SITE CONSERVATION PLAN

North Logan Natural Area



May 2016

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SCP Title: North Logan NA

Approvals for Site Conservation Plan

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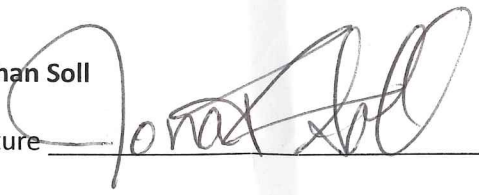
Signature  Date 12/3/15

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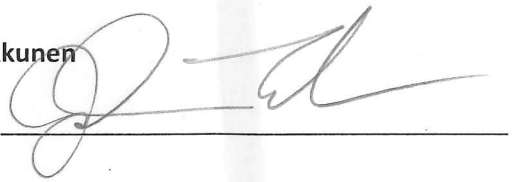
Signature  Date 3/10/16

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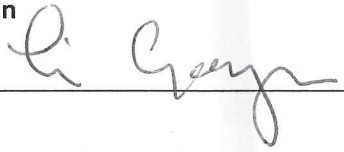
Signature  Date 12/10/15

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EXECUTIVE SUMMARY

This site conservation plan describes existing conditions and conservation targets at Metro's 165-acre North Logan Natural Area. It identifies the key ecological attributes of the conservation targets as well as likely threats and stresses from increasing public use, introduced species, climate change and other sources. North Logan Natural Area protects important riparian and upland forest, oak savanna and native fish habitats on the Clackamas River and provides needed connectivity among other natural areas. Currently, the riparian forest covers approximately 48 acres, mixed and conifer upland forest covers more than 102 acres and oak savanna covers just over 31 acres. Aquatic habitat includes recently enhanced side channels on the Clackamas River and an intermittent stream. The side channels provide important habitat for resident and anadromous fish. Nearly two acres of the site is occupied by a leased residence, an entry road and several outbuildings. Actions proposed in this plan include invasive species management, revegetation, including understory planting, the expansion and enhancement of oak prairie through forest thinning and further enhancement of side channel habitat. Future acquisition of adjacent lands could provide opportunities to significantly expand critical savanna. While many factors will influence the actual cost of implementing the recommended management actions, the current estimate is $450,000 to $600,000 over a ten-year period.

SECTION 1: INTRODUCTION

CONTEXT

North Logan Natural Area is located one mile southwest of Barton, Oregon on the south bank of the lower Clackamas River (Map 1) in a mixed agricultural and rural residential area where the Oregon Cascade Range meets the Willamette Valley. The site is directly south of and across the river from Barton Natural Area.

The Clackamas River supplies drinking water to more than 200,000 people. It also supports significant runs of imperiled fish species, including Chinook and coho salmon, steelhead and cutthroat trout, bull charr and pacific lamprey and is identified in federal salmon recovery plans for the Lower Columbia ESU as a focal recovery watershed for Chinook and coho salmon and winter steelhead. North Logan Natural Area's abundant native habitats include oak savanna, riparian and upland forests and wetlands that support a diversity of species.

The Clackamas River Basin has been used by people for thousands of years and North Logan Natural Area lies within the traditional territory of Clackamas, a Chinookan-speaking tribe who lived on the Willamette River near Willamette Falls, along the Clackamas River, and on nearby tributary streams. French and English fur traders began to explore the area in the early 1800s bringing diseases that decimated Pacific Northwest indigenous people. Oregon City was founded in 1829 at Willamette Falls to take advantage of the water power to run a lumber mill. Additional use of the area followed, including for transportation, commodity extraction and human settlement.

This site conservation plan is a tool for protecting and enhancing the unique natural characteristics of the site while allowing compatible access by the public. It includes an overview of the history of the site, existing conditions, conservation targets and recreation and access objectives. It also

considers the site in relation to surrounding lands and adjacent conservation properties. Nearby conservation properties include the Metro-owned Clackamas Bluff and Richardson Creek Natural Areas to the west, Barton Park (Clackamas County) and River Island (Metro) to the east/southeast, Barton Natural Area (Metro) to the immediate north, and Clear Creek Natural Area (Metro) to the southwest (Map 1).

North Logan Natural Area connects riverine-riparian habitats along the lower Clackamas River corridor and safeguards secondary channels and floodplain wetlands. In addition, the natural area features Oregon white oak savanna, which is part of a larger oak woodland/savanna landscape to the west and south. Historical and ongoing residential development, timber harvest, and agricultural practices in the surrounding area have fragmented and degraded native habitats, and North Logan Natural Area and neighboring conservation properties provide refugia for several species of imperiled fish and wildlife. Ongoing restoration and coordinated management with neighboring conservation properties has the potential to support improved on-site habitat conditions and restored landscape connectivity.

Since acquisition of the site in 2001 under Metro's 1995 Open Space Bond Measure, restoration treatments have included tree and shrub plantings, weed treatments, pre-commercial thinning, and side channel excavation and large woody debris placement.

PLANNING AREA

North Logan Natural Area is a 195-acre property on Southeast Bakers Ferry Road, on the south bank of the Clackamas River and northwest of the Bakers Ferry Bridge. It includes a forested riparian-floodplain and adjacent uplands with forest and savanna habitats and consists of six tax lots, including 23E22 00601, 23E22 00602, 23E22 00611, 23E22 00613, 23E22 00700, and 23E22 01000. Tax lot 23E22 01000 has a house and several outbuildings, with an access road, and a site address of 15265 S. Latourette Road. According to Clackamas County CMAP system, the 1,560 square foot house was built in 1955.

The zoning designation for all parcels is "Timber District (TBR)" under the Clackamas County comprehensive plan (see http://www.clackamas.us/planning/documents/zdo/ZDO406.pdf for more information on allowed and permitted uses). This zoning allows for park uses specified under OAR 660-034-0035 or 660-034-0040, whichever is applicable.

Access to North Logan Natural Area is provided via gated access roads at 15265 S. Latourette Road and at the intersection of Southeast Bakers Ferry Road and South Eaden Road (Map 2, magenta markers). The former road connects to a primitive dirt track that loops around the northwest portion of the property. The latter access point connects to the east half of the property via a primitive dirt road that runs through the savanna and down onto the floodplain, where it ends at the outside of an active river meander. Trails along the river bottomlands connect the two property halves on the north end of the private parcel at 15273 S. Latourette Road.

KEY METRO STAFF AND PARTNERS

Staff

Peter Guillozet, natural resource scientist
Brian Vaughn, natural resource scientist
Chris Hagel, natural resource specialist
Kristina Prosser, natural resource specialist
Dave Elkin, parks and natural areas planner

Partners

Metro collaborated with Portland General Electric beginning in 2004 on restoration of aquatic habitat in the Parsons side channel. More recently, Metro entered into an agreement with the Clackamas River Basin Council to restore riparian habitat. Key stakeholders and partners are listed under Section 6, below, and include neighbors, recreational users of the property, permitting agencies and partner organizations.

EXISTING PLANNING DOCUMENTS

Distribution of Native Turtles along the Mid-Section of the Clackamas River. Draft in review. Daniel Rosenberg and Jennifer Gervais, Oregon Wildlife Institute.

North Logan Natural Area Douglas fir plantation thinning project implementation plan (Hagel 2013).

SECTION 2: EXISTING CONDITIONS

Land use in the immediate vicinity of North Logan Natural Area is dominated by rural residential development, agriculture and forestry. Most parcels on the immediate perimeter of the natural area are five acres in size or larger and zoned for agriculture or forestry. However, to the immediate south along South Latourette Road are seven 0.5 to 2.5-acre occupied rural residential home sites. Prior to being purchased by Metro, upland portions of the property were managed forestlands and underwent a commercial harvest in the early 1990s. Impervious surfaces are currently limited to the paved driveway to the residence, the home and outbuildings, and the road-side gravel parking area along Southeast Bakers Ferry Road.

PHYSICAL ENVIRONMENT

The topography of North Logan Natural Area consists of a lower contemporary floodplain and several higher abandoned terraces. On the western half of the property there are two high terraces, close to the house and access driveway. On the eastern half of the property there is one distinct high terrace and the lower floodplain area, with an access road descending onto the floodplain and disconnecting a portion of the floodplain from the active river channel.

The geology of the lower Clackamas River is characterized by volcanic and sedimentary formations, including ancient lava flows and more recent alluvial and lacustrine deposits. The local landscape was shaped by Pleistocene-era Missoula floods, which back-watered the lower Clackamas River valley upstream to Estacada. Terrace ages and elevation differences between the modern and historical floodplain surfaces indicate that the Clackamas River has undergone rapid incision over the past 10,000 years (3.9 mm/year, Wampler 2004).

Soils mapped by the USDA Soil Conservation Service for North Logan Natural Area are summarized in Table 1 (Gerig 1985) and illustrated in Map 3. Most soils at the site consist of well-drained sandy or silt loams derived from alluvium.

Table 1. Mapped soil units, acres and descriptions for North Logan Natural Area (derived from Gerig 1985 and the USDA SCS Web Soil Survey)

MAP UNIT SYMBOL	MAP UNIT NAME	ACRES	PERCENT	DESCRIPTION
11	Camas gravelly sandy loam	7.9	4.7%	Deep, excessively drained soil formed from alluvium on floodplains. Slopes of 0-3% at elevations from 100-1,500 ft. Vegetation: black cottonwood, bigleaf maple, Oregon ash and blackberry.
12A	Canderly sandy loam, 0 to 3 percent slopes	16.4	9.7%	Deep, somewhat excessively drained soil formed in glaciolacustrine deposits on terraces. Elevations of 120-250 ft. Vegetation: Douglas-fir, Oregon white oak, Western hazel, blackberries, grasses and weeds.
19	Cloquato silt loam	13.6	8.1%	Deep, well drained soil formed in mixed alluvium on floodplains. Slopes of 0-3% at elevations of 50-300 ft. Vegetation: Douglas-fir, black cottonwood, Oregon white oak, bigleaf maple and blackberry.
67	Newberg fine sandy loam	79.0	46.8%	Deep, somewhat excessively drained soil formed in mixed alluvium on floodplains. Slopes of 0-3% at elevations from 30-1,000 ft. Vegetation: Douglas-fir, Oregon ash, black cottonwood, willow and trailing blackberry.
76C	Salem silt loam, 7 to 12 percent slopes	1.4	0.8%	Deep, well drained soil formed in alluvium on stream terraces. Elevations of 200-650 ft. Vegetation: Douglas-fir, Oregon white oak, Western redcedar, Western hazel, Oregon-grape, salal and bracken fern.
77B	Salem gravelly silt loam, 0 to 7 percent slopes	50.6	29.9%	Deep, well drained soil formed in alluvium on stream terraces. Elevations of 200-650 ft. Vegetation: Douglas-fir, Oregon white oak, Western redcedar, Western hazel, Oregon-grape, salal and bracken fern.

PRECIPITATION AND WATER BODIES

Average annual precipitation in the lower Clackamas River valley is 57.8 inches, with more than 90 percent occurring as rainfall between the months of October and May (NOAA National Weather Service Estacada 2SE cooperative weather station, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?or2693).

North Logan Natural Area is located at approximately river mile 14.5 on the Clackamas River, which is a large tributary of the Lower Willamette River basin. The contributing watershed area is approximately 786 square miles and originates in the high Cascades, flowing north and westwards to the confluence with the Willamette River at Oregon City. The reach of the Clackamas River passing the natural area is a moderate gradient (0.4%) semi-confined channel with point and mid-channel gravel bars. The channel here exhibits pool-riffle morphology with predominantly gravel and cobble substrates and several secondary channels that pass through the adjacent riparian forest.

North Logan Natural Area features several side channels on the south bank of the Clackamas River, as well as a small headwater stream. One side channel network lies east of the floodplain access road (measuring approximately 2,500 linear feet), and another lies west and downstream of the road (measuring approximately 2,400 feet in length). The side channel downstream of the floodplain access road is fed by a headgate and an underground pipe passing under the road and by hyporheic flow. In addition, there are several wider secondary mainstem channels created by islands within the main channel.

A small, unmapped headwater stream originating on a neighboring property to the east passes under the property access road and into a farm irrigation pond. Based on features visible in the LiDAR topography and aerial photos, the pond outlet stream appears to flow westwards to its confluence with the Clackamas River approximately 3,300 feet to the west. The stream is perennial with a bankfull width of 5-6 feet, lacks pools, and has sand/silt substrates. It is likely non-fish-bearing but native amphibians have been observed.

Although there is no evidence of historic drain tiling on the property, portions of the floodplain on the west end of the property were graded and bermed by the previous landowner to create a site for a home that was never built. Remnant high flow channels are clearly visible on adjacent pastureland but appear less well-developed within the natural area.

MAJOR HABITAT TYPES

Current cover types at North Logan Natural Area include riparian forest, upland forest (mixed and coniferous), and oak savanna with Douglas fir (*Psuedotsuga menziesii*), as well as river channel bars and a small developed area around the residence and outbuildings (Map 6).

A stand of riparian forest with a total acreage of approximately 46 acres and measuring 100-500 feet in width defines the property's northern border. Dominant tree species include black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), willow (*Salix spp.*) and bigleaf maple (*Acer macrophyllum*); understory plantings include Douglas-fir, Western redcedar (*Thuja plicata*) and grand fir (*Abies grandis*). An informal network of fishing trails branches off a floodplain access road, which bisects the upper side channel network and terminates at the outside of an active channel meander. The two side channel networks, one upstream and one downstream of the access road, have been excavated and enhanced with engineered logjams to provide habitat for native fish. Within the active channel of the Clackamas River there are two large river channel bars measuring 4.6 and 7.1 acres in size.

On the site's western end along the landward edge of the active floodplain is a 45.7-acre mixed upland forest. This stand is dominated by approximately 20-year-old Douglas fir trees and scattered older black cottonwood, bigleaf maple and Western redcedar. There are numerous canopy openings and the sparse understory plant community includes reed canarygrass (*Phalaris arundinacea*), bracken fern (*Pteridium aquilinum*), tall Oregon-grape (*Mahonia aquifolium*) and snowberry (*Symphoriocarpus albus*). There is no distinct topographic break between this mixed upland forest and the adjacent riparian forest, but they are divided by a primitive road track.

There are two openings measuring 13.8 and 3.0 acres in size within the mixed upland forest. Within these open areas are mature bigleaf maple and black cottonwood, as well as younger Douglas fir

and Ponderosa pine (*Pinus ponderosa*). Shallow topographic depressions within the opening represent high-flow channel courses with undeveloped soil horizons where previous plantings of native hardwood trees were unsuccessful.

Above this active floodplain area and to the immediate southeast are two abandoned terraces with 22 acres of conifer-dominated upland forest. On the eastern half of the property, a 10.9-acre upland conifer forest occupies a high terrace between the river bottomlands and the oak savanna. Both of these upland forests are dominated by 15-year-old Douglas fir stands, which were recently thinned. In addition to Douglas fir, there are small numbers of planted Western redcedar, grand fir, red alder and black cottonwood. Both stands have low tree and shrub diversity with infestations of Himalayan blackberry (*Rubus armeniacus*) and Scot's broom (*Cytisus scoparius*)that show signs of recent treatment.

At the southern edge of the 22-acre upland conifer forest, by the property access road gate, is a 2.1-acre riparian forest with a constructed farm irrigation pond feeding a small headwater stream. There have been recent plantings of willow and red osier dogwood (*Cornus sericea*) along the northern shore of the pond. Downstream of the pond, the red alder and Western redcedar-dominated forest has an understory dominated Indian plum (*Oemleria cerasiformis*), skunk cabbage (*Lysichiton americanus*), Himalayan blackberry and English ivy (*Hedera helix*).

An area of Oregon white oak (*Quercus garryana*) savanna occupies 30.4 acres at the southeast corner of the property along Southeast Bakers Ferry Road. Other tree species present include Douglas fir, black cottonwood and bigleaf maple along the north edge of the savanna. The shrub community here consists of tall Oregon-grape, snowberry and scattered oceanspray (*Holodiscus discolor*), mock orange (*Philadelphus lewisii*) and Scot's broom. There are also a few small patches of Himalayan blackberry and reed canarygrass. This savanna area was created when the previous landowner harvested mature Douglas fir and left a scattering of Oregon white oak and other trees.

Along South Latourette Road at the far southern end of the property are patches of Douglas-fir-dominated upland forest, totaling seven acres. These forested areas are interspersed with the oak savannah and have stand openings within them with a well-developed shrub layer consisting of tall Oregon grape, snowberry and poison-oak (*Toxicodendron diversilobum*). This upland forest stand serves as a management buffer separating the oak savanna to the north from neighboring residential properties to the south.

VEGETATION AND WILDLIFE

Historic vegetation and land use

Based on historical vegetation maps compiled by Christy and Alverson (2011), nearly the whole of the North Logan Natural Area site was dominated by Douglas fir forest ("often with bigleaf maple, grand fir, dogwood, hazel, and yew"). To the immediate north red alder-mixed conifer forest was prevalent on the Clackamas River bottomlands with mixed mesic conifer forest and Douglas fir-Oregon white oak woodlands dominant in the uplands. To the south of the natural area, there was a large tract of Oregon white oak-Douglas fir savanna (Map 4). Due to the relatively coarse nature of the historical General Land Office surveys, smaller features such as individual riparian corridors were not typically resolved on maps.

Invasive plants

Metro recently completed weed mapping at the site and currently manages Scot's broom, false brome (*Brachypodium sylvaticum*), garlic mustard (*Alliaria petiolata*), butterfly bush, (*Buddleia davidii*), Bohemian knotweed (*Fallopia x bohemicum*), blackberry, spurge laurel (*Daphne laureola*), ivy, vinca (*Vinca minor*), clematis (*Clematis vitalba*) and other common agricultural weeds. The species listed above exist either as small patches or are distributed in low to medium densities as a result of ongoing weed treatment efforts. The low level of weed cover at North Logan Natural Area is the result of significant weed management work completed to date, but ongoing management will be necessary to further reduce invasive vegetation and to promote native cover. An English holly (*Ilex aquifolium*) and hawthorn (*Crataegus monogyna*) treatment was completed in late 2015.

Wildlife

A comprehensive species list has yet to be developed for the site, but North Logan Natural Area supports a diverse array of wildlife including amphibians, reptiles, birds and mammals. Hawks, falcons, Neotropical migrant songbirds, pileated woodpeckers (*Dryocopus pileatus*) and grouse (*Bonasa umbellus*) all make use of the site as do small and large mammals, which serve as prey for raptors and predators such as cougar (*Felis concolor*) and bobcat (*Lynx rufus*), which have been observed by site managers. North Logan Natural Area habitats also support Douglas squirrel (*Tamiasciurus douglasii*), wood rat (*Neotoma spp.*), chipmunks (*Tamias townsendii*), voles (*Phenacomys spp.* and *Microtus spp.*), mice, mink (*Mustela vison*), bobcat , black bear (*Ursus americanus*), black tail deer (*Odocoileus hemionus*), elk (*Cervus elaphus roosevelti*) and several species of bats. Signs of beaver (*Castor Canadensis*) activity are common.

Anadromous fish occurring in the Clackamas basin include spring and fall Chinook (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*), winter steelhead (*Oncorhynchus mykiss*), non-native summer steelhead (*Oncorhynchus mykiss*), migratory cutthroat trout (*Oncorhynchus clarki*) and Pacific lamprey (*Lampetra tridentate*) (Runyon and Salminen 2005). Resident native fish in the Clackamas River include cutthroat trout, rainbow trout (*Oncorhynchus mykiss*) and bull trout (*Salvelinus confluentus*). Bull trout, previously eliminated from the basin, were reintroduced in 2011 and observed spawning in 2011-2012 (2013 Allen and Koski). Other resident fish potentially occurring in the project area include reticulate sculpin (*Cottus perplexus*), longnose dace (*Rhynichthys cataractae*), speckled dace (*Rhynichthys osculus*), red-sided shiner (*Richardsonius balteatus*), brook lamprey (*Lampetra richardsoni*), suckers (*Catostomus spp.*) and northern pikeminnow (*Ptychocheilus oregonensis*).

Based on recent turtle surveys in the Lower Clackamas River corridor, the adjacent Barton Natural Area and potentially North Logan Natural Area represent important refugia for native turtle populations owing to the presence of warmwater, off-channel pond habitats with closely juxtaposed upland nesting areas. The recent survey confirmed a small population of Western pond turtles (*Actinemys marmorata*) at Barton Natural Area, with potential opportunities for habitat enhancement and population expansion at both sites (Rosenberg and Gervais, Draft in review).

RECENT MANAGEMENT HISTORY

Since acquiring North Logan Natural Area in 2001, Metro has focused on reforestation of upland areas, weed control, pre-commercial thinning, and understory tree and shrub plantings within the riparian forest. Recent pre-commercial thinning of Douglas fir dominated upland forest stands has emphasized release of oaks and other tree species to enhance stand-level species diversity. Metro is currently mapping oak habitat throughout the region in partnership with The Intertwine Alliance Oak Mapping Workgroup (Map 5).

In addition, during two project phases Portland General Electric excavated two side channels and installed numerous engineered logjams along with a flow control device to meter high flows and preserve off-channel habitat from mainstem flood impacts for the benefit of native fish. The flow control device consists of a headgate at the inlet of a culvert passing beneath the floodplain access road. PGE conducts periodic monitoring of the side channels.

NATURAL RESOURCES OF SPECIAL INTEREST

Natural resources of special interest at North Logan Natural Area include the Oregon white oak savanna and the largely intact Clackamas River riparian-floodplain habitats. Metro plant materials scientist Marsha Holt-Kingsley visited the site and did not identify any rare plants. No formal archeological surveys have been completed at the site.

North Logan Natural Area is surrounded by other natural areas including Richardson Creek and Clackamas Bluff natural areas downstream, the Clackamas-Deep Creek confluence to the immediate northwest, Barton Natural Area to the immediate north, Barton County Park and River Island Natural Area upstream of Bakers Ferry Road (Map 1). To the southwest, at Clear Creek Natural Area there is active restoration of oak savanna habitat. This complex of conservation properties affords unique opportunities to protect landscape-level habitat connectivity for both aquatic-riparian and upland oak savanna habitats.

SECTION 3: CONSERVATION

CONSERVATION TARGETS

The habitat conservation targets represent major habitat types present at the site, including riparian and upland forests, as well as oak savanna. The immediate setting of North Logan Natural Area – with other, closely juxtaposed conservation properties – affords opportunities to reconnect habitat fragments distributed across the landscape both upstream-downstream within the Clackamas River corridor, and with the remnant oak landscape to the south, southeast and west (Map 6).

In addition to the habitat conservation targets, North Logan Natural Area safeguards habitat for native fish. This habitat is embedded within the Clackamas River riparian-floodplain area and is not explicitly mapped. The natural area also has habitat suitable for native turtles.

The habitat conservation targets are described briefly in Table 2 and are shown on Map 7. Acreages of existing cover types, conservation targets and stewardship types are presented in Table 3.

KEY ECOLOGICAL ATTRIBUTES

Key ecological attributes 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 good. This rating helps establish the restoration goals and guide Metro in development of restoration actions for the conservation targets. Tables 4a-d below describe KEAs and their ratings for North Logan Natural Area.

Table 2. Current status and generalized desired future condition of North Logan Natural Area conservation targets

TARGET	CURRENT STATUS	DESIRED FUTURE CONDITION
Riparian forest	Established mature tree canopy and ongoing understory restoration. Recent efforts have enhanced off-channel habitats.	Extensive native forest community with standing and downed wood, a complex network of interacting channel-floodplain habitats, and a mosaic of seasonal and perennial wetlands.
Upland forest	Under active restoration to re-establish a mix of native upland tree and shrub species, stand-level complexity and late seral characteristics.	Mature forest with late-seral characteristics including a diversity of species, tree ages and canopy layers; canopy gaps; snags and downed wood; and well-developed organic soil horizons.
Oak savanna	Under active restoration to re-establish dominant oak and Douglas fir and control invasive species.	Restored savanna with up to 30% woody cover including patches of diverse native shrubs and grasses/forbs, maintained under periodic controlled burns.
Native fish	Connectivity and habitat complexity in the restored side channels, but control structure may require evaluation and maintenance. The mainstem lacks wood/habitat complexity.	Complex, functional side channels and additional wood in the mainstem.

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

CURRENT COVER	ACRES
Riparian forest	47.9
River bars	11.6
Upland forest - mixed	69.5
Upland forest - conifer	32.9
Oak savanna	31.2
Developed - pervious	1.9
Total	**195.1**

STEWARDSHIP TYPE	ACRES
Riparian forest	47.9
River bars	11.6
Upland forest	102.4
Savanna	31.2
Developed	1.9
Total	**195.1**

CONSERVATION TARGET	ACRES
Riparian forest	47.9
Upland forest	102.4
Oak savanna	31.2
No target	13.5
Total	**195.1**

MANAGEMENT STATUS	ACRES
0 - Pre-initiation	3.2
1 - Initiation	16.8
2 - Establishment	71.9
3 - Consolidation	90.8
4 - Refinement and maintenance	0.0
9 - No targets (developed)	12.4
Total	**195.1**

Table 4a. Key ecological attributes for riparian forest at North Logan 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	Very Good	Very Good	Very Good	Native riparian forest area is largely intact and contiguous with adjacent upland forest. An access road limits the riparian forest width to approximately 100 feet over a small portion of the site, but the road is primitive, narrow and the upland side is forested.
Condition	Vegetative structure: shrub layer	% native shrub cover	<10% cover	10-25% cover	25-50% cover	>50% cover	Good	Very Good	Very Good	Past successful and ongoing native understory tree and shrub plantings, with a few small patches of invasive blackberry or other non-natives. One challenge is the monitoring and control of invasive vegetation such as butterfly bush and knotweed that could easily colonize exposed gravel bars.
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	Good	Good	Very Good	The side channels have had extensive installations of large wood to enhance in-stream native fish habitat. In addition, there are engineered snags placed where the floodplain access road meets the main channel. There are additional opportunities to place large wood in the main channel and secondary channels that bisect the floodplain for the benefit of fish and wildlife.
Condition	Floodwater access to the floodplain; 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)	Good	Good	Good	Though channel incision of the main river is evident at the site, almost the entire riparian forest area is within the active floodplain. There are extensive side channels that bisect the site and provide ample off-channel habitat for native fish and wildlife. One 800-foot-long access road segment disconnects a small portion of the active floodplain and limits flushing flows into a side-channel.

Table 4b. Key ecological attributes for upland forest at North Logan Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Native tree and shrub richness	Number of native tree and shrub species per acre	<5 species per 0.4 ha (1 ac)	5-8 species 0.4 ha (1 ac)	8-12 species per 0.4 ha (1 ac)	>12 species per 0.4 ha (1 ac)	Fair	Good	Very Good	Native tree plantings and invasive plant control efforts are ongoing across the various upland forest management units. There is presently low diversity and cover of native shrubs and forbs in the understory. With implementation of thinning and blackberry control, plantings of understory shrubs and forbs will help enhance native species richness.
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	Poor	Fair	Good	Due to a site history of timber extraction, mature trees are presently sparse to non-existent across all upland forest stands. In the near term, the abundance of mature trees will be limited by the low abundance of trees in age classes approaching maturity. Thinning will be required to reduce competition among dominant trees and boost growth rates to recruit more mature trees.
Condition	Standing and downed 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	Poor	Poor	Fair	The densities of large trees capable of recruiting as snags and downed wood is low and will likely remain so in the near term. There may be opportunities to import large woody debris to the site for placement to enhance downed wood. However, it is unlikely that this practice could be implemented on a grand scale in a manner to sufficiently alter the poor stocking levels of dead wood.

Table 4c. Key ecological attributes for oak savanna at North Logan Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Size	Western Meadowlark and grassland bird habitat	Number of potential male meadowlark territories (8 ha, or 20 acre units)	<16 contiguous ha (40 acres) 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/ connected habitat, i.e. enough for 6 to 20 male territories. Alternatively, 3 patches of closely associated suitable habitat, each >16 ha (40 acres) 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 acres) in size.	Poor	Poor	Fair	In the context of adjacent farm fields to the immediate southwest of the site, there appears to be some potential for savanna-associated bird habitat at the site. However, the current extent is too small. Future acquisition from a willing seller would allow for management of a much larger area, thereby increasing its habitat value significantly.
Condition	Native grass and forb presence	Native species richness	<20 native herbaceous plant species with high fidelity to the system types present within the patch.	20-39 native herbaceous plant species with high fidelity to the system types present at the patch.	40-59 native herbaceous plant species with high fidelity to the system types present at the patch.	> 60 native herbaceous plant species with high fidelity to the system types present at the patch.	Poor	Poor	Poor	There are low numbers of native herbaceous plant species with high fidelity to oak savanna. The presence of rocky soils limits use of farm equipment in site preparation and presents challenges to the restoration and maintenance of native grasses and forbs. Although some planting is likely to occur, this KEA is expected to remain in poor condition.
Condition	Vegetation structure	Canopy cover (5-30%) and architecture of woody vegetation	Total native woody cover is outside the preferred range (5-30%) over more than half the habitat area.	Total native woody cover is within the preferred range (5-30%) over 50-90% of the habitat area.	Total native woody cover is within the preferred range (5-30%) over at least 90% of the habitat area, but young oak tree recruitment is limited or absent.	Total native woody cover is within the preferred range (5%-30%) over at least 90% of the habitat area, and canopy includes appropriate mix of large open-grown trees and younger tree recruitment.	Good	Good	Very Good	Native trees are mostly immature Oregon white oak, Douglas fir and bigleaf maple. Shrubs are very sparse and low in diversity (some tall Oregon grape and creeping snowberry). While rocky soils may preclude treatments to re-establish native grass and forb cover across portions of the site, establishment of native shrubs could enhance savanna habitat for wildlife. Potential high-value wildlife shrub habitat species include: beaked hazelnut, Western serviceberry, ocean spray and poison oak.

Table 4d. Key ecological attributes for native fish habitat at North Logan Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Complexity of habitat	# of different stream habitat units per 305 m (1,000 foot) reach	Less than 2 habitat units	Between 2-5 habitat units	Between 5-10 habitat units	Greater than 10 habitat units	Fair	Fair	Good	Habitat complexity is currently good in the side channels that have undergone restoration treatments, but the mainstem channel (representing the majority of available aquatic habitat) is rated fair.
Condition	Key pieces and # of pieces of large wood in wetted areas of stream and adjacent streambank	# key pieces and large wood per 305 m (1,000 ft) reach	<10 large wood pieces and 0-1 key pieces	10-20 large wood pieces and 2-5 key pieces	20-40 large wood pieces and 6-10 key pieces	>40 large wood pieces and >10 key pieces	Poor-Fair	Fair	Good	The side channels have undergone past restoration treatments and are rated fair for numbers of large wood pieces, whereas the mainstem channel is lacking large, stable wood pieces or jams. The near-term conservation goal is to move both side and mainstem channels into the fair indicator rating for large wood.

THREATS

Numerous stresses influence current conditions at North Logan Natural Area and threaten long-term ecological health and the viability of restoration treatments (Tables 5a-c). These stresses include historical land conversion, gravel mining, and river channelization; active farming and residential development on neighboring lands, invasive species and ongoing human recreational uses. In addition, there is a history of arson at the natural area, which have impacted as much as 10 acres during one event.

Ongoing human recreational uses of the site associated with summer boating, fishing, hiking and dog-walking may be perceived by the general public as small impacts relative to historical manipulations of the land and waters. However, in aggregate, these recreational uses pose a large management challenge at the site. Due to the public access pressures and the site's location along a river corridor, Metro will need to be vigilant in Early Detection-Rapid Response activities for invasive species and more staff and financial resources may be needed to deal with invasive species in the future. Establishing native vegetation now will help defend against the establishment and spread of invasive species.

The threats and sources summary (Table 6) can be used to prioritize restoration actions and future management of the 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. Clackamas River hydrology will likely shift to flashier runoff patterns as winter storms shift from snow- to rain-dominated, and snowpacks are lost or reduced in depth and extent. 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.

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. North Logan Natural Area serves as an important connection for the movement of organisms up and down the Clackamas River corridor, and floodplain secondary channels and wetlands fed by hyporheic flows provide important buffers from seasonal water temperature extremes. The potential for altered hydrology increases the importance of riparian forest health, extent and continuity. Enhancing and increasing the resiliency of in- and off-channel habitats to the effects of climate change could help cold water-dependent native fish species.

In addition, the restored site will help establish connectivity with a network of nearby conservation properties to the southeast, south and west that harbor remnant Oregon white oak ecosystems. This includes River Island, Clackamas Bluff, and Clear Creek natural areas. At a larger scale, this remnant oak landscape connects with oak habitats of the Willamette Valley, and with those to the east on Clackamas River bluffs within Mt Hood National Forest.

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 (oak savannah), restore legacy habitat features that serve as refugia (downed wood and snags), buffer extreme climate events by restoring natural hydrology, and control invasive plants.

Table 5a. Threats and sources of stress for riparian forest and native fish habitat at North Logan Natural Area

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	High	Med									High	High	High	Historical large woody debris removal, channelization, and upstream dam construction, which has altered patterns of incision/aggradation, simplified the main channel, reduced channel meandering, and disconnected secondary channels and associated floodplain wetlands.
	Irreversibility	Med										High			
	Source Rank	Med										High			
Invasive species	Contribution			Low	N/A	Low	N/A							N/A	Invasive species are under control and cover minimal area. However ongoing monitoring and maintenance treatments are needed. There is potential for emergence of new invasive threats, colonizing site via river corridor.
	Irreversibility			Low		Low									
	Source Rank			Low		Low									
Human use, dogs, trails, fishing, etc.	Contribution							Med	Med					Low	Access trails for fishermen, dog-walkers and other public visitors need active management and signage.
	Irreversibility							Low							
	Source Rank							Low							
Diking, filling, draining	Contribution									Med	Med			Low	Floodplain access road disconnects secondary channel from mainstem flushing flows, which is only partially mitigated by semi-operable flow control headgate.
	Irreversibility									Low					
	Source Rank									Low					
Previous forest management	Contribution			Med	Med									Low	Historical loss of large trees and woody debris from river corridor has reduced the number and size of debris piles and microtopography on floodplain, altering tree and shrub community structure.
	Irreversibility			High											
	Source Rank			Med											
Climate change	Contribution									High	Med			Med	Potential long-term effects due to alterations in runoff patterns and microclimates.
	Irreversibility									Very High					
	Source Rank									High					

[1] 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 upland forest at North Logan Natural Area

Source of Stress		**Stresses** (rank each as L-M-H-VH for contribution, irreversibility & source)													Comments
		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**	
Development, land conversion	Contribution	Med	Med	Med	Med									Med	Historical logging and agriculture has resulted in loss of diverse native forest structure and composition. Replanted young forest will require active management to foster development of a diverse forest, with understory plant community, snags, downed wood and stand-level heterogeneity.
	Irreversibility	High		High											
	Source Rank	Med		Med											
Fire suppression	Contribution													N/A	
	Irreversibility														
	Source Rank														
Invasive species	Contribution					Med	Low							N/A	Active weed management has minimized competitive invasive species, but ongoing maintenance treatments of blackberry and Scot's broom will be needed.
	Irreversibility					Low									
	Source Rank					Low									
Human use, dogs, trails, fishing, etc.	Contribution							Low	N/A					N/A	Access trails for fishermen, dog-walkers, and other public visitors need active management and signage; but there is less pressure on uplands vs. riparian/floodplain areas.
	Irreversibility							Low							
	Source Rank							Low							
Previous forest management	Contribution	Med	Med	Med	Med									Med	See comments above on development, land conversion.
	Irreversibility	High		High											
	Source Rank	Med		Med											
Climate change	Contribution			High	Low									Low	Potential long-term effects from altered forest microclimate, new diseases and pests, as well as altered fire and drought regimes. These will be ongoing, long-term challenges for re-establishment of a healthy upland forest ecosystem.
	Irreversibility			High											
	Source Rank			High											

[1] 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 oak savanna at North Logan Natural Area

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	High	Med									High	High	High	Land conversion and development have destroyed and fragmented native prairie, resulting in more contiguous forestlands. Remnant trees in/around adjacent farmlands may sustain some prairie-dependent bird fauna.
	Irreversibility	Med										High			
	Source Rank	Med										High			
Fire suppression	Contribution			High										Low	Elimination of natural fire regime will require active management to control competing vegetation.
	Irreversibility			Med	Med										
	Source Rank			Med											
Invasive species	Contribution			Med		Med								N/A	Active weed management has reduced competitive invasive species, but ongoing maintenance treatments will be needed.
	Irreversibility			Low	Low	Low	Low								
	Source Rank			Low		Low									
Human use, dogs, trails, fishing, etc.	Contribution							Low						N/A	Access trails for fishermen, dog-walkers, and other public visitors need active management and signage; but there is less pressure on prairie vs. riparian/floodplain areas.
	Irreversibility							Low	N/A						
	Source Rank							Low							
Climate change	Contribution			Med										Low	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			Med	Low										
	Source Rank			Med											

[1] 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 site conservation plan outlines strategic actions to be carried out at North Logan Natural Area 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 and are not 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.

Weed management will pose an ongoing challenge for Metro land managers. Invasive weeds are largely under control at present, but the site has extensive boundaries bordering farm and residential lands where weeds are persistent. The river corridor poses a particular challenge because weed propagules can be carried to the site via overbank flows. Public access to North Logan Natural Area is another vector for the importation of weed seeds to the site via dog fur, shoes or fishing waders.

Table 6. Threats and actions for key ecological attributes (KEAs) of important conservation targets

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.
Riparian forest	Floodplain connectivity	Land conversion	Continue native tree and shrub plantings in forest understory. Install engineered logjams within active channel of main river.	Work with PGE to evaluate and remedy management challenges associated with side channel flow control structure.
Upland forest	Shrub species composition, mature trees, standing and down dead trees	Land conversion, previous forest management	Re-establish native understory trees and shrubs, snags and downed logs; stand-level heterogeneity.	Restoration treatments can occur in stages as the young forest ages and establishes multiple layers.
Oak savannah	Species size and composition	Land conversion, competition from Douglas fir due to fire suppression	Restore native understory shrub community in small patches.	Native understory shrub restoration in concert with weed treatments.
Native fish	Habitat complexity and numbers of key large wood pieces	Habitat destruction, human disturbance, impaired connectivity	Continue placements of engineered logjams in side channels and possibly the main stem.	Monitor and evaluate changing hydrology and restoration impacts on native turtle habitat.

SECTION 4: MANAGEMENT ACTIONS

Restoration actions, anticipated challenges and estimated costs are described in this section and in Table 7. North Logan 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 gage initial success, manage costs and maintain working relationships with neighbors. 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 $450,000 to $600,000 over ten years.

INVASIVE SPECIES

Metro completed the mapping of invasive weeds at the site, but periodic re-assessment will be necessary. Due to the proximity of fringing rural residential and agricultural lands at North Logan Natural Area, regular management of invasive species will be necessary to maintain the current low weed infestation levels, and to address new introductions. In the near term, Metro will continue monitoring and treatment of Scot's broom, false brome, garlic mustard, butterfly bush, knotweed, blackberry, spurge laurel, ivy, vinca, clematis, holly, hawthorn and other common agricultural weeds.

Over the medium to long term, Metro will address threats from new invasive plants through cooperative management agreements with neighboring landowners, and active management of the site's recreational users to limit the arrival of new weed propagules. Metro will also continue to develop and refine its cooperative weed management activities with partner agencies and stakeholders and is participating in the Clackamas River Invasive Species Partnership (CRISP), a multi-partner effort to reduce the threat of invasive species to riparian habitat and water quality in the Clackamas basin.

RIPARIAN CORRIDOR AND AQUATIC HABITATS

North Logan Natural Area offers important opportunities for the long-term conservation of native fish, turtles and other riverine-riparian dependent flora and fauna. Metro will continue to support channel-floodplain geomorphic complexity compatible with current and future foreseeable sediment, land use, large wood and recreational regimes. Metro will also work to reduce the impacts of old dikes, roads and other features that alter the natural hydrology of the site and to increase the amount of large wood (greater than 24 inches DBH, length greater than 30 feet) on the floodplain and in off-channel areas.

There is a history of engineered logjam placements in side channels as well as ongoing efforts to restore native understory tree and shrub communities. There are additional opportunities to augment large wood jams in the side channels and in the main stem, in association with the various islands and high-flow channels already present at the site. These actions could enhance channel complexity and create habitat refugia for the benefit of native fish and wildlife. Over the medium term, Metro will work with partner agencies to evaluate and address any challenges with the culvert headgate flow control structure that feeds the side channel downstream of the floodplain access road. Over the long-term Metro will seek to maintain and enhance populations of recovering coho, steelhead and Chinook populations. Enhancement of turtle habitat and possible establishment of native turtle populations should be explored at the site. This could include creation or enhancement of basking and nesting habitat and removal of migration barriers, as well as population re-introduction.

UPLAND FOREST

Upland forest habitats are being re-established at North Logan Natural Area in areas that were harvested for timber prior to acquisition by Metro. Over the short to medium term, Metro will continue weed treatments and thinning to create variable tree densities and openings for the re-establishment of native understory trees and shrubs. Thinning will increase tree growth, accelerate development of mature trees, and create opportunities for the creation of small snags and downed

wood. Over the long term (beyond the term of this plan), Metro should also work toward re-establishing native understory ground cover species.

At the south edge of the site is a 9.8-acre upland forest stand that serves a visual and management buffer for residential properties along South Latourette Road. This stand includes a scattering of large oaks but is otherwise dominated by Douglas fir with small openings. Over the medium to long term, Metro will thin Douglas fir from this stand to convert portions of it to oak savanna while preserving the southern edge in Douglas fir forest to retain a management buffer. Upland forest habitat could also benefit from future opportunities to acquire fee title or conservation easements on adjoining private lands to the south and west.

OAK SAVANNA

Portions of North Logan Natural Area will be managed to foster retention and enhancement of native oak savanna (Map 7). At present, the site supports approximately 30.4 acres of established oak savanna that resulted from a logging operation conducted by the previous owner. An additional 4.2 acres of oak savanna could be created through thinning of Douglas fir dominated forest at the southeast corner of the property along South Latourette Road. While thinning of firs will create additional space for oaks, fir are expected to remain as a component of the savanna habitat. The restoration of savanna ecosystems is a long-term process, and one challenge specific to the site is the presence of rocky soils, which preclude plowing treatments to establish native grasses and forbs. In light of this condition, management should favor development of a diverse shrub community at the upper end of the cover range for savannas (i.e., 30 percent). This will provide valuable native wildlife habitat and reduce weed management requirements over the long term.

Over the short term, Metro will continue weed treatments within the savanna habitats and manage woody vegetation towards achievement of diverse native shrub community. Over the medium to long term, Metro will work to establish native grass and forb species in patches. In the event there are willing sellers to the south, future acquisition of neighboring parcels could provide opportunities to expand oak woodland and savanna habitat by 50 acres or more.

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

CONSERVATION TARGET	KEAS	SOURCE OF STRESS	MANAGEMENT ACTIONS	PRIORITY	SEQUENCING	ESTIMATED COST	MONITORING
All	Native vegetation composition and cover	Invasive species, legacy land uses	Conduct periodic monitoring of and treatment for invasive vegetation	High	Ongoing and continuing	$30,000 (~$3,000/year)	Permanent vegetation plots or transects, photo points. Annual site walk to monitor plantings, and invasive plants.
Riparian forest/ native fish habitat	Floodplain connectivity and downed dead trees	Diking, filling, draining; land conversion	Evaluate culvert headgate under floodplain access road to augment flushing flows. Develop a long-term strategy to ensure that the side channel functions in a manner that provides the intended benefits.	High	Medium term	$80,000 to $120,000 for future modifications and maintenance based on projects of similar scope.	Project dependent, but at a minimum should include photo points, channel cross sections and longitudinal elevation profiles.
Riparian forest	Native shrub cover	Land conversion, invasive species	Remove invasive blackberry, reed canarygrass, and butterfly bush. Replant a diverse native tree and shrub community.	High along small headwater tributary and pond by access gate. Medium elsewhere.	Near term	$120,000-$140,000 (~$2,500/acre) for weed control, re-establishment of native shrub understory. CRBC to play a central role.	Vegetation, photo points. Annual maintenance for 4-5 years.
Upland forest	Shrub species composition, mature trees, standing and down dead trees	Land conversion, previous forest management, invasive species	Continue tree thinning to create variable densities and canopy openings. Re-establish native understory trees and shrubs, snags and downed logs. Coordinate activities with ongoing weed treatments.	Medium	Short to medium term	$90,000 -$120,000 (~$2,500/acre) for weed control, thinning, re-establishment of native shrub understory.	Vegetation, photo points. Annual maintenance for 4-5 years.
Oak savanna	Species composition and competition	Land conversion	Restore native understory shrub community in small patches. Explore opportunities to re-establish native grass and forb species and managed fire regimes. Prevent encroachment of Douglas firs as described in KEAs	Medium	Medium to long term	$80,000-$120,000 (~$2,500/acre) for weed control, native shrub restoration and seeding. $50,000-$70,000 for tree thinning and other treatments.	Annual site walk to monitor plantings and invasive plants. Permanent vegetation plots or transects, photo points.

Maps 8 and 9 show the distribution of stewardship classes and present-day management status at North Logan Natural Area, 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, 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.

Much of the west half of North Logan Natural Area is former managed forestland, which was harvested prior to the Metro acquisition. These areas are under active management to re-establish native forest or savanna and have a management status of "initiation" or "establishment." In contrast, the whole of the riparian corridor, as well as the oak savanna and upland forest on the eastern half of the property are in the "consolidation" 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 North Logan Natural Area is neither discouraged nor promoted by Metro. People have been recreating informally on the site since it was purchased and public access has been primarily isolated to the existing road networks and informal fishing trails by the river. At this time, the public use levels are generally low except during hot summer days, with the most use by fishermen, recreational boaters and neighbors. Although dogs are not allowed at the site, certain visitors walk dogs along the primitive access road that begins at Southeast Bakers Ferry Road. Many users park on the road shoulder, which is often full during summer days.

A recently installed fence and gate limit public access and have enabled Metro to post signs conveying rules and other information at a single location. Although North Logan Natural Area is

not identified as an access site, there will likely be increased public access demand in the future. To protect sensitive riparian, wetland and prairie habitats any additional access improvements would require a more in-depth analysis of opportunities and constraints, including meetings with neighbors and the public and development of a detailed master plan.

In coordination with Clackamas County, there may be an opportunity to connect the natural area by trail to the Barton County Park parking lot via the Bakers Ferry Road Bridge in order to establish a consolidated parking facility. Such a trail could prevent the need for additional parking at North Logan Natural Area, reduce or eliminate dangerous parking on the road shoulder and reduce impacts to natural resources. Challenges to creating such a trail include gaining access to private property and extending the sidewalk across the bridge.

North Logan Natural Area currently has one rental home and one barn. The barn is used by Metro's land management team and is a key facility for operations in the Clackamas River area. At the time of development of this site conservation plan, Metro is considering the removal of the house. However, this action has not been fully evaluated and may be considered more fully at a later date.

SECTION 6: COORDINATION

PUBLIC INVOLVEMENT

As projects are developed, Metro will provide local stakeholders and residents surrounding North Logan Natural Area with pertinent information about conservation work before it is implemented. Project information may include background on the project, timing, cost, material types and other information as necessary to keep the public informed.

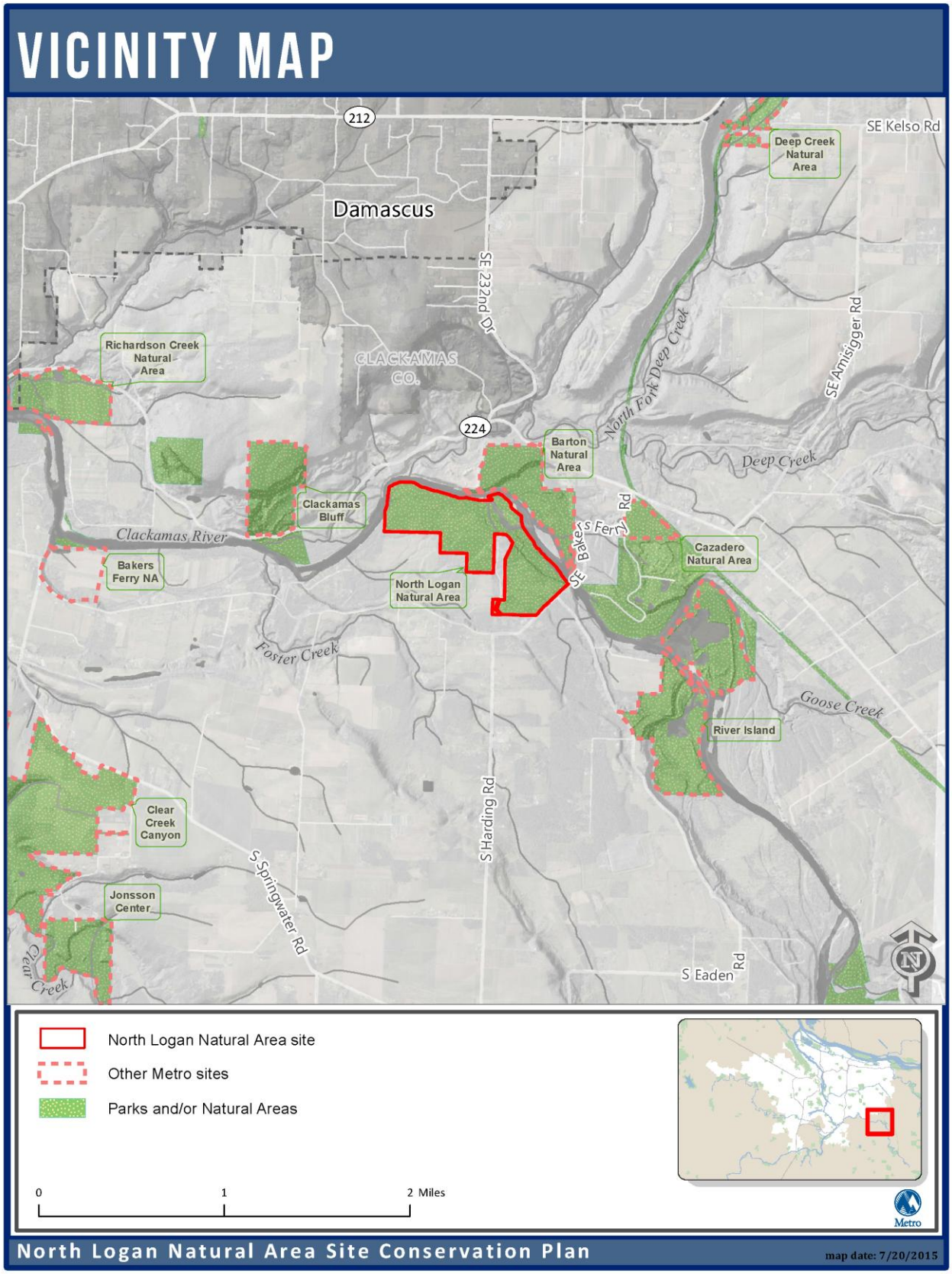
KEY STAKEHOLDERS AND PERMITTING AGENCIES

- Clackamas River Basin Council
- Portland General Electric
- Oregon Department of Fish and Wildlife
- Clackamas Soil and Water Conservation District
- Clackamas County
- North Clackamas Parks and Recreation District

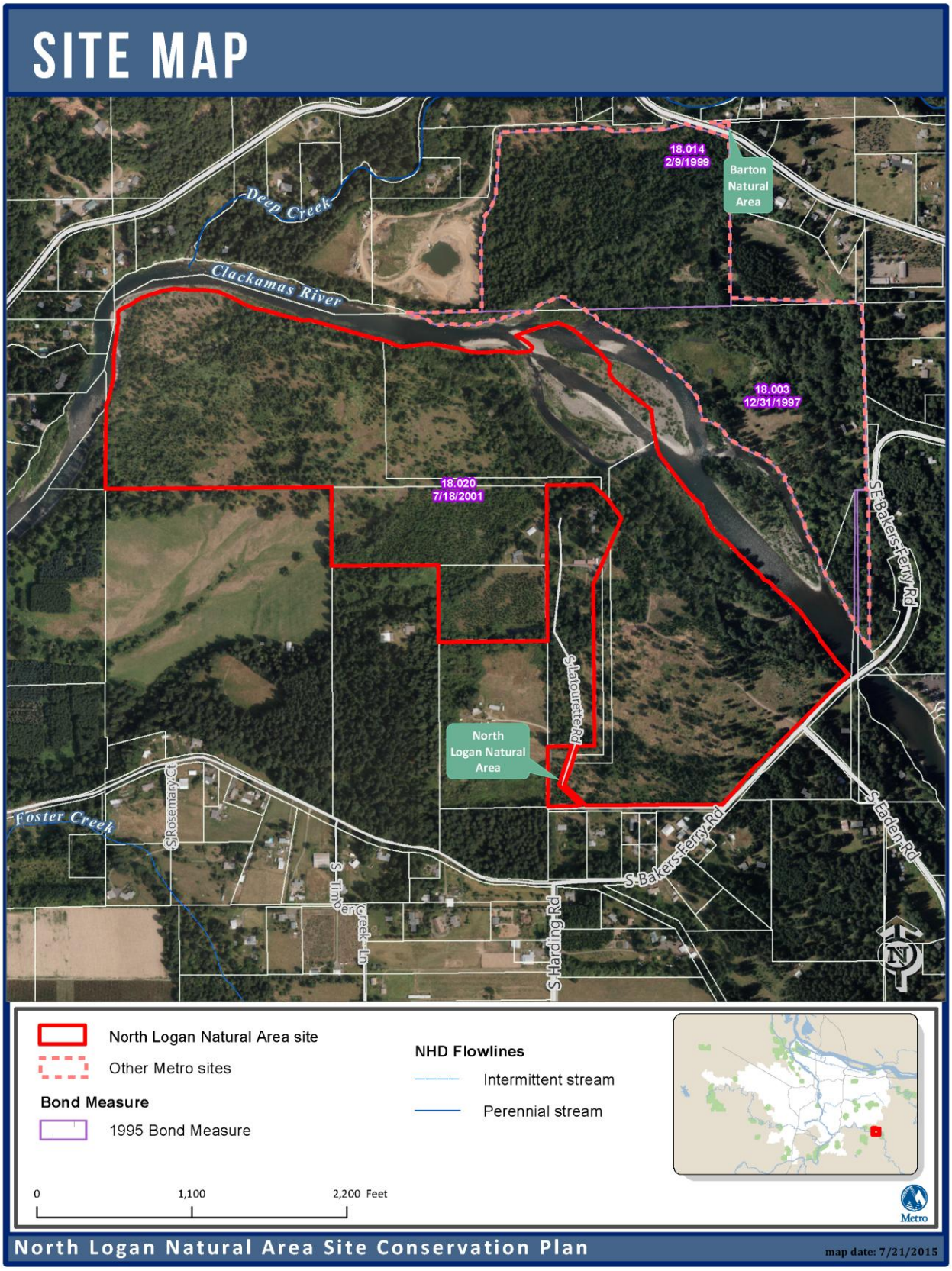
SECTION 7: MAPS

Map 1 Vicinity map
Map 2 Site Map
Map 3 Soils map
Map 4 Historical vegetation
Map 5 Distribution of Oregon white oak within the vicinity of North Logan Natural Area
Map 6 Current cover
Map 7 Conservation targets
Map 8 Stewardship class
Map 9 Management status

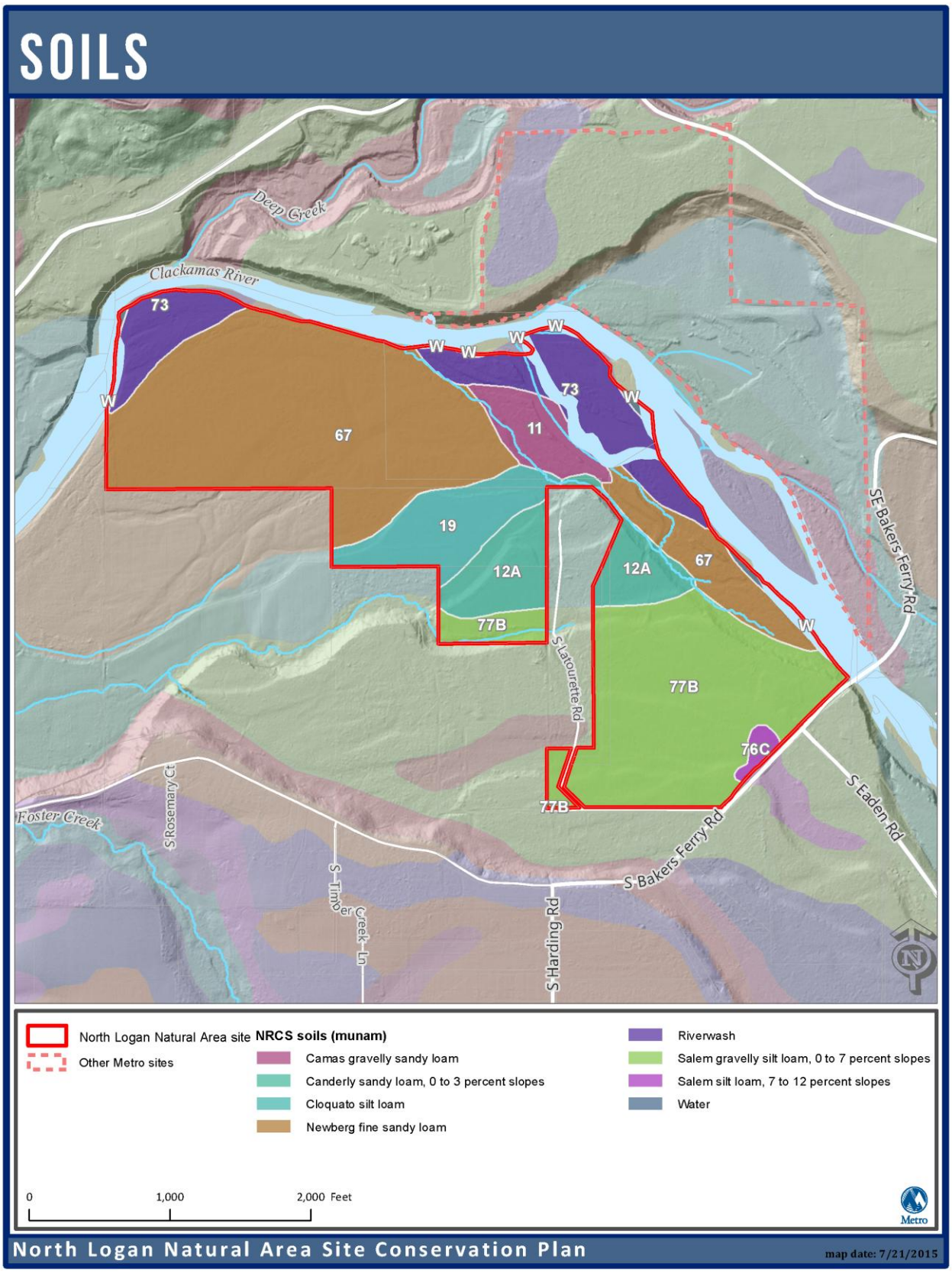
Map 1. North Logan Natural Area vicinity map



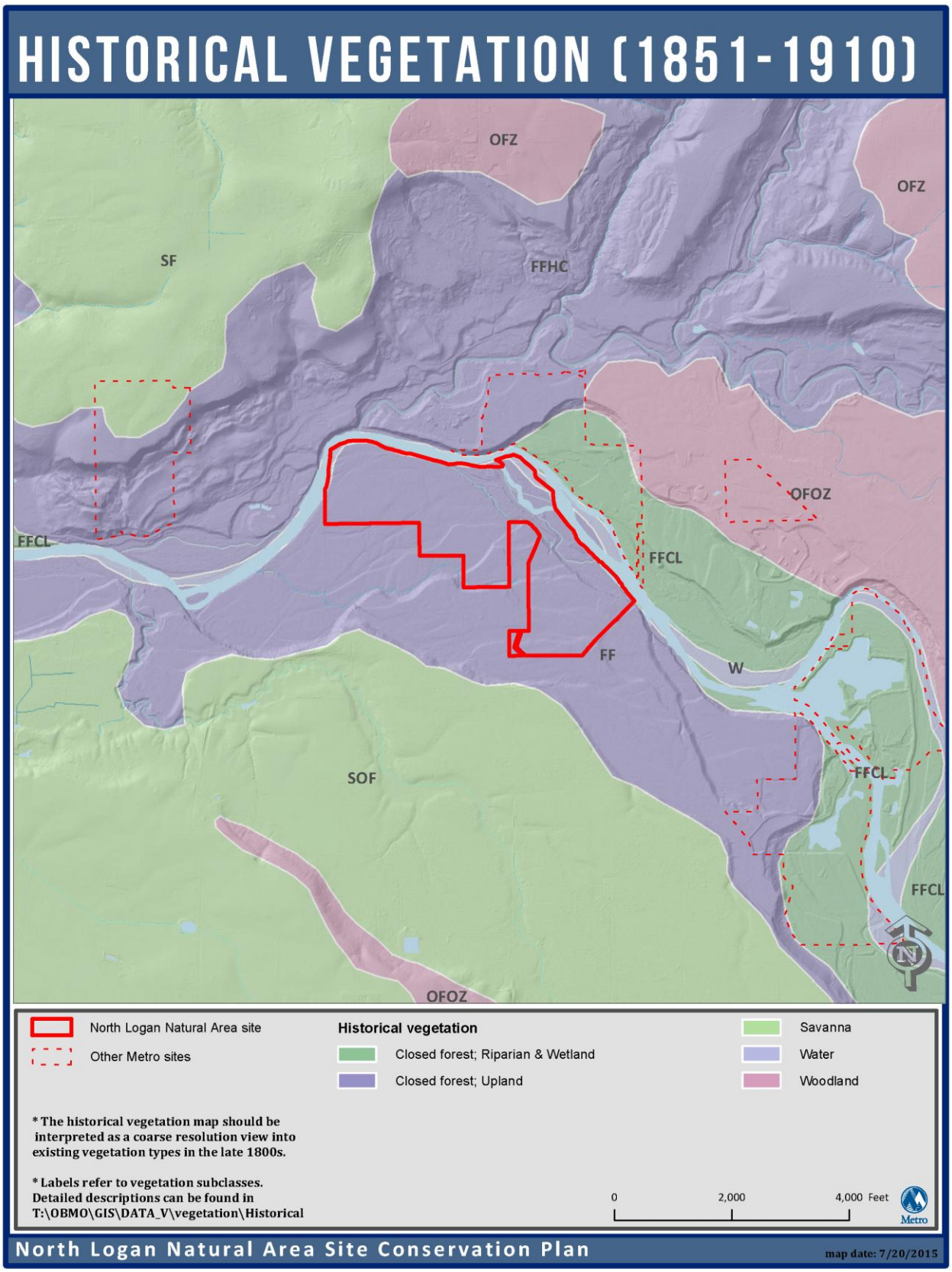
Map 2. North Logan Natural Area site map



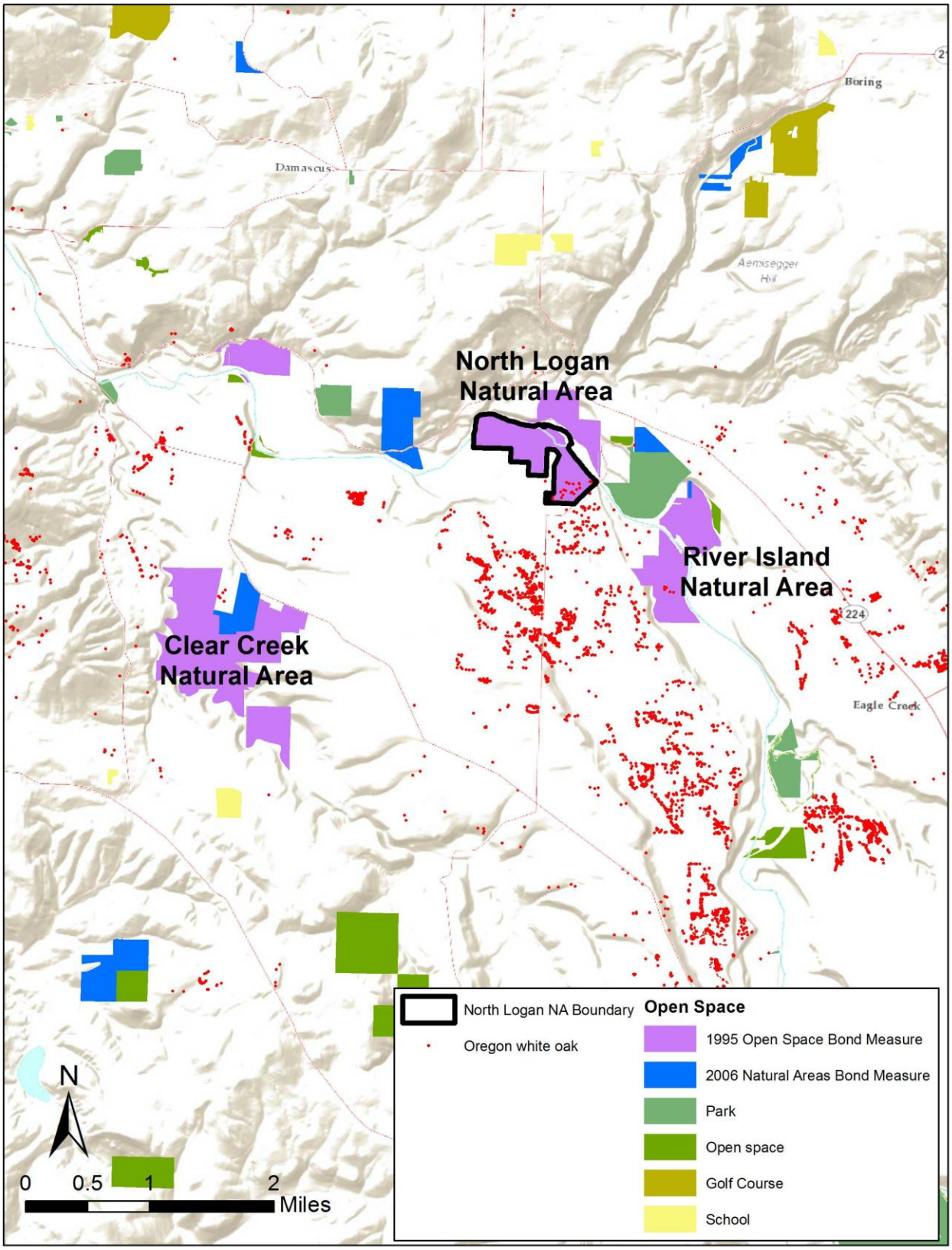
Map 3. North Logan Natural Area soils



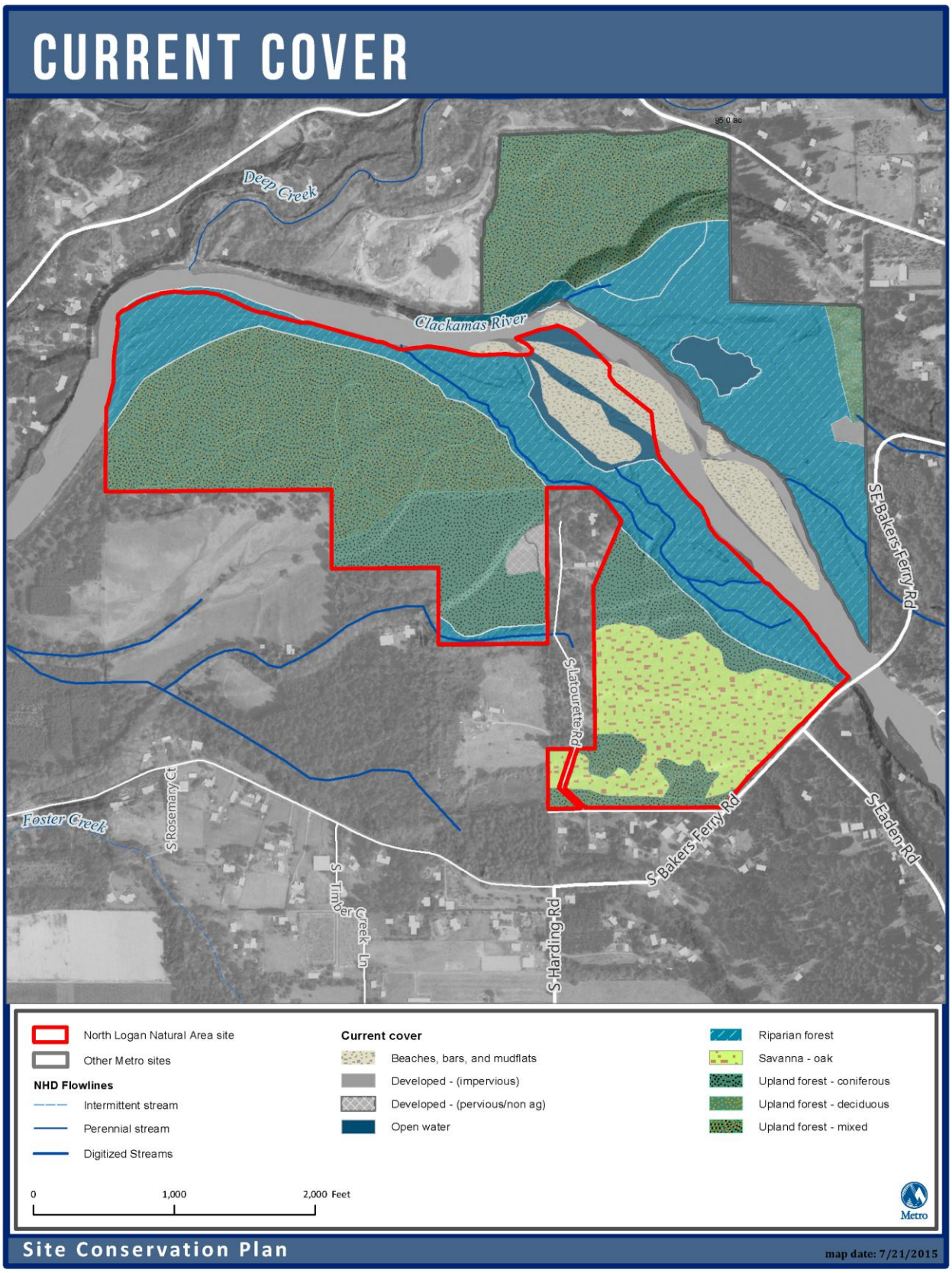
Map 4. North Logan Natural Area historical vegetation



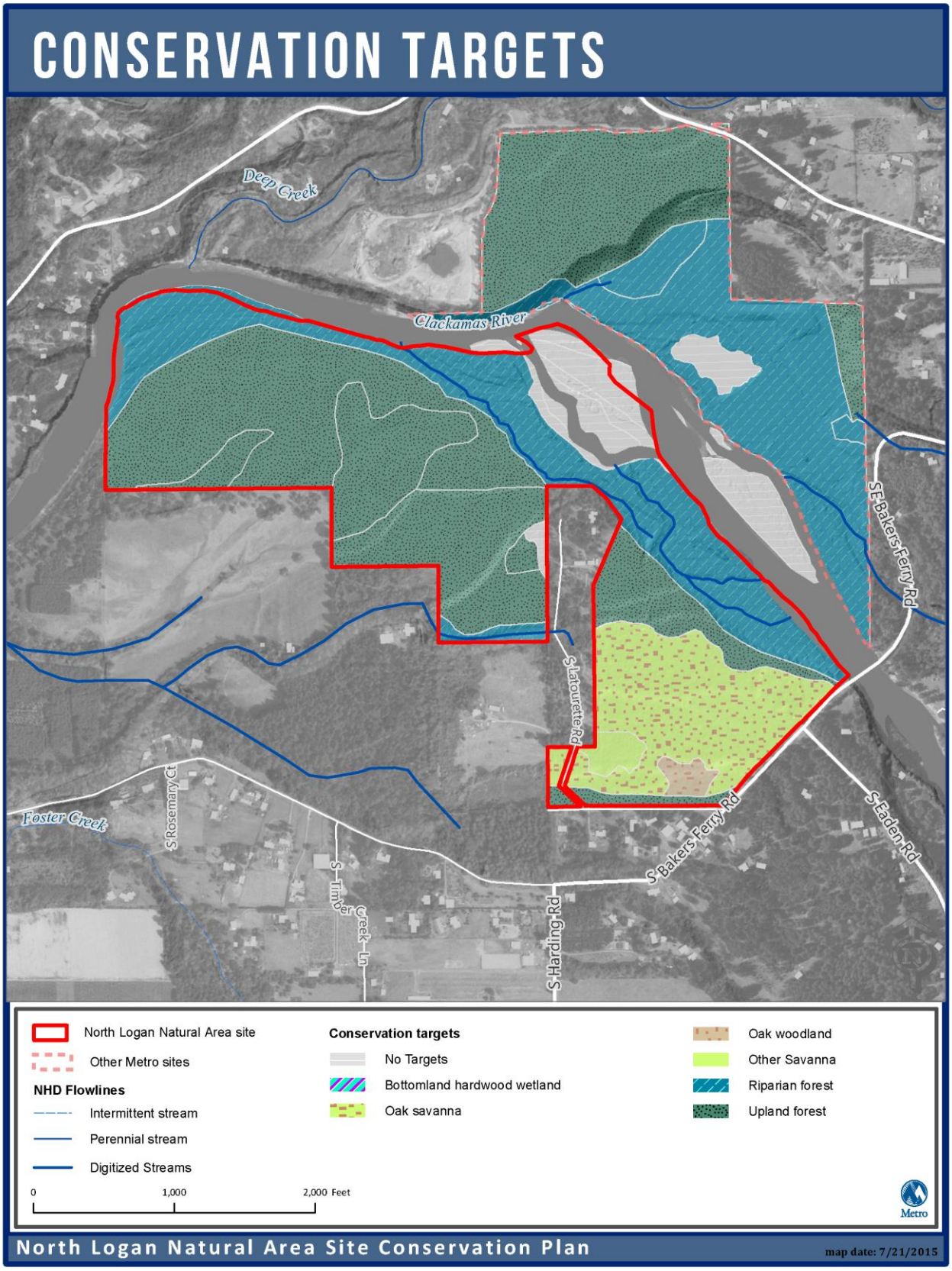
Map 5. Distribution of Oregon white oak within the vicinity of North Logan Natural Area
(Unpublished regional Oregon white oak maps, Hennings and Labbe 2015)



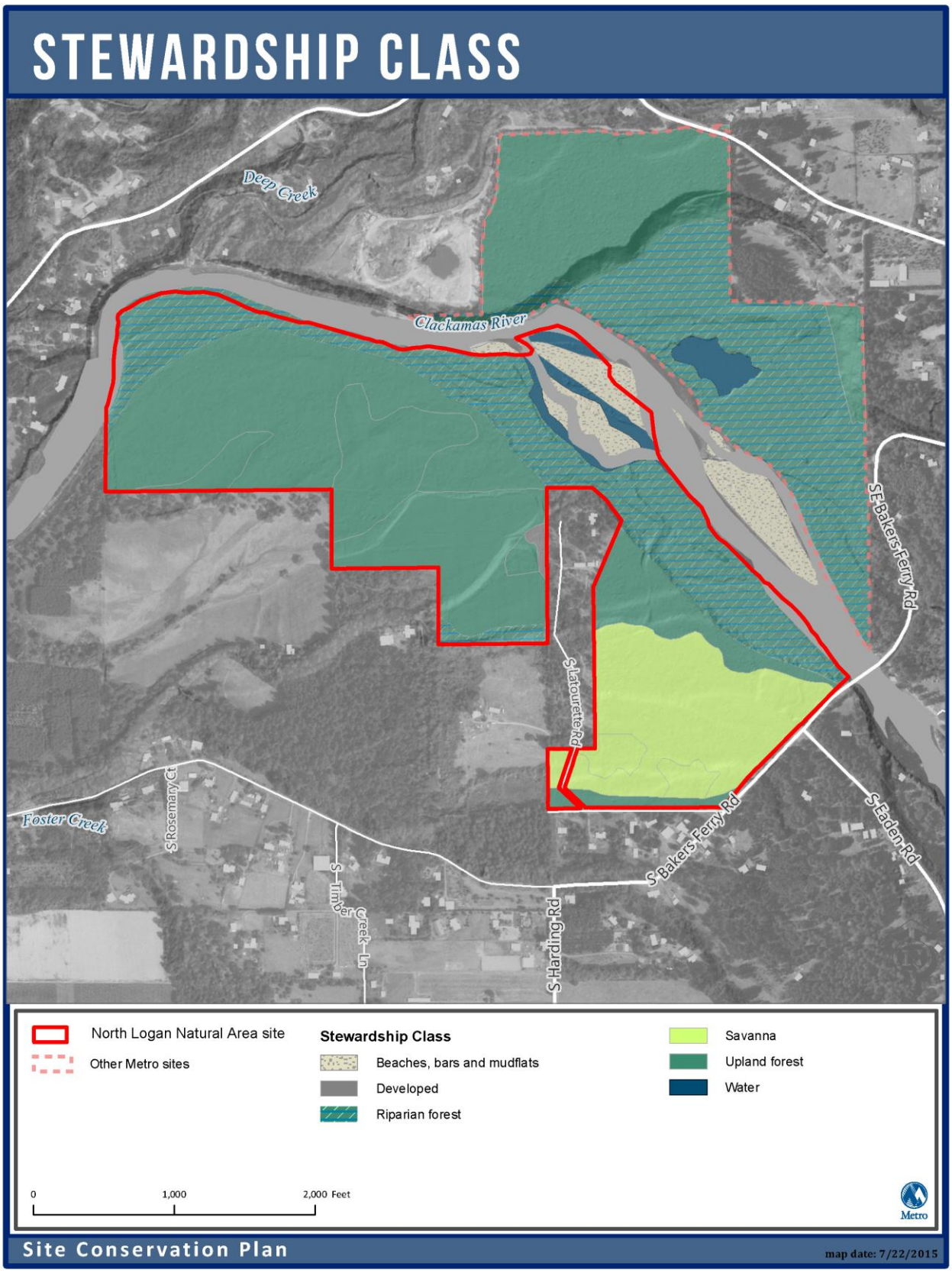
Map 6. North Logan Natural Area current cover



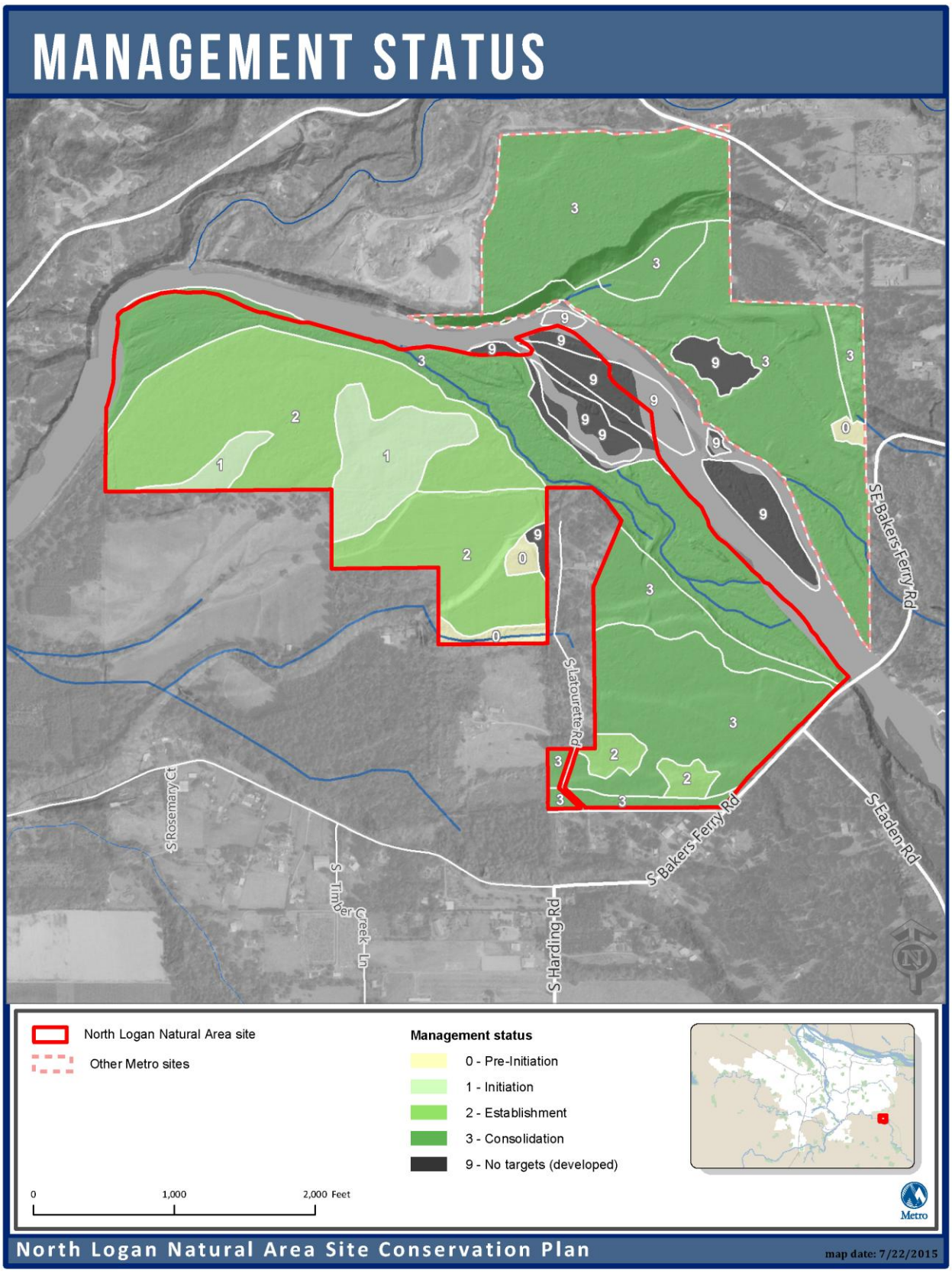
Map 7. North Logan Natural Area site conservation targets



Map 8. North Logan Natural Area stewardship class



Map 9. North Logan Natural Area management status



SECTION 8: REFERENCES

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APPENDIX: SITE PHOTOS

Trees planted within the upland coniferous forest on the eastern half of the property.

Oak savanna.

Access road to the river floodplain, with the upstream side channel to the right and the downstream side channel to the left.

Engineered logjams within side channel.

Clackamas River mainstem channel from the end of the floodplain access road, looking downstream towards Barton Natural Area.

High flow channel with reed canarygrass within the riparian forest area.

View across mid-channel bars, towards Barton Natural Area.

Low water trail crossing on the downstream side channel, connecting the end of the floodplain access road with the eastern half of the property.

Stand of reed canarygrass within the savanna on the western half of the property.

River bluff at far west end of property, looking upstream.

Large woody debris deposits within riparian forest area at west end of property.

Large stand of reed canarygrass (with teasel in foreground) within savanna area.

Savanna with mature bigleaf maple, tall Oregon-grape and bracken fern.

Recent blackberry treatment within upland conifer forest on first high terrace below the home site.

Old farm irrigation pond by access road gate.

Farm irrigation pond outlet stream, with large stand of Himalayan blackberry in riparian area.

Oregon white oak savanna.