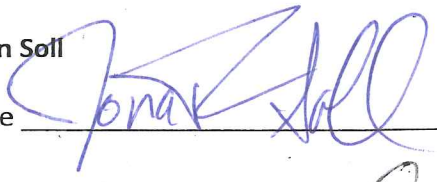
Fern Hill Forest

Approvals for Site Conservation Plan

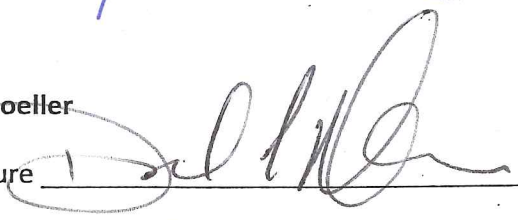
Date first routed: 1/15/15

Please return to Lori Hennings (Primary author: Kate Holleran)

Jonathan Soll

Signature  Date 1/23/15

Dan Moeller

Signature  Date 1/26/15

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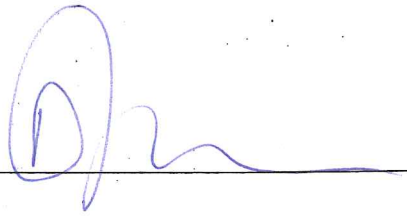
Signature  Date 1/28/15

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Fern Hill Forest Natural Area Site Conservation Plan

SECTION 1: INTRODUCTION

Context

Fern Hill Forest (FHF) Natural Area is located three miles south of Forest Grove, Oregon within the Tualatin River Watershed (Figure 1 Vicinity Map). The Tualatin River Watershed encompasses 712 square miles, running from the Oregon Coast Range to the Willamette River south of the City of Portland. The Tualatin River flows into the Willamette River approximately 28 miles upstream from its confluence with the Columbia River.

FHF is in the upper portion of the watershed, in the foothills above the Wapato Valley. The natural area includes the peak of Fern Hill, which is one of the points of recognition along the northwestern Chehalem Mountains. The Chehalem Mountains span from Newberg west to the Coast Range and north to Forest Grove.

Several other Metro properties are located in close proximity to FHF: Penstemon Prairie is immediately north, separated only by SW Fern Hill Road. This property is primarily within the Tualatin River floodplain and is composed largely of wetlands, wet prairie, and riparian forest. Chehalem Ridge Natural Area is approximately one mile southeast within the Chehalem Mountains and has similar vegetation communities to FHF.

FHF is an important connection between the Chehalem Ridge and the Wapato Valley. The hills are ringed with rural residential, timber harvest and agricultural land uses, with few remaining open spaces to provide a variety of habitat types. Two small intermittent streams originate within the site, providing seasonal habitat for amphibians, mammals and a resource for migrating birds. Conservation of the forested area will aid in protecting steep hillslopes from erosion, thus also providing better water quality. Further, Willamette Valley oak habitat has significantly declined since the beginning of fire suppression. FHF provides opportunities for restoring oak woodland habitat and the variety of species it supports.

No formal restoration planning has begun for the majority of FHF however stabilization work has occurred as documented in the Sandstrom stabilization plan.

Planning Area

FHF is a 262-acre natural area located in the Upper Tualatin Watershed in Washington County, consisting of three properties (Figure 2 Site Map). The natural area extends from SW Fern Hill Road south to SW Sandstrom Road, lying west of Spring Hill Road and the Tualatin River. The Fern Hill

Forest site includes the following tax lots: 1S318000500, 1S318000600, 1S319000500, 1S319000400.

The Fern Hill Forest Natural Area Site Conservation Plan (Conservation Plan) is a tool for protecting and enhancing the unique characteristics of the site while allowing access by the public. This Conservation Plan includes an overview of the site's history, existing conditions, conservation targets and recreation and access objectives for the site. Maps, figures and photographs from the May 2014 site visit are located in Appendix A-1.

Key Metro Staff

Kate Holleran, senior natural resources scientist
Peter Guillozet, senior natural resources scientist
Elaine Stewart, senior natural resources scientist
Ryan Jones, natural resources specialist
Nathaniel Marquiss, natural resources technician
Laurie Wulf, property management specialist
Tom Heinicke, real estate negotiator

Private Landowners/Private Leasing Agreements

There are two leases for agriculture use within the natural area and one leased residence. The first use is a 100-acre hazelnut farm that is in the first year of a 10-year lease set to expire or be renegotiated in 2024. The hazelnut trees are currently stressed and by the end of 2015 a decision will be made by the lessee regarding whether to continue with the farm. The second lease is with Lovejoy Center (Hally Hayworth) who sub-leases a three acre parcel to Manuel Sosa for vegetable production.

The residence can be accessed via Sandstrom Road. Metro owns the house and rents it on an annual basis. The driveway is also on Metro property and neighboring homes have right-of-way agreements that allow them use of the driveway.

Existing Planning Documents

Stabilization plans exist for the Sandstrom and LynScot parcels acquired in 2012.

SECTION 2: EXISTING CONDITIONS

Land use at FHF consists of open space/natural areas (58 percent), agriculture (40 percent), and residential (2 percent). Land use in the vicinity is similar but with several rural residences along Sandstrom Road to the south. Impervious surfaces are minimal on-site and include residential areas as well as compacted, dirt access roads.

2.1 Geology and Soils

Much of the landscape of the Wapato Valley is influenced by the historic Missoula floods, which deposited alluvium on the valley floor 10,000-15,000 years ago (O'Connor et al. 2001). Historically, water flowed from the surrounding hillslopes into the valley where lakes, wet prairies, wetlands and streams arose and formed multiple channels and drainages down to the Tualatin River. Fern Hill Forest lies in the foothills above the Tualatin River floodplain. Approximately 71 acres (over 25 percent) of the natural area has slopes steeper than 25 percent, primarily consisting of silt loams that are moderately to well drained (over 90 percent). Soils mapped for the planning area are summarized in Table 1 and shown in Figure 3.

Table 1: Mapped soil units for Fern Hill Forest

Map soil symbol	Map unit name	Description
1	Aloha silt loam	Somewhat poorly drained soils formed in alluvium or lacustrine soil on broad valley terraces. Slopes of 0-3%. Where not cultivated, vegetation is mainly Douglas-fir and some Oregon white oak, shrubs, forbs, and grasses.
7 B,C	Cascade silt loam	Somewhat poorly drained soils that formed in silty loess and old mixed alluvium on uplands. Slopes of 3-12%, on uplands and on smooth or rolling, convex ridge tops. Where not cultivated, vegetation is Douglas-fir, western redcedar, bigleaf maple, salal, red huckleberry, vine maple, swordfern, grasses, and forbs.
11 C, D, E, F	Cornelius and Kinton silt loams	Moderately well drained soils that formed in loesslike material over fine-silty, old alluvium of mixed origin on uplands. Slopes of 7-60%. Where not cultivated, vegetation is Douglas-fir, bigleaf maple, shrubs, and grasses.
28 B, C, D	Laurelwood silt loam	Well drained soils that formed in silty, eolian material overlying fine textured materials on uplands. Slopes of 3-20%. Where not cultivated, vegetation is Douglas-fir, bigleaf maple, Oregon grape, and hazelbrush.
31 E, F	Melbourne silty clay loam	Well drained soils that formed in residuum and colluvium weathered from sedimentary rock on uplands. Slopes of 20-60%. Vegetation is Douglas-fir, Oregon white oak, poison-oak, wild rose, shrubs, and forbs.
37 A	Quatama loam	Moderately well drained soils that formed in mixed, loamy alluvium on old terraces. Slopes of 0-3%. Where not cultivated, vegetation is Douglas-fir, western redcedar, Oregon white oak, ash, Oregon grape, grasses, and forbs.
38 B, C, D, E, F	Saum silt loam	Well drained soils that formed in mixed eolian material, old alluvium, and residuum from basalt on uplands. Slopes of 2-60%. Where not cultivated, vegetation is Douglas-fir, Oregon white oak, hazelbrush, poison-oak, grasses, and forbs.
45 B, C	Woodburn silt loam	Moderately well drained soils that formed in old alluvium on low, broad valley terraces. Slopes of 3-12%. Where not cultivated, the vegetation is Douglas-fir, Oregon white oak, grasses, and shrubs.

2.2 Precipitation and Streams

The upper Tualatin project area is a wet region, with annual precipitation of approximately 46 inches. There are two primary intermittent streams located within FHF, one draining hillslopes and flowing north towards SW Fern Hill Road (north drainage) and the second on the southern side of the ridge draining southward towards Sandstrom Road (south drainage). See figure 4. A third drainage flows across the northeast corner of the planning area, but it is not discussed in detail because it only occupies a very small portion of the natural area site. The vast majority of its

drainage basin is outside of the FHF natural area. This northeast corner is identified as riparian forest. See Figure 4 Streams.

North drainage

The headwaters of the north drainage consist of mixed upland forested hill slopes, dominated by bigleaf maple (*Acer macrophyllum*) with some Douglas-fir (*Psuedotsuga menzesii*) trees, and an understory of snowberry (*Symphoricarpos albus*), beaked hazelnut (*Corylus cornuta*), cascara (*Rhamnus purshiana*), willows (*Salix spp.*), red elderberry (*Sambucus racemosa*), swordfern (*Polystichum munitum*), grasses and forbs. Many non-native species are present, including large areas of reed canarygrass (*Phalaris arundinacea*), common velvetgrass (*Holcus lanatus*) and sweet cherry (*Prunus avium*).

The steep hillslopes converge to form a small intermittently flowing stream channel that flows for approximately 2,000 feet to the north-northwest towards Fern Hill Road. The stream has an active channel width of approximately 1.5 to 3 feet. The stream channel flows through a series of wetland pockets with good floodplain connectivity and some small woody debris, while other sections are entrenched stream channel between steeply sloped stream banks. The streambed substrate is primarily silty material with some small gravels present in the lower reaches of the channel.

Approximately 400 feet upstream of Fern Hill Road, the stream enters a 12-inch diameter pipe, where it was historically piped through the former homestead lot towards the downstream wetland. A section of this old pipe has collapsed or become clogged, causing a portion of the stream flow to emerge from the ground and flow on the surface to the north. A small drainage ditch appears to have been recently excavated to convey water northeast towards a roadside drainage ditch on the south side of Fern Hill Road. The drainage ditch flows east along the road and makes a sharp turn at a utility pole, passing through an 18-inch diameter culvert beneath Fern Hill Road before draining north into the wetland at Penstemon Prairie.

The north drainage has an estimated watershed area of 0.095 square miles, or approximately 61 acres, above a watershed point at the Fern Hill Road crossing. The drainage has a mean basin slope of 11.2 degrees. An estimate of potential Q_2 event flow in the stream channel is approximately 6.39 cubic feet per second and an estimate of potential Q_{100} event flow is approximately 17.6 cfs (Stream Stats 2014).

The culvert crossing Fern Hill Road is undersized and the road has been known to flood. Water runs east along the road, turns north and enters into the wetland at Penstemon Prairie. The culvert may be undersized, contributing to the flooding.

South drainage

The headwaters of the south drainage originate within the hazelnut orchard. Any original stream channels within this area have been graded over, and it appears that a network of buried clay pipe drain tiles is present in the orchard drainage paths. Several small sinkholes provide evidence of these clay pipes, some of them broken and collapsed. At least two drain tile pipes combine at an

open junction manhole near the southwest corner of the middle orchard block. From this point, the stream was historically piped, in a 12-inch diameter concrete pipe, for approximately 1,800 linear feet to the south, where it discharges into a drainage ditch along Sandstrom Road. Several sections of the concrete pipe have failed, creating large sinkholes and daylighting small sections of stream. These areas are actively eroding, with several major headcuts or drops contributing fine sediment to the stream.

In areas where the stream has become exposed, the channel is approximately 2 to 3 feet wide and is severely incised due to the invert elevations set by the buried pipe sections of the stream. The streambed substrate consists primarily of silty material with some small gravels and fragments of broken clay pipe.

Vegetation along the south drainage is mostly comprised of maintained hazelnut orchard in the headwaters, with minimal understory vegetation. In the location where the drain tiles appear to converge, there is a wet area dominated by common horsetail (*Equisetum arvense*), common velvet grass (*Holcus lanatus*), Watson's willowherb (*Epilobium watsonii*), curled dock (*Rumex crispus*), reed canarygrass, and recently planted shrubs including salmonberry (*Rubus spectabilis*) and Pacific ninebark (*Physocarpus capitatus*). This area includes several sinkholes exposing buried portions of the stream, as well as sections where surface water is flowing towards the next sinkhole. Downstream of the orchard access road, the stream emerges again where it flows through the center of the valley towards Sandstrom Road in alternating buried and exposed sections. The vegetation in this lower section is primarily pasture grasses with weedy species including reed canarygrass, Canada thistle (*Cirsium arvense*), Watson's willowherb, common dandelion (*Taraxacum officinale*) and some Armenian blackberry (*Rubus armeniacus*). The adjacent slopes have been recently planted with native trees and shrubs.

The south drainage has an estimated watershed area of 0.15 square miles, or approximately 96 acres, above a watershed point at the Sandstrom Road crossing. The drainage has an average basin slope of 6.61 degrees. An estimate of potential Q_2 event flow in the stream channel is approximately 7.54cubic feet per second and an estimate of potential Q_{100} event flow is approximately 21 cubic feet per second(Stream Stats 2014).

2.3 Vegetation and Wildlife

Historic vegetation and land use

The Oregon Natural Heritage Program has compiled a statewide composite GIS shapefile of historic vegetation based on 1851 General Land Office survey records. This data set identifies three vegetation types for the FHF natural area site. The hilltop area currently occupied by hazelnut orchard and the south drainage are identified as "Oak Savanna." The steep slopes and ravine of the north drainage are identified as "Douglas Fir" forest. The eastern portion of the site including Fern Hill and the northeastern quarter of the property are identified as "Oak-Douglas Fir" mixed

woodland. Reviews should be aware that a known weakness of the "pre-settlement map" is that due to its relatively course scale, it fails to represent riparian corridors and small patches of other habitat types within the matrix.

The Washington County Soil Survey indicates that the site was historically vegetated with Douglas-fir, bigleaf maple, western red cedar, Oregon white oak, salal, red huckleberry, vine maple, Oregon grape, hazelbrush and swordfern.

Historically, the Chehalem Ridge located nearby to the south was dominated by oak woodlands, conifer forest, oak savanna and prairie. Currently, the ridge has more rural residential uses, resulting in fire suppression, reduction in oak habitat and increase in conifer forest.

The Upper Tualatin watershed was originally inhabited and heavily used by Native Americans, primarily the Atfalati (also known as Tualatin) tribes of the Kalapuya. Encampments existed around Wapato Lake, but they also lived in the hills around Forest Grove.

The Wapato Valley has been influenced by a number of land management decisions since heavy settlement began in the mid-1800s. Many of the small tributaries that existed as swales, connecting wetlands and prairies across the valley, were ditched and consolidated to drain agricultural areas. See Figure 5 Historic Vegetation.

Wildlife

FHF supports a variety of resident and migratory species typical of the Tualatin Basin. Wildlife observations made during spring 2014 field work, as part of preparing this conservation plan, consisted mainly of birds; however, several species of native amphibians, reptiles and mammals are expected to inhabit the site at least seasonally. Songbird species observed in the hazelnut orchard during the spring of 2014 include American Robin, Scrub-jay, House Finch and Cedar Waxwing. A pair of red-tailed hawks was seen circling near the upland forest where they may be nesting. Songbirds seen and/or heard in the riparian habitat along the north drainage include the spotted towhee, Wilson's warbler and the song sparrow. No birds were seen or heard in the dense Douglas fir grove in the southeastern portion of the study area. Neotropical migratory birds expected to use the riparian forest and edges as stopover habitat include orange-crowned warbler, yellow warbler, Swainson's thrush and black-headed grosbeak.

No anadromous or native resident fish are mapped for the small streams on-site (south drainage or north drainage) (StreamNet 2014). Fish habitat is extremely limited or absent due to the intermittent flow in the streams and extensive piping.

Native amphibians expected to breed on-site include the Pacific chorus frog and terrestrial salamanders such as the ensatina. Pacific chorus frogs can breed in shallow, slow-moving puddles which are present in the north drainage. No permanent or deep water is present on-site that would support other pond breeding amphibians or turtles.

Natural Resources of special interest

Historic vegetation data indicate that the hazelnut orchard was oak savanna. Restoration of the 100acre orchard to oak habitat would be a significant addition to efforts to restore native habitats connecting Chehalem Ridge to the Tualatin River floodplain.

2.4 Site Management

Recent Management History

The Fern Hill Forest Natural Area is composed of three separate land acquisitions. The first property consists of two tax lots totaling 69.4 acres along SW Fern Hill Road that was part of the Penstemon Prairie Natural Area acquisition. The second property, totaling 152.6 acres, is along Sandstrom Road and was acquired in 2012. The third property totals 39.9 acres and was also recently acquired.

Site management began upon acquisition of the first property and includes invasive weed control and removal, replanting or re-seeding with natives and thinning dense wooded areas. Management activities have also included removing debris and fencing. A summary of management activities is presented in Table 2 (also see Figure 6).

Table 2: Management Summary

Year	Location	Treatment
2012	Lynscott	English Ivy treatment (both ground and in trees)
		Vinca treatment
		Fence and debris removal
		Field mow
		Boundary survey
		Blackberry cut (missed spraying the re-sprout in Aug/Sept)
		Scotch broom cut
		Seeded cut blackberry areas and their soil where buildings used to be (60% *Deschampsia elongata*, 30% *Agrostis exarata*, and 10% *Prunella vulgaris*)
2013	Sandstrom	Bare root planting
	Lynscott	Seedling release (circle sprays)
		Vinca and English Ivy treatments
	Sandstrom	Blackberry cutting
		Scotch broom cutting
		Invasive woody tree treatment (cherry, holly, hawthorn)
		Maple clump thinning (stump sprout)
		Oak release
	Sandstrom	Douglas fir plantation thinning

		Blackberry and other broadleaf treatments
		Invasive woody tree treatment (cherry, holly, hawthorn)
	Lynscott	Oak release
		Japanese knotweed treatment, Reed canarygrass treatment
		Blackberry re-sprout spray
	Sandstrom	Seeded treated blackberry areas, bare soil, and large thinning gaps (90% *D. elongata* and 10% *P. vulgaris*)
		Seeded heavily thinned units with a mix of *D. elongata*, *Hydrophyllum tenuipes*, *Carex leptopoda*, *Tolmiea menziesii*, *Osmorhiza chilensis*, *Adenocaulon bicolor*, *Nemophila parviflora*s
2014	Sandstrom	Bare root planting
	Lynscott	Bare root planting
- ---	Former	Agricultural lease monitoring
	Penstemon	Installation of access gate on Fern Hill Road
	Prairie	Invasive woody species control
	parcel*	Boundary survey
		Oak establishment and woodland thinning
		Routine boundary monitoring, posting of no-hunting signs
		*Level of detail differs from new property due lack of consolidated record keeping prior to development of Terramet.

Invasive species management

Invasive plant species can impact the habitat values for which land is conserved. Careful management can minimize these negative impacts. Metro has initiated an early detection and rapid response (EDRR) program for invasive species including false brome and garlic mustard which have been documented in the area. EDRR species will be controlled by hand pulling or herbicide application as they are detected in the natural area. Other invasive plant species will be controlled as part of restoration projects or ongoing management of habitat areas.

Long term stewardship (site maintenance)

Metro's Natural Areas Program is committed to long term stewardship of the Fern Hill Forest Natural Area. Metro staff will visit the site multiple times each year to monitor the natural resource condition. As determined necessary by staff, specific treatments or actions will be implemented to ensure that the health and condition of the natural area are maintained. Some periodic stewardship actions implemented by Metro staff include visits to monitor for illegal use of the site, clean up of illegal dumping, assess for fire safety, replace signage and respond to complaints.

2.5 Access and recreation

Public access

To date there has been no formal master plan developed to help identify appropriate levels of public access and use at Fern Hill Forest Natural Area. There are no currently mapped recreational uses and the site is gated and fenced as appropriate to minimize public use.

Programmatic access (education and volunteers)

There are no current uses of this natural area for education and no current volunteer activities.

2.6 Natural Resources of Special Interest

Natural resources of special interest on site include remnant oak habitat along the ridge east of the headwaters of the north drainage. Several mature oaks were growing with bigleaf maple and Douglas fir over a dense shrub layer of California hazelnut and Indian plum. Additionally, Fern Hill Natural Area is one of several large blocks of natural areas reaching from the Tualatin River to Chehalem Ridge.

Archeological resources

No formal archeological surveys have been completed at this site.

SECTION 3: CONSERVATION

3.1 Conservation targets and key ecological attributes

The habitat conservation targets represent the major habitat types present at the site. The site's habitat diversity and connectivity at the landscape level can help conserve rare and at-risk species and prevent decline of currently common native species.

The four conservation targets selected for the site include riparian forest, upland forest, and oak woodland. These target habitats are briefly described in Table 3 and shown on Figure W1 (Appendix A-1). Acreages of existing cover types, conservation targets and stewardship types are presented in Table 4 (also see Figures 7-10).

Table 3. Non-technical status and DFC of Fern Hill Forest conservation targets.

Target	Current condition	Desired future condition
Riparian forest – South Drainage	Overall the riparian habitat is in poor condition; it lacks a shrub and canopy layer, although bare root plantings have recently been installed. Floodplain connectivity is poor because the channel is piped in several sections or is incised where open. Down wood is absent.	The desired riparian width is 50 to 100 feet given the surrounding steep slopes and narrow valley. The desired shrub and tree layer cover is good to very good. With significant restoration, good to very good floodplain connectivity can be achieved.
Riparian forest – North Drainage	Riparian habitat along the North Drainage is generally good. The width is good to very good and tree canopy cover is generally good, but poor in areas east of the drainage (this area is the old home site, where compacted soils make it difficult to establish trees and shrubs). Native shrub cover is good, but several areas are fair and could benefit from native plantings. Down wood is limited and small in size. Floodplain connectivity is fair to good, but absent where piped for the lowest 400 feet on site.	Desired future conditions are good to very good: floodplain connectivity could be improved by daylighting the lower reach, and down wood could be placed in a few areas along the drainage.
Upland forest	A majority of the Upland forest is in good condition, with the exception of the Douglas fir grove. Canopy trees provide good cover, but the shrub layer is absent or sparse in some areas. Few mature trees (>24 in) are present and down wood and snags are lacking. There are individual and small clumps of Oregon white oak embedded in the Douglas-fir dominated upland forest	Desired future conditions include establishing a healthy native shrub layer and thinning the Douglas fir stand to promote larger trees. Snags of varying sizes and down wood would benefit several species. Maintain individual and clumps of oaks where practical within the conifer matrix.
Oak Woodland	A small oak woodland exists in the northeast corner of the property. The stand has been thinned to reduce competition from Douglas fir. The understory is dominated by non-native grasses. Oak Woodland is planned for the hazelnut orchard and for the Northeast portion of the site, part of which is currently in agricultural use.	Oak-dominated woodland with 30 to 60% cover is desired with limited encroachment by Douglas firs and other species. The herbaceous layer would have a minimum of 20 and up to 39 native species.

Table 4. Summary of current cover, conservation targets and status, and stewardship type

Stewardship type	Acres
Developed	1.59
Riparian Forest	8.56
Upland forest	133.75
Woodland	118.26
Grand Total	**262.16**

Conservation target	Acres
Riparian Forest	13.77
Oak Woodland	113.05
Upland forest	135.34
Grand Total	**262.16**

Conservation target status	Acres
0 - Pre-Initiation	88.39
1 – Initiation	25.91
2 - Establishment	71.00
3 – Consolidation	69.67
4 - Refinement & long-term maintenance	5.60
9 - No targets (developed)	1.59
Grand Total	**262.16**

Current cover	Acres
Agriculture	88.39
Riparian Forest	8.56
Upland forest – mixed	109.98
Upland forest – coniferous	19.76
Upland forest – deciduous	5.60
Woodland – oak	10.65
Woodland – other	19.22
Grand Total	**262.16**

For the conservation targets that currently exist on the landscape, descriptions of key ecological attributes (KEAs), current rating, desired future conditions and long-term desired future conditions may be found in Tables 5 - 7.

Table 5a. Key Ecological Attributes for Riparian Forest (streams or small rivers) - South Drainage

Category	KEA	Indicator	---------- Indicator rating ---------- Poor (P)	Fair (F)	Good (G)	Very good (VG)	Current Rating	DFC* for this SCP	Long term DFC	Comments
Size	Riparian forest width	Avg. width of riparian forest	<15 m (50 ft) each side of stream	15-30 m (50-100 ft) each side of stream	30-61 m (100-200 ft) each side of stream	>61 m (200 ft) each side of stream	P	F	F/G	The South Drainage stream channel has been piped, and any historic riparian forest was cleared for orchard and pasture production. It is not feasible to establish riparian forest to 'very good' condition based on the available land, particularly in the lower reach where the tax lot is less than 300 feet wide. A riparian forest width of 50-100 feet on either side of the stream would fit this setting and benefit the restored stream.
Condition	Vegetative structure: shrub layer	% native shrub cover	<10% cover	10-25% cover	25-50% cover	>50% cover	P	G	VG	Native shrubs have been recently planted in this area. They are small and will require 3-5 years of maintenance to be free-to-grow. Additional plantings may occur as part of a larger restoration project. As these plantings mature, the area is on track to eventually reach 'very good' condition in the long term.
Condition	Floodwater access to the floodplain	Degree of connection between stream/ floodplain during high water events	Extensively disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Moderately disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Minimally disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Completely connected (backwater sloughs, channels)	P	G/VG	G/VG	The South Drainage stream channel was historically piped, completely eliminating floodplain connectivity. Several sections of pipe have failed and several small sections of stream channel are now present. However, the majority of the existing sections of channel are heavily incised and disconnected from the floodplain. A restoration project is currently being planned which would daylight the stream channel and aggrade the channel to restore floodplain connectivity to 'good' or 'very good' condition.

*Desired future condition

Table 5b. Key Ecological Attributes for Riparian Forest (streams or small rivers) - North Drainage

Category	KEA	Indicator	---------- Indicator rating ---------- Poor (P)	Fair (F)	Good (G)	Very good (VG)	Current Rating	DFC* for this SCP	Long term DFC	Comments
Condition	Vegetative structure: shrub layer	% native shrub cover	<10% cover	10-25% cover	25-50% cover	>50% cover	F/G	G/VG	G/VG	% Native shrub cover varies throughout this area from 10% to approximately 50%, including *Symphoricarpos albus, Sambucus spp., Acer circinatum, Salix spp., holodiscus discolor, mahonia nervosa, corylus cornuta, rubus spectabilis, rubus parviflora,* and *oemleria cerasiformis*. However, there are large areas devoid of native shrubs that would benefit from supplemental planting. Invasive shrub species are also present including *rubus armeniacus, rubus laciniatus*, and *Cytisus scoparius*
Condition	Vegetative structure: tree layer	% native tree canopy cover	<20% cover	20-30% cover	30-40% cover	40% or more	P/G	G	VG	% native tree canopy cover varies throughout this area from 0% to 50% or more. In general, the west side of the drainage has a 'good' or 'very good' canopy cover comprised primarily of bigleaf maple with some young Douglas fir. The east side of the drainage is sparser, with many areas of 'poor' canopy cover.
Condition	Floodwater access to the floodplain	Degree of connection between stream/ floodplain during high water events	Extensively disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Moderately disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Minimally disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Completely connected (backwater sloughs, channels)	F/G	G	G	The upper reaches of the North Drainage begin with small headwater wetlands and small channels with floodplain connection. The floodplain within these areas is very small and confined by relatively steep slopes. The lower reach of the drainage was historically piped, eliminating floodplain connectivity. Some minor improvements could be made to the floodplain connectivity in the upper reach by adding wood to the channel. A stream restoration project for the lower reach is in the early planning stages, which would daylight the stream and improve floodplain connectivity.

*Desired future condition

Table 6. Key Ecological Attributes for Upland Forest

Category	KEA	Indicator	---------- Indicator rating ---------- Poor (P)	Fair (F)	Good (G)	Very good (VG)	Current status	DFC* for this SCP	Long term DFC	Comments
Condition	Vegetative structure: native tree and shrub layer	% native tree and shrub canopy cover (combined)	<25% cover	25-50% cover	50-75% cover	>75% cover	P-VG	VG	VG	Canopy cover is good to very good, but shrub cover is poor in the Douglas fir grove. Shrub cover in the existing upland mixed forest is good. Estimate overall via site walk. Native bird species richness is associated with the amount of native shrub cover. (Hagar 2003; Hennings 2006).
Condition	Mature trees	Number and size (dbh) of species such as Douglas fir, western red cedar, western hemlock and grand fir	Mature trees lacking	<3 per ac with dbh >24 in	3-5 per ac with dbh >24 in	>5 per ac with dbh >24 in	P	F	G	A number of trees are in the 12-20 inch range, but few are >24 in. Recruitment of native trees necessary for long-term health of upland forests. Saplings are < 2m tall. Based on PIF (2000) biological objective for WV large-canopy trees in riparian deciduous woodland. Maintain individual and small clumps of Oregon white oak embedded in the mixed Douglas-fir/hardwood upland forest.
Condition	Standing and down dead trees	Average # snags and large wood (> 50 cm, or 20 in, DBH) per acre	< 5 snags and <5% down wood	5-11 snags and 5-10% down wood	12-18 snags and 10-20% down wood with moderate variety of size and age classes	>18 snags and >20% cover down wood in a good variety of size and age classes	P	F	G	Snags and down dead trees that are present are generally <20 in Estimate via site walk.

*Desired future condition

Table 7. Key Ecological Attributes for Oak Woodland

Category	KEA	Indicator	---------- Indicator rating ---------- Poor (P)	Fair (F)	Good (G)	Very good (VG)	Current rating	DFC* for this SCP	Long term DFC	Comments
Condition	Vegetation structure	Canopy cover and architecture of woody vegetation	Woody vegetation (e.g., Douglas fir) is encroaching and total native canopy cover is acceptable (30-60%) over less than half of the target area.	Woody vegetation encroaching but total native canopy cover is 30-60% at least half of the target area.	Woody vegetation encroaching but total native canopy cover is 30-60% at least 90% of the target area.	Woody vegetation encroaching is generally absent, total native canopy cover is 30-60% in the target area, and canopy architecture is appropriate mix of large open grown trees / younger trees.	F	G	VG	The current rating is for the existing oak stand in the north east area of the site-not for the 100 acre hazel nut orchard. The orchard will likely remain in hazelnuts for the duration of this SCP planning period. Additional KEAs should be identified when restoration occurs at the orchard site.
Condition	Native grass and forb abundance	Relative cover of native forb and grass species	<20% of total herbaceous cover	20-30% of total herbaceous cover	30-50% of total herbaceous cover	>50% of total herbaceous cover	P	P	G	Oaks have been released but the understory is still dominated by non-native grasses.

3.2 Threats and sources

A number of stresses have influenced current conditions of the conservation targets and threaten long-term health. These stresses include development and land conversion, invasive species and previous forest management. Human use, dogs, trails, fishing etc., are not considered to be a major source of stress on site, but have had some minor effects on some of the conservation targets. Potential adverse effects of climate change are difficult to predict, but this stress is included in the assessment.

Climate change is anticipated to affect summer temperatures and availability of water in the summer. Other indirect effects of climate change may include range shifts of plants, some native to North America and some not, and increased competition by these plants.

Possible direct effects of climate change

a. Increased summer temperatures
b. Increased severity of winter rain events and resulting peak flows
c. Decreased water availability in summer

Possible indirect effects of climate change

a. Increase risk of erosion, including landslides, on steep slopes with severe rain events
b. Increased risk of wildfire in hotter, dryer summers
c. Range shifts by undesirable plants increasing competition
d. Disease introductions and/or increased vulnerability to disease
e. Loss of synchronicity of plant reproduction and pollinators
f. Loss of synchronicity of resident and migratory animals and food sources (e.g., insect hatches)

Threats and sources of stress for each of the FHF Natural Area conservation targets are provided in Tables 8 - 10.

Table8a. Threats for Riparian Forest Habitat – South Drainage

Source of Stress		**Stresses** (rank each as L-M-H-VH for contribution, irreversibility & source)													
		Habitat Destruction / Conversion	**Stress Rank**	Altered Composition / Structure[1]	**Stress Rank**	Competition for Resources	**Stress Rank**	Human Disturbance	**Stress Rank**	Altered Hydrology	**Stress Rank**	Impaired habitat connectivity	**Stress Rank**	**THREAT RANK**	**Comments**
Development, land conversion	Contribution	VH													
	Irreversibility	M	VH											VH	The stream channel in this area was piped, and the riparian forest habitat was cleared, graded, and converted to orchard and pasture. This area is targeted for restoration.
	Source Rank	VH													
Invasive species	Contribution					M									
	Irreversibility					M	M							M	Some invasive vegetation is present, including many pasture grasses. However, native shrubs have been recently planted in this area and additional vegetation enhancement is planned.
	Source Rank					M									
Human use, dogs, trails, fishing, etc.	Contribution							L							
	Irreversibility							L	M					L	No trails are currently present, and no human or dog use is authorized except for the orchard practices (covered under "Development, land conversion").
	Source Rank							L							
Climate Change	Contribution									VH					
	Irreversibility									VH	ML			M	Potential long term effects due to climate and microclimate changes.
	Source Rank									VH					
Previous forest management	Contribution			VH											
	Irreversibility			M	VH									VH	Historic forest clearing eliminated the original forest composition and structure. This can be mitigated through vegetation enhancement and reforestation, but it will take decades to restore riparian forest function.
	Source Rank			H											

Table 8b. Threats for Riparian Forest Habitat – North Drainage

Source of Stress		**Stresses** (rank each as L-M-H-VH for contribution, irreversibility & source)													
		Habitat Destruction / Conversion	**Stress Rank**	Altered Composition / Structure[2]	**Stress Rank**	Competition for Resources	**Stress Rank**	Human Disturbance	**Stress Rank**	Altered Hydrology	**Stress Rank**	Impaired habitat connectivity	**Stress Rank**	**THREAT RANK**	**Comments**
Development, land conversion	Contribution	M													
	Irreversibility	M	M											M	Riparian forest in the upper reaches of the drainage is in fair condition, but the lower potion was historically cleared for development. Restoration is planned.
	Source Rank	M													
Invasive species	Contribution					M									
	Irreversibility					M	M							M	Some invasive vegetation is present, including reed canarygrass in the wetland areas. However, native trees and shrubs comprise the majority of vegetation in this area.
	Source Rank					M									
Human use, dogs, trails, fishing, etc.	Contribution							L							
	Irreversibility							L	M					L	No trails are currently present, and no human or dog access is currently authorized.
	Source Rank							L							
Climate Change	Contribution									VH					
	Irreversibility									VH	L			L	Potential long term effects due to climate and microclimate changes.
	Source Rank									VH					
Previous forest management	Contribution			H											
	Irreversibility			M	H									H	Historic logging and land clearing significantly altered the original forest composition and structure. However, the area has remained undisturbed for several decades allowing for some regeneration of riparian forest. This area was planted several times and managed during site stabilization. The area lacks down and standing dead wood.
	Source Rank			H											

[1] Includes lack of down and standing dead wood, poor shrub structure in forest, too much shrub in prairie, etc.

[2] Includes lack of down and standing dead wood, poor shrub structure in forest, too much shrub in prairie, etc.

Table 9. Threats for Upland Forest

Source of Stress		Stresses (rank each as L-M-H-VH for contribution, irreversibility & source)													Comments
		Habitat Destruction / Conversion	Stress Rank	Altered Composition / Structure[3]	Stress Rank	Competition for Resources	Stress Rank	Human Disturbance	Stress Rank	Altered Hydrology	Stress Rank	Impaired habitat connectivity	Stress Rank	THREAT RANK	
Development, land conversion	Contribution	L													
	Irreversibility	H	L											L	Small developed area within Upland forest habitat
	Source Rank	L													
Invasive species	Contribution					M									
	Irreversibility					L	M							M	Perching birds will continually introduce Holly, English Ivy, blackberry, etc.
	Source Rank					M									
Human use, dogs, trails, fishing, etc.	Contribution							L							
	Irreversibility							L	L					L	Localized human use from residence on-site
	Source Rank							L							
Climate Change	Contribution			H											
	Irreversibility			H	L									L	Potential effects from climate change may include more extreme temperatures, new disease vectors that could shape forest composition
	Source Rank			H											
Previous forest management	Contribution			H											
	Irreversibility			H	H									H	
	Source Rank			H											

Table 10. Threats for Oak Woodland

Source of Stress		Stresses (rank each as L-M-H-VH for contribution, irreversibility & source)													Comments
		Habitat Destruction / Conversion	Stress Rank	Altered Composition / Structure[4]	Stress Rank	Competition for Resources	Stress Rank	Human Disturbance	Stress Rank	Altered Hydrology	Stress Rank	Impaired habitat connectivity	Stress Rank	THREAT RANK	
Development, land conversion	Contribution	VH													
	Irreversibility	H	H											H	Land conversion has significantly altered the structure and composition of Oak Woodland.
	Source Rank	H													
Invasive species	Contribution					M									
	Irreversibility					M	M							M	Controlling Invasive species will be an ongoing effort, especially long-term control of fast-growing canopy trees like Douglas fir.
	Source Rank					M									
Climate Change	Contribution			H											
	Irreversibility			H	L									L	Climate change has the potential to affect species composition, but it may favor oaks which are drought tolerant and can withstand winter ponding.
	Source Rank			H											

[3] Includes lack of down and standing dead wood, poor shrub structure in forest, too much shrub in prairie, etc.

[4] Includes lack of down and standing dead wood, poor shrub structure in forest, too much shrub in prairie, etc.

3.3 Strategies to address threats

This conservation plan outlines strategic actions to be carried out at the Fern Hill Forest site over the next five-ten years. These actions are based on short and long-term goals for the conservation targets. The strategic actions described here are general courses of action to achieve these objectives and not highly prescriptive courses of action. Detailed prescriptions will be developed by Metro staff to address site-specific conditions encountered in the areas targeted for restoration action. Current and proposed actions to address threats are summarized in Table 11.

One of the most constant and widespread threats to the conservation targets on-site is weed invasion from wind and animal dispersal. Annual treatment will be required to keep weed populations low. Treatments have already been done on blackberry, ivy, vinca, Japanese knotweed, holly, cherry and hawthorn. More intensive weed treatment may be needed in certain areas such as the lowest reach of the north drainage where a reed canarygrass monoculture has established.

Table 11. Threats and actions for KEAs of important targets

Target	KEA	Threat	Action	Notes
All	Species composition and competition	Invasive species	Integrated approach of cutting, spraying two to three times per year; Annual site walks to monitor weed populations	
Riparian forest – South Drainage	Floodplain connectivity	Land conversion	Develop a holistic restoration plan to remove piping, aggrade the channel where incised, and establish healthy riparian forest	Restoration contract has been awarded, work is scheduled for the summer of 2015.
Riparian forest – North Drainage	Floodplain connectivity	Land conversion	Develop a restoration plan concurrent with the Drainage to remove 400 feet of pipe and restore riparian forest	Restoration contract has been awarded, work is scheduled for the summer of 2015.
Oak woodland	Vegetative structure and percent cover of native ground cover	Invasive species competition	Maintain oaks from competing vegetation and determine feasibility of re-establishing native forbs and grasses.	Applies only to existing oak woodland, not to orchard.
Upland forest	Vegetative structure: native tree and shrub layer	Previous forest management	Thin forest, establish shrub layer, place large down wood or brush piles for habitat complexity	Initiated over a portion of the upland forest in 2013.

3.4 Specific conservation/restoration actions and funding requirements

Specific restoration actions and estimated costs are described in this section and summarized in Table 12. Extensive restoration is recommended for the south drainage and restoration of the lowest reach of the north drainage could be included as one permitting, design and construction project.

South Drainage

The intermittent stream, identified in this document at the "south drainage", presents the most significant opportunity and need for active stream restoration. The south drainage was historically piped for the majority of its length, beginning with clay drain tile pipes within the hazelnut orchard and continuing in a 12-inch diameter concrete pipe for approximately 1,800 feet towards the drainage ditch along SW Sandstrom Road. Collecting and concentrating runoff in the drain tile and pipe network has likely significantly altered hydrology patterns in the watershed. Many sections of pipe have failed, either collapsing or becoming clogged, creating a series of sinkholes and sections of actively eroding, incised stream channel. These features are likely contributing fine sediment to the downstream water bodies including the Tualatin River. Furthermore, the piped sections of stream currently provide minimal habitat value.

Natural stream function and hydrology

Burying and piping small headwater streams can significantly alter natural hydrology patterns. Water moves much faster through a smooth, straight pipe than it would naturally through a complex stream channel connected to adjacent floodplain. In a natural stream system, water is in contact with the ground surface, hydrating adjacent wetlands and taking advantage of the infiltration capacity of the landscape. Roughened streambeds, woody debris and irregularly shaped channels reduce water velocities in the stream, attenuating peak flood energy.

Water Quality

In a piped stream network, water is rapidly transported downstream, resulting in floods and high flows that peak more rapidly than in natural watersheds. High velocities can lead to additional erosion and sediment inputs. The orchard rows between trees are sparsely vegetated and appear to be frequently disturbed, contributing additional sediment and pollutants to the downstream water bodies. Orchard management practices may include fertilizer and pesticide applications. Natural headwater wetlands and floodplain interaction would help filter sediment and pollutants, improving downstream water quality.

Wildlife Habitat

Restoring a natural stream channel and connected wetlands in the historic stream valley bottom would improve habitat conditions for reptiles, amphibians and macroinvetebrates. Restoring native wetland and riparian vegetation would improve habitat conditions for birds and pollinator species.

South Drainage Proposed Restoration Actions:

- Excavate and remove drain tile piping within the orchard
- Restore natural headwaters
    - Remove orchard plantings within 50 feet of the defined flow paths
    - Restore headwater wetlands without defined stream channel in upper reaches
    - Restore small stream channel with good connection to adjacent wetlands/floodplain
    - Restore native wet prairie and riparian vegetation in historic drainage paths
    - Add woody debris to the stream/wetland system for habitat complexity
- Excavate and remove approximately 1,800 linear feet of 12-inch diameter concrete pipe
- Restore natural stream channel in valley bottom
    - Improve channel connectivity to floodplain and historic wetlands
        - Aggrade stream channel by filling channel sections and installing wood structures and artificial beaver dams
        - Excavate areas of floodplain/wetland bench along restored channel sections
    - Install wood habitat structures and scattered woody debris for improved habitat complexity and nutrient inputs
- Install approximately three new culverts where access roads cross the stream
    - Increase pipe sizes as appropriate for hydraulic capacity and wildlife benefit
- Restore native wetland and riparian vegetation along restored stream channel

North Drainage

The intermittent stream, identified in this document as the “north drainage”, also presents an opportunity for stream restoration, primarily in the lower reach of the stream. The majority of the north drainage stream is an open channel with moderate floodplain connectivity. However, the lower reach of the stream was historically piped for approximately 400 feet, beginning at a large earthen berm. The stream enters a 12-inch diameter pipe and flows north through a former homestead lot towards the downstream wetland. A section of this old pipe has collapsed or become clogged, causing a portion of the stream flow to emerge from the ground and flow on the surface to the north. A small drainage ditch appears to have been recently excavated to convey water northeast towards a roadside drainage ditch on the south side of Fern Hill Road.

This parcel is now vacant, but the historic impacts to natural stream function still remain. For many of the same reasons identified for the south drainage, daylighting the stream channel in this location and restoring floodplain connectivity and riparian habitat would improve natural stream function and hydrology, water quality and wildlife habitat conditions.

North Drainage Proposed Restoration Actions:

- Excavate and remove 400 feet of 12-inch diameter pipe just south of Fern Hill Road
- Excavate and remove large earthen berm to restore natural drainage patterns in the area
- Restore stream functions and associated riparian habitat
    - Restore small stream channel with good connection to adjacent wetlands/floodplain
    - Improve stream channel connection to the existing drainage ditch along Fern Hill Road to reduce erosion
    - Add woody debris to the stream/wetland system for habitat complexity
    - Plant native herbaceous, shrub, and tree layer along new channel
- Control and/or remove reed canarygrass from an approximately 0.5 to 1 acre area
- Restore northeast corner field to oak woodland

Table 12. Management actions, prioritization, costs and monitoring important to maintaining or improving KEAs at Fern Hill Forest Natural Area, planning horizon of 5-10 years.

Conservation Target	KEA	Source of stress	Management Actions	Priority	Estimated cost	Monitoring
Riparian Forest – South Drainage	Forest Width	Development / Land Conversion	• Currently planning for restoration of the stream and riparian corridor. • Maintain native trees and shrubs that have already been planted.	• Moderate – Will occur slowly over time as native trees are established.	• $6,000 or three crew days per year	• Annual site walk and planting maintenance
Riparian Forest – South Drainage	Vegetative structure: tree and shrub layer	Competition from invasive species	• Maintain recent native plantings. • Plant additional shrubs in conjunction with restoration project	• High – Maintenance of existing plantings is important to ensure establishment.	• $15,000	• Monitor plantings for survival and encroachment by invasives
Riparian Forest – South Drainage	Floodwater access to floodplain	Development, land conversion	• Currently planning for stream daylighting and restoration for improved floodplain connectivity • Design and build is schedule for Nov 2014- Sept 2015	• High, will not improve without intervention. The majority of the existing channel is piped, and open channel sections are incised.	• $80,000	• Project dependent
Riparian Forest – North Drainage	Vegetative structure: tree and shrub layer	Competition from invasive species	• Maintain existing shrubs from invasive reed canarygrass and blackberry in upper reach • Plant additional shrubs in conjunction with restoration of lower reach	• Low, in upper reach • High, in lower reach where new shrubs will be planted in conjunction with restoration project	• $15,000	• Monitor plantings for survival and encroachment by invasives
Riparian Forest – North Drainage	Standing and down dead wood	Previous forest management and land conversion	• Place down wood in restored stream, floodplain and adjacent reforested areas. • Add down wood in upper reach where feasible while minimizing impacts	• High, will not improve in short term without intervention as it typically requires decades or centuries to recruit large pieces of wood or snags	• $25,000	• Photo points when installed then periodic visual monitoring

Riparian Forest – North Drainage	Floodwater access to floodplain	Development, land conversion	• Currently planning for stream daylighting and restoration for improved floodplain connectivity in lower reach • Design and build is schedule for Nov 2014- Sept 2015	• High, will not improve without intervention. The majority of the existing channel is piped, and open channel sections are incised.	• $50,000	• Project dependent
Upland forest	Vegetative structure: native tree and shrub layer	Previous land management	• Selective thinning to promote growth of larger trees and reduce "doghair" condition • Plant native shrubs	• Thin: High • Native shrubs: High • Note: thinning and planting initiated on 20 acres at the top of Fern Hill in 2013	• Thin: $10,000 to $30,000 • Native shrubs: $25,000 to $50,000	• Annual site walk
Upland forest	Standing and down dead trees	Previous land management	• Place down wood in forest or leave brush piles to increase habitat complexity and value for small mammals, terrestrial amphibians, etc.	• Low, placing down wood could be done concurrently as part of thinning	• $150 to $1,000 per brush pile or large piece of down wood	• Monitor implementation and then every ten years
Oak woodland	Native grass and forb abundance	Previous land management	• Treat to prevent encroachment of trees and increase in non-native species, initiate establishment of native grasses and forbs	• Low-stand has been thinned, may benefit by understory seeding/planting	• $24,000	• Annual site walk
Oak Woodland	Vegetation structure	Development, land conversion	• Restore northeast corner field to oak woodland. • Prepare work plan to convert hazelnut orchard to oak woodland	• High: current levy project to restore to oak woodland (except small area still farmed by M. Sosa). • Low in near term as hazelnut orchard will operate for an additional 2-10 years.	• $14,750 • $500,000 (very rough estimate)	• NA • TBD

SECTION 4: RECREATION AND ACCESS

Next five years

Future public access

Metro staff conducted an internal process to consider an appropriate level of access for each of its natural areas. The access designation is offered as a starting point, with the understanding that judgment will always be needed on a case-by-case basis, and indicates that some part of the site could accept people at the stated level. It does not suggest that the entire site should have that level of access. The determined access level for Fern Hill Forest Natural Area is *low* (access by neighbors or local residents is permitted but not encouraged).

The Parks and Natural Areas Planning department is developing a new visitor experience overview that will be added to this conservation plan as an appendix at a later date.

SECTION 5: COORDINATION

5.1 Public involvement

As projects develop, Metro will provide local stakeholders and residents near Fern Hill Forest Natural Area with pertinent information about the work before it is implemented. Project information may include background on the project, timing, cost, material types and other information as necessary for the public to be aware of the project and its implications.

5.2 Key stakeholders

Tualatin River Watershed Council. Current contact: April Olbrich, trwc@easystreet.net

Clean Water Services, Current contact: Rich Hunter, HunterR@CleanWaterServices.org

Washington County. Current contact: To be determined.

Orchard Lessee. Current contact: Clark Firestone, 503-864-8612

Agricultural sub-lessee. Manuel Sosa, 503-467-6788

Tualatin Soil and Water Conservation District. Current contacts: Nicole Ahr, nicole.ahr@or.nacdnet.net or Lacey Townsend, lacey.townsend@or.nacdnet.net

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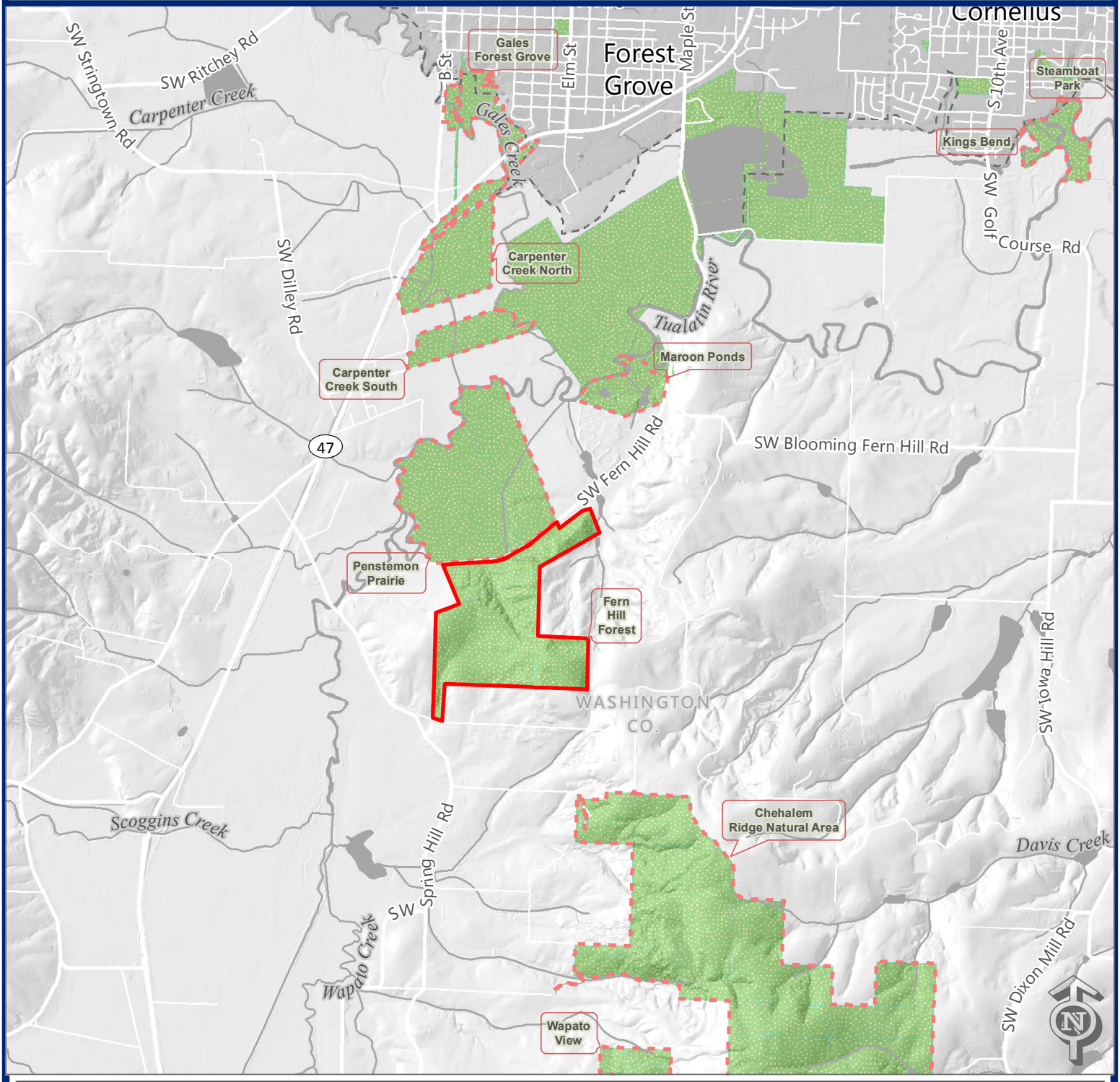
7. U.S. Geological Survey, 2012, The StreamStats program for Oregon, online at http://water.usgs.gov/osw/streamstats/oregon.html.

A-1 = Figures and Photos

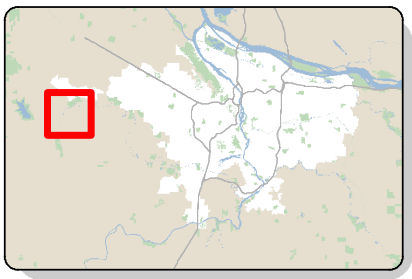
VICINITY MAP



Fern Hill Forest site

Other Metro sites

ORCA (Parks and Natural Areas)



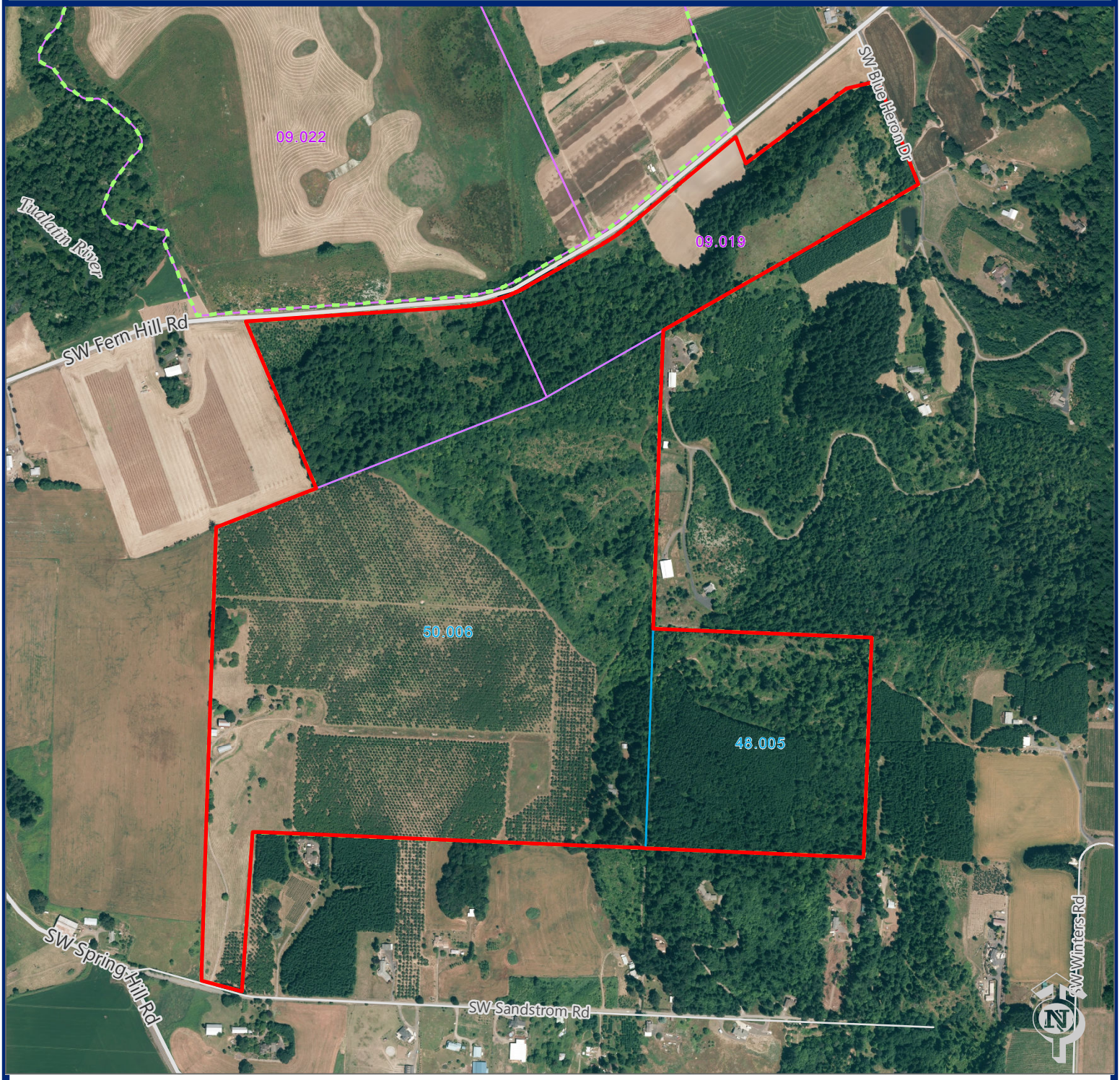
0 1 2 Miles

Metro

Fern Hill Forest Site Conservation Plan

map date: 12/15/2014

SITE MAP



Fern Hill Forest site

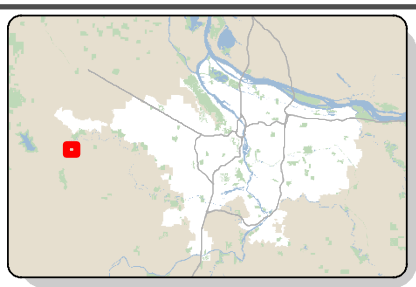
Other Metro sites

Bond Measure

1995 Bond Measure

2006 Bond Measure

0 1,100 2,200 Feet

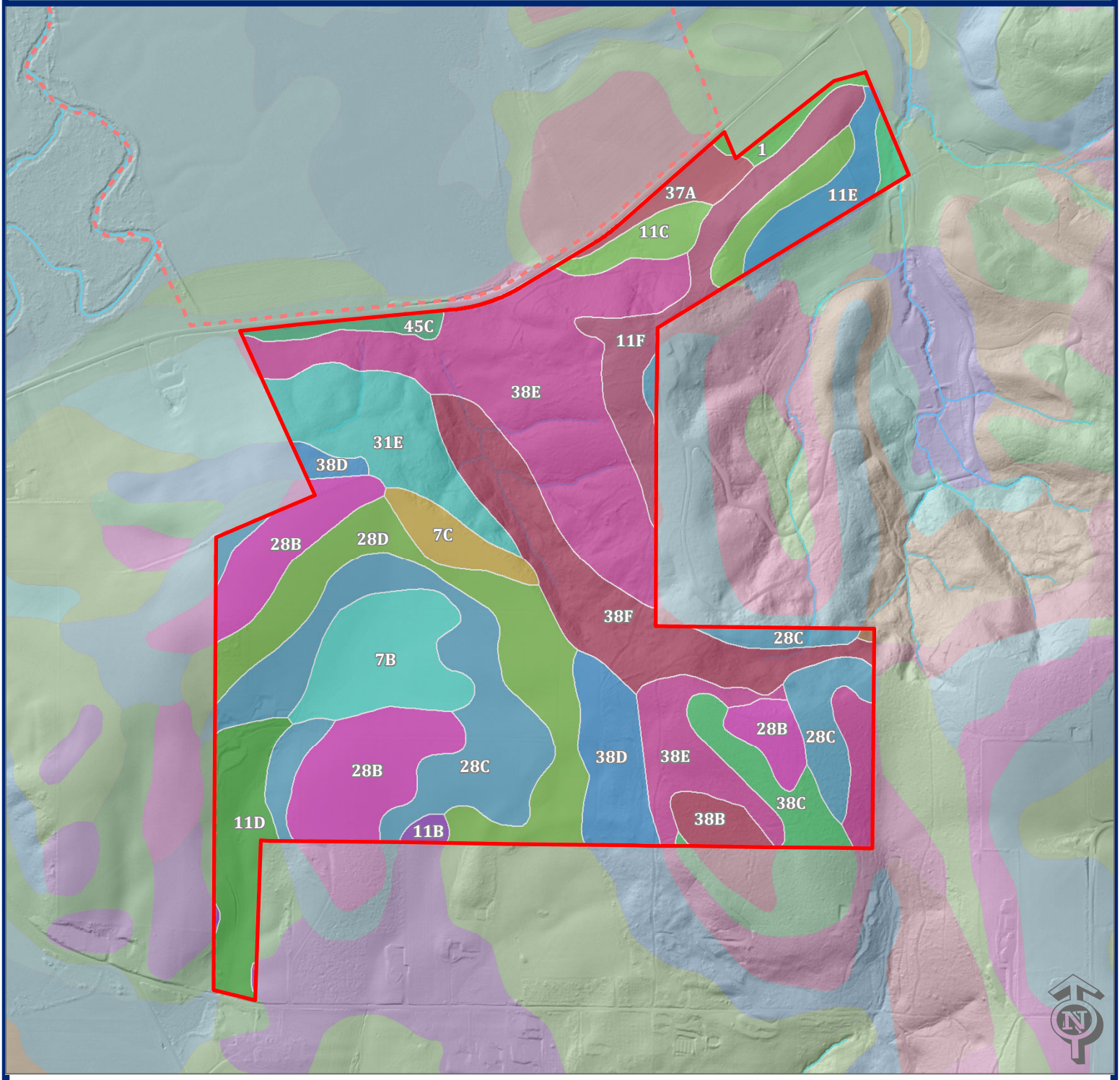


Metro

Fern Hill Forest Site Conservation Plan

map date: 12/15/2014

SOILS



Fern Hill Forest

Other Metro sites

Hydric soils

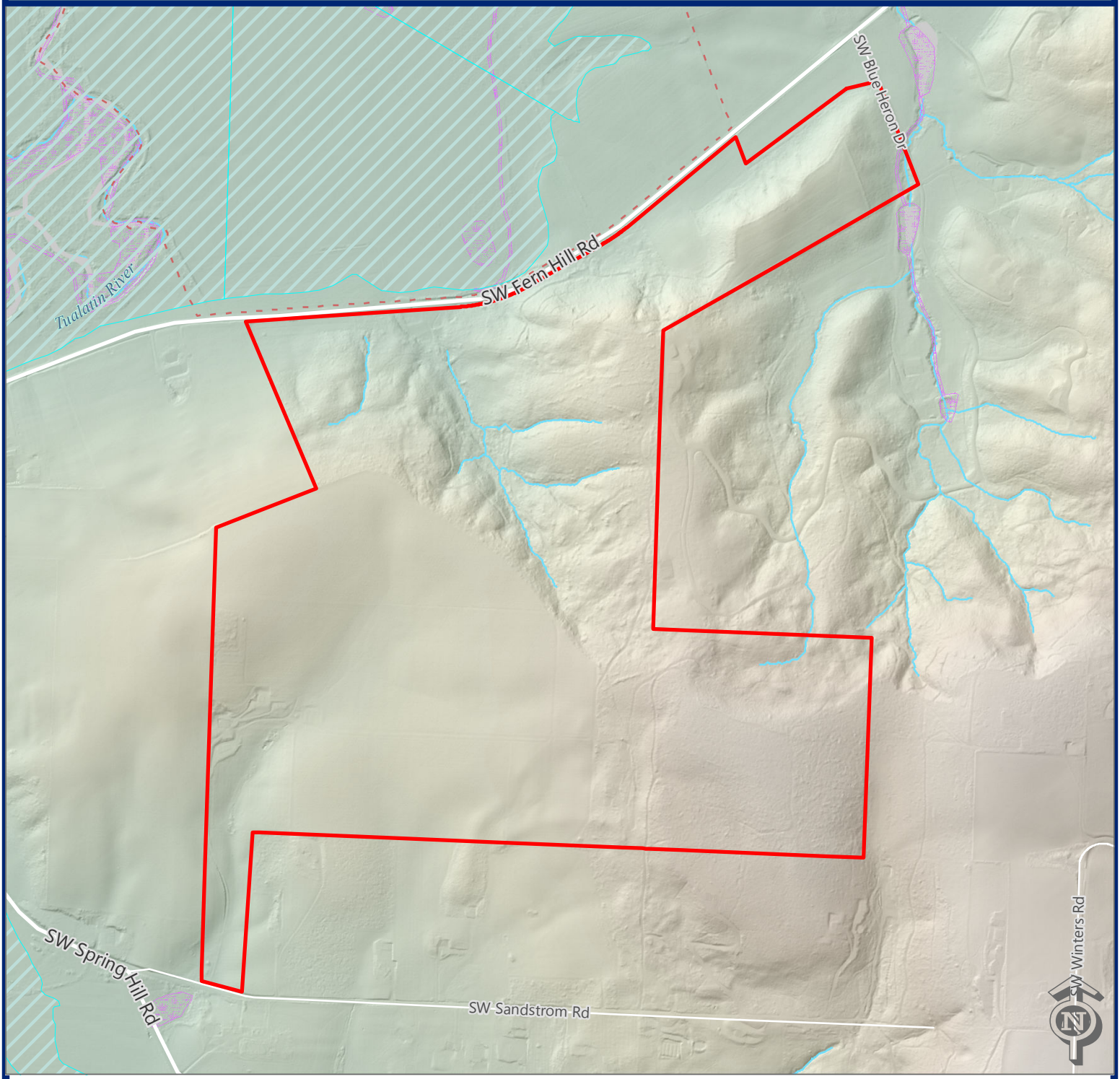
NRCS soils on Site

- Aloha silt loam
- Cascade silt loam, 3 to 7 percent slopes
- Cascade silt loam, 7 to 12 percent slopes
- Cornelius and Kinton silt loams, 12 to 20 percent slopes
- Cornelius and Kinton silt loams, 2 to 7 percent slopes
- Cornelius and Kinton silt loams, 20 to 30 percent slopes
- Cornelius and Kinton silt loams, 30 to 60 percent slopes
- Cornelius and Kinton silt loams, 7 to 12 percent slopes
- Laurelwood silt loam, 12 to 20 percent slopes
- Laurelwood silt loam, 3 to 7 percent slopes
- Laurelwood silt loam, 7 to 12 percent slopes
- Melbourne silty clay loam, 20 to 30 percent slopes
- Melbourne silty clay loam, 30 to 60 percent slopes
- Quatama loam, 0 to 3 percent slopes
- Saum silt loam, 12 to 20 percent slopes
- Saum silt loam, 2 to 7 percent slopes
- Saum silt loam, 20 to 30 percent slopes
- Saum silt loam, 30 to 60 percent slopes
- Saum silt loam, 7 to 12 percent slopes
- Wapato silty clay loam
- Woodburn silt loam, 3 to 7 percent slopes
- Woodburn silt loam, 7 to 12 percent slopes

0 1,000 2,000 Feet

Metro

HYDROLOGY

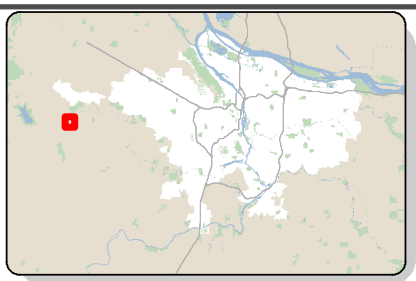


Fern Hill Forest site

Other Metro sites

100 year floodplain

Wetlands (Wetlands Conservancy data)



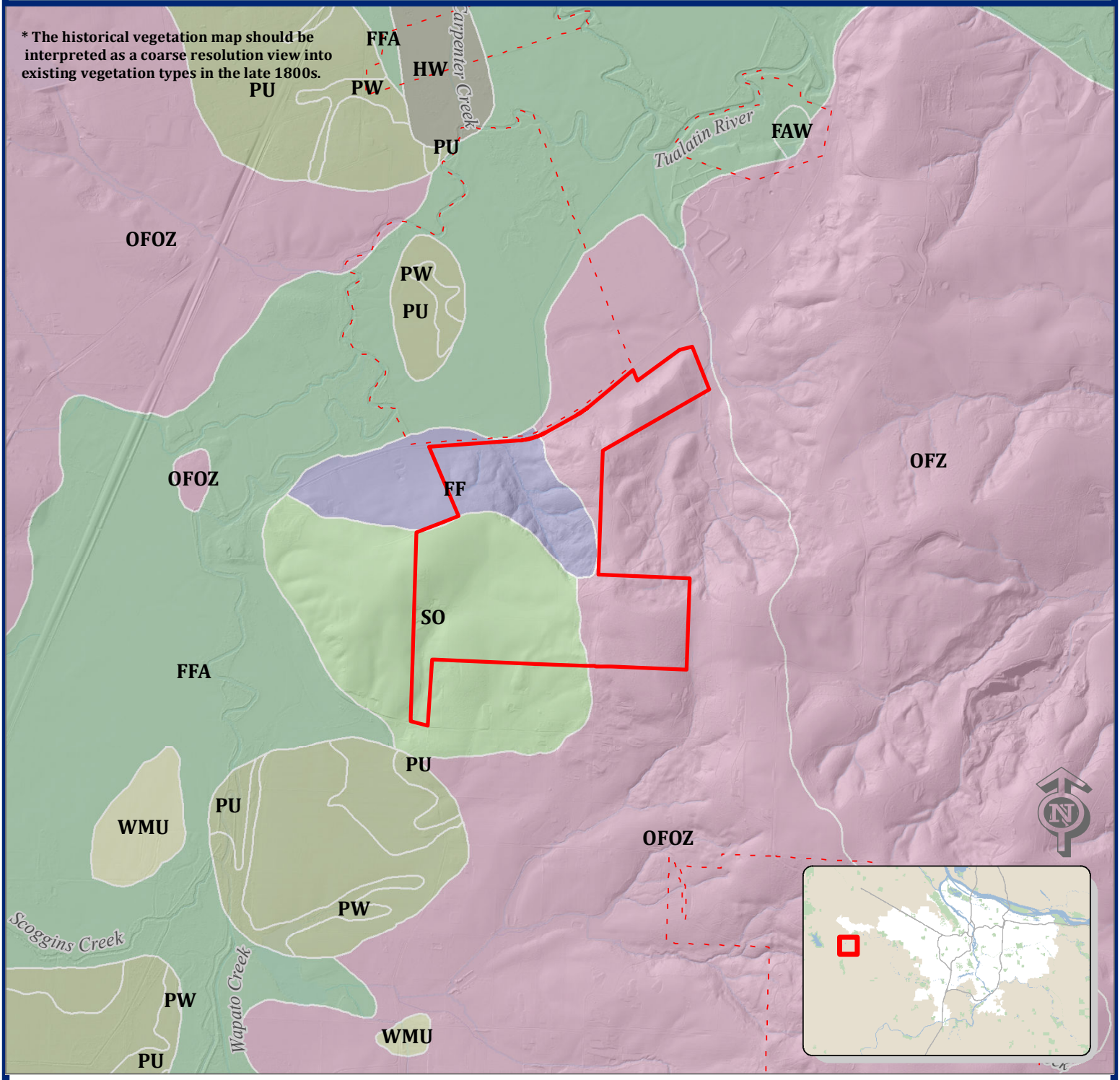
0 1,100 2,200 Feet

Metro

Fern Hill Forest Site Conservation Plan

map date: 12/15/2014

HISTORICAL VEGETATION (1851-1910)



Fern Hill Forest site

Other Metro sites

Streams

Historical vegetation

- Closed forest; Riparian & Wetland
- Closed forest; Upland
- Emergent wetlands
- Prairie
- Savanna
- Shrubland
- Woodland

*** Labels refer to vegetation subclasses. Detailed descriptions can be found in T:\OBMO\GIS\DATA_V\vegetation\Historical**

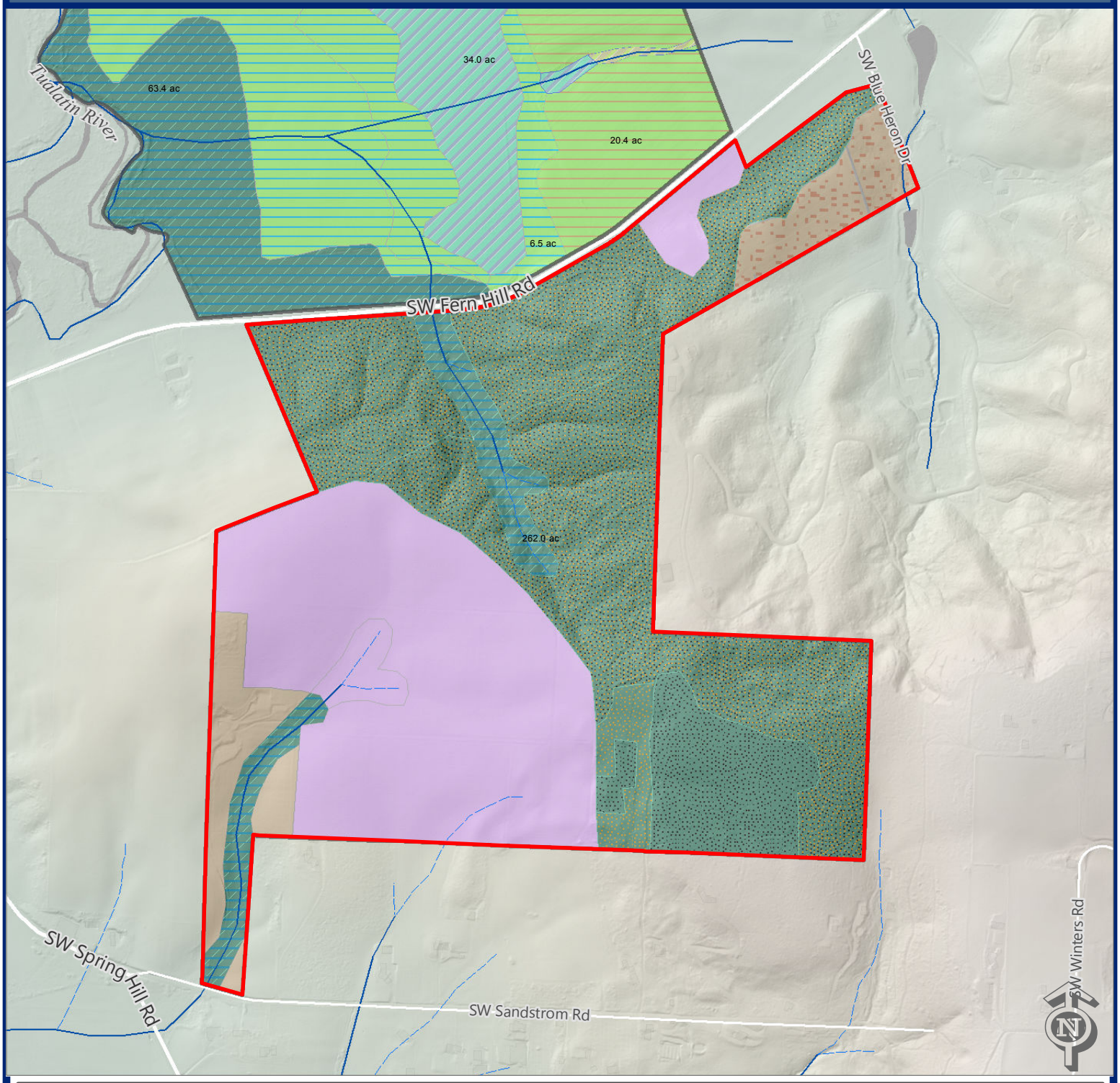
0 2,000 4,000 Feet

Metro

Fern Hill Forest Site Conservation Plan

map date: 12/15/2014

CURRENT COVER



Fern Hill Forest site

Other Metro sites

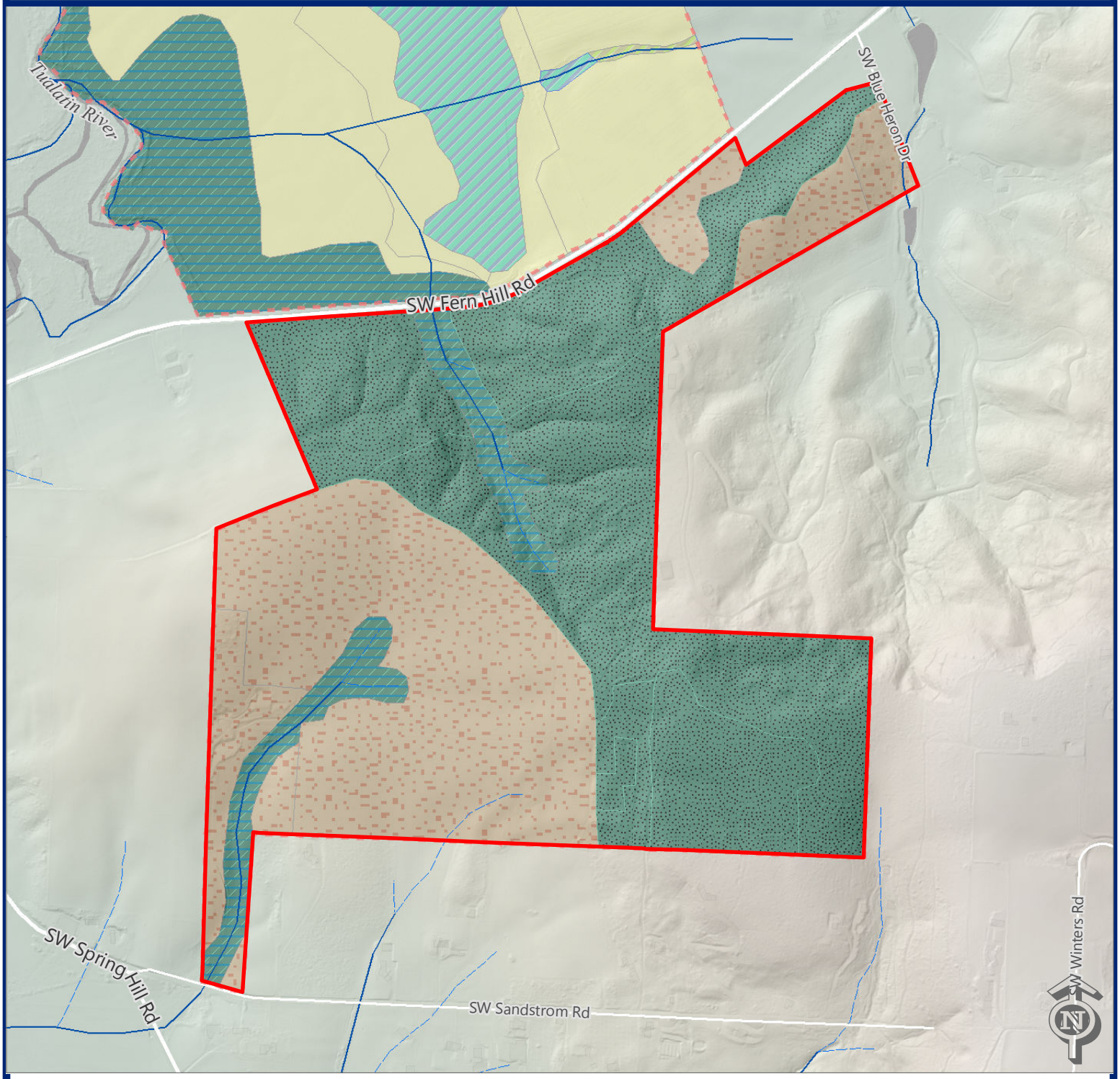
Current cover

- Agriculture
- Prairie - (dry)
- Prairie - (wet)
- Riparian forest
- Upland forest - coniferous
- Upland forest - deciduous
- Upland forest - mixed
- Wetland - emergent
- Wetland - shrub
- Woodland - oak
- Woodland - other

0 1,000 2,000 Feet

Metro

CONSERVATION TARGETS



Fern Hill Forest site

Other Metro sites

NHD Flowlines

Intermittent stream

Perennial stream

Conservation targets

Emergent wetland

Oak woodland

Other Woodland

Prairie - wet or dry

Riparian forest

Shrub dominated wetland

Upland forest

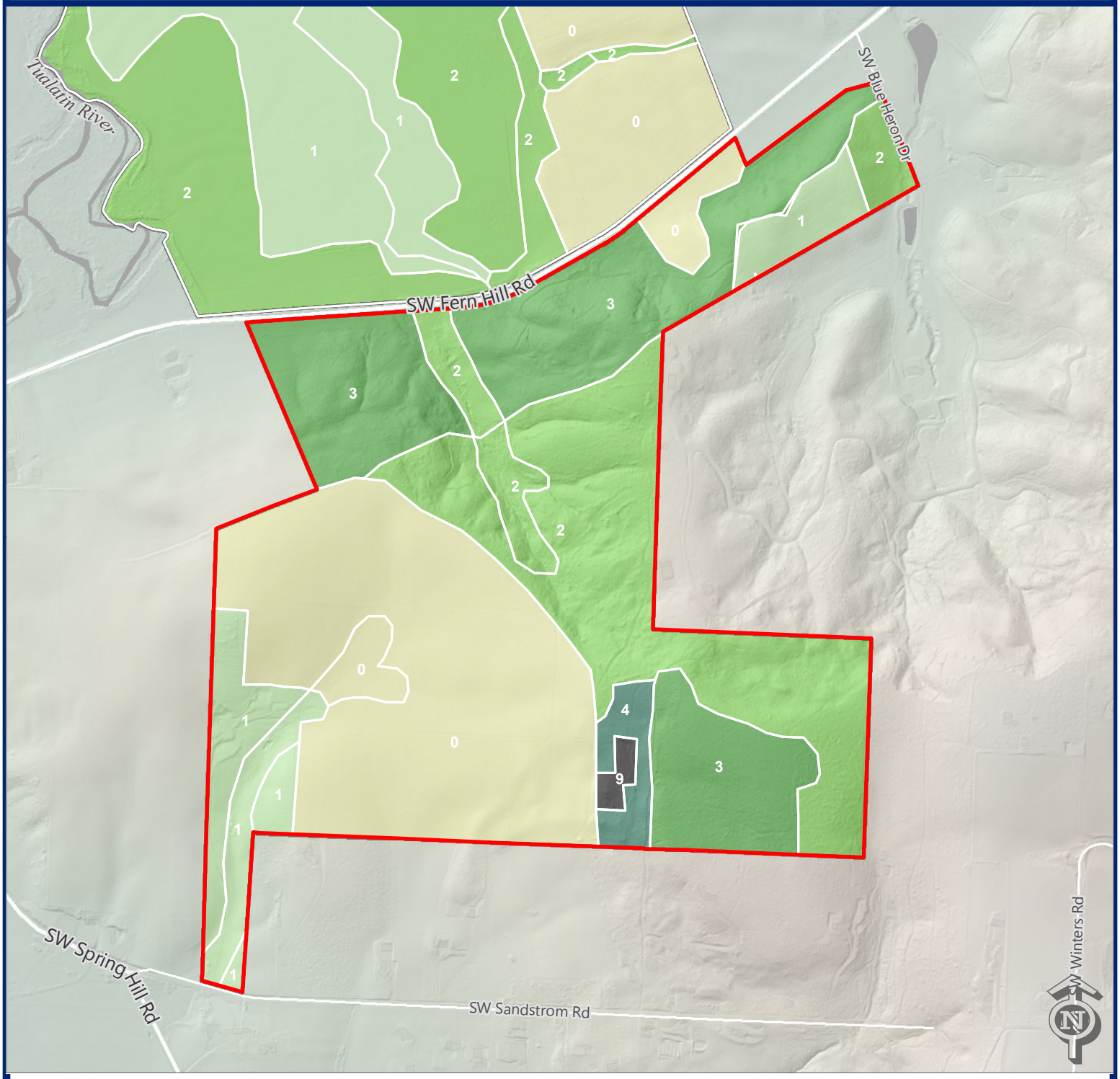
0 1,000 2,000 Feet

Metro

Fern Hill Forest Site Conservation Plan

map date: 1/15/2015

MANAGEMENT STATUS



Fern Hill Forest site

Other Metro sites

Management status

- Yet to be classified
- 0 - Pre-Initiation
- 1 - Initiation
- 2 - Establishment
- 3 - Consolidation
- 4 - Refinement and long-term maintenance
- 9 - No targets (developed)

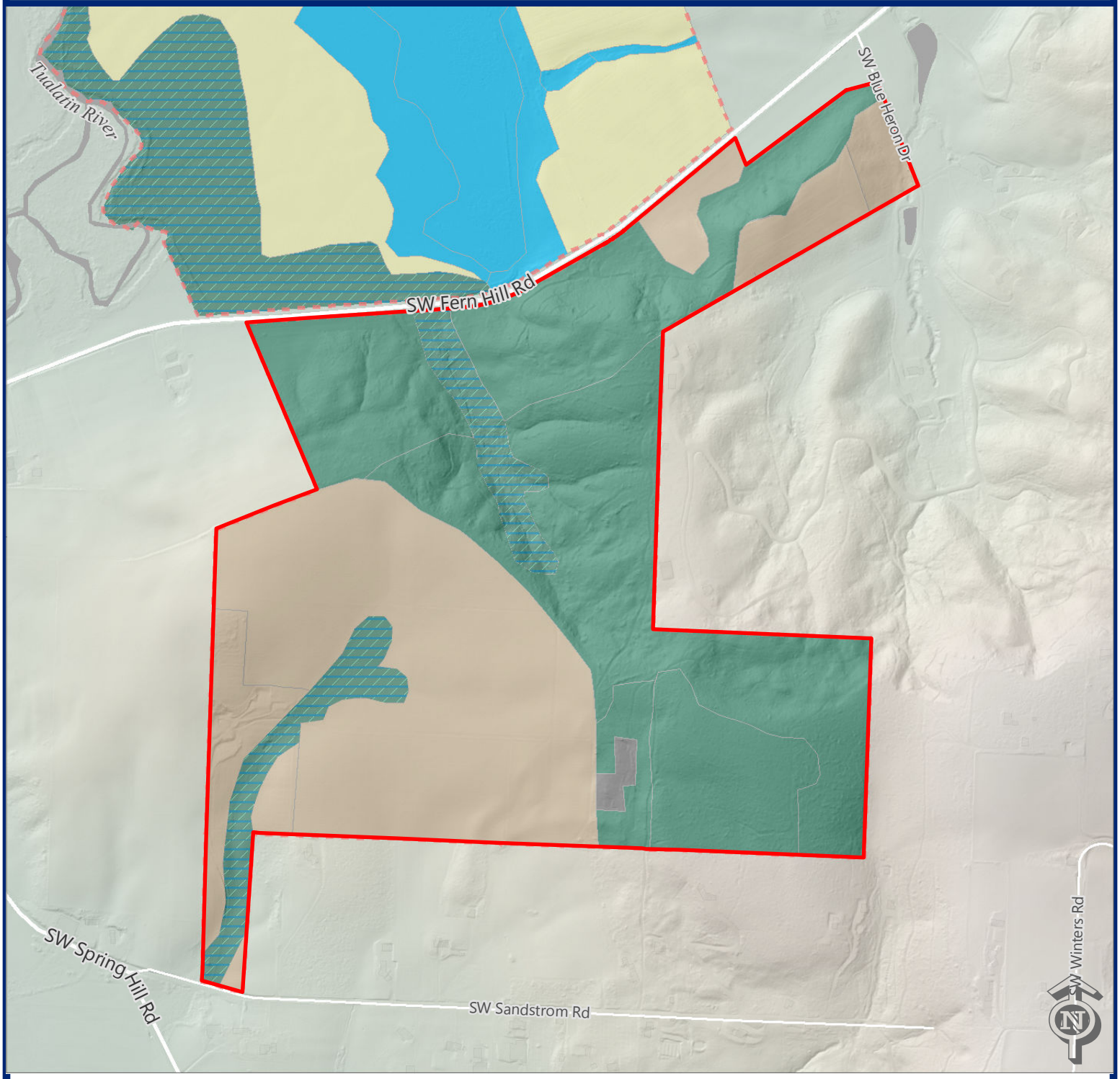
0 1,000 2,000 Feet

Metro

Fern Hill Forest Site Conservation Plan

map date: 1/15/2015

STEWARDSHIP CLASSIFICATION



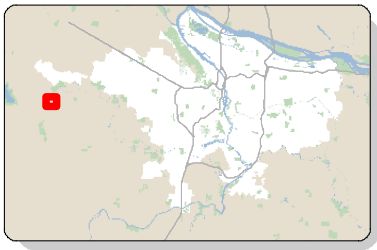
Fern Hill Forest site

Other Metro sites

Stewardship Type

- Developed
- Prairie
- Riparian forest
- Upland forest
- Wetland
- Woodland

0 1,000 2,000 Feet



Metro

Fern Hill Forest Site Conservation Plan

map date: 1/15/2015