Beaver Creek Complex

Approvals for Site Conservation Plan

Date first routed: 07-21-2014

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

Jonathan Soll

Signature _____ Date 8/25/14

Dan Moeller

Signature _____ Date 8/25/14

Mark Davison

Signature _____ Date 8/29/14

Kathleen Brennan-Hunter

Signature _____ Date 9/2/14

JAS: some short text describing past (& current) management would be helpful

SITE CONSERVATION PLAN

Beaver Creek Complex

South Beaver Creek, North Beaver Creek Greenway and Beaver Creek Woods natural areas; Arrow Creek conservation easement



July 2014

Metro | *Making a great place*

Clean air and clean water do not stop at city limits or county lines. Neither does the need for jobs, a thriving economy, and sustainable transportation and living choices for people and businesses in the region. Voters have asked Metro to help with the challenges and opportunities that affect the 25 cities and three counties in the Portland metropolitan area.

A regional approach simply makes sense when it comes to providing services, operating venues and making decisions about how the region grows. Metro works with communities to support a resilient economy, keep nature close by and respond to a changing climate. Together, we're making a great place, now and for generations to come.

Stay in touch with news, stories and things to do.

www.oregonmetro.gov/connect

MAKING A GREAT PLACE

Metro

TABLE OF CONTENTS

Maps

INTRODUCTION

The Beaver Creek sub-basin of the Sandy River Watershed includes portions of Gresham, Troutdale and unincorporated Multnomah County, covering approximately 15 square miles. Three Metro natural areas (North Beaver Creek Greenway, South Beaver Creek Natural Area, Beaver Creek Woods) and one conservation easement (Arrow Creek) are located within the watershed.

PLANNING AREA

This site conservation plan includes all Metro-managed property in the Beaver Creek sub-basin and considers adjacent parcels that contain important habitat features or would connect Metro ownership.

KEY STAFF

Kate Holleran, senior regional scientist
Jeff Merrill, natural resource specialist
Katy Weil, conservation easement monitoring
Rod Wojtanik, parks and natural areas planner

STAKEHOLDERS

In 2012, a voluntary coordination group formed to share information and build a partnership for more effective and collaborative restoration in the Beaver Creek sub-basin. The Beaver Creek Conservation Partnership meets monthly, with Roy Iwai currently serving as the convener. A partial list of participants is identified below. The partnership members either own and manage land in the watershed, have a regulatory interest or a conservation interest in the watershed. Metro restoration projects are routinely shared with this group and Metro provides technical input and review to partner projects in the watershed.

Beaver Creek Conservation Partnership

Roy Iwai	Multnomah County, Water Quality Services,	roy.iwai@multco.us
Torrey Lindbo	Department of Environmental Services, Gresham	torrey.lindbo@greshamoregon.gov
Todd Hanna	Mt Hood Community College	todd.hanna@mhcc.edu
Joan DeYoung	Mt Hood Community College	joan.deyoung@mhcc.edu
Dave Stewart	Oregon Department of Fish and Wildlife	dave.stewart@state.or.us
Bill Weiler	Sandy Basin Watershed Council	theland@gorge.net
Steve Kennett	SOLV	steve@solv.org
Lucas Nipp	East Multnomah Soil and Water Conservation District	lucas@emswcd.org
Amy Pepper	City of Troutdale	amy.pepper@troutdaleoregon.gov
Katherine Cory	Private landowner	

OTHER STAKEHOLDERS

David Ripma and Sharon Nesbitt, agricultural lease holders (503-666-8462).

ACQUISITIONS

The following table lists Metro's Beaver Creek Natural Area acquisitions under the 1995 and 2006 bond measures.

Acquisitions listed by site for Beaver Creek Natural Area

NAME	YEAR PURCHASED	RELATED SITE	OWNERSHIP	MANAGEMENT	ACRES
Mike McKeel	1997	Arrow Creek	Conservation easement	Metro	30.00
Strebin Trust	2000	North Beaver Creek Greenway	Fee simple title	Metro	15.59
Rethwisch	2000	Beaver Creek Woods	Fee simple title	Metro	1.67
Mt. Hood CC	2004	South Beaver Creek Greenway	Fee simple title	Metro	62.61

EXISTING PLANNING DOCUMENTS

Implementation plans for the Beaver Creek riparian restoration and Beaver Creek aquatic restoration levy projects can be found here: *M:\suscntr\Natural Areas and Parks\Regional Properties\Beaver Creek\2013 Levy.* There are no sub-basin planning documents specific to Beaver Creek.

The Sandy River Partners develop restoration priorities for the Sandy River Basin, including Beaver Creek. Priorities include restoring overbank flows and vegetation, as well as installing large down wood and side channel connections. More information can be found here: *http://www.sandyriverpartners.org/projects.html.*

SITE DESCRIPTION

Beaver Creek is the lowest major tributary to the Sandy River. The Beaver Creek natural areas are dominated by coniferous and mixed deciduous-coniferous forests and riparian areas. The habitat is relatively intact. However, there are gaps and areas that need significant weed control and reforestation work, and some parcels are narrow and linear. Much of the rural land in the upper watershed has been cleared for agriculture. Kelly Creek, a significant tributary to Beaver Creek, has experienced significant development. The agriculture and development have narrowed the riparian area along the length of Beaver Creek, with Metro's South Beaver Creek natural area offering the largest single ownership parcel of intact habitat.

The North Beaver Creek Greenway natural area includes a narrow canyon with steep basalt walls, a few Oregon white oak, and approximately 15 acres in berry production. The current lease holders are David Ripman and Sharon Nesbit.

Beaver Creek Woods is a small two-acre riparian forest on the south bank of Beaver Creek. It was reforested in 2002.

South Beaver Creek is the largest Metro property in the watershed and includes approximately 63 acres of riparian forest along both banks of Beaver Creek. One three-acre shrub wetland exists just south of Stark Street as well as much smaller scattered wetland patches in the floodplain, particularly at South Beaver Creek natural area. Minor but unusual habitats include a *Fraxinus latifolie/Carex obnupta* forested wetland (less than one acre and not mapped at the site conservation plan mapping scale) and a narrow canyon feature with vertical basalt walls at North Beaver Creek Greenway.

The Arrow Creek conservation easement is 15.5 acres and includes riparian and upland forest. In 2013, East Multnomah Soil and Water Conservation District completed an understory interplanting of riparian species through a 300-foot-wide buffer along the creek.

Soils in the Beaver Creek complex include Wapato soils in the floodplain of South Beaver and Halumprept soils on the steep canyon hillslopes.

RARE SPECIES

A complete biological survey has not been conducted. The species below are known to exist and others are possible.

- *Rana aurora*, red legged frog. Oregon: sensitive vulnerable status, federal species of concern.
- *Oncorhynchus kisutch*, coho salmon. Oregon: sensitive endangered status, federal listed species.
- *Oncorhynchus mykiss*, winter steelhead. Oregon: sensitive critical status, federal listed species.
- *Lampetra ayresi*, western brook lamprey. Oregon: sensitive vulnerable status.

HISTORIC VEGETATION (1851-1910)

The entire site is mapped as closed mesic mixed conifer forest, with over 90 percent shown as burned. The description includes oak. However, a known weakness of the "pre-settlement map" is that it fails to represent riparian corridors and small patches of other habitat types within the matrix.

RECENT MANAGEMENT HISTORY

- some text here would be helpful

NATURAL AREA	ACTION	DATES	COMMENT
North Beaver Creek Greenway	Garlic mustard	2011-2013	
	Multiple species	2012	
	Reforestation	2001?	
Beaver Creek Woods	Garlic mustard	2011-2013	
	Multiple species	2012	
	Reforestation	2001?	
South Beaver Creek Woods	Garlic mustard	2010-2013	Reforestation includes annual MHCC volunteer work and contract work.
	Multiple species	2012	
	Reforestation	2000-2013	
Arrow Creek	Multiple species	2012	EMSWCD conducted weed control within 300 feet of Arrow Creek.

- Development of a one acre nature park in the northeast corner of South Beaver Creek natural area, managed by Troutdale under an intergovernmental agreement.
- Ongoing monitoring for and removal of homeless camping and college-associated student smoking sites

VISITOR EXPERIENCE

EXISTING SITE USE BY PUBLIC

People have been using Beaver Creek Natural Area informally since the time it was purchased. Currently, Metro neither actively promotes nor discourages public access to Beaver Creek. Public use of the natural area is primarily from the west along the Mt. Hood Community College border. Access from the eastern neighborhoods has been noted with the users primarily students and people walking their dogs. Public access is fairly consistent along the existing road network, which was developed to access the outfall for the college campus youth-only fishing pond. Additional social trails have developed over time, especially after the college became a tobacco-free campus.

Trails leading from educational buildings formed from students walking to find a place for a smoke break. Issues needing further understanding and conversation include the following:

Mt. Hood Community College

The primary use of the property is by the college. Some faculty utilize Beaver Creek for environmental studies. It appears that the greatest use comes from students using the natural area for exploration and a place to smoke. It has been noted that continuing a dialogue with the college about the natural resource impacts and the likely spread of invasive plant material may be warranted.

Maintenance road

The college has identified a need to maintain the outfall for their campus trout pond. This access point is easily identified from above. A major pedestrian circulation route through the campus looks down on that road and readily invites passersby to explore the natural area. The access road ends abruptly at the outfall.

Social trails

A series of social trails appear to be developing throughout the natural area as students and neighbors push further in to the natural area to explore. Further study of the natural area should identify the potential for trail connection opportunities that would help to provide access while preserving sensitive habitats and provide a high-quality experience. Future efforts should look to establish strategies and actions to decommission existing trails and/or roads if deemed inappropriate.

Signage

There are no signs or trail maps to assist in wayfinding within the natural area. Future planning efforts should identify key locations for regulatory, wayfinding and informational signage.

Capital improvements

Future planning efforts should develop cost estimates for potential trail and signage improvements, as well as identify and implement priority actions.

During a future comprehensive planning process, the balance between access to and conservation of the natural resource area will be thoughtfully considered. Some of the potential opportunities/ constraints that will be discussed include the natural area experience; public access; environmental education and stewardship; Mt. Hood Community College educational curriculum; resource impacts; patch fragmentation; wildlife corridor disruption; access to the water control structure; land use and development permit requirements; long term operations and maintenance; as well as capital development and maintenance funding.

PROGRAMMATIC (EDUCATION AND VOLUNTEERS)

Metro's regional parks and natural areas were created to intentionally give residents within our region opportunities to enjoy, experience, participate in and understand the natural world. Metro conservation education staff work with schools, civic organizations and the general public to provide nature programs that thoughtfully connect people to Metro's parks and natural areas. Interested schools and civic groups contact Metro to request a program. Public walks are

advertised in Metro's quarterly Our Big Backyard publication. Information about conservation education programming is also available on Metro's website.

Education program

Metro does not currently offer any nature walks that are open to the public and has no plans for significant expansion of the Beaver Creek Natural Area as an educational site beyond its current usage. South Beaver Creek Natural Area is utilized multiple times a year by Mt. Hood Community College for environmental curriculum. Potential themes that could be promoted include riparian ecology, the importance of flood plains and water quality, bird identification, and open house tours to showcase Metro's natural areas program. From an education perspective, South Beaver Creek Natural Area's unique nature and proximity to the college hold strong potential for educational programming.

Volunteer program

The primary goal of the volunteer program is to provide a variety of high-quality, meaningful opportunities that add value and capacity to Metro's work. Benefits of the program include a collaborative effort between community members and the college to learn about and enjoy Beaver Creek Natural Area, skill development and growth, as well as the satisfaction of contributing to the long-term health and livability of the community.

Wildlife monitoring volunteers

Metro's volunteer wildlife monitoring program provides valuable information about Metro's natural areas while offering a unique and in-depth service opportunity for community members. By focusing on indicator species, such as amphibians and birds, volunteers collect data to help Metro's science and stewardship team gauge the progress of its restoration efforts and track the effects of public use on wildlife.

Native Plant Center volunteers

Metro's Native Plant Center, located near Wanker's Corner in Tualatin, provides an important supply of rare, locally adapted native seeds and plant stock to support Metro's natural area restoration projects. Staff and volunteers collect, grow and distribute native species for planting at restoration sites throughout the region.

Restoration volunteers

The restoration volunteer program focuses on providing groups of all kinds the opportunity to contribute to the health and vitality of our parks, natural areas and cemeteries. Primarily involving a short-term commitment of one day, restoration volunteers experience an engaging, hands-on learning opportunity with immediate, tangible results.

Volunteer site stewards

The natural area site steward volunteer program enhances Metro's parks and natural areas for community members and creates healthy habitat for fish and wildlife through active monitoring of site conditions and use by both people and wildlife, as well as personal and group restoration projects and various educational activities. The steward program provides opportunities for committed volunteers to take an active, leadership role in Metro's natural areas. The steward

engages in hands-on small restoration projects for the site as well as monthly monitoring. Stewards can take on crew leader roles with volunteer groups for restoration educational projects at the site.

Youth Ecology Corps

Metro's Youth Ecology Corps (YEC) is a parks and natural areas levy-funded program to provide job readiness training, on-the-ground conservation work experience and environmental education to teens who are disconnected from school and/or the workforce. This program is run in partnership with Mount Hood Community College's Project YESS program. YEC participants support the stabilization, restoration and maintenance of Metro's parks and natural areas while learning about stewardship through hands-on work projects.

SITE MANAGEMENT

Metro's management of the site will include enforcement of the posted rules to provide protection for wildlife and water quality, and to protect the safety and enjoyment of any person visiting these facilities.

Special use permits

Special use permits are required for certain regulated and non-traditional uses of parks and natural areas to ensure public health and safety and to protect natural resources, properties and facilities owned or managed by Metro. Special use permits are required for commercial film, video or photography; educational activities or educational events; festivals and organized sports activities; use of amplified sound; equipment or other elements posing a safety threat or public nuisance; concession services; site restoration or alteration, biological research, scientific collection (soil, wildlife or vegetation disturbance of any kind); any organized activity, event or gathering involving 25 or more people. The college currently obtains two or three special use permits per year for natural area use as an educational laboratory.

Archeological resources

Beaver Creek Natural Area is steeped in history and may contain archeological resources. To date, there have been no formal archaeological investigations.

If, during any site investigation, alteration or improvement, an archaeological resource is discovered, Metro will work with the State Historic Preservation Office to sensitively address the find. If any damage or unlawful use is identified, Metro would also partner with the Multnomah County Sheriff to investigate.

Dogs

One of the most difficult management issues for public access is the introduction of dogs by visitors. Research shows that even if dogs stay on the trails, they are perceived as predators by wildlife. The zone of influence of a dog, even on leash, can be several hundred feet on either side of a trail. Because of the potential disturbance to wildlife and wildlife habitat, dogs are not allowed within Beaver Creek Natural Area. Educational signage, self-policing and strict enforcement are all needed to effectively manage this sensitive issue.

Signage

As part of the integration of people into a natural area, the need for regulatory, wayfinding and interpretive signage becomes necessary. The development of a signage plan for Beaver Creek Natural Area would be part of the future comprehensive plan and subsequent design/development process. Typically, interpretive themes are identified during the planning effort and those themes are further vetted during design/development. Wayfinding and regulatory signage is developed once the trail network is finalized. As aspects of the comprehensive plan are implemented, e.g., formalized access points, new trails, gates, etc., signage would be added to help inform and orient the visitor.

STRATEGIC ACTIONS

No immediate actions are proposed for this phase of the project. Existing infrastructure will be maintained as necessary. Issues identified above will be addressed either through current maintenance practices and enforcement or through a future comprehensive planning process.

BEYOND FIVE YEARS OR AS NEEDED

In the future there may be increased demand to access and recreate at Beaver Creek Natural Area. Future access improvements will need a more in-depth analysis of opportunities and constraints for trails and public access, including meetings with the college and the public and developing a detailed trails master plan.

SUMMARY OF CURRENT COVER, CONSERVATION TARGETS, STEWARDSHIP TYPE AND STATUS

Summary of current cover, conservation targets, stewardship type and status

CURRENT COVER	ACRES
Agriculture	10.7
Riparian forest	87.5
Upland forest - coniferous	6.8
Upland forest - shrub (stage)	0.4
Wetland - shrub	4.1
Total	**109.5**

STEWARDSHIP TYPE	ACRES
Agriculture	8.0
Riparian Forest	87.5
Upland Forest	9.9
Wetland	4.1
Total	**109.5**

CONSERVATION TARGET	ACRES
Riparian forest	87.5
Shrub dominated wetland	4.1
Upland forest	15.2
Upland forest - shrub (early successional)	2.7
Total	**109.5**

	PRE-INITIATION	INITIATION	ESTABLISHMENT	CONSOLIDATION	MAINTENANCE
Upland	12.3				5.25
Riparian forest				1.4	86
Upland-shrub		.4			
Wetland			4.1		
Total	**12.3**	**.4**	**4.1**	**1.4**	**91.25**

CONSERVATION TARGETS

There are five conservation targets for the Beaver Creek Natural Area:

1. Upland forest
2. Riparian forest
3. Native fish
4. Wetland-shrub
5. Upland forest-shrub stage

CURRENT AND DESIRED FUTURE CONDITION OF CONSERVATION TARGETS

Non-technical status and desired future condition of conservation targets

TARGET	CURRENT CONDITION	DESIRED FUTURE CONDITION
Upland forest	Moderately good condition, primarily due to previous weed control efforts. Lacks snags and large down wood.	Late successional forest with diverse structure and composition including gaps, vertical diversity, large down wood and snags.
Riparian forest	Fair to moderately good condition, primarily due to previous weed control efforts. Lacks snags and large down wood, and some areas are dominated by invasive blackberries in the understory.	Late successional riparian forest with composition and structural diversity, in very good condition.
Wetland-shrub	Currently in fair condition, one area has received aggressive weed control and planting. Other smaller and scattered shrub wetland areas are dominated by invasive weeds.	Wetland with greater than 50 percent cover with native wetland associated shrubs, minor component of trees. Removal of Stark Street culvert may result in hydrologic changes that negatively affect the wetland. Lack of effective strategies for these types of sites with reed canary control may limit ability to establish a native plant community over more than 50 percent of the area.
Upland forest, shrub stage	This small habitat includes the college nature park and the immediately adjacent area. Developed paths are managed by the City of Troutdale; however, associated open space is dominated by weedy field.	Sustainable low stature native shrub habitat in areas managed collaboratively with the City of Troutdale.
Native fish	A 2010 survey found 12 native and four non-native fish species in Beaver Creek. Habitat conditions range from marginally to severely impaired.	TBD. Herrera Environmental is currently surveying and evaluating the existing conditions and the potential for enhancement.

Key ecological attributes for riparian forest at Beaver Creek 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	# native tree and shrub species per 0.4 ha (1 ac)	<5 species	5-10 species	10-15 species	>15 species	Good	Good	Very Good	Estimate via site walk.
Condition	Native herbaceous layer richness	# native species of grasses, herbs, forbs and ferns, at least half of which are riparian-associated, per 0.4 ha (1 ac)	<5 species	6-12 species	12-18 species	>18 species	Fair	Good	Very Good	Estimate via site walk. Limited now by invasive plants but aggressive levy project work should improve site conditions.
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	TBD (Poor)	Fair	Good	Estimate via site walk. Snags and down wood are likely at a low level due to previous land use and will require decades to reach a fair to good level.
Condition	Floodwater access to the floodplain	Degree of connection between stream/ floodplain during high water events	Extensively disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Moderately disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Minimally disconnected by channel incision, dikes, tide gates, elevated culverts, etc.	Completely connected (backwater sloughs, channels)	TBD	TBD	Good	Measure based on field walk, aerials. Current conditions are being assessed by Herrera as part of a levy funded stream restoration project.
Condition**	Riparian habitat continuity	Gaps in woody vegetation	>2 gaps >50 m (55 yards) OR >3 or more 25-50 m (27-55 yards) gaps	1 or 2 gaps >50 m (54 yards) OR 2 or more gaps between 15-25 m (16-27 yards)	1, 25-50 m (27-55 y) gap OR 2 or more gaps between 15-25 m (16-27 yards)	0 or 1, 15-25 m (16-27 yards) gap	Good	Good	Very Good	Estimate via GIS, per km stream length. Riparian contiguity for water quality and wildlife. Allows for continuity and also some mosaic for wildlife that need (or create, such as beaver) openings. Tracking this KEA will help us see trends over time across ownership.
Landscape context	Offsite riparian habitat condition	% rating at least "fair" for both width and gaps (see above), within 2.5 km (1.6 mi) up- and down-stream of property.	0-25%	25-50%	50-75%	75-100%	TBD	TBD	TBD	Measure using aerial photos for 2.5 km (1.6 mi) stream length, up- and downstream. Several studies suggest the importance of riparian buffer contiguity to water quality, fish and benthic organisms. Multiple partners are working across private and public ownership to improve riparian conditions. Tracking this KEA will help us see trends over time across ownership.

*Desired future condition

Key ecological attributes for native fish at Beaver Creek 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	TBD	TBD	TBD	The number of different habitat units indicates the complexity of the stream reach. Complex stream reaches provide high quality habitat for all life stages of native fish. Habitat units may include glides, riffles, runs, pools, step pools, alcoves, side channels, etc. (Independent Multidisciplinary Science Team, 2002, *Recovery of Wild Salmonids in Western Oregon Lowlands*). Herrera Environmental Consultants are assessing current conditions Spring 2014.
Condition	Key pieces and # of pieces of large wood in wetted areas of the 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	TBD	TBD	TBD	Large wood is defined as logs greater than 46 cm (18 inch) diameter and 6 m (20 ft) in length. Note that optimum diameter and length depends on bankfull width; see DSL/ODFW's 2010 *Guide to Placement of Wood, Boulders and Gravel for Habitat Restoration*. Key pieces resist downstream transport as well as anchor and retain other pieces of large wood. Herrera Environmental Consultants are assessing current conditions Spring 2014.

*Desired future condition

Key ecological attributes for upland forest at Beaver Creek Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ---------- POOR	FAIR	GOOD	VERY GOOD	CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
Condition	Vegetative structure: native tree and shrub layer	% native tree and shrub canopy cover (combined)	<25% cover	25-50% cover	50-75% cover	>75% cover	Very Good	Very Good	Very Good	Estimate overall via site walk. Native bird species richness is associated with the amount of native shrub cover (Hagar 2003; Hennings 2006). Numbers based on data analysis from local studies at 54 riparian study sites (Hennings 2001). Native shrub cover was as high as ~60%, with highest native shrub cover in the 50-60% tree canopy cover range.
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	Fair	Fair	Very Good	Recruitment of native trees necessary for long-term health of upland forests. Saplings are < 2m tall. Based on PIF (2000) biological objective for WV large-canopy trees in riparian deciduous woodland.
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	Good	Estimate via site walk. Rankings distilled from multiple references and particularly from *Habitat Conservation for Landbirds in Lowlands and Valleys of Western Oregon and Washington* (Altman and Alexander 2012) and DecAID results for species' use of dead wood in Westside Lowland Conifer-hardwood forests.

*Desired future condition

Key ecological attributes for shrub wetlands at Beaver Creek Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ---------- POOR	FAIR	GOOD	VERY GOOD	CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
Condition	Native shrub richness	Number of native shrub species per acre	<2 species	3-4 species	4-5 species	>6 species	Very Good	Very Good	Very Good	Species diversity has been increased due to weed control and native plantings.
Condition	Vegetative structure: shrub layer	Percent native shrub canopy cover	<30% cover or >80% cover	30-50% cover	50-70% cover	70-80% cover	Poor	Fair	Good	Significant areas are still dominated by reed canarygrass, limiting the establishment of native shrub species. Scrub-shrub wetlands have minimum 30% shrub cover (Cowardin 1979). PIF biological objective for willow flycatcher and yellow-breasted chat up to 80% shrub cover with scattered herbaceous openings (Partners in Flight 2003).

*Desired future condition

Key ecological attributes for upland shrubs at Beaver Creek Natural Area

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ---------- POOR	FAIR	GOOD	VERY GOOD	CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
Condition	Vegetative structure: shrub layer	% native shrub canopy cover	<10% cover	10-25% cover	25-50%	>50%	P	G	VG	Native shrubs and herbaceous plants provide a number of services, including food and ovipositing sites, as well as structural complexity to the habitat that is associated with increased wildlife diversity (Hagar 2003; Hennings and Edge 2004; Ares et al. 2010; Pendergrass et al. 2012).
Condition	Native shrub richness	# native shrub species per acre	<2 species per 0.4 ha (1 acre)	2-5 species per 0.4 ha (1 acre)	6-9 species per 0.4 ha (1 acre)	>10 species per 0.4 ha (1 acre)	P	G	VG	Estimate via site walk. Native wildlife species diversity is associated with native vegetation. Shrub diversity is particularly important to long-distance migratory songbirds. Partners in Flight biological objective for yellow warbler (sub-canopy, tall shrub foliage in riparian woodland) (Altman 2000).

*Desired future condition

THREATS AND THEIR SOURCES FOR THE NEXT 10 YEARS

Major threats to the Beaver Creek natural areas include invasive weeds, unauthorized human use including smoking sites developed by Mount Hood Community College students, homeless camping and climate change.

CLIMATE CHANGE CONSIDERATIONS

Climate change is anticipated to affect summer temperatures and availability of water in summer. Other indirect effects of climate change may include range shifts of plants and animals, some native to North America and some not, and increased competition by these species. It is possible that climate change may touch every key ecological attribute, though effects on some KEAs may be more important than others.

Direct effects that may occur

- Increased summer temperatures
- Increased severity of winter rain events
- Decreased water availability in summer

Indirect effects that may occur

- Increased risk of wildfire in hotter, dryer summers
- Range shifts by undesirable plants increasing competition
- Disease introductions and/or increased vulnerability to disease
- Loss of synchronicity of plant reproduction and pollinators
- Loss of synchronicity of resident and migratory animals and food sources (e.g., insect hatches)
- Increased erosion in streams caused by the flashier winter rain events
- In upland forests, plant growth and survival may be affected by increased summer temperatures and reduced water availability in summer.

Threats worksheet for riparian forest and shrub wetland at Beaver Creek 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	Stress rank	Competition for resources	Stress rank	Human disturbance	Stress rank	Altered hydrology	Stress rank	Impaired habitat connectivity	Stress rank	THREAT RANK	Comments
Development, land conversion	Contribution									VH					
	Irreversibility									H	M			H	
	Source rank									VH					
Invasive species	Contribution					VH									Levy funds allocated to reduce this threat
	Irreversibility					M	H							H	
	Source rank					H									
Human use, dogs, trails, fishing, etc.	Contribution							H							New SUP process
	Irreversibility							M	M					L	
	Source rank							M							
Previous forest management	Contribution			H											Levy funds allocated to reduce this threat
	Irreversibility			L	H									M	
	Source rank			M											

Threats worksheet for upland forest and shrub habitat at Beaver Creek 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
Invasive species	Contribution					H									Garlic mustard in year 4 of treatment
	Irreversibility					M	L							L	
	Source rank					M									
Human use, dogs, trails, fishing, etc.	Contribution							VH							
	Irreversibility							M	H					H	
	Source rank							H							
Previous forest management	Contribution			VH											Levy funds allocated to reforest
	Irreversibility			L	H									H	
	Source rank			M											

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

Threats worksheet for native fish at Beaver Creek 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[2]	Stress rank	Competition for resources	Stress rank	Human disturbance	Stress rank	Altered hydrology	Stress rank	Impaired habitat connectivity	Stress rank	THREAT RANK	Comments
Development, land conversion	Contribution			VH	VH					VH	L			VH	Historic: incision, reduced groundwater connectivity; plans for major large wood installations
	Irreversibility			M						VH					
	Source rank			H						VH					
Invasive species	Contribution					VH	L							L	Unknown: mussels? Invasive fish? More information needed
	Irreversibility					VH									
	Source rank					VH									
Previous forest management	Contribution			VH	VH									VH	Reduced large wood inputs and loss of in stream complexity
	Irreversibility			M											
	Source rank			H											

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

NATURAL RESOURCE STRATEGIES

High-priority strategies

- In response to anticipated climate change stresses and to increase the ecological function of the natural areas, improve the health of the Beaver Creek complex through ongoing invasive weed control and enhancement of plant diversity in the understory.
- Improve the function of riparian and aquatic habitat through installation and recruitment of large wood.

Medium-priority strategies

- Continue to work with Mt. Hood Community College programs to manage college use of the natural area to enhance conservation education opportunities while reducing or mitigating overuse issue.

Lower-priority strategies

- Work with the City of Troutdale to develop a low stature native plant community in weed dominated areas of the college nature park.
- Work with Mt. Hood Community College to develop long-term student studies to document changing conditions.

NATURAL RESOURCE STRATEGIES, ACTIONS, AND COSTS

STRATEGY	TARGET	KEA	STRESS	SOURCE OF STRESS STRATEGY ADDRESSES	RANK* (HOW SOON)	SPECIFIC TASKS	ESTIMATED COST	MEASURE OF SUCCESS
Expect emerald ash borer to occur locally; track movement and develop response as knowledge develops	Riparian forest	Native tree and shrub richness	Competition for resources	Invasive species	Moderate	Monitor spread of ash borer and work with USDA and/or ODA on treatment options Increase diversity of tree species included in riparian planting projects to buffer mortality due to EAB	Part of routine work	Staff is working collaboratively with partners to address EAB in Oregon; strategies for control are limited
Track information regarding invasive fish and mussel species downstream; develop response as knowledge develops	Native fish		Competition for resources	Invasive species	Moderate	Communication with partners and other agencies regarding information on invasive species with the potential of being introduced to Beaver Creek	Part of routine work	Staff is working collaboratively with partners to address aquatic invasives in Oregon; strategies for control are limited
Enhance native diversity	All	Native tree, shrub, and herbaceous plant richness	Competition for resources	Invasive species Climate change	High Low	Survey and treat EDRR species, particularly garlic mustard Conduct periodic core stewardship weed treatments across all properties; weed treatments have been implemented across all Metro Beaver Creek properties including multiple treatments of garlic mustard	$7,500 for GM survey and treat across all properties $12,000 (5 crew days) every 5-7 years for routine survey and control of non-EDRR	Visual assessment EDRR are eradicated or controlled (GM), other invasive plants are <1%
Enhance native tree diversity	Riparian	Native tree and shrub richness	Competition for resources	Previous land management Climate change	Moderate	Large patches of red alder in the floodplain are dominated by an understory of Armenian blackberry; underplant decadent old growth red alder patches with conifers; estimate five-8 acres; a levy project is currently in-progress to address this condition	$25,000	Understory conifers established in targeted sites
Maintain appropriate stocking levels to reduce inter-tree competition	Riparian and upland forests	Number and size of mature trees	Competition for resources	Previous land management Climate change	Low	Conduct stand inventories and develop treatment strategies based on specific stand stocking levels; focus treatment on young stands; can be accomplished over the next 5-15 years	TBD	Over 90% of stand densities are at recommended levels for maintaining forest health
Increase snags and downed wood	Riparian and upland forest, and native fish habitat	Number and size of snags and down wood	Altered structure	Previous land management	High	Selective topping and girding/tree-falling, create wildlife piles; include as component of all restoration opportunities as appropriate Import down wood as part of restoration projects	$20,000	KEA rating increases to fair
Increase in stream complexity	Native fish	Habitat complexity	Altered structure	Previous land management	High	A levy project is currently in-progress to enhance in-stream and floodplain complexity	$300,000	Improvement in KES rating to good
Special use permit system to control disturbance	All	Native tree, shrub and herbaceous richness	Human disturbance	Human use, dogs, social trails	Low	Site monitoring to identify increase or decrease of social trails, homeless or student camps, provide feedback to SUP manager.	Part of routine work	Visual assessment, reduction in social trails

***RANK**

High: Must do within 5 years to protect target viability

Medium: Target will persist without it but will degrade over 5-10 years or require additional future management

Low: Addresses a non-critical threat or one that is unlikely to threaten target viability within 10 years

MONITORING PLAN

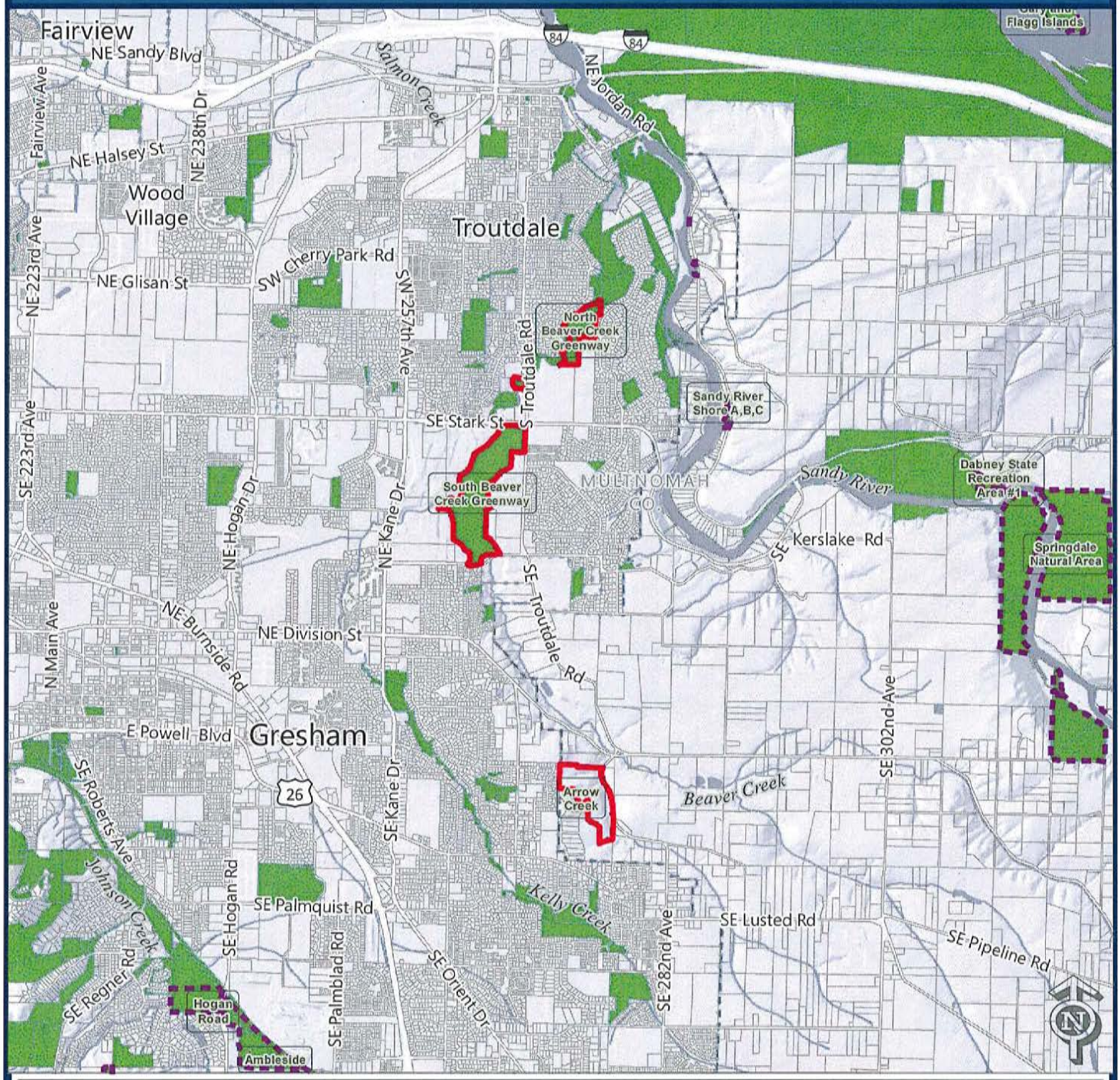
Monitoring for selected key ecological attributes associated with the conservation targets is shown in the table below.

Monitoring

TARGET KEA(S)	INDICATOR	METHOD	THRESHOLD FOR ACTION?	FREQUENCY
Upland and riparian native tree, shrub and herbaceous plant richness	# native tree, shrub and herbaceous species per 0.4 ha (1 ac)	Visual estimate on site visit	Less than Very Good	2 days of staff time every 5 years
Upland and riparian standing and down dead trees	Average # snags and down wood (> 50 cm, or 20 in, DBH) per acre	Visual estimate on site visit	Not expected to reach Good rating for decades	Done concurrently with plant richness assessment
Riparian habitat off-site condition and continuity	Gaps in habitat	Estimate via GIS analysis	Action on sites beyond Metro natural areas will be limited to collaboration with partners and community education	1-2 days in collaboration with partners every 3-5 years
Wetland shrub	% cover	Estimate via aerial photo	Less than 30% cover once 50% cover is obtained.	Once every 3-5 years
Native fish	Key pieces and # of large wood per 305 m (1000 ft)	Photo points established as part of levy restoration project Supplemented by visual estimate on site visit	TBD	2 staff days every five years

MAPS

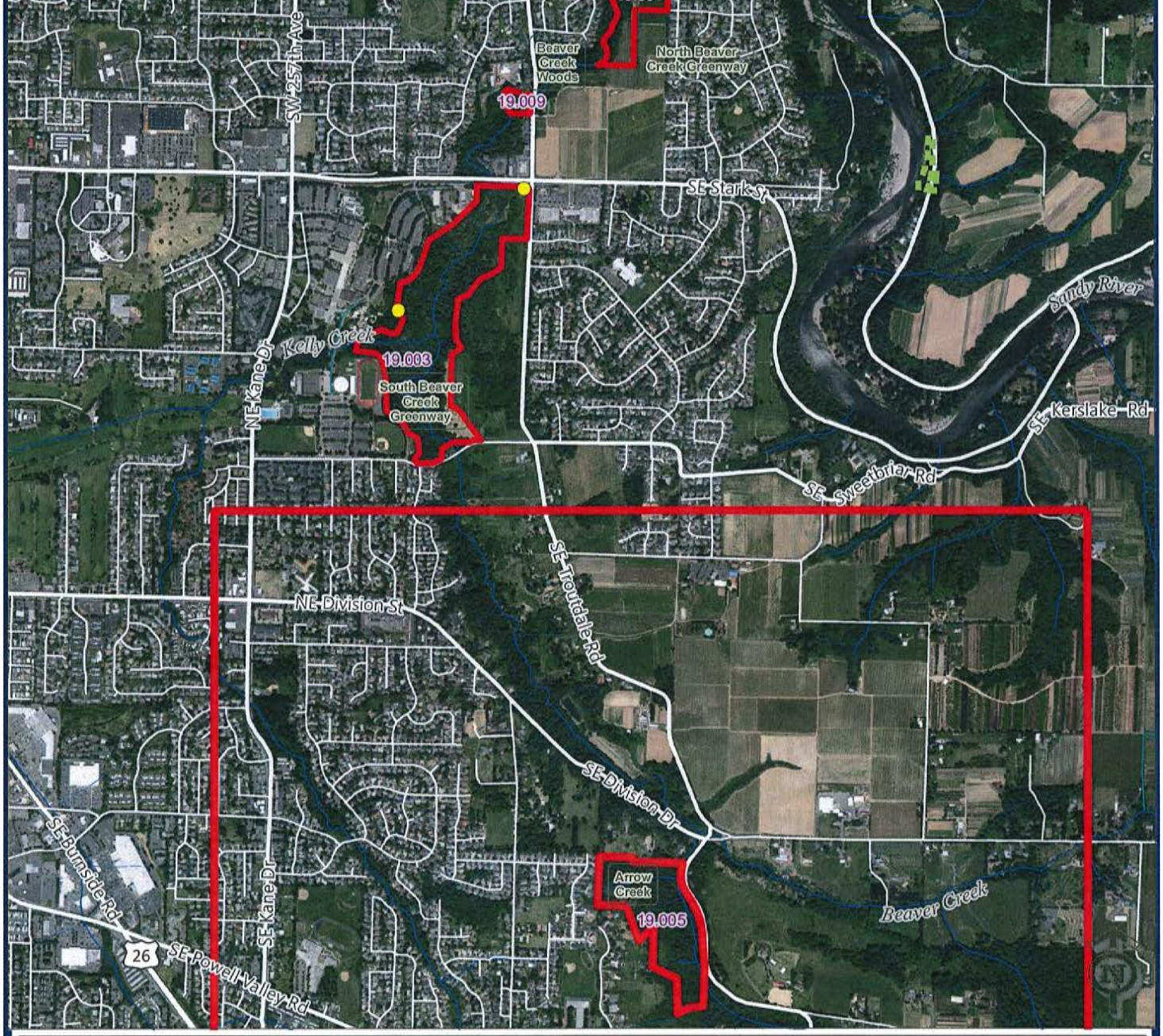
Vicinity Map



Beaver Creek Complex Site Conservation Plan

map date: 3/19/2014

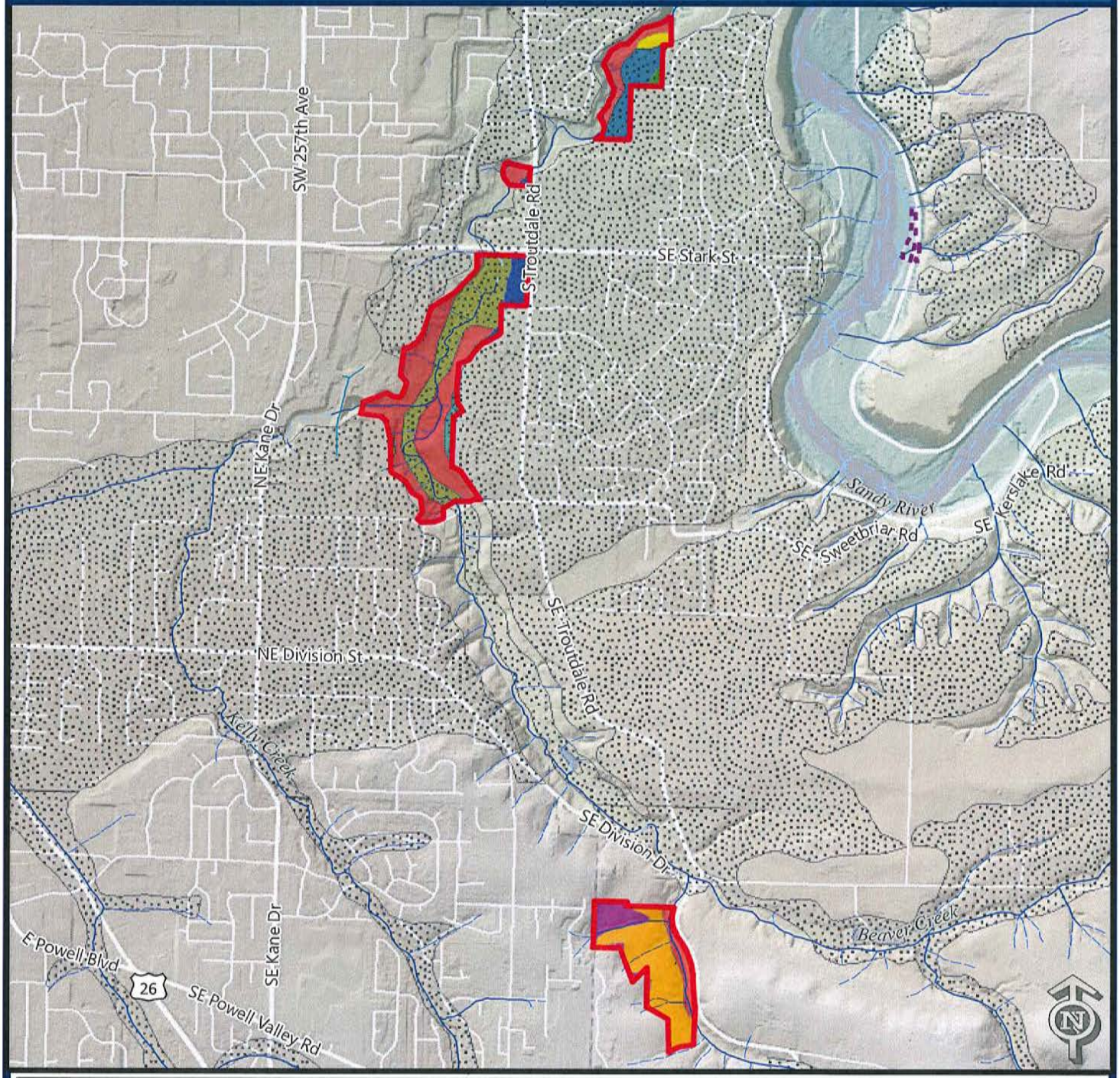
Site Map



Beaver Creek Complex Site Conservation Plan

map date: 7/10/2014

Soils



Beaver Creek sites
Other Metro sites
Hydric soils

Site soils

- Aloha silt loam, 0 to 3 percent slopes
- Aloha silt loam, 3 to 8 percent slopes
- Haplumbrepts, very steep
- Multnomah silt loam, 0 to 3 percent slopes
- Powell silt loam, 15 to 30 percent slopes
- Powell silt loam, 8 to 15 percent slopes
- Quatama loam, 3 to 8 percent slopes
- Urban land-Quatama complex, 8 to 15 percent slopes
- Wapato silt loam
- Wollent silt loam

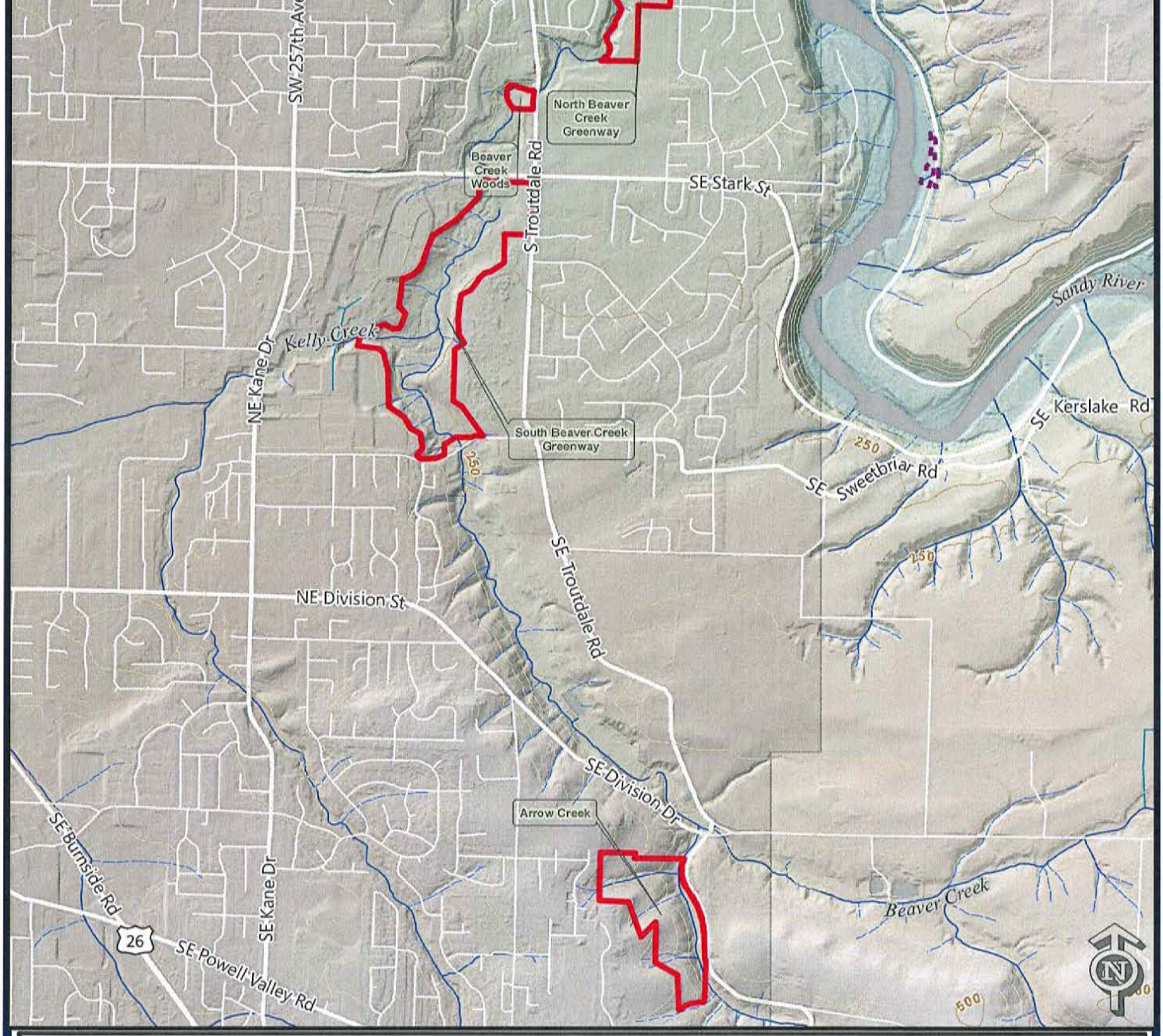
0 2,000 4,000 Feet

Metro

Beaver Creek Woods Site Conservation Plan

map date: 3/20/2014

Topography



Beaver Creek sites

Other Metro sites

NHD Flowlines

Intermittent stream

Perennial stream

Canal

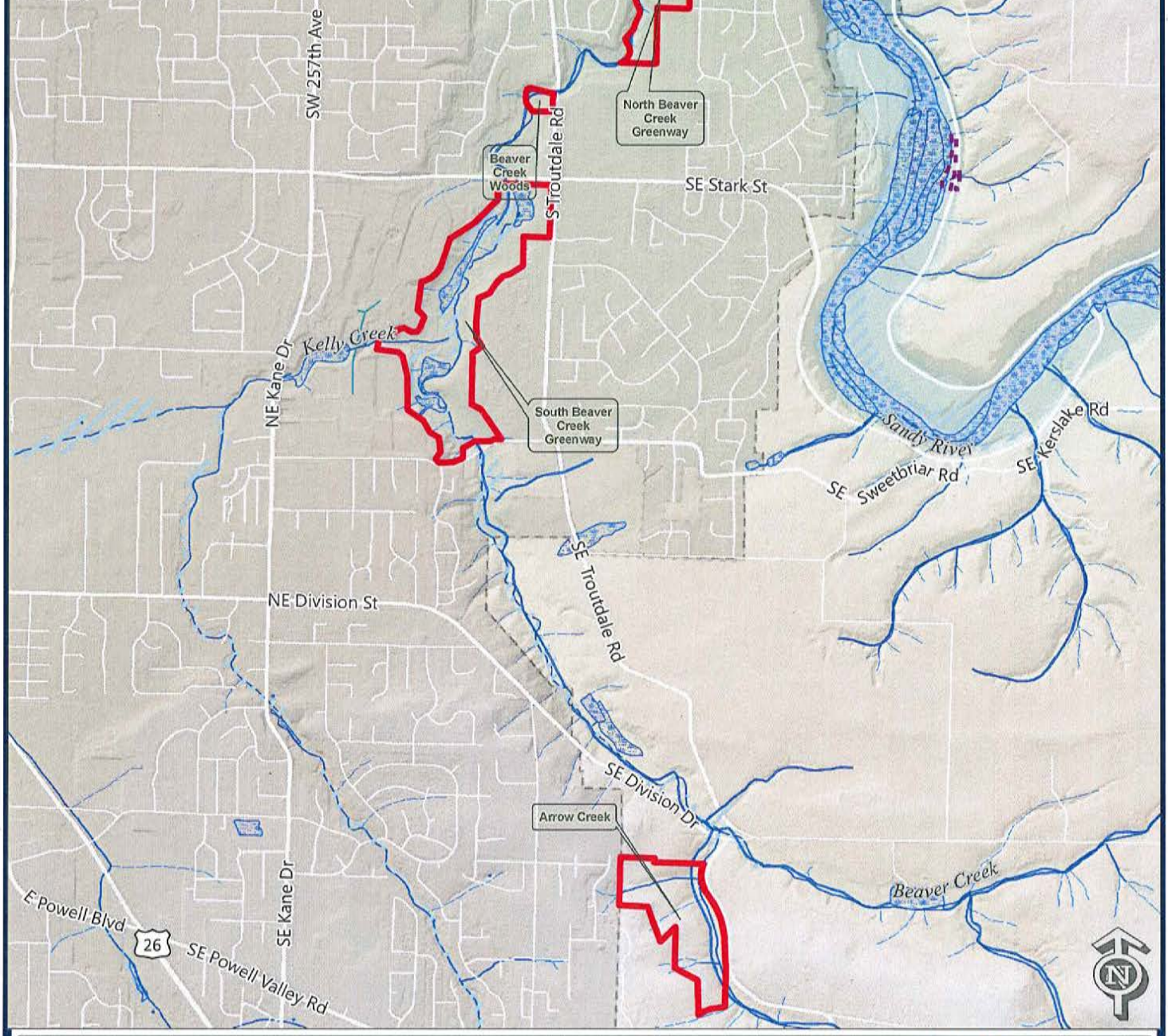
0 2,000 4,000 Feet

Metro

Beaver Creek Complex Site Conservation Plan

map date: 3/20/2014

Hydrology



Beaver Creek sites

Other Metro sites

Wetlands

100 year floodplain

NHD Flowlines

Intermittent stream

Perennial stream

Canal

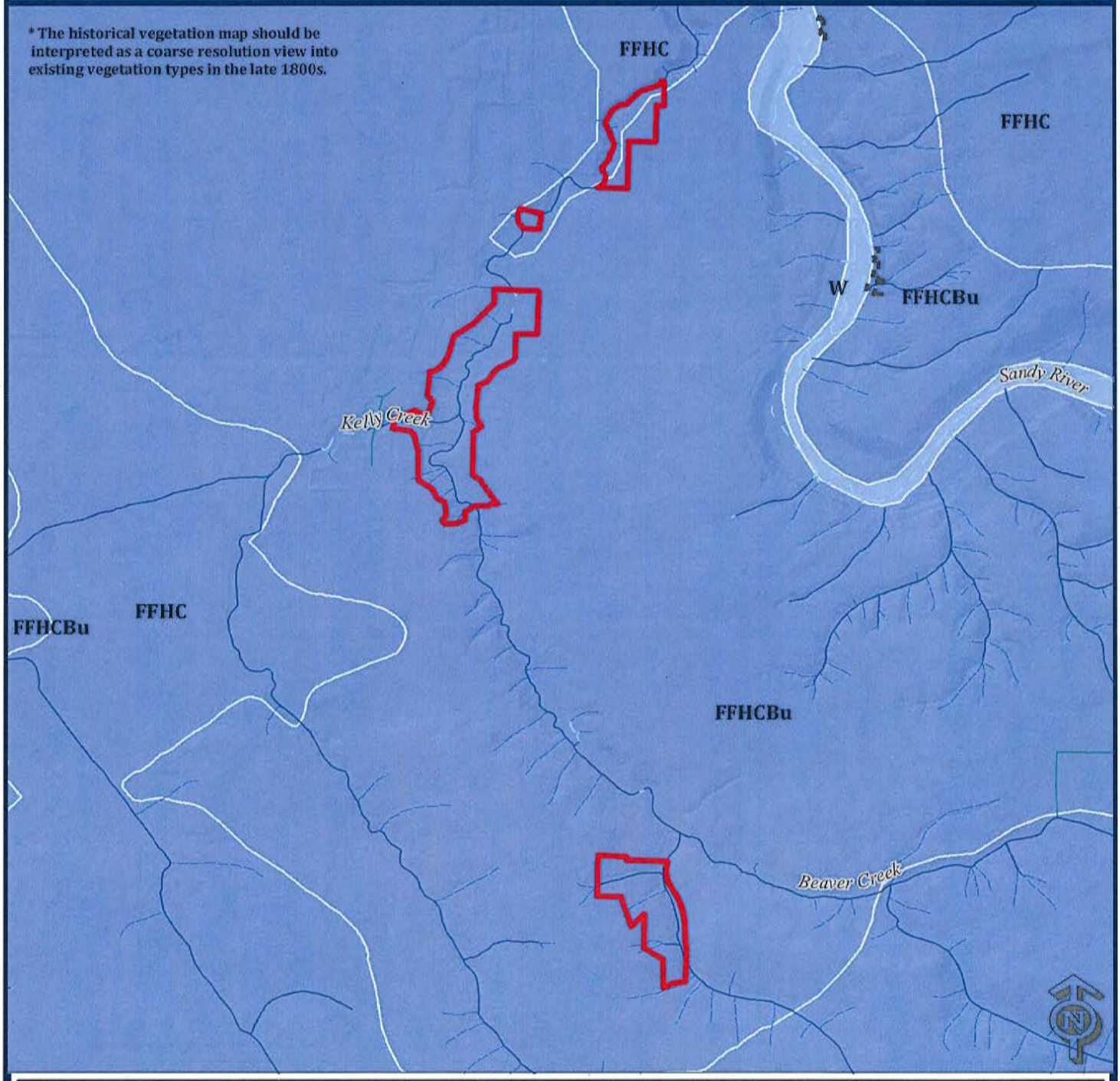
0 2,000 4,000 Feet

Metro

Beaver Creek Woods Site Conservation Plan

map date: 3/20/2014

Historical Vegetation (1851-1910)



Beaver Creek sites

Other Metro sites

Historical vegetation

Closed forest; Upland

Water

FFHC = Mesic mixed conifer forest with mostly deciduous understory. May include Douglas fir, western hemlock, red cedar, grand fir, bigleaf maple, yew, dogwood, white oak, red alder.

FFHCBu = FFHC, but burned, often with scattered trees surviving fire.

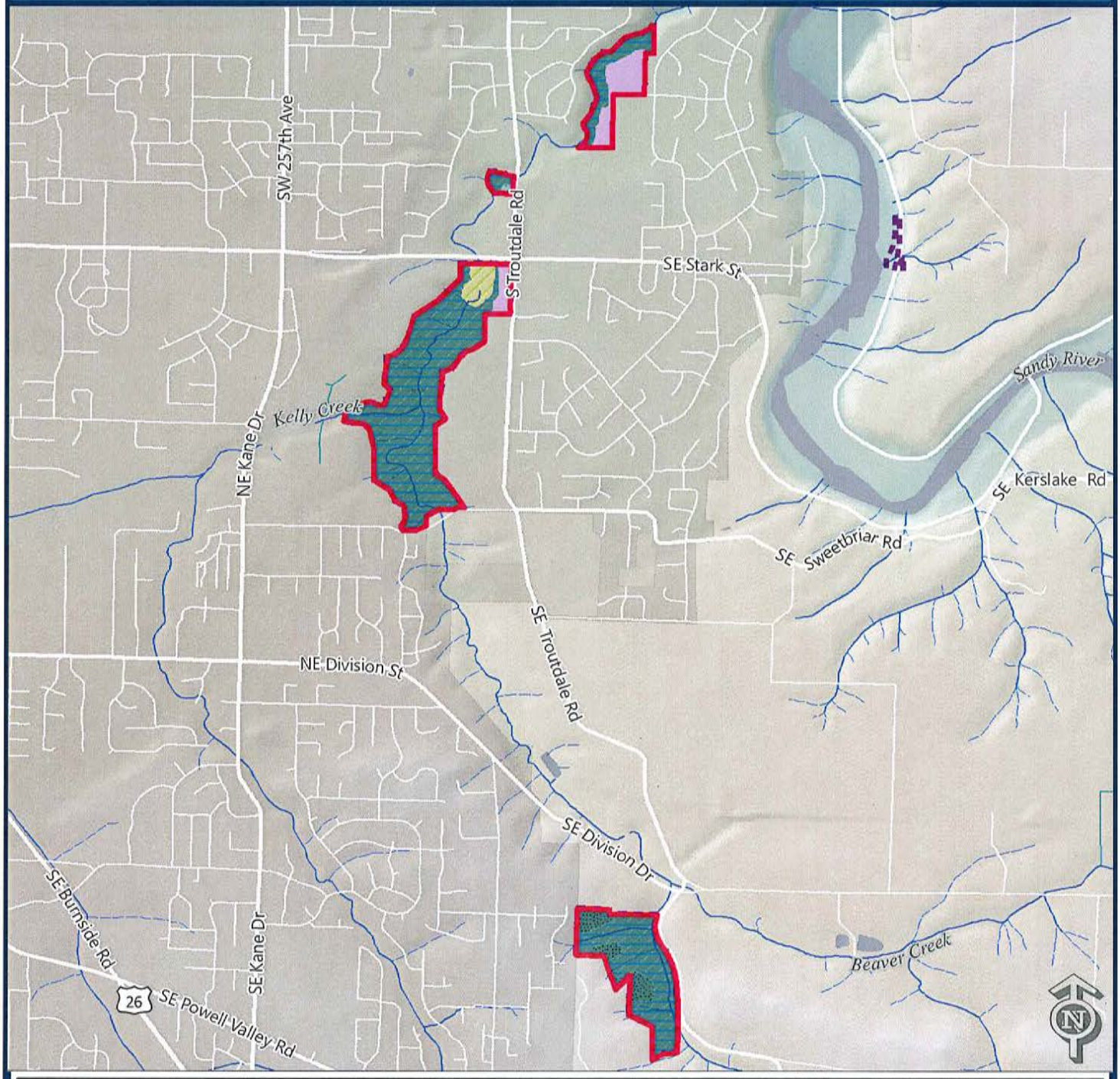
0 2,000 4,000 Feet

Metro

Beaver Creek Complex Site Conservation Plan

map date: 3/25/2014

Current Cover



Beaver Creek sites

Other Metro sites

Current cover

- Agriculture
- Riparian forest
- Upland forest - coniferous
- Upland forest - shrub (stage)
- Wetland - shrub

NHD Flowlines

- Intermittent stream
- Perennial stream
- Canal

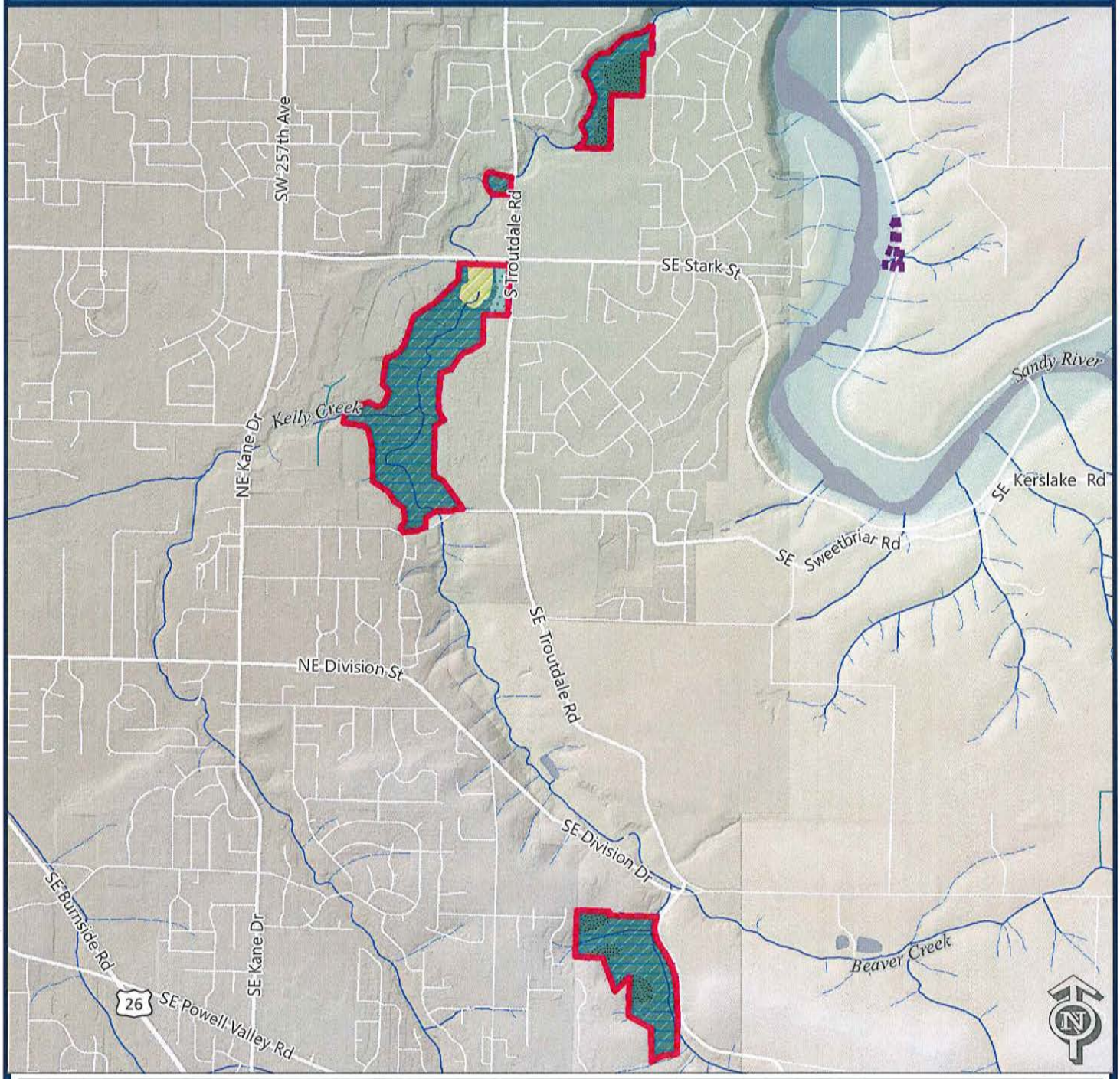
0 2,000 4,000 Feet

Metro

Beaver Creek Complex Site Conservation Plan

map date: 3/20/2014

Conservation Targets



Beaver Creek sites

Other Metro sites

Conservation targets

- Riparian forest
- Shrub dominated wetland
- Upland forest
- Upland forest - shrub (early successional)

NHD Flowlines

- Intermittent stream
- Perennial stream
- Canal

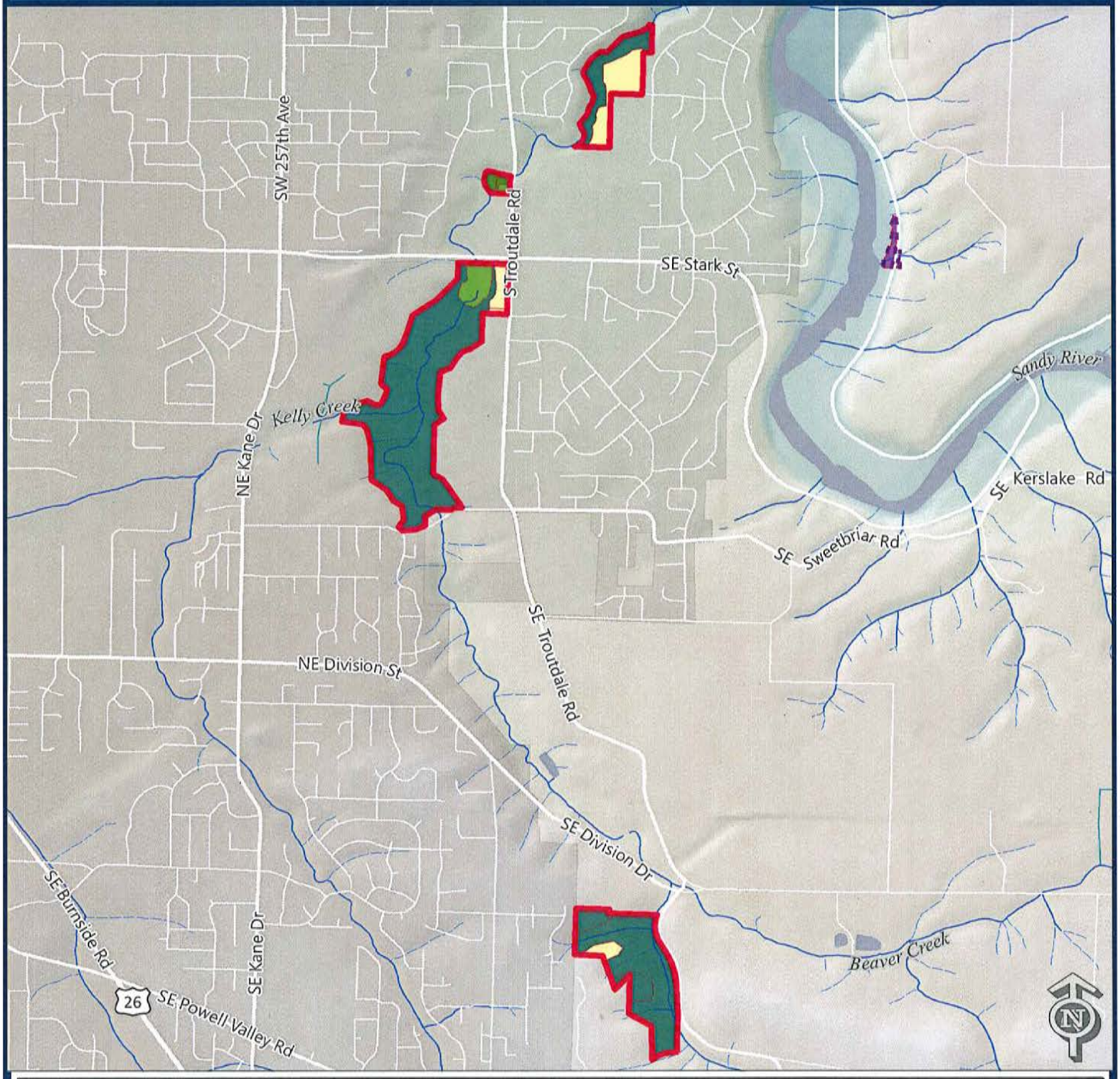
0 2,000 4,000 Feet

Metro

Beaver Creek Complex Site Conservation Plan

map date: 3/20/2014

Management Status



Beaver Creek sites

Other Metro sites

Management status

- Yet to be classified
- 0 - Pre-Initiation
- 2 - Establishment
- 3 - Consolidation
- 4 - Refinement and long-term maintenance

NHD Flowlines

- Intermittent stream
- Perennial stream
- Canal

0 2,000 4,000 Feet

Metro

Beaver Creek Complex Site Conservation Plan

map date: 3/20/2014