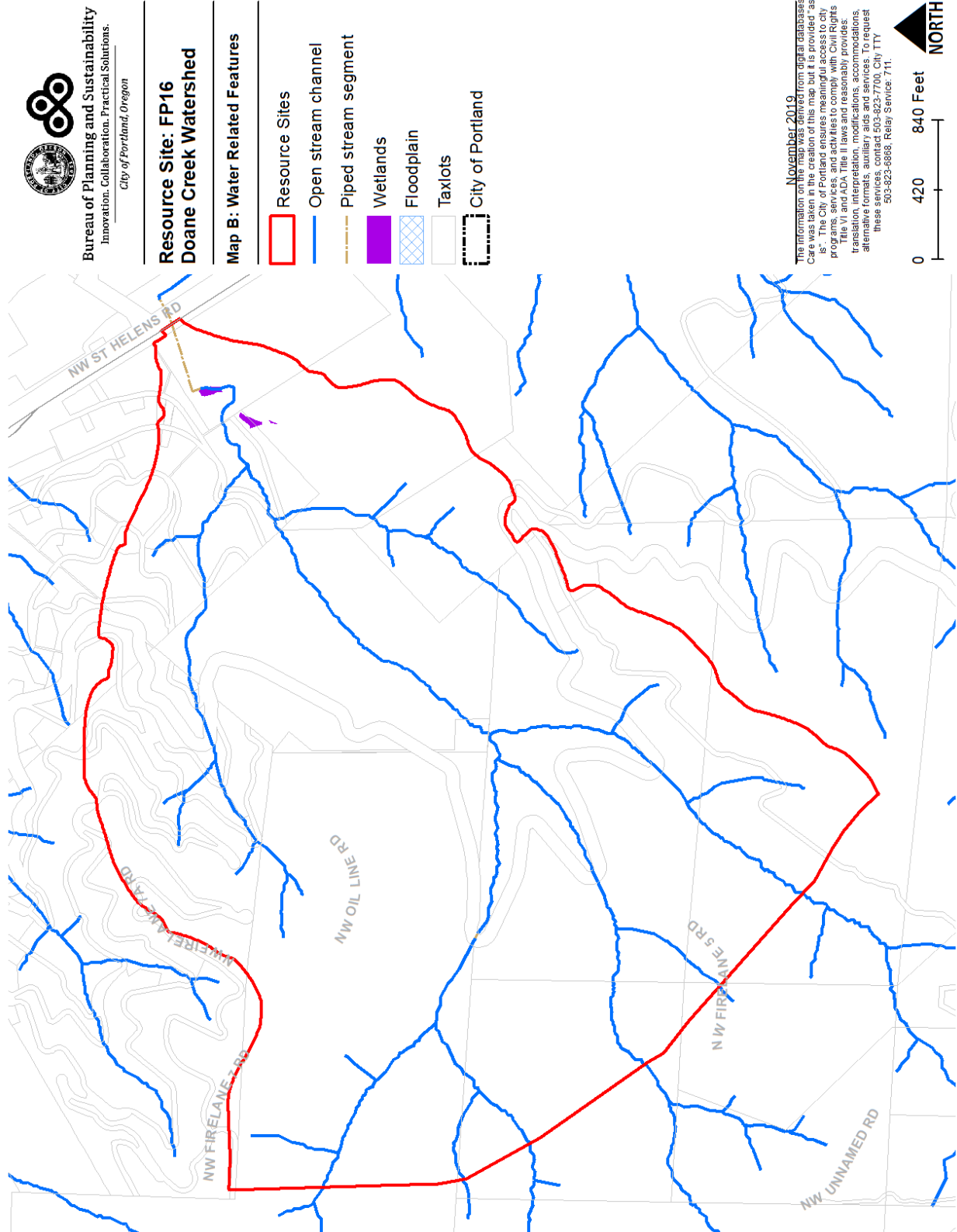
ESEE Decisions

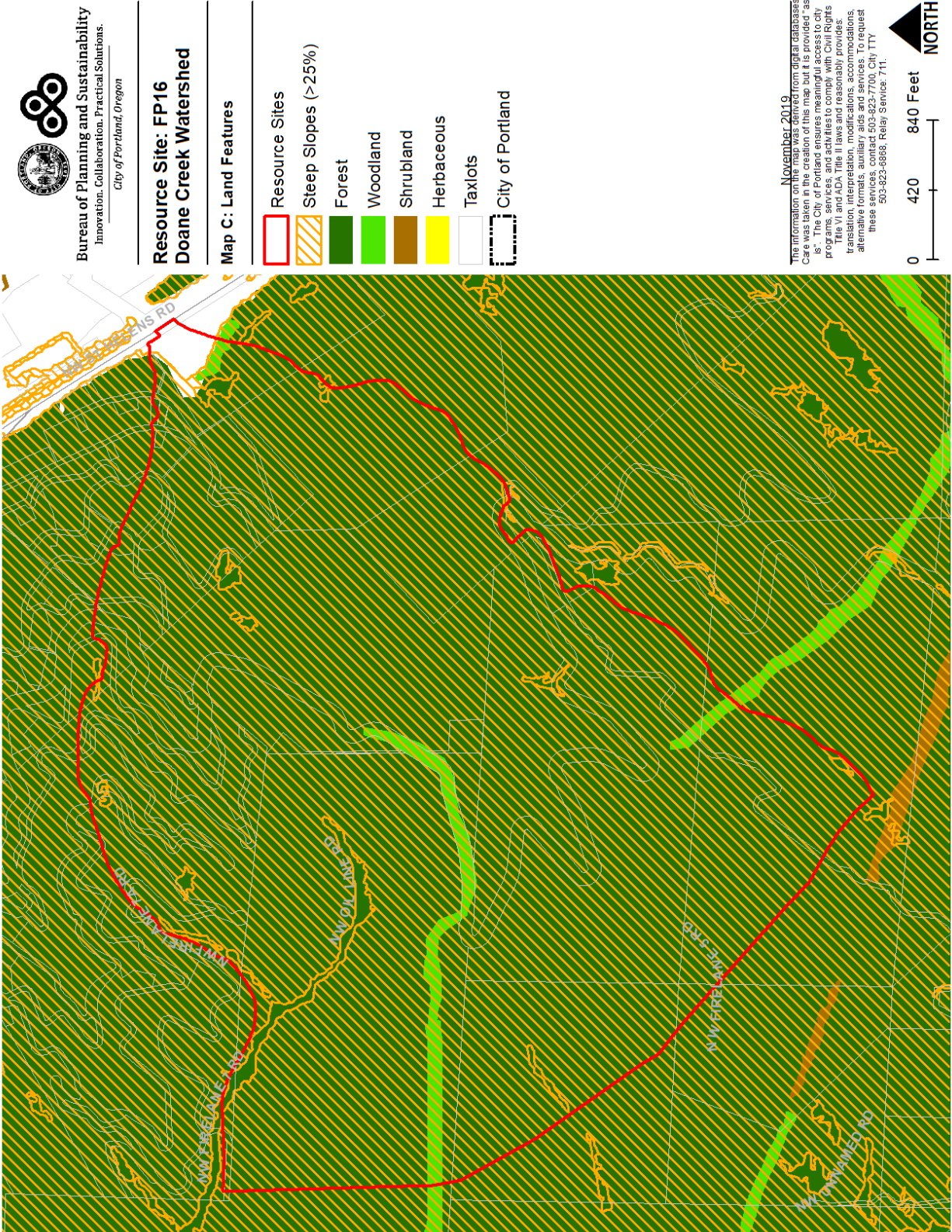
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP16 are:

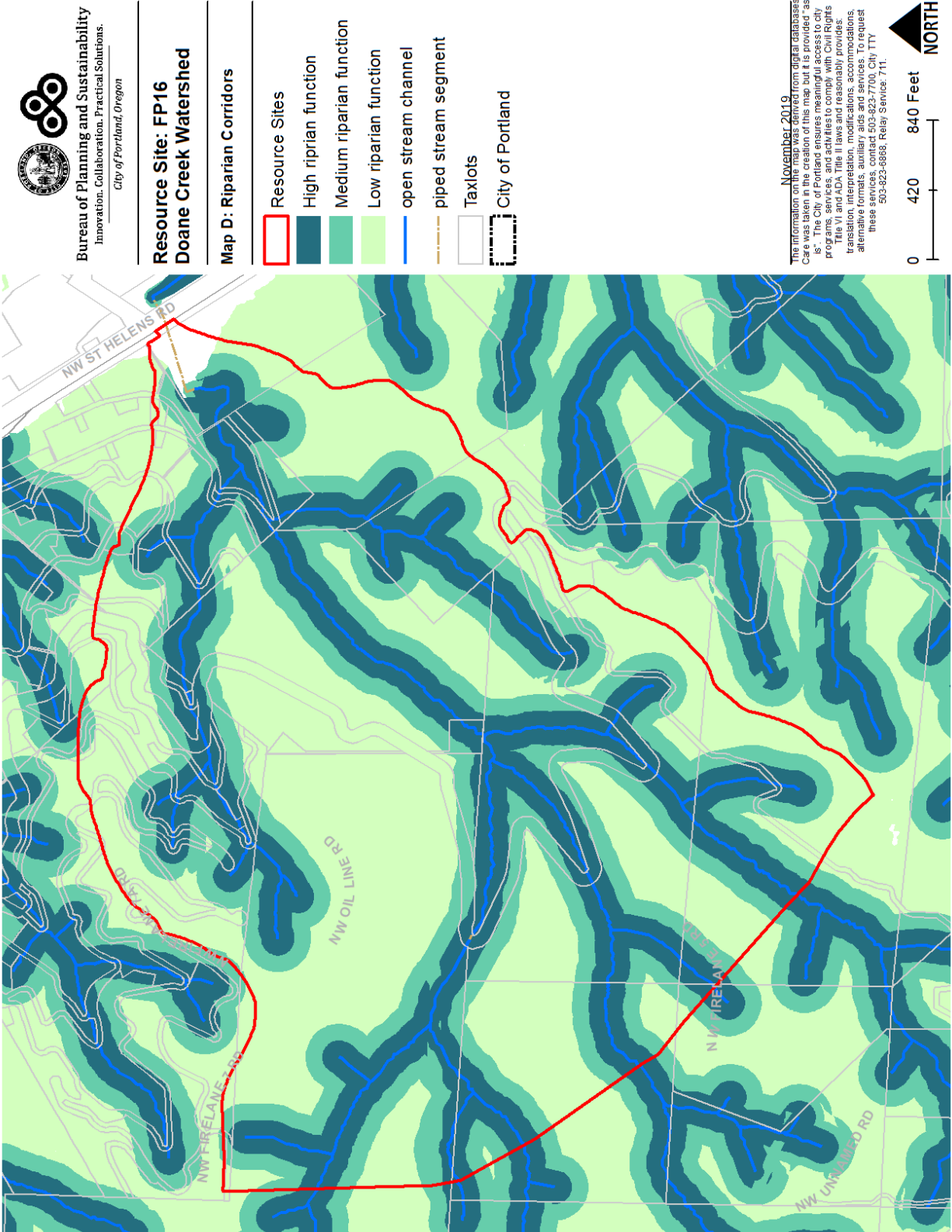
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank, wetlands, land within 25 feet of stream top-of-bank and land within 50 feet of a wetland.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within areas of forest, woodland, shrubland or herbaceous vegetation that are contiguous to but more than 50 feet from stream top-of-bank or wetlands.
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 or wetlands.
4. *Limit* conflicting uses within flood area, vegetated or developed, located more than 170 feet measured horizontally from the ordinary high water mark.
5. *Allow* conflicting uses within all other areas containing significant natural resources.

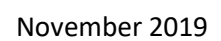
Table C: ESEE Decision for Resource Site FP16	
ESEE Decision	Acres
Strictly Limit	342.0
Limit	0.0
Allow	2.2

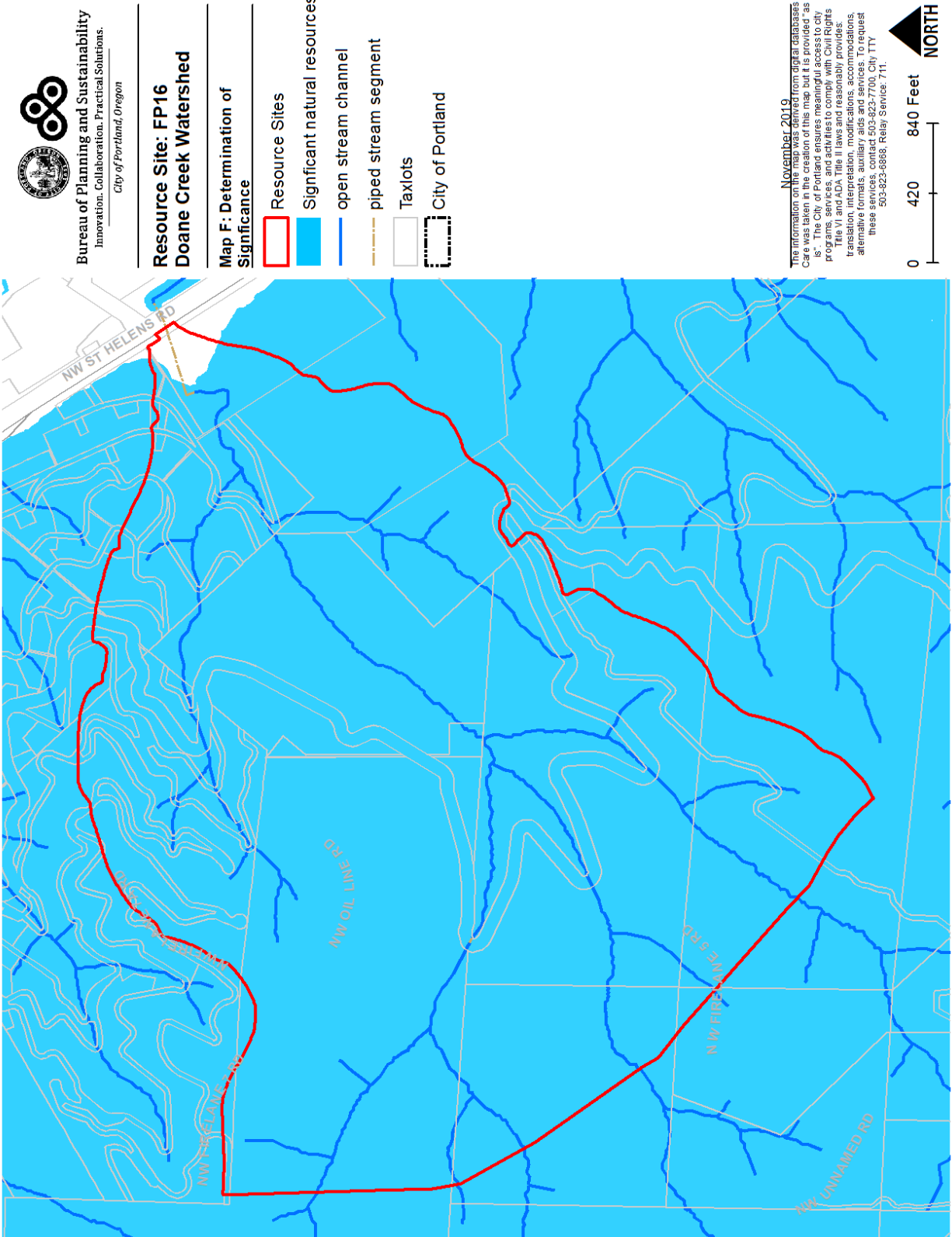


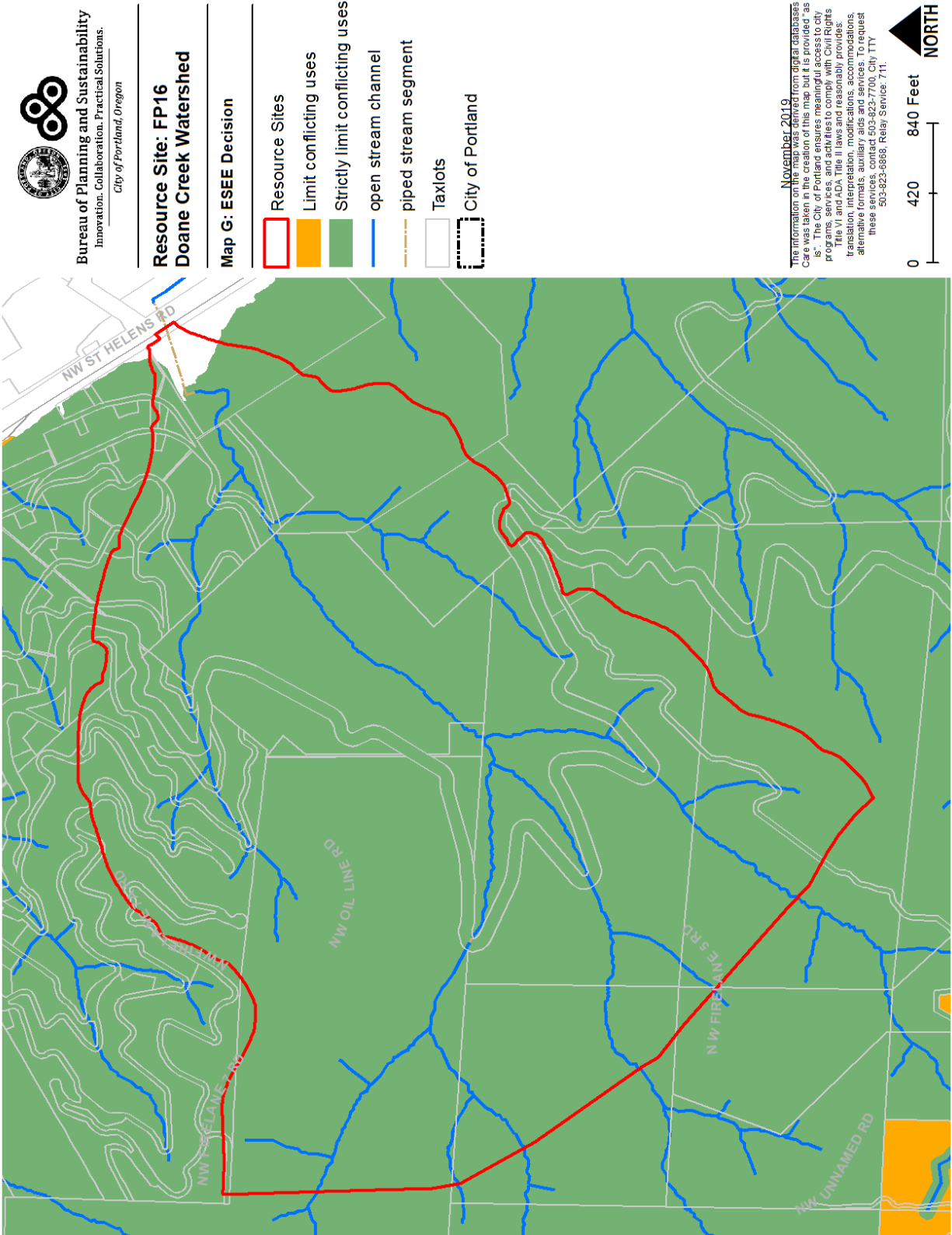












Resource Site No.: FP17 Resource Site Name: Doane Creek & Meadow

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 93

Resource Site 93 is included in the Northwest Hills Natural Areas Protection Plan and is not being updated by this Environmental Overlay Zone Map Correction Project. The inventory, ESEE Analysis and ESEE Decisions for Resource Site 93 are found in the Northwest Hills Natural Areas Protection Plan until updated by the River Plan/North Reach project.

Resource Site No.: FP18 Resource Site Name: Doane Lake

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 92

Resource Site 92 is included in the Northwest Hills Natural Areas Protection Plan and is not being updated by this Environmental Overlay Zone Map Correction Project. The inventory, ESEE Analysis and ESEE Decisions for Resource Site 92 are found in the Northwest Hills Natural Areas Protection Plan until updated by the River Plan/North Reach project.

Resource Site No.: FP19 Resource Site Name: Willbridge Uplands

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 91



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP19	
	Study Area
Stream (Miles)	0.6
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	354.0
Forest (acres)	328.6
Woodland (acres)	22.8
Shrubland (acres)	2.6
Herbaceous (acres)	0.0
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	344.4
Impervious Surface (acres)	32.8
* 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%.	

This site is made up of one large (215 acres) and two small (<50 acres) intermittent creek basins with a diverse riparian habitat. Substantial down woody material has accumulated in the streambed and on the forest floor. *Conifer topping hardwood* covers most of the basin. A large stand of mid-aged conifer is located near the center of the site; small stands of mature hardwood, hardwood with young conifer and shrub are also present. Large western hemlock and Douglas fir trees are prevalent at this site. Forest cover protects watershed resources 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 western wahoo occurs along the lower creek banks. Invasive species including ivy, holly, laurel and clematis are proliferating near St. Helens Road.

The site provides high quality food, water and cover habitat for wildlife. Birds using this site include pileated woodpecker, vulture, red-tailed hawk and a variety of songbirds. Evidence of both bear and bobcat were discovered in August, 1990. Extensive coyote runs were identified at this site, which serves as a coyote feeding and breeding area. The site's primary creek supports a healthy population of macroinvertebrates. St. Helens Road impairs wildlife migration between the forest and the Willamette River.

Table B: Quality of Natural Resource Functions in Resource Site FP19				
Resource Site (acres) = 372.895372				
	High	Medium	Low	Total
Riparian Corridors*				
acres	124.5	109.7	121.0	355.1
percent total inventory site area	33.4%	29.4%	32.4%	95.2%
Wildlife Habitat*				
acres	351.4	0.0	0.0	351.4
percent total inventory site area	94.2%	0.0%	0.0%	94.2%
Special Habitat Areas**				
acres				352.9
percent total inventory site area				94.6%
Combined Total⁺				
acres	356.7	1.0	0.0	357.6
percent total inventory site area	95.6%	0.3%	0.0%	95.9%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP19 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, R10, and R2.5 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 FP19, 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.

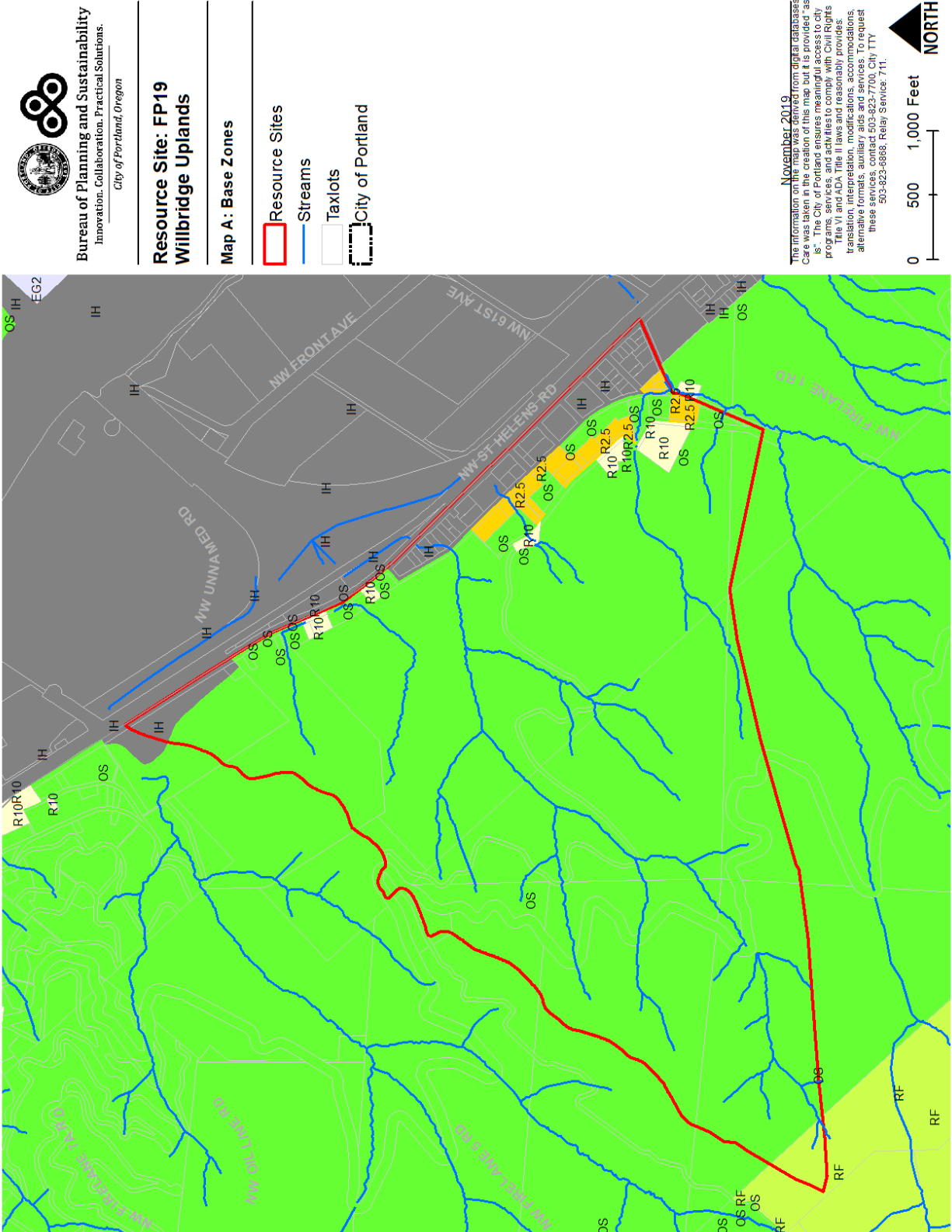
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

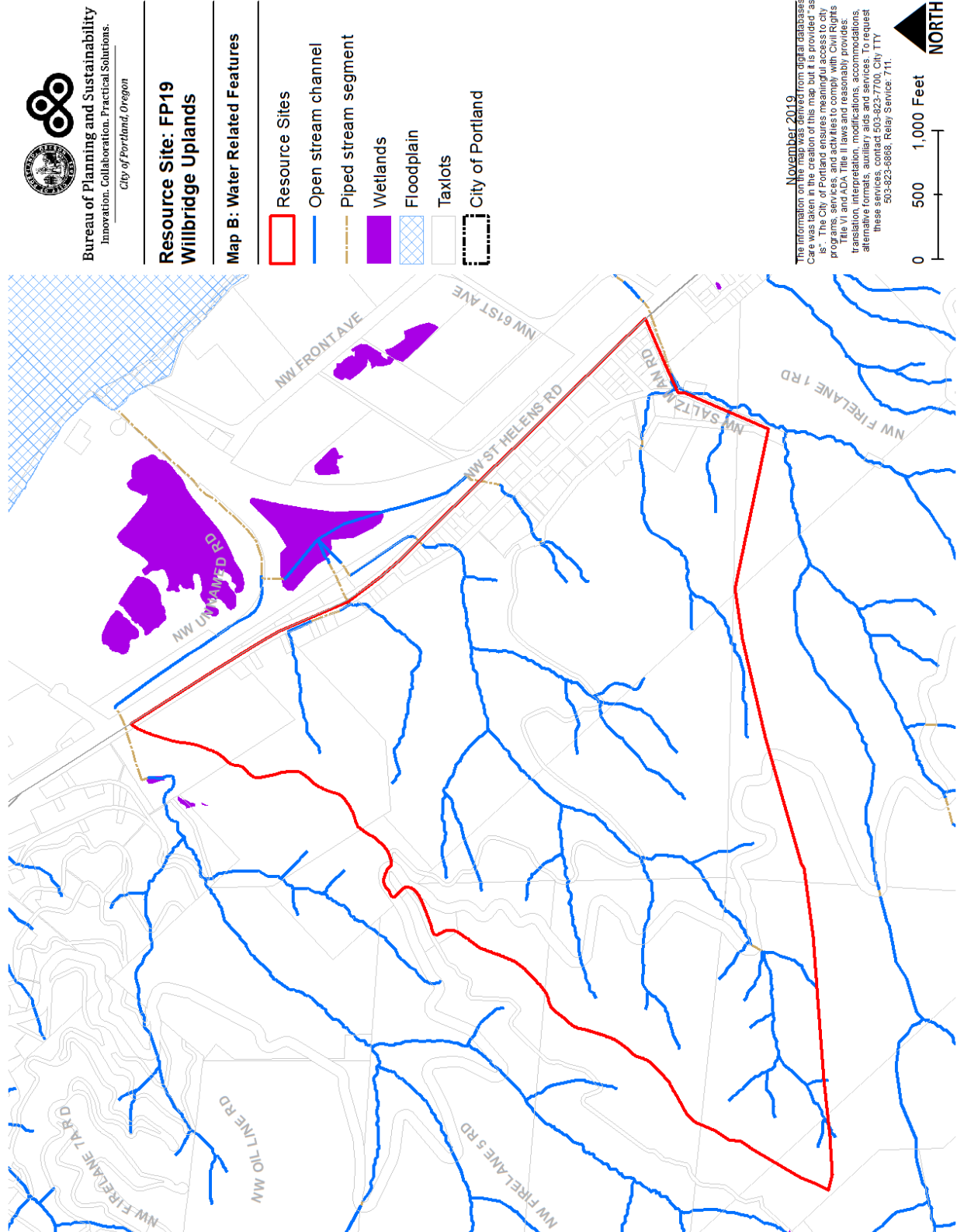
ESEE Decisions

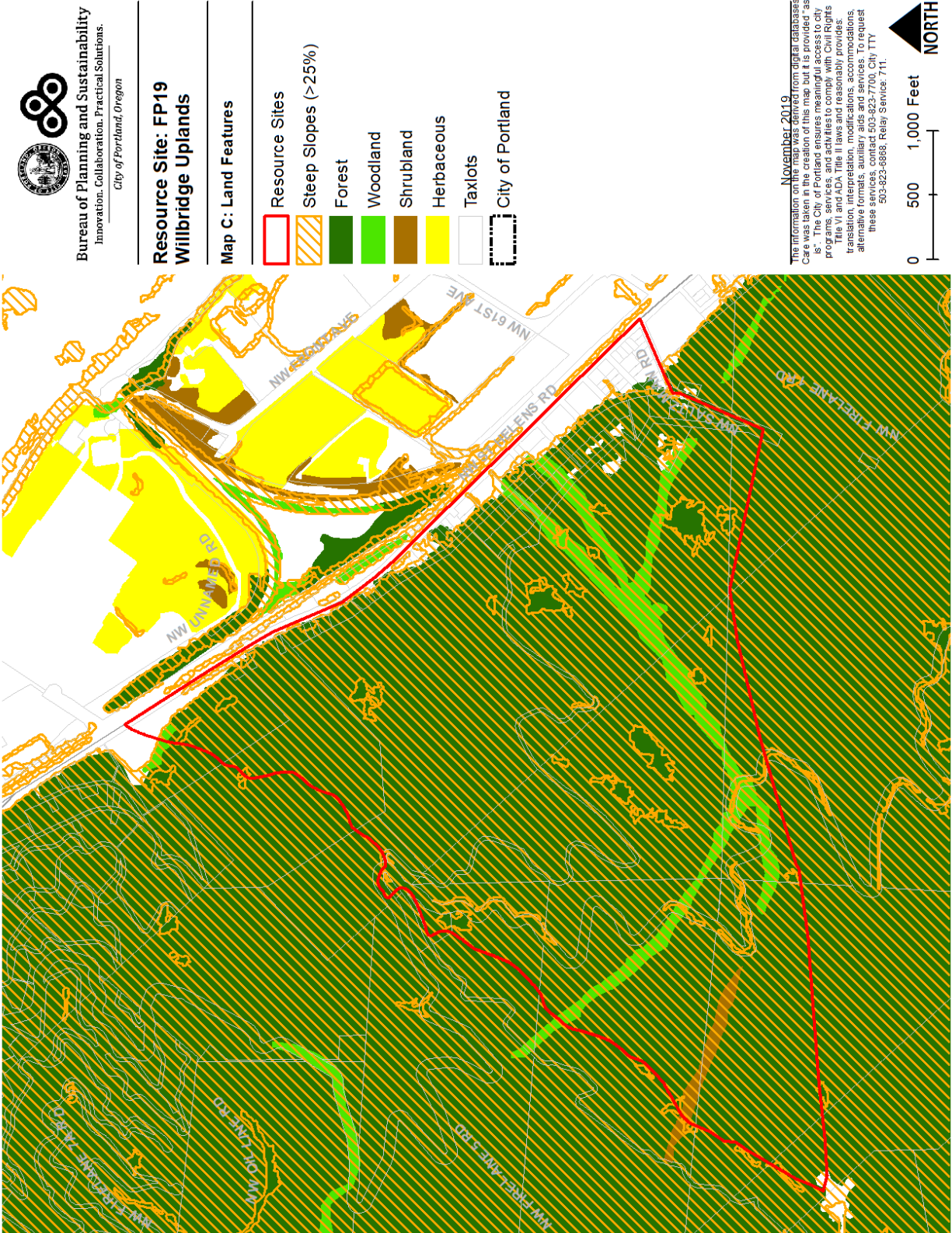
Based on the ESEE general recommendations (Volume 2) and resource site-specific ESEE, the ESEE decisions for Resources Site FP19 are:

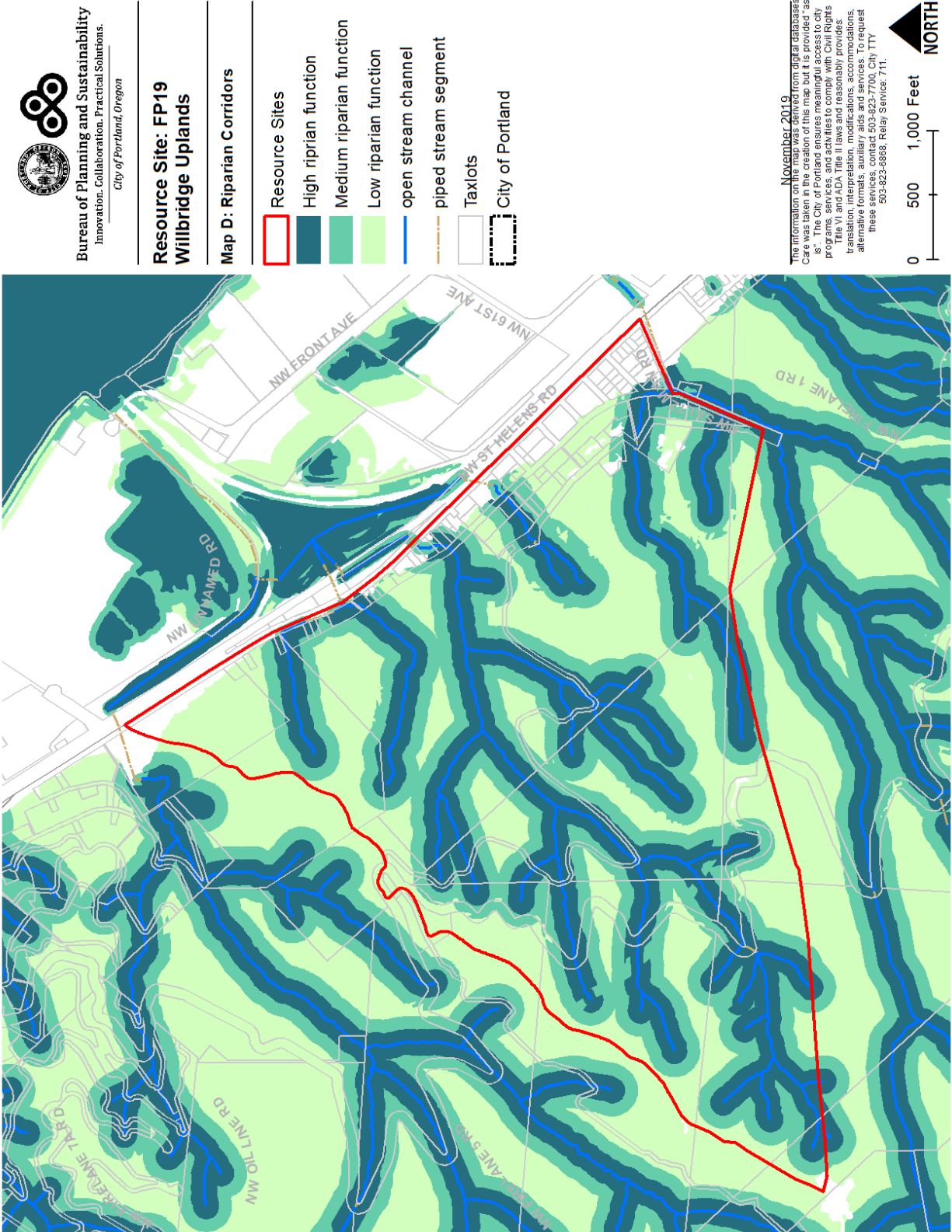
1. *Strictly limit* conflicting uses within stream channels from top-of-bank to top-of-bank and land within 25 feet of stream top-of-bank.
2. Within public parks, *strictly limit* conflicting uses on land between 25 and 50 feet of stream top-of-bank and within areas of forest, woodland, shrubland or 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.

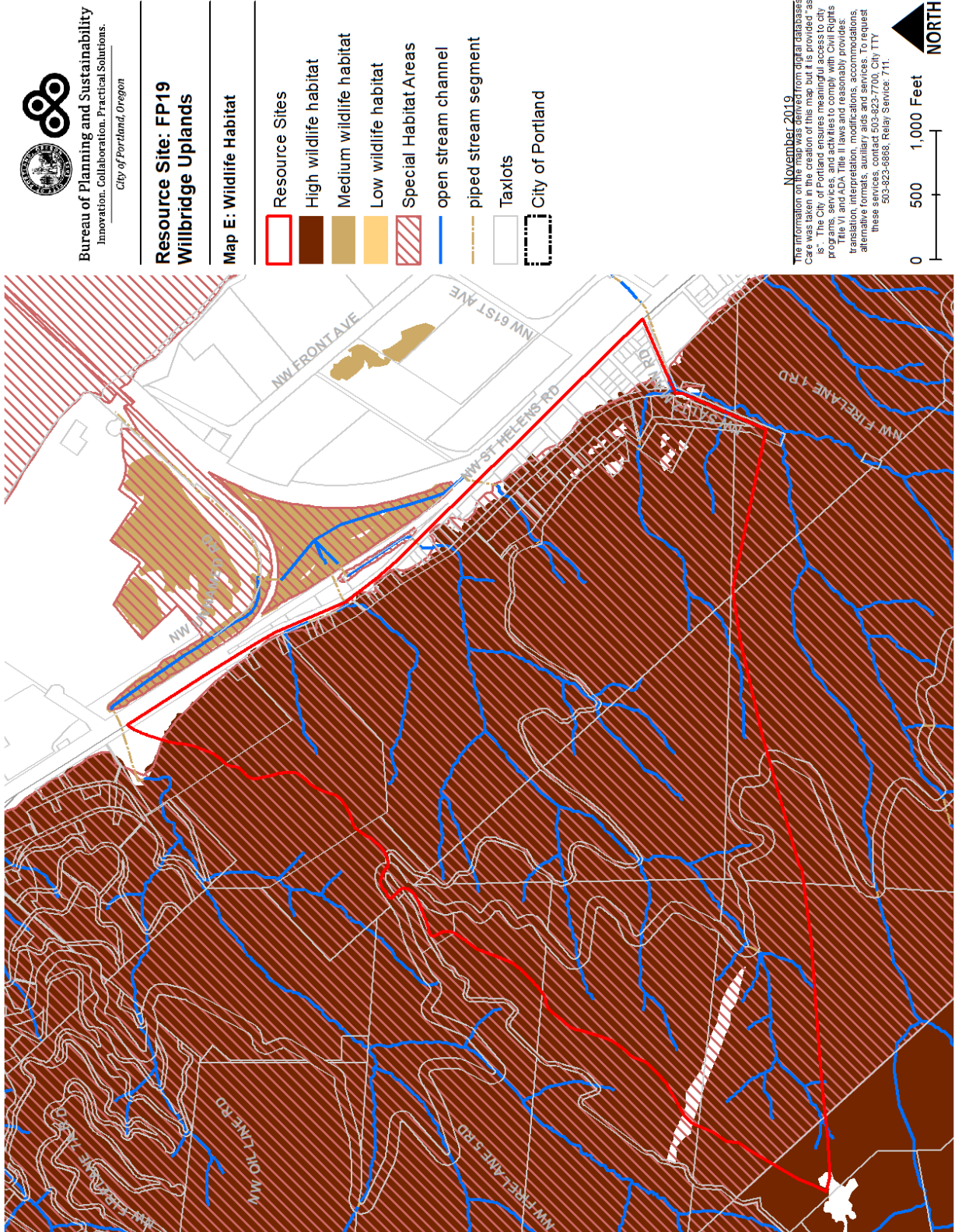
Table C: ESEE Decision for Resource Site FP19	
ESEE Decision	Acres
Strictly Limit	341.9
Limit	13.5
Allow	17.5



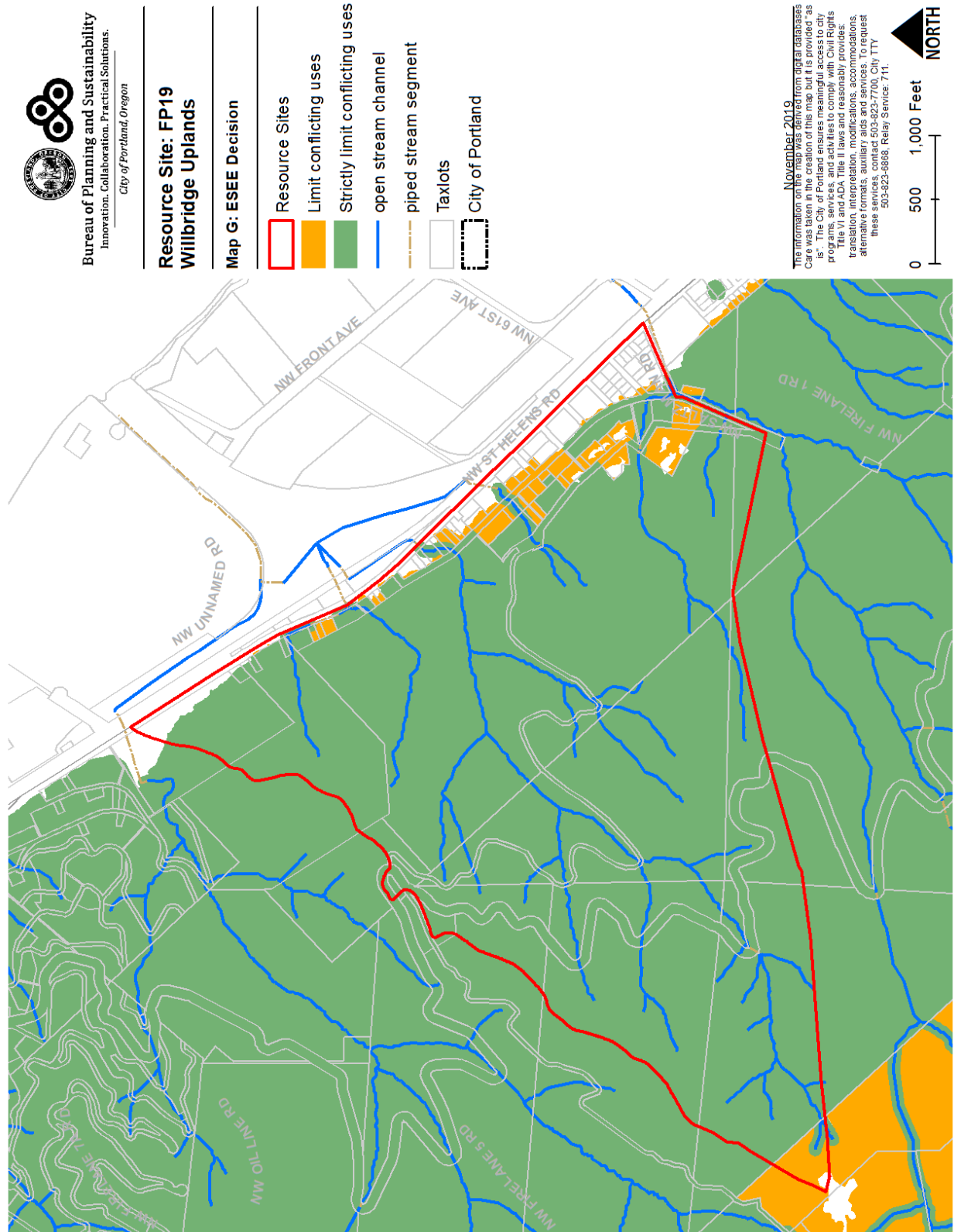






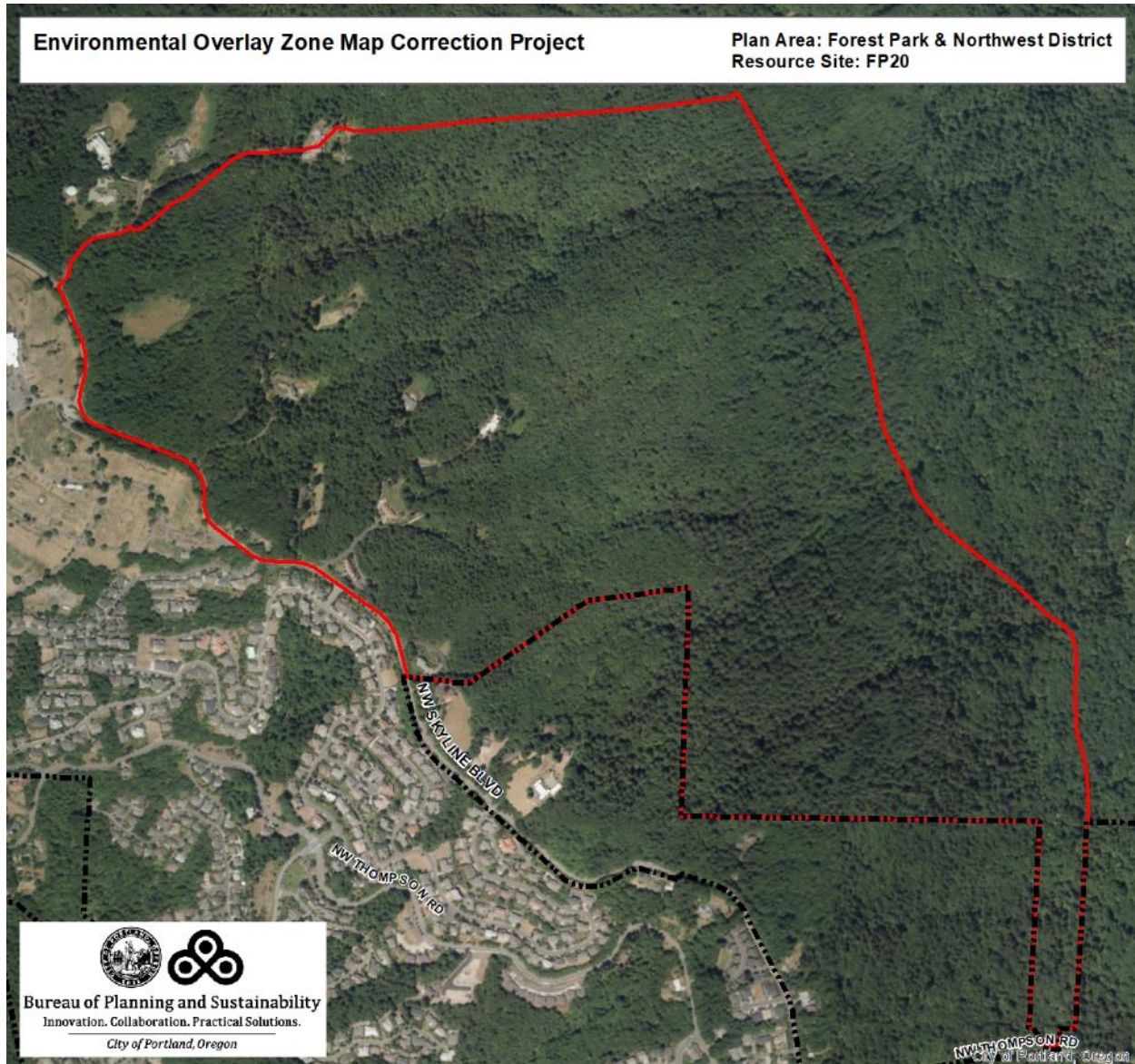






Resource Site No.: FP20 Resource Site Name: Saltzman Creek

Previous Plan: Northwest Hills Natural Areas Protection Plan **Previous Resource Site No.:** 90



Natural Resources Inventory

Table A: Quantity of Natural Resource Features in Resource Site FP20	
	Study Area
Stream (Miles)	0.5
Wetlands (acres)	0.0
Vegetated Areas >= 1/2 acre (acres)	402.7
Forest (acres)	397.9
Woodland (acres)	0.0
Shrubland (acres)	0.0
Herbaceous (acres)	4.7
Flood Area*	0.0
Vegetated (acres)	0.0
Non-vegetated (acres)	0.0
Steep Slopes (acres)**	385.9
Impervious Surface (acres)	6.5
* 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 four primary drainages that pass through this site form the headwaters of Saltzman Creek. The vegetative cover is predominantly second growth western hemlock forest with mid-aged conifer to the south and hardwood with young conifer in the central and northern portions of the site. Interspersed with these two larger forest stands are patches of conifer topping hardwood and shrub vegetation stages. Forest cover protects watershed resources, serves as habitat for wildlife and provides open space, scenic and recreational resources. Downed logs and woody debris found at the site are critical structural and functional components of the watershed ecosystem, particularly in the headwaters region.

Rare plants in the area include two species of coral-root (*Corallorhiza mertensiana* and *C. striata*) and the only known occurrence of calypso orchid (*Calypso bulbosa*) in the plan area. An uncommon *Arbutus menziesii*/*Corallorhiza striata* community is present at this site. Also present at this site is the only known native white fir (*Abies concolor*) specimen in the plan area.

This site provides medium to high quality food and cover habitat for wildlife. The Saltzman Creek headwaters provide an important upland water source. Bird species sited in the area include pileated woodpecker, Cooper's hawk, Oregon junco and kinglets. Interspersion with surrounding habitat allows for free migration of wildlife; several game trails cross the site at lower elevations.

Table B: Quality of Natural Resource Functions in Resource Site FP20				
Resource Site (acres) = 410.689535				
	High	Medium	Low	Total
Riparian Corridors*				
acres	154.2	128.4	119.3	401.8
percent total inventory site area	37.5%	31.3%	29.0%	97.8%
Wildlife Habitat*				
acres	397.9	0.0	0.0	397.9
percent total inventory site area	96.9%	0.0%	0.0%	96.9%
Special Habitat Areas**				
acres				205.8
percent total inventory site area				50.1%
Combined Total⁺				
acres	397.9	0.2	3.6	401.8
percent total inventory site area	96.9%	0.1%	0.9%	97.8%
<p>* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include open water.</p> <p>** Special Habitat Areas rank high for wildlife habitat.</p> <p>+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 FP20 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 plant 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. 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 FP20, 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.

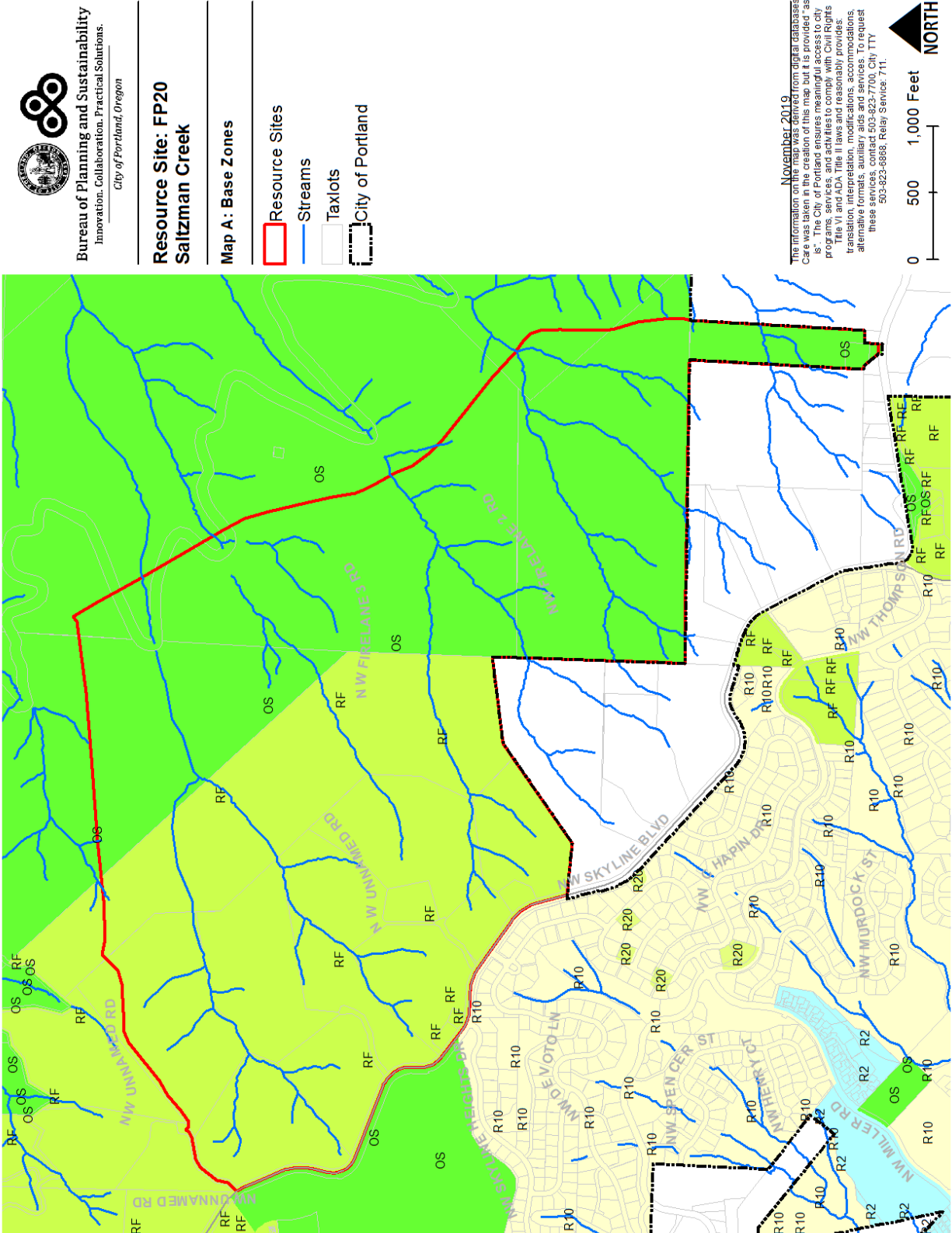
Steep slopes are susceptible to erosion and landslides. Development should be clustered away from steep slopes and trees and vegetation should be maintained to reduce the landslide risks. New or expanded development on steep slopes should be *limited*.

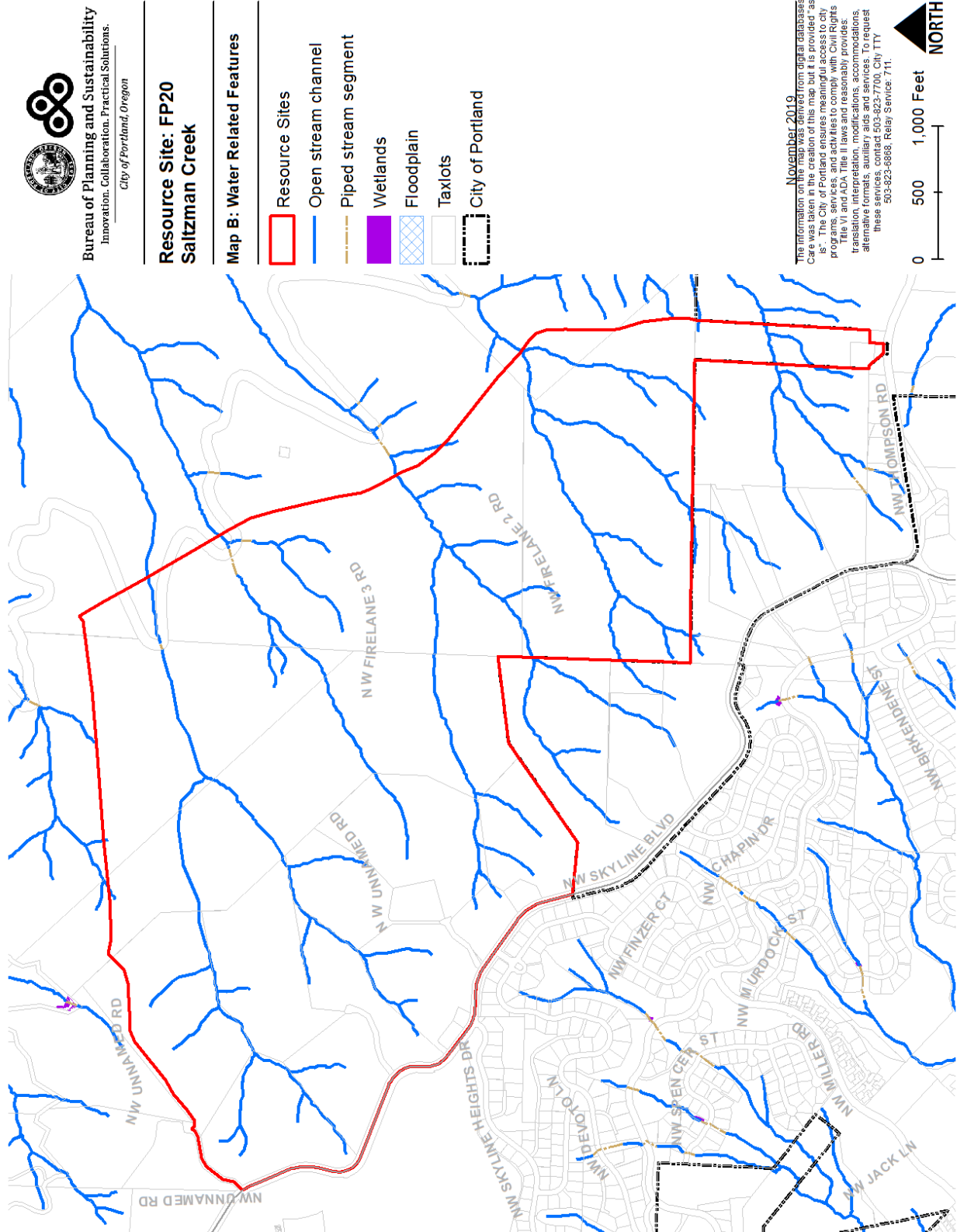
ESEE Decisions

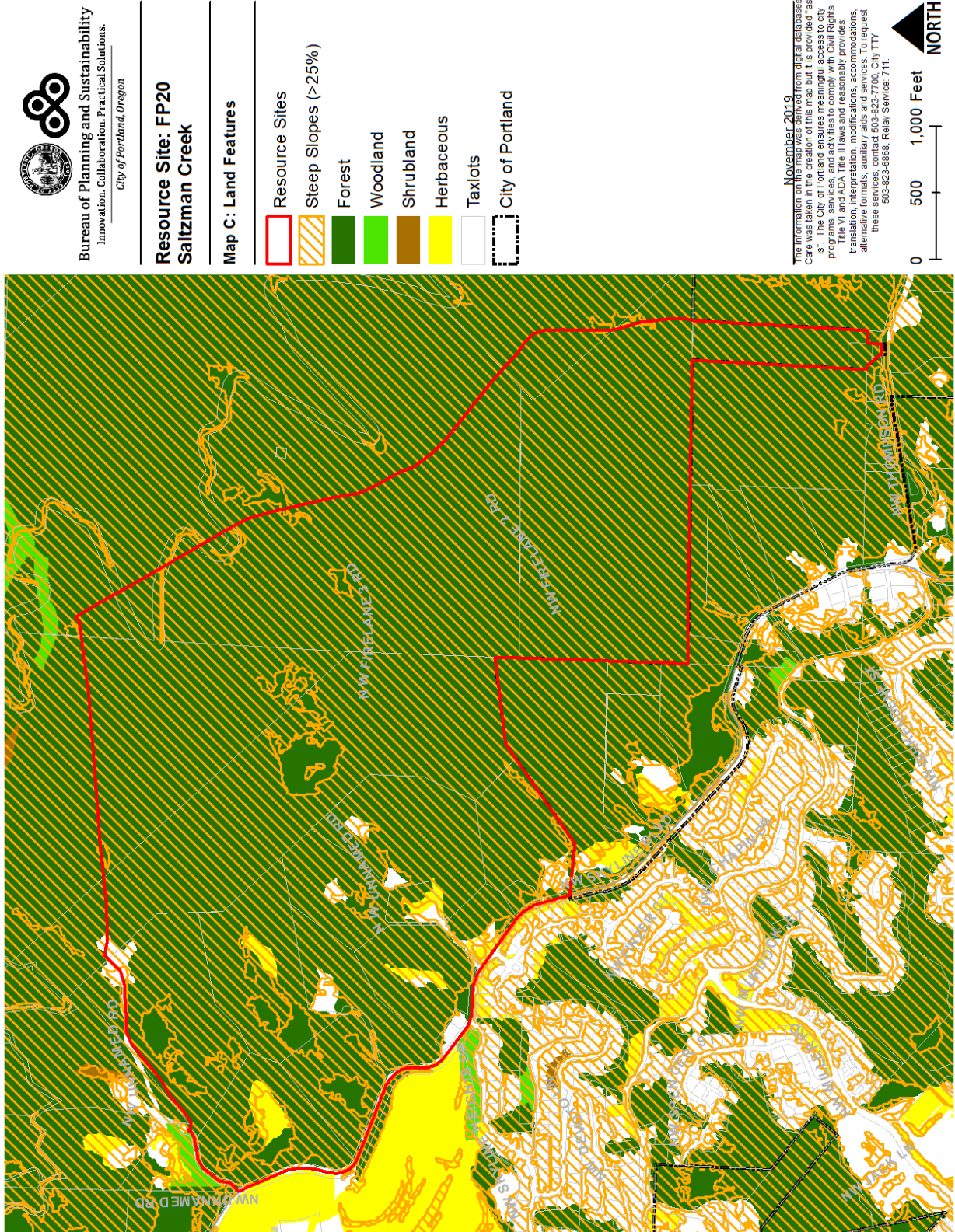
Based on the ESEE and general recommendations (Volume 2) resource site-specific ESEE, the ESEE decisions for Resource Site FP20 are:

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. 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.
3. 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.
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.

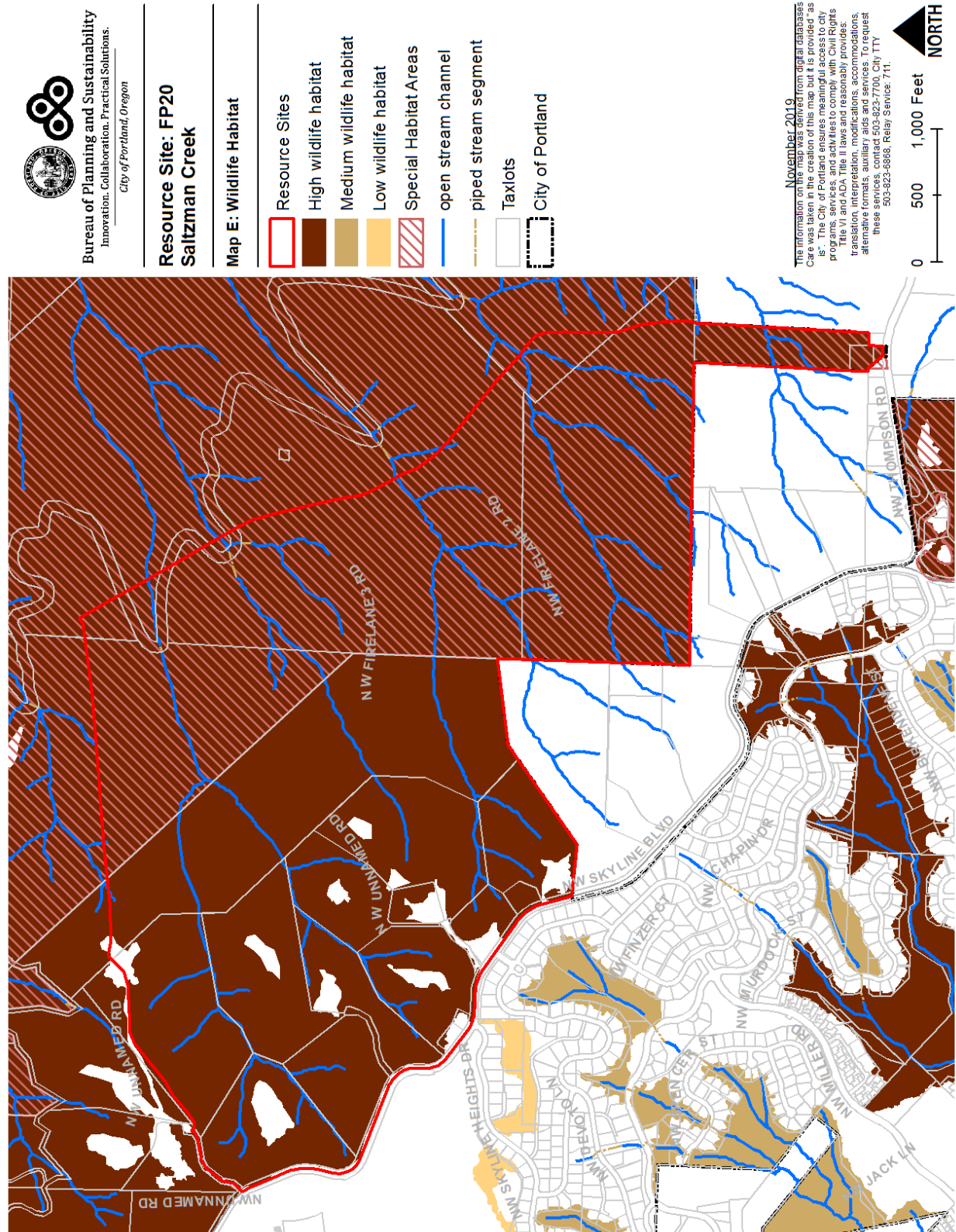
Table C: ESEE Decision for Resource Site FP20	
ESEE Decision	Acres
Strictly Limit	242.3
Limit	149.7
Allow	18.7



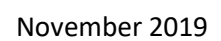












The *Environmental Overlay Zone Map Correction Project* plan documents:

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.