SITE CONSERVATION PLAN

Spring Hill Natural Area



December 2016

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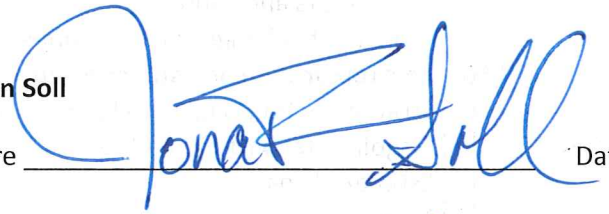
SCP Title: Spring Hill Natural Area

Approvals for Site Conservation Plan

Date first routed: 12/12/16

*Please return to Lori Hennings (Primary author: **Peter Guillozet**)*

Jonathan Soll

Signature  Date 12/21/16

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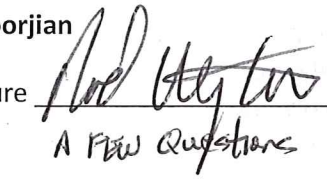
A FEW MINOR QUESTIONS & COMMENTS ADDED

Lisa Goorjian

Signature  Date 2/10/17

A FEW Questions

Justin Takkunen

Signature  Date 3/10/17

SCP Title: Spring Hill Natural Area

Primary Author: Peter Guillozet

Standard SCP Template Checklist*

- [x] **Introduction**
  - [x] Context
  - [x] Planning area
    - *Table X. Included properties*
  - [x] Key Metro staff and partners
  - [ ] Existing planning documents
- [x] **Existing conditions**
  - [x] Physical environment (e.g., geology, soils, hydrology)
  - [x] Major habitat types
  - [x] Vegetation and wildlife
  - [x] Recent management history
  - [ ] Natural resources of special interest
- [ ] **Conservation**
  - [x] Conservation targets
  - [x] Key ecological attributes
    - *Table X. KEA tables*
    - *Table X. Summary of current cover, conservation targets and status, and stewardship type*
  - [x] Threats
    - *Table X. Threats and their sources*
    - [x] Climate change considerations (see doc)
  - [ ] Proposed strategies to address threats
    - *Table X. Threats and actions for KEAs*
- [x] **Management actions** (10-year timeframe)
    - *Table X. Management actions tied to strategies with estimated cost and timing*
    - *Table X. Monitoring tied to maintaining or improving KEAs*
- [x] **Access and recreation**
- [ ] **Coordination**
  - [ ] Key stakeholders
  - [ ] Public involvement
- [ ] Map – Vicinity map
- [ ] Map – Site map
- [ ] Map – Historical vegetation (optional)
- [ ] Map – Current cover
- [ ] Map – Conservation targets
- [ ] Map – Stewardship classes
- [ ] Map – Management status
- [ ] **References**

- For additional details, see *Site Conservation Plan Template JAS updated version 08-23-2012*

Outward Facing (more public) SCP Template Checklist*

- [ ] **Introduction**
  - [ ] Context
  - [ ] Goals and objectives of the conservation plan
  - [ ] Key Metro staff and partners
- [ ] **Planning process summary**
  - [ ] Planning area
  - [ ] Planning process
- [ ] **Existing conditions**
  - See Standard Template
- [ ] **Conservation**
  - [ ] Summary of Appendix content
    - [ ] Conservation targets
    - [ ] Key ecological attributes
    - [ ] Threats and sources
    - [ ] Climate change considerations
- [ ] **Strategic restoration and stewardship**
  - [ ] Strategic actions linked to KEAs and threats
  - [ ] Ongoing stewardship and restoration programs
  - [ ] Estimated cost
  - [ ] Monitoring plan
  - [ ] Long-term strategies
- [ ] **Visitor experience**
  - [ ] Existing site use by public
  - [ ] Programmatic (education and volunteers)
  - [ ] Site management
  - [ ] Strategic actions (access and site management)
- [ ] **Coordination**
  - [ ] Key Partners
  - [ ] Key stakeholders
  - [ ] Public involvement
- [ ] Map – Vicinity map
- [ ] Map – Site map
- [ ] Map – Topography
- [ ] Map – Soils
- [ ] Map – Hydrology
- [ ] Map – Historical vegetation
- [ ] Map – Current cover
- [ ] Map – Conservation targets
- [ ] Map – Stewardship classes
- [ ] Map – Management status
- [ ] Map 11 – Access
- [ ] Appendix A – Historical context
- [ ] Appendix B – Conservation in detail
  - Relationship to other conservation plans
  - Key ecological attributes
  - Threats and sources
  - Invasive species
  - Monitoring framework
- [ ] Appendix D – References and Additional Resources

TABLE OF CONTENTS

SECTION 1: INTRODUCTION

CONTEXT

Spring Hill Natural Area (SHNA) is located two miles northeast of Gaston, Oregon on the east bank of the upper Tualatin River (Map 1) in the Wapato Valley of southwest Washington County. The immediate neighborhood of SHNA is dominated by agriculture with scattered rural residential properties.

Spring Hill Natural Area represents an important conservation connection, linking Metro's upland Chehalem Ridge, Fern Hill Forest, and Wapato View properties with bottomland conservation areas including Penstemon Prairie and the Joint Water Commission's Hutchinson property on the opposite side of the Tualatin River. Spring Hill Natural Area is located within the approved boundary of the Tualatin River National Wildlife Refuge – Wapato Lake unit, which is managed by the U.S. Fish and Wildlife Service (USFWS 2007). In addition, the property supports remnant Oregon white oak (*Quercus garryana*) habitat linking the extensive oak ecosystems of Yamhill County to the south with those of the Tualatin Valley to the north. To the west and upstream on Scoggins Creek lies Scoggins Reservoir (Henry Hagg Lake), constructed in the 1960s by the Bureau of Reclamation for flood control and irrigation supply.

The upper Tualatin River supplies drinking water to over 250,000 people through Washington County's Joint Water Commission. The river supports native fish including threatened steelhead (*Oncorhynchus mykiss*) and Chinook salmon (*Oncorhynchus tshawytscha*), naturalized coho salmon (*Oncorhynchus kisutch*), and cutthroat trout (*Oncorhynchus clarki*). The SHNA native habitats include riparian forests (with Oregon white oak), shrub wetlands, and wet prairie. Though impacted by agriculture, these habitats continue to support wildlife and ecosystem functions.

The Tualatin Valley is the ancestral homeland of the Atfalati, a band of Kalapuya-speaking Native Americans who originally occupied twenty-four villages in the area. By the 1830s Euro-American disease and land encroachment had resulted in severe population declines and cultural upheaval. In the 1850s the Atfalati ceded their territorial lands to the U.S. government, moving first to a small reservation at Wapato Lake and then later to the Grand Ronde reservation in southwest Yamhill County.

This Site Conservation Plan (SCP) is a tool for protecting and enhancing the unique natural characteristics of the site. It includes a history of the site, as well as an overview of existing conditions, key ecological attributes, conservation targets, and management priorities. It also considers the site in relation to surrounding lands and adjacent conservation properties. Since the recent acquisition of the site in 2014 under Metro's 2006 Natural Areas Bond Measure, restoration treatments have focused on weed control.

PLANNING AREA

Spring Hill Natural Area is an approximately 241-acre property on SW Spring Hill Road, on the east bank of the upper Tualatin River. It includes a semi-forested riparian-floodplain corridor along the Tualatin River, two tributaries draining from the east, a farm pond, shrub wetlands, and agricultural fields.

The site consists of five tax lots, including 1S4240000600 and 1S4240000701 on the north part of the property, and 1S4250000100 and 1S4250000200 on the south part. Tax lot 1S4250000100 has a barn with an access road, and a site address of 8673 SW Spring Hill Road. Taxlots 1S4240000600 and 1S4240000701 have a site address of 7280 SW Spring Hill Road and an access road but no building improvements.

There are five water rights associated with SHNA. The southern property includes two surface water diversion rights on the Tualatin River for 0.36 cubic feet per second (cfs) and 0.13 cfs with priority dates of 1953 and 1956, respectively. The Harris Creek farm pond provides surface water diversion and storage rights for a total of 26 acre-feet with priority dates of 1967 and 1968. The north property includes a Tualatin River surface water diversion right of 0.398 cfs with a priority date of 1947. For more information on these water rights, see the Oregon Water Resources Department online water rights mapping tool: http://apps.wrd.state.or.us/apps/gis/wr/Default.aspx.

The zoning designation for all parcels is Exclusive Farm Use (EFU) under the Washington County comprehensive plan (see http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/Publications/upload/340-344_112715.pdf for more information on allowed and permitted uses).

Access to SHNA is provided via ungated access roads, one to the north property near the intersection of SW Spring Hill and Sandstrom roads, and one to the south property at the former farmstead at 8673 SW Spring Hill Road. The north access road crosses the farm field and terminates at an irrigation power pole next to remnant bridge pilings in the Tualatin River. The south access road accesses the farm pond and a second irrigation power pole along the Tualatin River. A third road runs along the south property line and provides access to a neighboring property.

Because SHNA is within the Tualatin River National Wildlife Refuge planning area, future land acquisitions could increase habitat connectivity between the north and south properties as well as between SHNA and other nearby natural areas. Farmland acquired by Metro in the Wapato Lake Target Area is subject to farmland preservation policies under Metro Resolution #06-3727.

KEY METRO STAFF AND PARTNERS

Staff

Peter Guillozet, senior natural resource scientist
Alex Perove, senior parks planner
Adam Stellmacher, lead natural resource specialist
Ariel Whitacre, natural resource technician

Partners

Metro will work with Clean Water Services to restore riparian and wetland habitat at the site through a Grant of Rights Agreement established in 2015. Metro currently maintains annual leases with area farmers who cultivate and graze the SHNA lands. In an effort to better align farming practices with the conservation goals for the site, Metro is working with the Natural Resource Conservation Service (NRCS) and Tualatin Soil and Water Conservation District (TSWCD) to develop farm plans for the leased areas. Key stakeholders and partners are listed under Section 6, below, and include the farmers holding leases to the property, permitting agencies, and other partners such as Clean Water Services, U.S. Fish and Wildlife Service, NRCS and TSWCD who may assist or coordinate with site restoration.

EXISTING PLANNING DOCUMENTS

Guillozet, Peter. 2015. Zurcher Property (Spring Hill Natural Area) Stabilization Plan. 5 pages.

SECTION 2: EXISTING CONDITIONS

Land use in the immediate vicinity of SHNA is dominated by small-scale agriculture and rural residential development, with some forestry in the surrounding hills. Large parcels of 60 to150 acres zoned for agriculture lie to the south, west, and north of SHNA. To the east, across SW Spring Hill Road are 5 to 40-acre agricultural properties, many of which have residences on site. To the immediate west of the SHNA north property, across the Tualatin River are four parcels ranging from 30 to 240 acres owned by the Joint Water Commission and managed as agricultural lands. On the northern edge of the SHNA are two 2 to 4-acre rural residential properties near the intersection of SW Spring Hill and Fern Hill roads.

Prior to being purchased by Metro, SHNA was managed farmland with limited hunting by permission. Previous owners modified drainage patterns to improve agricultural production. Harris Creek and another unnamed tributary entering from the southeast were ditched, straightened, and dammed near their confluence with the Tualatin River to create a farm pond. Fern Hill Creek, which crosses the north property, was routed into an underground drainage system constructed from discarded tires. Riparian vegetation was cleared from the edges of watercourses, and drained bottomlands were grazed or used for till agriculture. Impervious surfaces are limited to the farm residence and outbuildings.

PHYSICAL ENVIRONMENT

The local landscape surrounding SHNA was shaped by the Pleistocene-era Missoula floods, which created poorly-drained lake deposits in Wapato Valley. This led to the development of interconnected lakes, wetlands, and wet prairies on the valley floor, connecting to seasonal and perennial streams draining adjacent uplands.

Approximately 140 acres of SHNA are within the active floodplain of the Tualatin River or tributary streams. The remaining 101 acres, the southeast corner of the north property and the northeast corner of the south property, are on higher and drier ground that lies outside of the active floodplain. The property is free from steep slopes except for portions of the banks of the Tualatin River and Wapato Creek, which are eroding.

Soils mapped by the USDA Soil Conservation Service for SHNA are summarized in Table 1 (Green 1982) and illustrated in Map 3. The soils of SHNA are a mix of well-drained silty clay or silt loams and the poorly-drained Wapato silty clay loam, which predominates along stream courses.

Table 1. Mapped soil units, acres, and descriptions for Spring Hill Natural Area (derived from Green 1982 and the USDA SCS Web Soil Survey)

MAP UNIT SYMBOL	MAP UNIT NAME	ACRES	PERCENT	DESCRIPTION
7B	Cascade silt loam	0.7	0.3%	Poorly-drained soils formed in silty loess and old mixed alluvium on uplands. Slopes of 3-7% at elevations of 250-1400 ft. Vegetation is Douglas-fir, Western red cedar, bigleaf maple, salal, red huckleberry, vine maple, sword fern, grasses and forbs.
9	Chehalis silty clay loam	79.0	32.6%	Well-drained soils formed in recent alluvium on bottomlands. Slopes of 0-3% at elevations of 150-300 ft. Vegetation is ash, cottonwood, and willow.
11C	Cornelius silt loam	1.5	0.6%	Moderately well-drained soils formed in loesslike material over fine-silty old alluvium of mixed origin on uplands. Slopes of 7-12% at elevations of 350-800 ft. Vegetation is Douglas-fir, bigleaf maple, shrubs, and grasses.
11D	Cornelius silt loam	2.3	0.9%	Moderately well-drained soils formed in loesslike material over fine-silty old alluvium of mixed origin on uplands. Slopes of 12-20% at elevations of 350-800 ft. Vegetation is Douglas-fir, bigleaf maple, shrubs, and grasses.
13	Cove silty clay loam	0.5	0.2%	Poorly-drained soils formed in recent clayey alluvium on floodplains. Slopes of 0-2% at elevations of 150-300 ft. Vegetation is ash, willow, sedges, cattails, and grasses.
30	McBee silty clay loam	47.8	19.7%	Moderately well-drained soils formed in alluvium on floodplains. Slopes of 0-3% at elevations of 100-300 ft. Vegetation is ash, cottonwood, and willow.
37A	Quatama loam	12.4	5.1%	Moderately well-drained soils formed in mixed, loamy alluvium on old terraces. Slopes of 0-3% at elevations of 140-200 ft. Vegetation is Douglas-fir, Western red cedar, Oregon white oak, ash, Oregon grape, grasses and forbs.
43	Wapato silty clay loam	98.0	40.5%	Poorly-drained soils formed in recent alluvium on floodplains. Slopes of 0-3% at elevations of 100-300 ft. Where not cultivated, vegetation is ash, willow, rushes, and grass.

PRECIPITATION AND WATER BODIES

Average annual precipitation in the Wapato Valley is 45.2 inches, with more than 90 percent occurring as rainfall between the months of October and May (NOAA National Weather Service Dilley 1S cooperative weather station, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?or2325).

The reach of the Tualatin River that forms the west boundary of SHNA is a low gradient, sinuous channel with fringing wetlands, floodplain overflow channels, and beaver activity. There is low abundance of large woody debris and certain sections of the channel appear to have been straightened and channelized. Along the western edge of SHNA, numerous overflow channels convey floodwaters from the Tualatin River mainstem onto the floodplain. During high water events, large portions of the SHNA floodplain are underwater (Map 4).

The confluence of Scoggins Creek and the Tualatin River lies at the northwest corner of the south property, and the confluence of Wapato Creek with the Tualatin is at the southwest corner of SHNA. Upstream on Wapato Creek, approximately a half mile south, is a remnant forest wetland called Gaston Slough, which is the confluence of the unnamed stream draining Wapato View natural area with Wapato Creek (Christy et al. 2007).

At the southwest corner of SHNA there is a bridge crossing over Wapato Creek (just upstream of the confluence with the Tualatin River), which provides a neighboring landowner with access to an irrigation diversion. On the north property, at the irrigation diversion power pole are remnant pilings for an historic abandoned bridge. The entire length of Wapato Creek and the Tualatin River below the Wapato Creek confluence on the south property of SHNA is channelized and straightened.

Harris Creek and another unnamed perennial tributary join at the southeast corner of the SHNA south property and drain westwards to their confluence with the Tualatin River. Upstream and downstream of SW Spring Hill Road, both tributaries have been stripped of their riparian vegetation and ditched. Near the confluence of Harris Creek with the Tualatin River a concrete weir impounds a thirteen-acre farm pond. At the northeast corner of the farm pond is a swale with seasonal drainage and a remnant ash-dominated riparian area crossed by a farm access road. During high water events, flows spill over at the northwest corner of the pond into wetlands on the east side of the Tualatin River, bypassing the weir and outlet channel.

The headwaters of Fern Hill Creek to the east of SHNA recently underwent partial restoration on the adjacent Fern Hill Forest Natural Area. At SHNA, Fern Hill Creek drains under SW Spring Hill Road and into a subsurface drain constructed of discarded tires. A secondary branch of this subsurface drain flows beneath the farm field to the south of the access road on the north property. Approximately 700 feet west of the intersection of SW Spring Hill and Sandstrom roads, the creek resurfaces and flows northwestwards through a ditch to its confluence with the Tualatin River next to a five-acre shrub wetland. With the exception of pasture grasses, there is only sparse riparian vegetation along the entire length of Fern Hill Creek as it crosses SHNA.

MAJOR HABITAT TYPES

Current cover types at SHNA include agricultural fields (tilled and pasture lands), riparian forest, open water, and a small developed area around the barn (Map 5).

Riparian forest remnants are concentrated along the Tualatin River, including stands measuring 13.8 and 13.5 acres on the south and north properties, respectively. The riparian forests are dominated by Oregon ash (*Fraxinus latifolia*), with lesser amounts of red alder (*Alnus rubra*), red osier dogwood (*Cornus sericea*), and Oregon white oak. The forest understory is dominated by reed canarygrass (*Phalaris arundinacea*), wild rose (*Rosa pisocarpa*), Himalayan blackberry (*Rubus armeniacus*), ninebark (*Physocarpus capitatus*), snowberry (*Symphoriocarpus albus*), and crabapple (*Malus fusca*). Extensive clearing of riparian forest at SHNA has resulted in openings dominated by invasive Himalayan blackberry and reed canarygrass.

At present, active agricultural lands predominate at SHNA. Both the north and south properties have a mix of tilled and pasture lands. Pasture lands are concentrated on lower, wetter soils while the tilled fields occupy higher, drier ground. Agricultural lands total 101.4 and 98.7 acres on the south and north properties, respectively.

Two creek networks drain through the farm fields into the Tualatin River: Harris Creek at the south and Fern Hill Creek at the north. Both creeks have been ditched and cleared of riparian vegetation along their lengths. A farm pond on lower Harris Creek occupies 13.2 acres, and has limited fringing riparian vegetation. At the confluence of Fern Hill Creek with the Tualatin River is a 5.1-acre shrub wetland that is seasonally grazed; the wetland vegetation is dominated by wild rose thickets and scattered willow (*Salix spp*.), ash, and non-native hawthorn (*Crataegus monogyna*).

Development is limited to the area of the former 1.1-acre farmstead. Two houses and several outbuildings were removed by Metro in 2016 and only the barn remains. On both the north and south properties, dirt roads from SW Spring Hill Road provide access to the farm fields and irrigation diversion power poles along the Tualatin River. Both the north and south properties have irrigation.

VEGETATION AND WILDLIFE

Historic vegetation and land use

Based on historical vegetation maps compiled by Christy and Alverson (2011), ash-mixed deciduous riparian forest dominated much of the low-lying lands adjacent to the Tualatin River at SHNA (Map 6). Along the lower reaches of Fern Hill Creek and the swale on the south property, wet prairie predominated with upland prairie in the higher, drier areas. In the uplands to the east of SW Spring Hill Road, there was white oak savanna and scattered Douglas fir (*Pseudotsuga menziesii*)-white oak woodlands.

The historical vegetation maps by Christy and Alverson (2011) represent a snapshot view of historical landcover at a time when indigenous burning had ceased and before extensive areas had been settled by Euro-Americans. Nonetheless, the maps reveal that fire-dependent prairie ecosystems were present and persisting at SHNA at the onset of Euro-American settlement.

Invasive plants

In addition to common agricultural weeds, a 2015 weed survey identified the following invasive plants present at SHNA: Himalayan blackberry, reed canarygrass, tansy ragwort (*Senecio jacobaea*), caper spurge (*Euphorbia lathyris*), leafy spurge (*Euphorbia esula*), shiny leaf geranium (*Geranium lucidum*), bittersweet knightshade (*Solanum dulcamara*), bindweed (*Convolvulus arvensis*), Bohemian knotweed (*Fallopia x bohemicum*), cherry laurel (*Prunus laurocerasus*), non-native hawthorn, non-native cherry (*Prunus avium*), locust (*Robinia pseudoacacia*), English holly (*Ilex aquifolium*), Scot's broom (*Cytisus scoparius*), poison hemlock (*Conium maculatum*) and English ivy (*Hedera helix*).

Invasive plants are concentrated in riparian areas of the Tualatin River, where forest clearing has created openings for thickets of blackberry and reed canarygrass to develop. Around the farm pond on lower Harris Creek and in the shrub wetland on lower Fern Hill Creek, there are extensive areas covered with invasive blackberry and non-native hawthorn.

Wildlife

Spring Hill Natural Area supports a diversity of wildlife species. Riparian areas have high concentrations of songbirds. Deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), and beaver (*Castor canadensis*) signs are evident in the forested riparian areas. Canada geese and other waterfowl make use of the farm pond and seasonal wetland at the north end of the property.

In surveys of Tualatin River fish populations by ODFW in 1999-2000 at two reaches upstream of Gaston, the following species were collected: western brook lamprey (*Lampetra richardsoni*), cutthroat trout, rainbow trout, juvenile steelhead, redside shiner (*Richardsonius balteatus*), speckled dace (*Rhynichthys osculus*), reticulate sculpin (*Cottus perplexus*), torrent sculpin (*Cottus rhotheus*), prickly sculpin (*Cottus asper*), and signal crayfish (*Pacifastacus leniusculus*) (Leader and Hughes 2001, App Table C-1, p. 24 & 26). All of these species are likely present in the reach passing through SHNA. Although this reach of the upper Tualatin River does not appear to support spawning habitat for native salmonids, it is important adult migratory and juvenile rearing habitat.

In their Wapato Lake-Chehalem Mountains biological assessment, Christy et al. (2007) highlight Gaston Slough, approximately 0.5 miles upstream on the Tualatin River, as having year-round use by waterfowl, beaver, and western pond turtles (*Actinemys marmorata*). Other known occurrences of rare, threatened, and endangered species within several miles of SHNA include: Aleutian Canada goose and Townsend's big-eared bat (*Corynorhinus townsendii*) (ORNHIC Biotics database as summarized in Christy et al. 2007).

In addition, Christy et al. (2007) identify potential habitat for the following priority species within the immediate vicinity of Wapato Lake and the Chehalem Mountains: red-legged frogs (*Rana aurora*), tundra swans, Oregon vesper sparrow, streaked horned lark , and several sensitive bat species (*Lasionycteris noctifagans*, *Myotis evoltis*, *M. thysanodes*, *M. volans*, *M. yumanensis*).

RECENT MANAGEMENT HISTORY

Spring Hill Natural Area was recently acquired by Metro. Initial efforts have focused on weed control, including weedy tree removal, reed canary grass mowing and spraying in the Harris Creek and farm pond areas, and spot reed canary grass and blackberry spraying throughout rest of site.

NATURAL RESOURCES OF SPECIAL INTEREST

Natural resources of special interest at SHNA include the Oregon white oak, the remnant Oregon ash riparian forest along the Tualatin River, and the confluence of Scoggins Creek with the Tualatin River. Metro Plant Materials Scientist Marsha Holt-Kingsley visited the site in 2015 and did not identify any rare plants. Clean Water Services contracted with a consulting firm to complete a preliminary cultural resources and archeological survey, which will be completed in 2016.

Spring Hill Natural Area is close to natural areas including Fern Hill Forest, Penstemon Prairie, Chehalem Ridge, Wapato View, Wapato Lake, and Gaston Slough. These other natural areas lie upstream and downstream of SHNA, or upslope to the southeast. Together they support riparian, oak woodland, and prairie habitats. This complex of conservation properties affords unique opportunities to protect landscape-level habitat connectivity for both aquatic-riparian and prairie habitat species.

SECTION 3: CONSERVATION

CONSERVATION TARGETS

The habitat conservation targets represent major habitat types present at the site, including riparian forests, shrub wetlands and prairie. The Tualatin River riparian corridor safeguards habitat for native fish and turtles – although this habitat is not explicitly mapped as part of this site conservation plan.

The immediate setting of SHNA – with other, closely juxtaposed conservation properties – affords opportunities to reconnect habitat fragments distributed across the landscape both upstream-downstream within the Tualatin River corridor, and with the wider network of sites supporting oak-prairie habitats to the north, east, and south.

The habitat conservation targets are described briefly in Table 2 and are shown on Map 7. Acreages of existing cover types, conservation targets, stewardship types and management status are presented in Table 3. Although this plan describes the eventual restoration of the entire site, Metro plans to continue leasing the prime farmland portions of the site for at least 10 years. Near term actions at SHNA will result in modest reductions in the extent of farming and grazing to restore altered hydrology and protect water quality.

Table 2. Current status and generalized desired future condition of Spring Hill Natural Area conservation targets

TARGET	CURRENT STATUS	DESIRED FUTURE CONDITION
Riparian forest	POOR – Greatly reduced in extent and degraded by invasive vegetation, with channelized and simplified drainage patterns.	Extensive mixed-seral native forest community with standing and downed wood, a complex network of interacting channel-floodplain habitats, and a mosaic of seasonal and perennial wetlands.
Shrub wetland	POOR – One small shrub wetland at the north end of property has been extensively grazed, and on the south property a historical wetland has been impounded by a constructed farm pond.	Diverse shrub community with a mix of perennial and seasonally wet habitats, standing and downed wood, and good connectivity to adjacent upland and riverine environments.
Prairie	POOR – Native dry and wet prairie has been eliminated from the site and replaced with intensive agriculture.	Good cover of native grass and forb prairie species, supporting grassland bird species. For wet prairie, seasonally high water tables may be present.

Table 3. Summary of current cover, conservation targets, stewardship type, and management status for Spring Hill Natural Area (the total acreage reported below is calculated from GIS, which differs slightly from the deed or survey recorded acreage reported above)

CURRENT COVER	ACRES
Agriculture	200.1
Riparian forest	27.8
Open water	13.2
Developed – pervious	1.2
Total	**242.3**

STEWARDSHIP TYPE	ACRES
Prairie	157.2
Riparian forest	51.0
Wetland	32.9
Developed	1.2
Total	**242.3**

CONSERVATION TARGET	ACRES
Prairie	157.2
Riparian forest	51.0
Shrub wetland	32.9
No target	1.2
Total	**242.3**

MANAGEMENT STATUS	ACRES
0 - Pre-initiation	157.2
1 - Initiation	83.9
9 - No targets (developed)	1.2
Total	**242.3**

KEY ECOLOGICAL ATTRIBUTES

Key ecological attributes (KEAs) are the features that define aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy, 2007). KEAs define the conservation target's viability. They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. KEAs are rated from poor to very good. This rating helps establish the restoration goals and guide Metro in development of restoration actions for the conservation targets. Tables 4a-c below describe KEAs and their ratings for Spring Hill Natural Area.

Table 4a. Key ecological attributes for riparian forest at Spring Hill Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Size	Riparian forest width	Average 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	Poor	Very Good	Very Good	Native Oregon ash riparian forest is fragmented and discontinuous in low-lying and floodplain areas of the Tualatin River. There are small numbers of Oregon white oak and alder mixed in with the ash. The riparian forest extent has been greatly reduced over the historical period, and it has been completely removed along the unnamed tributary entering from the southeast.
Condition	Vegetative structure: shrub layer	% native shrub cover	<10% cover	10-25% cover	25-50% cover	>50% cover	Poor	Good	Good	Riparian forest understory, particularly areas near stream banks, are dominated by reed canarygrass and Himalayan blackberry, with small patches of wild rose, hawthorn, red osier dogwood, ninebark, snowberry, and crabapple. Within farmed areas, there is no remnant riparian tree or shrub cover.
Condition	Standing and downed dead trees	Average # snags and large wood (>50 cm, or 20 in, DBH) per 0.4 ha (1 ac)	<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	Poor	Good	Very Good	There are few snags and mostly small diameter downed wood in areas immediately adjacent to the Tualatin River channel. A forested side channel at the eastern edge of the remnant riparian forest on the south property has the most extensive downed wood deposits.
Condition	Floodwater access to the floodplain; and upstream habitat connectivity	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)	Fair	Good	Good	Floodwaters spill in and out of the Tualatin River mainstem channel via low places on the right river bank. There is one main and one overflow channel originating from the farm pond, draining to the Tualatin River and adjacent floodplain wetlands. Though historical channelization and large wood cleanouts have likely reduced the frequency and extent of overbank flows, they still occur periodically. The southeast tributary to the farm pond has also been channelized both on and off the Metro property.

Table 4b. Key ecological attributes for shrub wetlands at Spring Hill Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Extent of scrub-shrub wetland area	Hectares or acres of scrub-shrub wetland	N/A	Reduced due to habitat conversion	Maintained at current size	N/A	Fair	Good	Very Good	The south property wetland was converted to a farm pond, lacking in native vegetative structure and composition, and a concrete outlet structure disconnects the pond from natural patterns of inundation and drawdown by the Tualatin River. The north property wetland is still connected to the main river, but cattle grazing and farm have severely impacted the vegetation.
Condition	Vegetative structure: shrub layer	% native shrub canopy cover	<30% cover or >80% cover	30-50% cover	50-70% cover	70-80% cover	Poor	Good	Very Good	Native shrub cover is very limited and composed mostly of wild rose with scattered willow, ash, and hawthorn. Vegetative structure cover is limited by water depths and an artificial hydroperiod in the farm pond, and by cattle grazing in the north wetland.
Condition	Hydrology	Hydroperiod	Both the filling/inundation and drawdown/drying of the site deviate from natural conditions (either increased or decreased magnitude and/or duration)	Filling or inundation patterns characterized by natural conditions but thereafter are subject to more rapid/extreme drying, compared to more natural wetlands, OR patterns are of substantially lower magnitude or duration than natural conditions.	Filling or inundation patterns are of greater magnitude and greater/lesser duration than natural, but subject to natural dry down.	Hydroperiod of the site is characterized by natural patterns of inundation and dry down.	Poor	Fair	Good	Note: this KEA was borrowed from the KEAs for emergent wetlands, as it seemed particularly relevant here. Most of the wetlands and upstream farm areas to the east have been extensively drained for agricultural development. Stream and wetland channels have been ditched and at least one 1,900-ft long subsurface drain has been installed to accelerate runoff and drainage on the north parcel. A constructed farm pond on the south property interferes with natural patterns of inundation and dry down.

Table 4c. Key ecological attributes for prairie at Spring Hill Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Size	Grassland bird habitat	Number of potential male meadowlark territories (8 ha, or 20 acre units)	<16 contiguous ha (40 ac) of a mix of suitable habitat such as prairie and degraded prairie, savanna or appropriate pasture habitat, i.e. insufficient habitat for 2 male meadowlark territories.	16-49 ha (40-120 ac) of contiguous prairie or other suitable habitat, i.e. enough suitable habitat for 2 to 5 male meadowlark territories.	49-162 ha (120-400 ac) of suitable contiguous or connected habitat, i.e. enough suitable habitat for 6 to 20 male meadowlark territories. Alternatively, 3 patches of closely associated suitable habitat, each >16 ha (40 ac) in size.	>162 ha (400 ac) of suitable contiguous or connected habitat, i.e. enough suitable habitat for >20 male meadowlark territories. Alternatively, 3 patches of suitable contiguous or connected habitat, each >57 ha (140 ac) in size.	Poor	Fair	Fair	Historically, the uplands of Spring Hill Natural Area and environs had extensive wet and upland prairie and white oak savanna. At present, these lands are dominated by agriculture and rural residential development.
Condition	Native forb and grass abundance	% cover native forbs & grasses	<20%	20-30%	30-50%	>50%	Poor	Fair	Good	Currently the site supports intensive agriculture and cattle grazing and there is little or no native grass or forb species cover in these areas.
Condition	Surface hydrology	Seasonal high water table	Wet prairie soils are either never saturated to the surface during the rainy season, or are completely inundated for more than 120 continuous hours (5 days) at least once in a five year period.	N/A	N/A	Wet prairie soils are generally saturated to the surface during the rainy season, with pedestals or hummocks emerging above water level except for short duration flood events, and low spots between pedestals generally covered with shallow water <5 cm (2 in) deep.	Poor	Very Good	Very Good	At present, agricultural drainage and a constructed farm pond heavily impact the site. Once natural hydrology is restored, low-lying prairie habitats should support more natural patterns of seasonal inundation and dry down, promoting redevelopment of wet prairie plant communities and ecological characteristics.

THREATS

Numerous stresses influence current conditions at SHNA and threaten long-term ecological health and the viability of restoration treatments (Tables 5a-c). These stresses include historical land conversion, stream and river channelization, clearing of riparian vegetation, suppression of natural fire regimes, and invasive species, as well as residential development on neighboring lands.

Because human access and recreation at SHNA is currently low and not expected to increase in the immediate future, the greatest management challenges at the site relate to invasive species and pressures from ongoing agriculture (occurring both on- and off-site).

CLIMATE CHANGE CONSIDERATIONS

Climate change is anticipated to affect summer high temperatures, growing season length, wet-season storm events and runoff patterns, as well as drought-season water availability. Tualatin River hydrology may develop flashier runoff patterns as winter storms shift from a mix of snow and rain to rain-dominated, as the transient snowpack of the Coast Range completely disappears. Some of these hydrology changes may be mediated by the presence of Scoggins Reservoir (Henry Hagg Lake) immediately upstream of SHNA, which reduces the frequency and severity of high- and low-flow extreme events.

With longer, more pronounced summer drought seasons, tree growth may be reduced and the risk/severity of wildfires could increase. Other indirect effects of climate change could include increased erosion, invasion of opportunistic native and non-native species, extirpations of less resilient native species, shifts in vegetation phenology, and alterations to pollination, dispersal, competition and predator-prey dynamics.

The potential for altered hydrology increases the importance of riparian forest health, extent, and continuity at SHNA. Enhancing and increasing the resiliency of in- and off-channel habitats to the effects of climate change could help both native fish and turtle species. At the site level, the likelihood of native species persistence will be enhanced by restoration actions that remove or remedy habitat fragmentation, re-establish and reconnect native drought-resistant habitats (prairie), restore legacy habitat features that serve as refugia (downed wood and snags), buffer extreme climate events by restoring natural hydrology, and control invasive plants.

As the direct and indirect effects of climate change begin to manifest at the site, it is important to provide restored native habitats and viable corridors for the movement of flora and fauna across the landscape. The SHNA serves as an important connection for the movement of organisms north and south within the Wapato Valley for species associated with riverine-riparian, wetland, and oak-prairie habitats. Future management of the site should also consider how habitat connections to the neighboring sites of Fern Hill Forest, Chehalem Ridge, Wapato View, Gaston Slough, and Wapato Lake can be re-established or enhanced.

Table 5a. Threats and sources of stress for riparian forest at Spring Hill Natural Area

Source of stress		**Stresses**[1] (rank each as L-M-H-VH for contribution, irreversibility & source)													Comments
		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	
Development, land conversion	Contribution	H		H						M		H			Riparian forest loss, channelization, and drainage alterations for agriculture have simplified river and stream channels, reduced tree and shrub cover, led to the loss of snags and large wood, and disconnected secondary channels and floodplain wetlands. In addition, upstream dam construction at Henry Hagg Lake has altered the natural hydrology of the upper Tualatin River, reducing the frequency and severity of high- and low-flow extremes.
	Irreversibility	H	H	H	H					VH	H	M	H	H	
	Source Rank	H		H						H		M			
Invasive species	Contribution			M		M									Heavy infestations of Himalayan blackberry and reed canarygrass compete with native shrub and forb species within forest openings and at the fringes of the fragmented riparian area.
	Irreversibility			M	H	M	H							M	
	Source Rank			M		M									
Human use, dogs, trails, fishing, etc.	Contribution							L							Access to the site is currently limited to land managers and agricultural lessees. No trails or access improvements are planned. Existing farm access roads can be closed to limit uninvited access.
	Irreversibility							L	L					N/A	
	Source Rank							L							
Diking, filling, draining	Contribution									H					Tributary streams draining across the property from the east have been channelized and/or routed into subsurface agricultural drains.
	Irreversibility									M	M			L	
	Source Rank									M					
Climate change	Contribution									M					Potential long-term effects on drought and flood events in the mainstem Tualatin River corridor are at least partially mitigated for by Henry Hagg Lake, a reservoir immediately upstream on Scoggins Creek to the west. The small tributary streams with agricultural development at their headwaters will fare less well in the face of extreme drought and flooding.
	Irreversibility									M	M			M	
	Source Rank									M					

[1]Stress ranks are Low (L), Medium (M), High (H) or Very High (VH).

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

Table 5b. Threats and sources of stress for shrub wetland at Spring Hill Natural Area

Source of stress		**Stresses**[1] (rank each as L-M-H-VH for contribution, irreversibility & source)													Comments
		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	
Development, land conversion	Contribution	VH		VH											A constructed farm pond inundates and isolates a floodplain wetland from the mainstem river channel on the south property. Active farming and cattle grazing impacts wetland fringes and water quality.
	Irreversibility	M	H	M	H									H	
	Source Rank	H		H											
Invasive species	Contribution					M									There are heavy infestations of reed canarygrass within wetland areas, with lesser amounts of English hawthorn and Himalayan blackberry on the fringes.
	Irreversibility					M	H							M	
	Source Rank					M									
Human use, dogs, trails, fishing, etc.	Contribution							L							Existing farm access roads traverse wetlands, but access is currently limited to land managers and agricultural lessees and no additional human use pressures are anticipated in the near-term.
	Irreversibility							L	N/A					N/A	
	Source Rank							L							
Diking, filling, draining	Contribution	VH								VH		VH			Wetland channels have been ditched and placed into subsurface drains to facilitate agricultural development.
	Irreversibility	M	H							M	H	M	H	H	
	Source Rank	H								H		H			
Climate change	Contribution			M						M					Hydrological alterations contributing to more extreme drought and flood events may be partially offset by the presence of Henry Hagg Lake, a constructed reservoir upstream.
	Irreversibility			M	L					M	L			L	
	Source Rank			L-M						L-M					

[1]Stress ranks are Low (L), Medium (M), High (H) or Very High (VH).

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

Table 5c. Threats and sources of stress for prairie at Spring Hill Natural Area

Source of stress		**Stresses**[1] (rank each as L-M-H-VH for contribution, irreversibility & source)													Comments
		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	
Development, land conversion	Contribution	VH	VH									H	H	H	Land conversion for agriculture has destroyed and fragmented native prairie, resulting in more contiguous forestlands. Remnant trees in/around adjacent farmlands may sustain some prairie-dependent bird fauna.
	Irreversibility	M										H			
	Source Rank	H										H			
Fire suppression	Contribution			M	M									L	Elimination of natural fire regime will require active management to control competing vegetation, and/or to harmonize restoration burns with neighboring land uses.
	Irreversibility			M											
	Source Rank			M											
Invasive species	Contribution			H	VH	H	VH							H	Active management to suppress invasive species is necessary as part of prairie restoration and will likely be an ongoing challenge with adjacent active agriculture.
	Irreversibility			M		M									
	Source Rank			M		M									
Human use, dogs, trails, fishing, etc.	Contribution							L	N/A					N/A	Existing farm access roads traverse farm fields, but access is currently limited to land managers and agricultural lessees and no additional human use pressures are anticipated in the near-term.
	Irreversibility							L							
	Source Rank							L							
Climate change	Contribution			M	M					L-M	M			L-M	Potential long-term effects from new diseases and pests, as well as altered fire and drought regimes. Increased drought and fire could favor prairie, but impacts from disease and pests could be detrimental.
	Irreversibility			M						VH					
	Source Rank			M						H					

[1]Stress ranks are Low (L), Medium (M), High (H) or Very High (VH).

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

PRIORITIZED STRATEGIES TO ADDRESS THREATS

This SCP outlines strategic actions to be carried out at SHNA over the next ten years, based upon short- and long-term goals for the various identified conservation targets. The strategic actions described below are intentionally general in nature rather than highly specific prescriptions. Specific prescriptions will be developed by Metro staff to address site-specific conditions encountered in areas targeted for restoration. Proposed strategic actions to address threats are summarized in Table 6.

Initial restoration actions should focus on control of invasive plant species, re-establishment of native riparian vegetation, and removal of the field drains and farm pond. These steps will remedy the most immediate threats to the site and help re-establish natural processes that will advance the ecological resiliency of SHNA. Longer term, SHNA managers can focus on restoration of the native prairie ecosystem, once a strategy is developed to reconcile conservation with any on-site or neighboring agriculture.

Table 6. Threats and actions for key ecological attributes (KEAs) of important conservation targets at Spring Hill Natural Area

CONSERVATION TARGET	KEA	THREAT	ACTION(S)	NOTES
All	Species composition and competition	Invasive species	Integrated approach of monitoring, cutting, herbicide spraying and controlled burns.	This will be an ongoing challenge for the entire natural area.
Shrub wetland	Hydrology	Land conversion	Remove farm pond weir and artificial field drains, and re-contour to restore natural hydrology.	Integrate actions with restoration of wetland vegetation.
Riparian forest and shrub wetland	Tree (for RF) and shrub species composition	Land conversion	Re-establish native trees in denuded riparian areas and shrubs in understory where invasive species presently dominate.	Time the wetland plantings to immediately follow removal of farm pond and field drains.
Prairie	Species composition and size	Land conversion, fire suppression	Reduce agricultural uses at the site and restore native forb and grass cover.	Prairie restoration should be delayed until invasive vegetation is under control.

SECTION 4: MANAGEMENT ACTIONS

Restoration actions, anticipated challenges, and estimated costs are described in this section and in Table 7, below. Spring Hill Natural Area stewardship class and management status are shown in Maps 8 and 9. For several restoration actions, there are options for Metro to stage interventions in order to gauge initial success, manage costs, and maintain working relationships with the current agricultural lessees. Each conservation target habitat presents unique challenges, and proactive measures to prevent or minimize future threats at the property scale and beyond will be beneficial. While many factors will influence the actual cost of implementing the recommended management actions, the current estimate is $1.5 to $1.6 million over ten years.

INVASIVE SPECIES

The dominant invasive species at the site are Himalayan blackberry, reed canarygrass, English ivy, non-native hawthorn, and various non-native pasture grasses. In addition, there are numerous species of weeds associated with the tilled ground and pasture lands at SHNA.

Metro developed a basic map of invasive weeds at SHNA in 2015 in order to prioritize and stage weed treatments. Initial weed control measures have focused on the riparian forest and shrub wetland areas, and continue to be implemented in coordination with efforts to restore the site's natural hydrology.

Once initial restoration treatments of the riparian forest and shrub wetlands are complete and a plan and schedule for modifying farming has been developed, Metro will be better positioned to address weed treatments on portions of the site identified for prairie restoration.

Over the medium to long term, Metro can address threats from new invasive plants through vigilance and cooperative management agreements with neighboring landowners. Immediately upstream of SHNA on Harris Creek are intensively grazed pasture lands that will likely remain an ongoing source of new weed propagules (via passive downstream water transport). Through re-establishment of vegetation across the riparian forest and shrub wetland areas at SHNA, Metro can pro-actively minimize opportunities for colonization by new weed species or propagules.

RIPARIAN CORRIDOR AND SHRUB WETLANDS

Spring Hill Natural Area offers important opportunities for the long-term conservation of riparian forest, shrub wetlands, and the fish and wildlife species that depend on these habitats in the upper Tualatin River Basin. Metro will focus initial restoration efforts on these habitats, re-establishing riparian and wetland vegetation, restoring natural hydrology, and reconnecting tributaries with the mainstem Tualatin River.

There are significant gaps in the continuity of riparian vegetation along the Tualatin River with heavy infestations of invasive species. Riparian vegetation has been completely removed from the banks of the two tributary stream systems and a farm pond has inundated one of the two shrub wetlands. Riparian re-vegetation work will focus on re-establishing a native understory shrub community and reforesting gaps along the mainstem channel and floodplain. On the tributaries, re-vegetation will focus on plant communities typical of native shrub wetlands.

At the western boundary of SHNA are channelized sections of Wapato Creek and the Tualatin River. Because these stream courses lie at or close to the SHNA property boundary, re-meandering the channels in this location could impact neighboring property owners who may have a less favorable view of flooding. An opportunity also exists at this location to utilize the remnant bridge pilings in the Tualatin River on the north property as points to stabilize logjams on the riverbank. However, such restoration treatments would need to be carefully considered with Metro's neighbors prior to implementation.

On Harris Creek, Metro plans to remove the weir and re-contour the farm pond to create gentler grades and facilitate re-creation of a large shrub wetland. On Fern Hill Creek, the farm field tire drain system will be excavated and removed. Both creek channel systems will be enhanced through wood placement or limited grading to slow runoff and support fine-scale habitat diversity. Where feasible, standing and downed wood will be reintroduced to create additional habitat niches for wildlife.

The SHNA properties collectively include 0.89 cfs in surface water rights for irrigation, as well as rights to 26 acre-feet of water storage in the farm pond. To restore in-stream flows to the upper Tualatin River, Metro will explore transferring all or a portion of these irrigation and water storage rights to in-stream uses to support minimum flows for fish and wildlife. If water rights are retired, Metro could potentially remove the associated network of power poles and lines feeding across the property to the bank of the Tualatin River mainstem at the two diversion points. Under the Grant of

Rights Agreement, Clean Water Services may seek opportunities to lease water rights for in-stream use as part of its flow restoration program. In Table 7, below, the process of retiring/lease-back of agricultural water rights is estimated to cost $100,000 for research, consultation, and document preparation. However, this flow restoration opportunity may ultimately represent a revenue stream for Metro.

Over the medium to long term, Metro will evaluate other habitat enhancement measures to support recovery of steelhead and western pond turtle populations at SHNA. Enhancement measures could include additions of large woody debris (LWD) to the mainstem channel or off-channel environments to improve aquatic habitat. Due to uncertainty around the viability of adding large wood to the Tualatin main stem, the cost estimate is based on treatment of half of the total channel length of 7,000 linear feet on the western boundary of the site (see Table 7).

PRAIRIE

Native prairie represents the largest area for restoration at SHNA. At present, no native prairie remains at SHNA, although low-lying pasture lands of the north property support a remnant population of camas. Portions of the site mapped for prairie restoration include low-lying floodplain wetland areas where restoration of wet prairie plant communities will be pursued. Elsewhere, on upland portions of the site with well-drained Chehalis, McBee, and Quatama soils, future restoration work will focus on upland prairie habitat.

Although Metro plans to continue leasing the prime farmland portions of the site for at least 10 years, in the near term Metro will pursue modest reductions in the extent of active farming and grazing at SHNA in order to restore altered hydrology and protect water quality. When future farm leases are ended or modified, Metro will develop more refined plans for the prairie restoration. Nearly all of the area delineated for future prairie restoration is currently farmed land and lacks manmade structures or other infrastructure that would complicate efforts to control weeds and re-establish native prairie grass and forb species. One key question to resolve is the relative area of wet versus dry prairie at SHNA.

Over the medium to long term, Metro will work to establish native grass and forb species at SHNA. In order to achieve a good or very good KEA indicator rating for grassland bird habitat, Metro may need to consider coordination of prairie restoration goals and treatments at neighboring sites with prairie or savanna conservation targets, such as Penstemon Prairie and Wapato View. In the event that there are willing sellers on neighboring properties, Metro will also explore the feasibility of additional land acquisition to provide larger and more contiguous management units.

Table 7. Management actions, prioritization, costs and monitoring important to maintaining/improving KEAs at Spring Hill Natural Area over the next ten years

CONSERVATION TARGET	KEAS	SOURCE OF STRESS	MANAGEMENT ACTIONS	PRIORITY	SEQUENCING	ESTIMATED COST	LEAD PARTNER/ FUNDING SOURCE	MONITORING
All	Native vegetation composition and cover	Invasive species; legacy land uses	Prioritize and complete initial treatments to contain and minimize invasive weeds.	High	Ongoing and continuing	$242,300 ($1,000/acre over ten years)	Metro	Vegetation plots or transects, photo points. Annual site walk to monitor plantings, with maintenance as needed.
Shrub wetland and wet prairie	Hydrology	Diking, filling, draining; land conversion	Remove farm pond weir and subsurface drain in farm fields and re-contour tributary channels and floodway fringes to restore natural hydrology and microtopography.	High	Near term	$150,000 for project design, permitting, and excavator time	CWS	Project dependent, but at a minimum should include photo points, channel cross-sections, and longitudinal elevation profiles.
Shrub wetland	Wetland area and shrub cover	Land conversion; invasive species	Re-establish native shrub species cover in wetlands, after restoration of hydrology and termination of cattle grazing.	High	Near term, in concert with restoration of natural hydrology	$132,000 ($4,000/acre)	CWS	Vegetation plots or transects, photo points. Annual site walk to monitor plantings, with maintenance as needed.
Riparian forest	Width, and native shrub cover	Land conversion; invasive species	Replant a diverse mix of native tree and shrub species.	High	Near term	$204,000 ($4,000/acre)	CWS	Vegetation plots or transects, photo points. Annual site walk to monitor plantings, with maintenance as needed.
Riparian forest	Hydrology and upstream-downstream habitat connectivity	Development, land conversion; climate change	Transfer, modify or retire agricultural water rights and convert them to in-stream uses to safeguard low flows for imperiled fish.	High/ Medium	Medium term	Estimate $100,000 for water rights transfer/lease	CWS	N/A
Riparian forest	Downed wood and numbers of key large wood pieces	Development, land conversion; climate change	Place downed wood in stream channels and wetlands to enhance aquatic habitat.	High/ Medium	Medium term	$210,000 to $280,000 for 3,500 feet ($60-$80/linear feet) for LWD enhancement	CWS	Project dependent, but at a minimum should include photo points, channel cross-sections, and longitudinal elevation profiles.
Dry and wet prairie	Species composition and competition	Land conversion	Restore native prairie forb and grass cover and explore opportunities to re-establish managed fire regimes. Evaluate opportunities to link prairie restoration and management at neighboring Metro sites to support enhanced grassland bird habitat.	Medium	Medium to long term	$471,000 ($3,000/acre)	Metro	Vegetation plots or transects, photo points. Annual site walk to monitor plantings, with maintenance as needed.

Maps 7 and 8 show the distribution of stewardship classes and present-day management status at SHNA, respectively. Stewardship class is a high-level, generalized land cover classification of all Metro properties, reflecting desired future conditions. Stewardship classes are not as specific as conservation target classes, and they include both natural and non-natural land covers.

Management status describes how far a given portion of a site is from desired future condition (DFC), with a score of "0" for those that are the farthest away from DFC, and "4" for areas currently at DFC. Areas lacking a conservation target are scored as "9" (unclassified). Table 8 defines Metro's management status categories. Most of the SHNA is active farmland and has a management status of "pre-initiation". In contrast, portions of the Tualatin River riparian corridor where there is some intact (though degraded) riparian vegetation is at the "initiation" management stage.

Table 8. Conservation management status categories under the Metro site conservation planning framework

MANAGEMENT STATUS	SCORE	TIMEFRAME	DESCRIPTION
Pre-initiation	0	N/A	Highly disturbed sites where restoration work has not been initiated. Few native plants typically present (farm fields, clearcuts, oak woodlands/prairies with high levels of invasive/colonizing vegetation encroachment).
Initiation	1	0-3 years post-restoration	Sites under initial restoration establishment phase. Includes areas under treatment with tilling, mowing, grading, invasive species control and initial planting.
Establishment	2	3-8 years post-restoration	Sites undergoing treatments to reduce competition to vegetation planted or released during the initiation phase. Areas generally stay in this phase until priority native plants have established dominance over competing vegetation.
Consolidation	3	8-20 years post-restoration	Sites with developing native plant communities that require periodic management to reach the DFC (tree thinning, mowing and weed control).
Refinement and long-term maintenance	4	Indefinite	Sites that have reached their DFC or are on a clear path towards it, requiring only modest additional intervention.
Unclassified	9	N/A	Sites with unclassified conservation targets, representing developed areas.

SECTION 5: ACCESS AND RECREATION

Presently, public access to SHNA is neither discouraged nor promoted by Metro. Based on observations by staff, few people from the surrounding rural area currently enter the site. Over the next several years, however, it is possible that use by neighbors and others will increase. There are several reasons to presume this may happen. Several planned trails, including the Hagg Lake Greenway, the Yamhelas Westsider Rail-to-Trail and future trails at Chehalem Ridge Natural Area are expected to increase circulation on a regional scale. These trails may increase the number of visitors who find SHNA an attractive destination.

In addition to the potential for more people at SHNA, the number and diversity of sensitive species may increase due to restoration efforts. Although there are currently no trails, any future trails should be routed to avoid sensitive areas. People may also experience the site in a group with an educator or as part of a volunteer work party. Seasonal access may be possible based on wildlife patterns of use.

Spring Hill Natural Area is not currently publicized, except as a conservation area without access.

SECTION 6: COORDINATION

PUBLIC INVOLVEMENT

As projects are developed, Metro will provide local stakeholders and residents surrounding SHNA with pertinent information about conservation work before it is implemented. This may include details about project background, timing, costs, material types, and other information as necessary to keep the public informed.

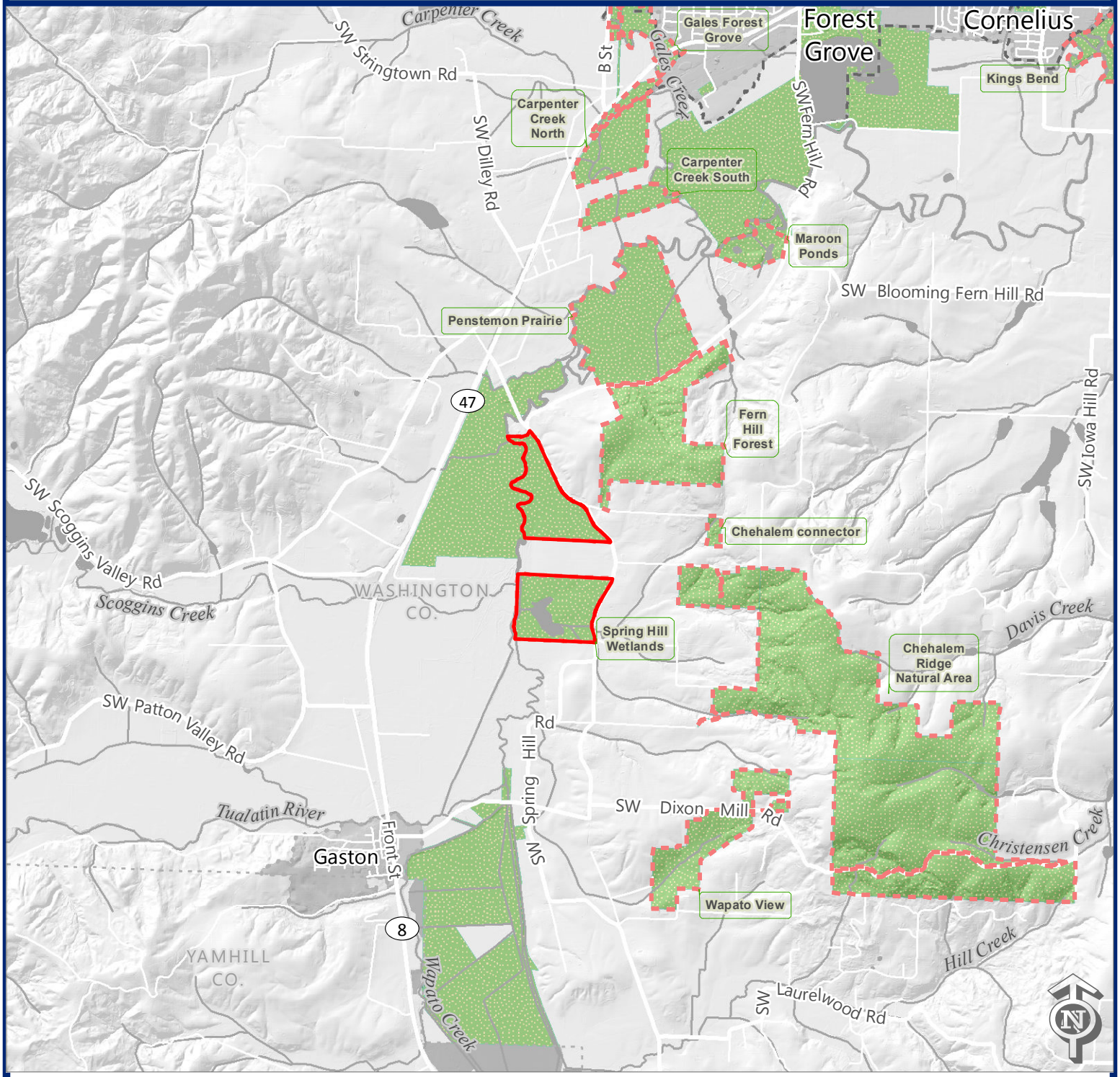
KEY STAKEHOLDERS AND PERMITTING AGENCIES

- Clean Water Services
- Tualatin River National Wildlife Refuge
- Tualatin River Watershed Council
- Tualatin Soil and Water Conservation District
- Leasing rancher, George Saul
- Leasing farmer, Wesley Van Dyke
- Neighbor, Hally Haworth
- Washington County Planning and Development Services – a right of way or building permit may be required for alteration of the barn, development of on-site parking or improved road access.
- Gaston Fire District – for burn permits.
- Oregon Department of Forestry – forest practices and slash burning.
- Oregon Division of State Lands – removal-fill permit or general authorization for any in-stream work.
- Oregon Water Resources Department – for adjustments or changes to water rights.
- U.S. Army Corps of Engineers – federal section 404 or regional general permits covering any new fill placed in wetlands or waters, including restoration of ditched channels.

SECTION 7: MAPS

Map 1 Vicinity
Map 2 Site
Map 3 Soils
Map 4 Hydrology
Map 5 Current cover
Map 6 Historical vegetation
Map 7 Conservation targets
Map 8 Stewardship class
Map 9 Management status

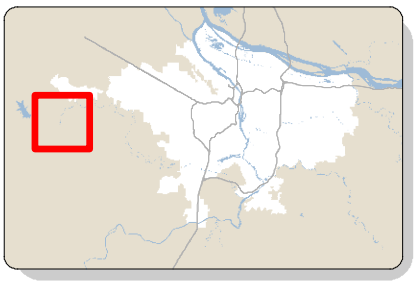
VICINITY MAP



Spring Hill Wetlands site

Other Metro sites

Parks and/or Natural Areas



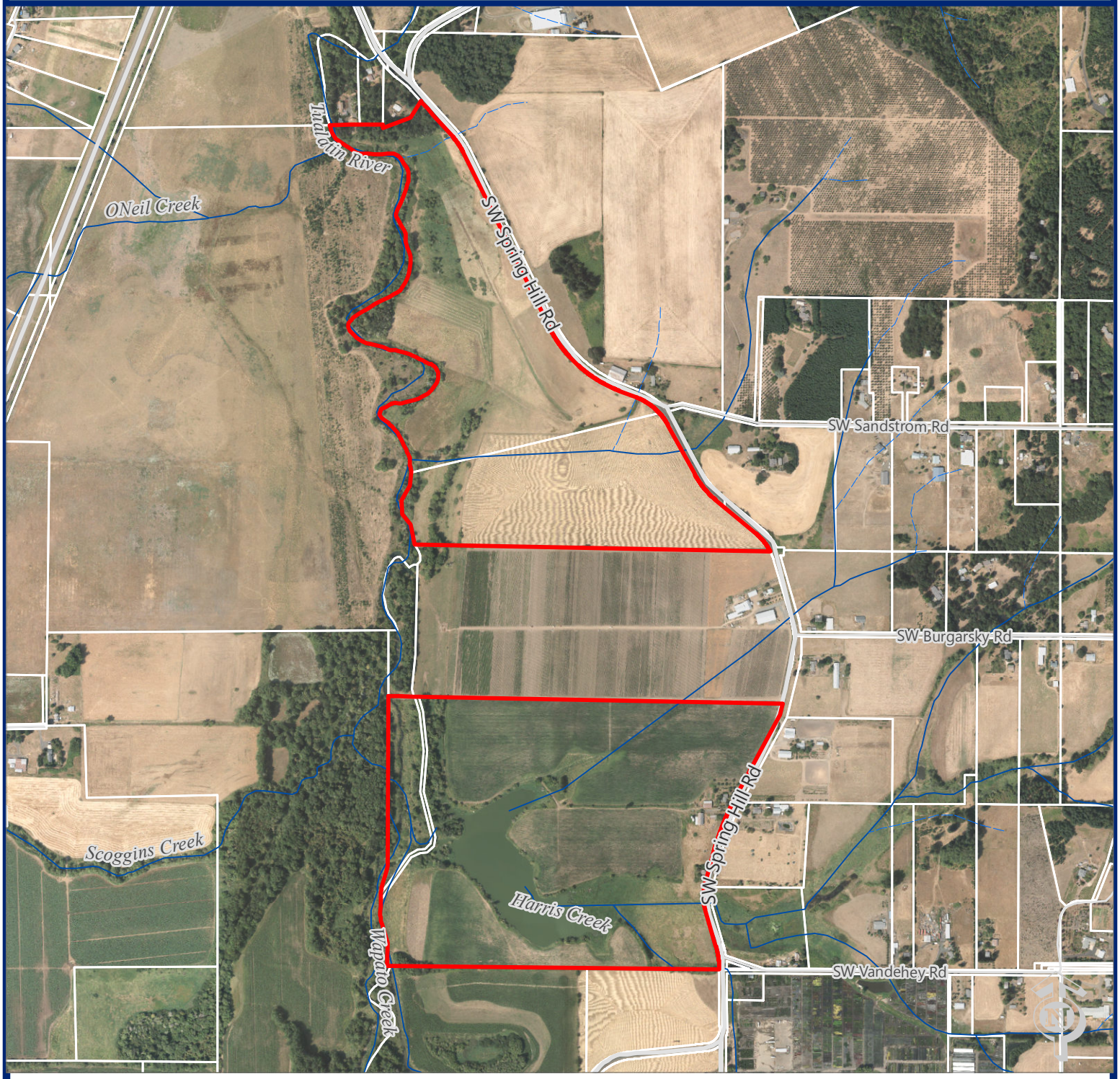
0 1 2 Miles

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/30/2016

SITE MAP

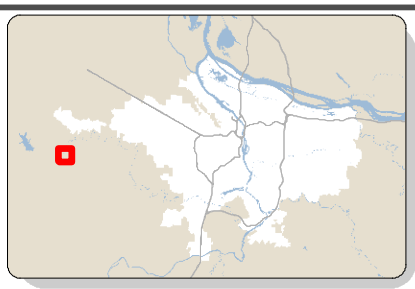


Spring Hill Wetlands site

NHDplusStrmFlowline

Intermittent stream

Perennial stream



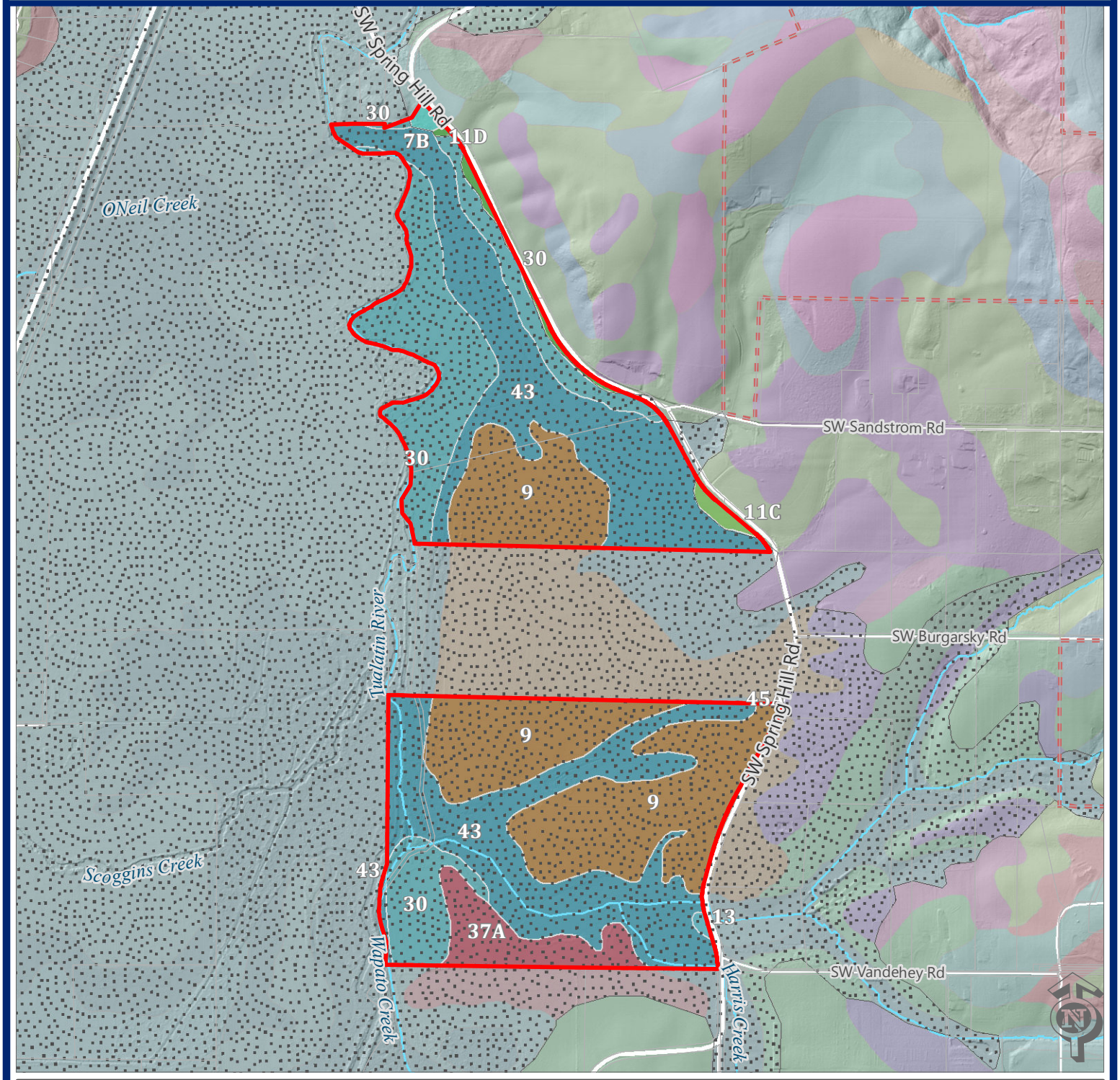
0 1,500 3,000 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/30/2016

SOILS



Spring Hill Wetlands site

Other Metro sites

Hydric soils

NRCS soils on featured site

- Cascade silt loam, 3 to 7 percent slopes
- Chehalis silty clay loam, occasional overflow
- Cornelius and Kinton silt loams, 12 to 20 percent slopes
- Cornelius and Kinton silt loams, 7 to 12 percent slopes
- Cove silty clay loam
- McBee silty clay loam
- Quatama loam, 0 to 3 percent slopes
- Wapato silty clay loam
- Woodburn silt loam, 0 to 3 percent slopes

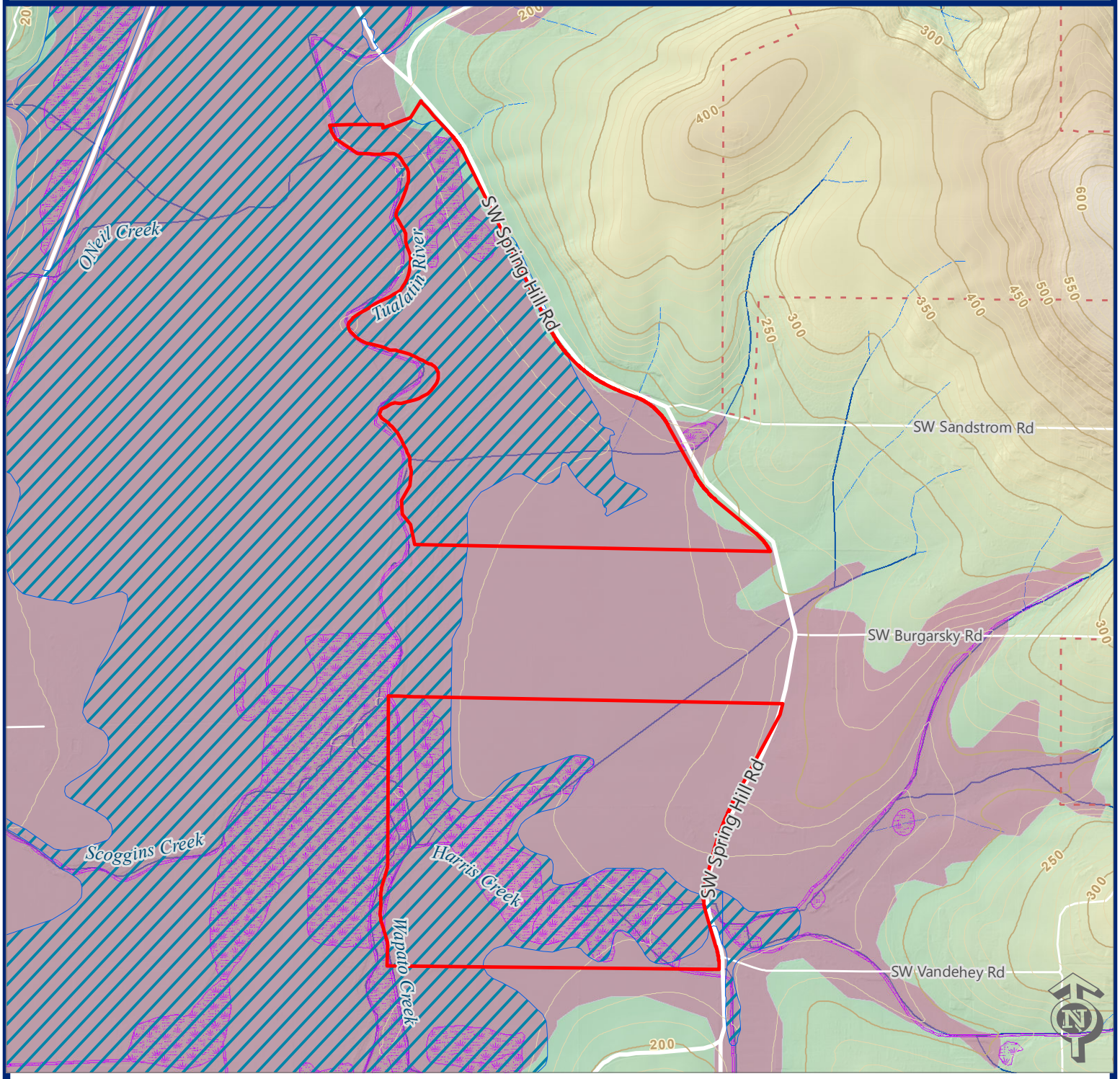
0 1,300 2,600 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/30/2016

HYDROLOGY



Spring Hill Wetlands site

Other Metro sites

100 year floodplain

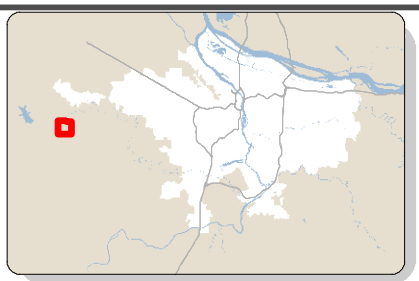
Wetlands (Wetlands Conservancy data)

NHD Flowlines

Intermittent stream

Perennial stream

Hydric soils



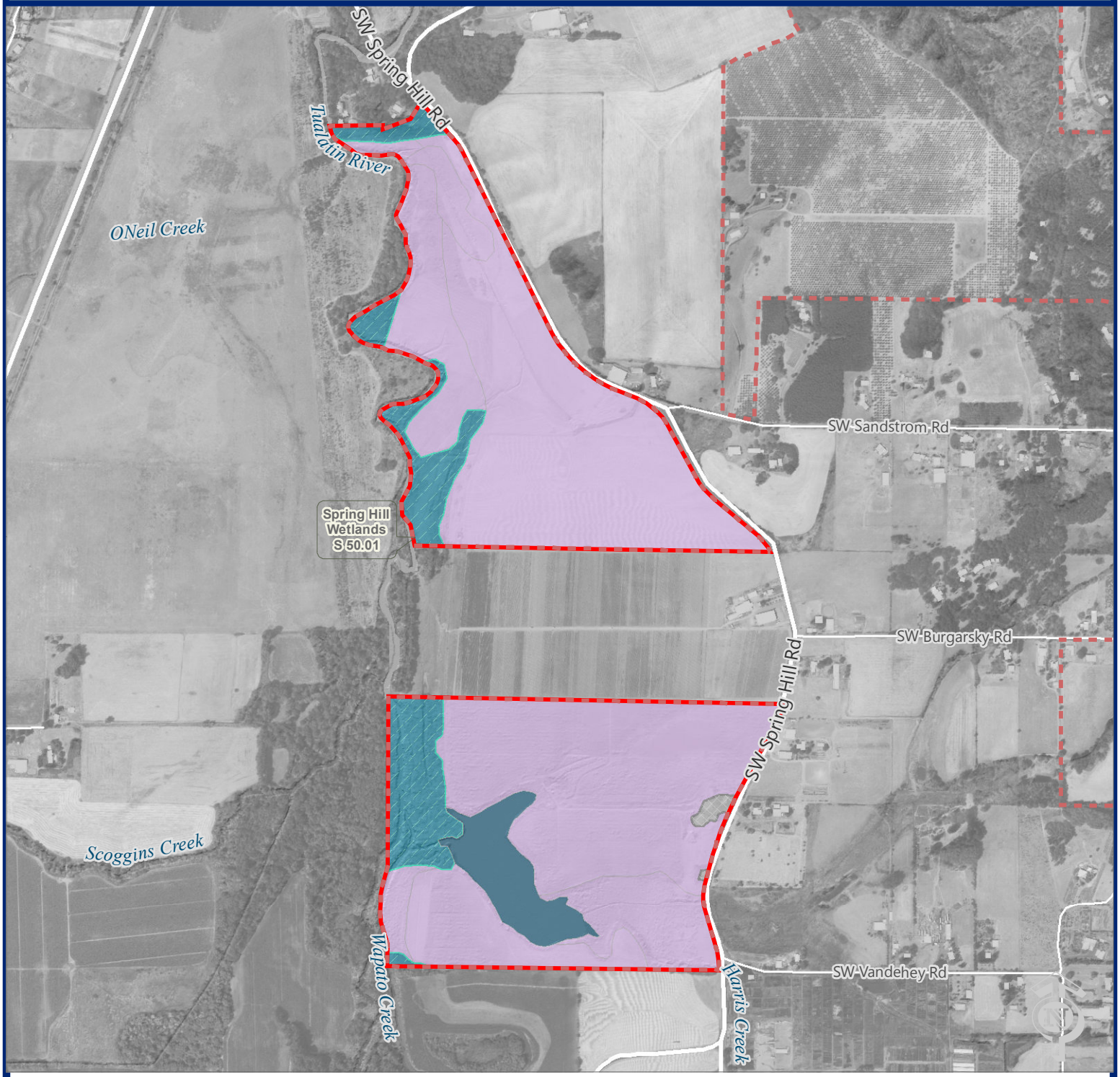
0 1,500 3,000 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/30/2016

CURRENT COVER



Spring Hill Wetlands site

Other Metro sites

Agriculture

Developed - (pervious/non ag)

Open water

Riparian forest

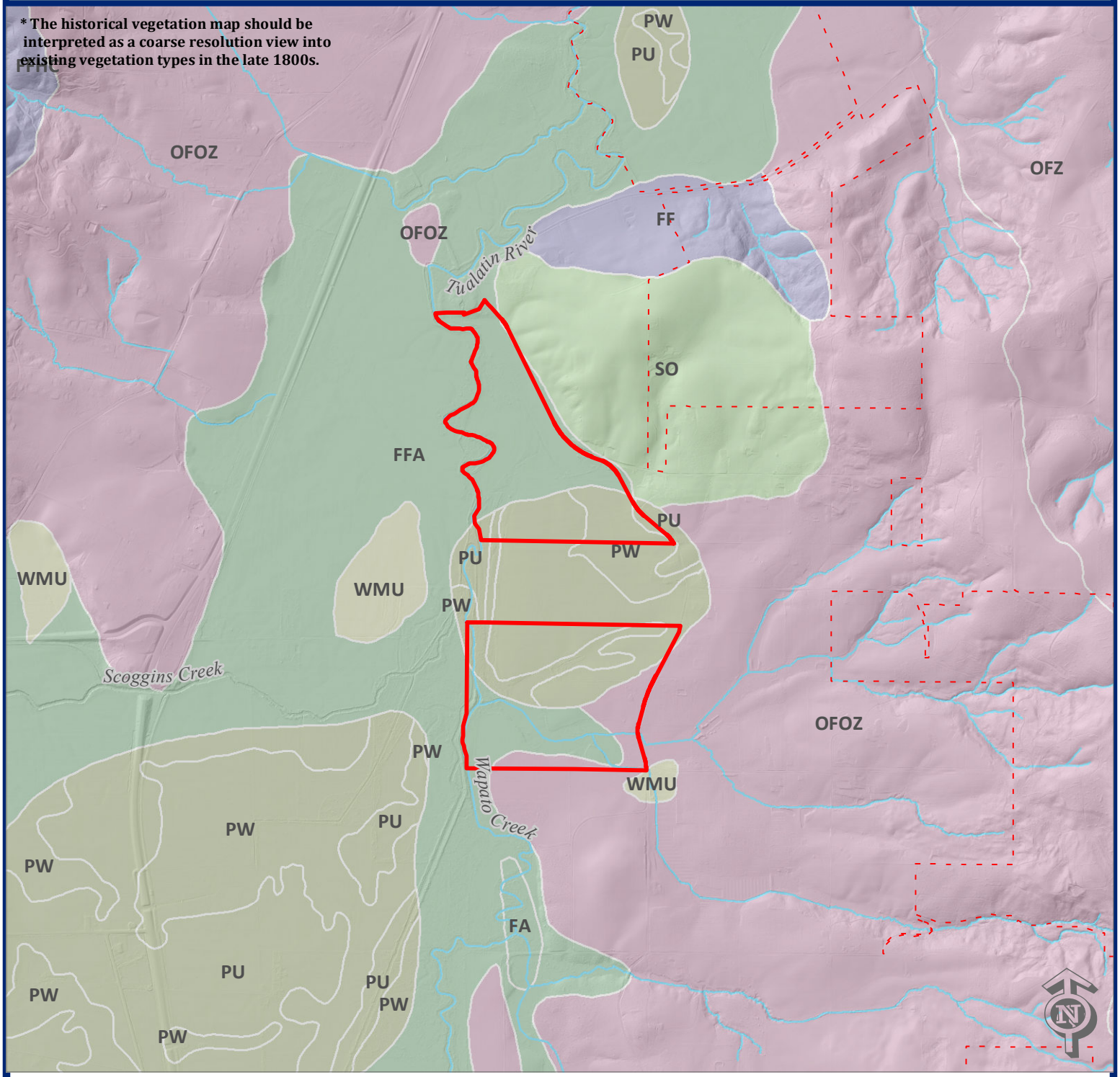
0 1,300 2,600 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 12/2/2016

HISTORICAL VEGETATION (1851-1910)



Spring Hill Wetlands site

Other Metro sites

Historical vegetation

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

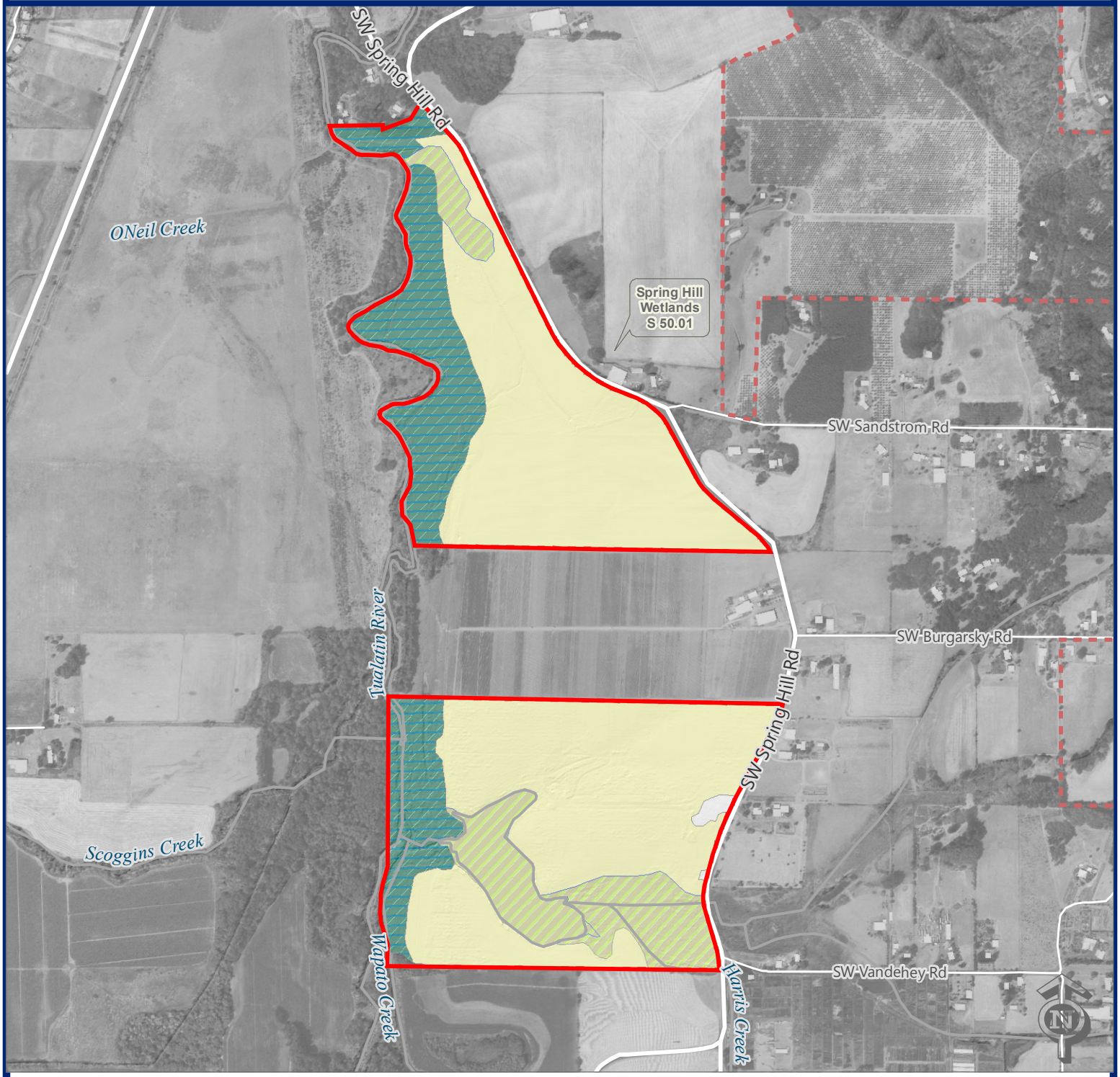
* Labels refer to vegetation subclasses. Detailed descriptions can be found in T:\OBMO\GIS\DATA_V\vegetation\Historical

0 2,000 4,000 Feet

Metro

map date: 3/30/2016

CONSERVATION TARGETS



SPRING HILL WETLANDS SITE

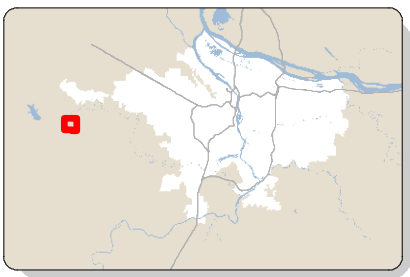
Other Metro sites

No targets

Prairie - wet or dry

Riparian forest

Shrub dominated wetland



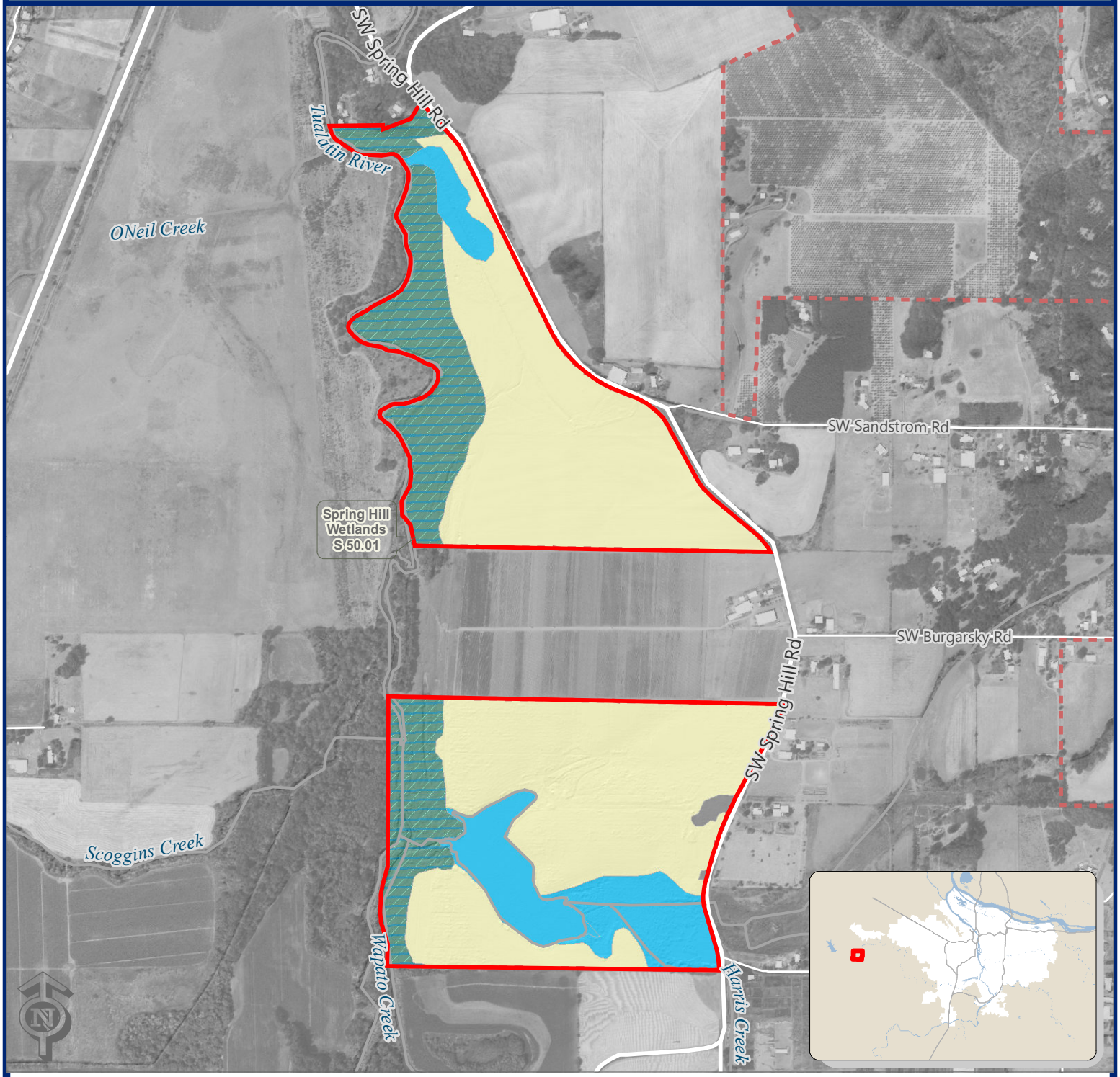
0 1,300 2,600 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/25/2016

STEWARDSHIP CLASS



Spring Hill Wetlands site

Other Metro sites

Stewardship Class

- Agriculture
- Beaches, bars and mudflats
- Developed
- Prairie
- Riparian forest
- Savanna
- Upland forest
- Water
- Wetland
- Woodland
- Undeclared

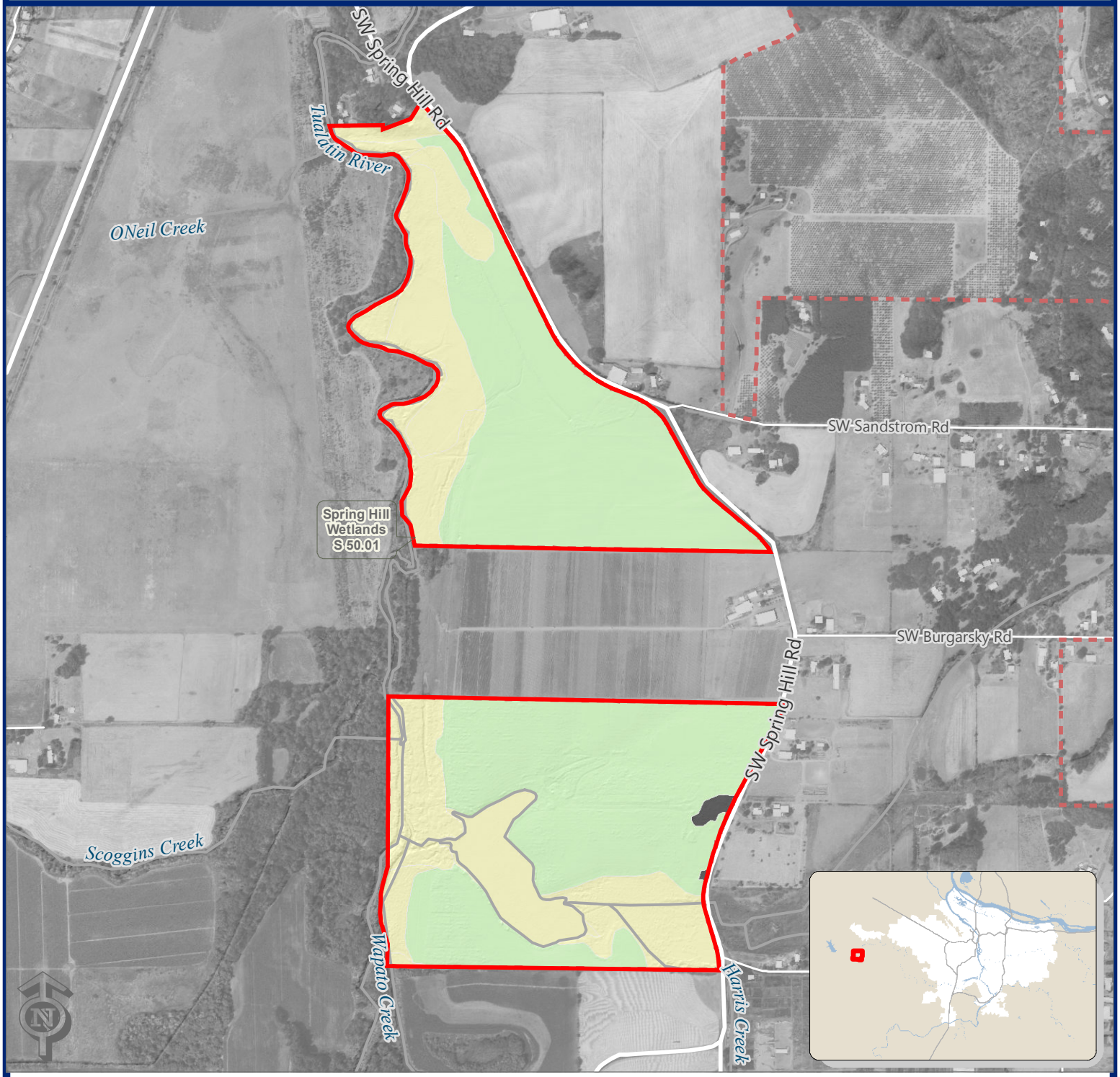
0 1,300 2,600 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/25/2016

MANAGEMENT STATUS



Spring Hill Wetlands site

Other Metro sites

Management status

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

0 1,300 2,600 Feet

Metro

Spring Hill Wetlands Site Conservation Plan

map date: 3/25/2016

SECTION 8: REFERENCES

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APPENDIX: SITE PHOTOS

Looking west, across the farm pond on south parcel.

Looking west from farm road crossing at NE corner of farm pond, visible at far left.

Looking northeast from the farm road crossing at NE corner of farm pond.

View of farm pond from the road crossing at NE corner.

Farm pond overflow channels at NW corner, adjacent to Tualatin River riparian area.

Riparian forest along the Tualatin River, dominated by Oregon ash and reed canarygrass.

Oregon ash-dominated riparian forest overstory with reed canarygrass, Himalayan blackberry, and wild rose in understory.

Riparian forests are set back from the main channel on the south parcel, with shrubs at the water's edge. This view shows an Oregon white oak at the top left, which are present in low densities within the riparian area.

Another view of the Tualatin River with fringing riparian forest at rear.

Main outlet of the farm pond, close to the confluence with the Tualatin River.

Concrete weir at the pond outlet.

Power poles within the riparian area on the south property.

Pond overflow channel outlet as it enters the adjacent riparian forest.

Another view of the riparian area on the south property, with reed canarygrass dominating low-lying areas close to the stream, and Oregon ash-dominated forests landward.

Another view of the Tualatin River mainstem as it passes through the south property riparian forest area.

Wetland channel at east edge of riparian forest on south property, fed by overflow channels from the pond to the south.

The south property farm field, looking northeast.

Abandoned farm equipment along the south property access road near the pond.

Ditching upstream from SW Spring Hill Road on tributary draining to the southeast corner of the south property. This pasture is heavily stocked with horses and goats.

View downstream of SW Spring Hill Road of channel entering the southeast corner of the south property.

Outlet of the field drain on the north property, looking north towards the wetland.

Farm field with surface drainage channel flowing north to the wetland in the distance.

Overflow channel at the southwest corner of the north property. This channel drains to the northeast and feeds into the surface drainage channel to the northeast.

Looking northeast towards confluence of the riparian overflow channel and the surface drainage channel.

Abandoned bridge pilings in the Tualatin River on the west edge of the north property.

The Tualatin River, meandering along the west boundary of the north property.

Canada geese flushing from the wetland at the north end of the north property.

Wild rose thickets and standing snags line the west edge of the wetland on the north parcel.

The north property wetland, looking towards a stand of Oregon white oak at the far north boundary. The wetland outlet to the Tualatin River is to the left, just out of view.

View northwards along the drainage leading to the wetland on the north property. SW Spring Hill Road is to the right.

View southwards along the drainage channel running through the farm field.