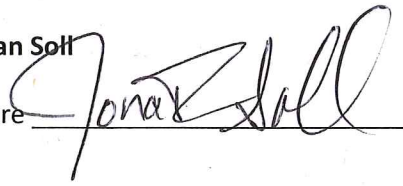
Killin Wetlands Natural Area

Approvals for Site Conservation Plan

Date first routed: 06-13-2014

Please return to Lori Hennings (Author: Curt Zonick)

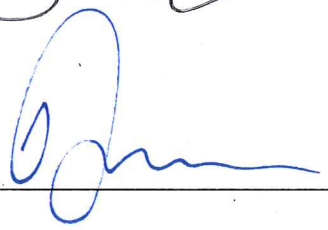
Jonathan Soll

Signature  Date 6/23/14

Dan Moeller

Signature  Date 6/17/14

Mark Davison

Signature  Date 6/20/14

Kathleen Brennan-Hunter

Signature _____ Date _____

SITE CONSERVATION PLAN

Killin Wetlands Natural Area



May 2014

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INTRODUCTION

The 590-acre Killin Wetlands site is the only site within the Killin Wetlands target area, located north of Hwy. 6 and west of the town of Banks, along the west fork of Dairy Creek, a tributary of the Tualatin River. The area surrounding Killin Wetlands contains a mixture of land uses including residential, timber management, commercial development and agriculture.

PLANNING AREA

Although the Killin Wetland's planning area is defined by the site's boundaries, i.e., Metro ownership, there are large expanses of privately and publicly owned properties nearby that share habitat, hydrologic or soil features with the wetlands, and influence its potential ecological viability and larger landscape value. These properties are important to the development of effective conservation strategies for Killin Wetlands, but detailed evaluations of their stewardship classification, targets, etc. are beyond the scope of this plan.

KEY STAFF

Curt Zonick, natural resource scientist
Rick Scrivens, natural resource technician
Katy Weil, wildlife monitoring coordinator/natural area maintenance manager
Tim Richard, parks and natural areas planner
Laurie Wulf, property manager
Tom Heinicke, real estate negotiator
Jenny High, Parks and Environmental Services

KEY PRIVATE LANDOWNERS

Duane Spiering
Tim Dierickx
John Bernard
Bruce and Sheila Harris

EXISTING PLANNING/HISTORICALLY-RELEVANT DOCUMENTS

Preserve Design Plan for Banks Swamp, a report prepared by John Christy for the Nature Conservancy, September 1991. The report described the larger site area from an ecological perspective, offering descriptions of the wetland's condition, management recommendations and a short list of threats to the site. The report is located at: M:\suscntr\Natural Areas and Parks\Regional Properties\Killin Wetlands TA\Planning\Killin SCMP 2012\Historical documents\TNC Preserve Plan for Banks Swamp.pdf

Botanical inventory of Moore property and observations on adjacent Killin Wetland, a 2012 report from John Christy of the Oregon Biodiversity Information Center on the eastern expansion to the site acquired in 2011, and observation on the larger wetlands. The report is located at: M:\suscntr\Natural Areas and Parks\Regional Properties\Killin Wetlands TA\Planning\Killin SCMP 2012\Historical documents\Christy 2012 Report.pdf

Notes on the Flora of Lake Labish Oregon, a short report by J.C. Nelson in 1918 on the vegetation occurring in the Lake Labish Wetlands. The report is located at: M:\suscntr\Natural Areas and Parks\Regional Properties\Killin Wetlands TA\Planning\Killin SCMP 2012\Historical documents\Lake Labish 1918 Veg.pdf

SITE DESCRIPTION

The primary access points for the Killin Wetlands are along Hwy. 6 and Cedar Canyon Road (see vicinity and site maps). The site lies in a narrow floodplain depression that receives runoff from an encompassing perimeter of partially-forested uplands. Beaver activity at the site is abundant, and their influence on the site has helped create a large, perennially-flooded wetland that has developed a deep, high organic/peat soil layer over centuries of flooding. Cedar Canyon Creek is the primary tributary to Dairy Creek that passes through the heart of the wetlands and receives water upstream from Sadd Creek and Park Farms Creek (See hydrology map). Historically, Cedar Canyon Creek was heavily impeded by beavers and sediment accretion, forming the wetlands. The site was markedly dewatered in the late 1800s. From ~1870 to 2000, creeks at the site were ditched and periodically dredged to support cultivation and grazing. Most of the agricultural practices at the site stopped in the lower floodplain during the mid-1990s, a few years prior to Metro acquisition. Cultivation of the upland fields and in the floodplain at the recently acquired eastern addition continues via agricultural leases under Metro management. Metro has taken no steps to alter the hydrology of the site (other than to occasionally remove a beaver dam), due to the effects such actions would have on neighboring landowners' fields.

The site's wetlands are largely underlain with Labish soils, with areas of Wapato soil on the higher western regions of the wetlands (see Table 1 and soils map). The site's upper wetland soil layer, comprised largely of peat, was severely damaged when it was dewatered and exposed to air for such a long period of time while the site was being grazed. The surface layer of the thick Labish soil area, underlaying much of the site's emergent and aquatic wetland habitat, subsided by 1-2 meters when they were drained, because the organic soils oxidized. This essentially converted the heart of the wetlands from a shallow shrub wetland swamp (as described in the 1850 General Land Office surveys) to a deeper lakebed. Native shrubs that once thrived are now losing a struggle to adapt to these new hydrologic conditions. The full recovery of the wetlands will happen only after the organic soil layer has re-accumulated, which may take decades, or even centuries.

Table 1: Soils present at Killin Wetlands

MAP SOIL SYMBOL	MAP UNIT NAME	DESCRIPTION
27	Labish mucky clay	Poorly drained soils that form in mixed alluvial or lacustrine material that is high in organic matter and is stratified with lenses of peat or muck. Where these soils are not cultivated, the vegetation is sedges, willow and cottonwood.
43	Wapato silty clay loam	Poorly drained soils that formed in recent alluvium on floodplains. Where these soils are not cultivated, the vegetation is ash, willow, rushes and grass.
11	Cornelius and Kinton silt loams	Moderately well drained soils that formed in loesslike material over fine-silty, old alluvium of mixed origin on uplands. Where these soils are not cultivated, the vegetation is Douglas-fir, bigleaf maple, shrubs and grasses.
28	Laurelwood silt loam	Well-drained soils that formed in silty, eolian material overlaying fine textured materials on uplands. Where these soils are not cultivated, the vegetation is Douglas-fir, bigleaf maple, Oregon grape and hazelbrush.

Based on maps and descriptions from the 1850s General Land Office surveys, the site was a mix of shrub and herbaceous dominated swamp in the lower wetlands and mixed coniferous and deciduous forest on higher ground (Table 2). These habitat descriptions mimic what was present in less-disturbed areas of the site when Metro acquired the tract. The 1918 botanic description of Lake Labish by J.C. Nelson, referenced above, gives further insight into the possible vegetative composition of the pre-settlement swamp. The site is described as having been heavily influenced by beaver and their dams.

Table 2: Historic habitats at Killin Wetlands

~ % COVER	HABITAT TYPE	HISTORIC HABITAT DESCRIPTION BY GLO SURVEYOR NOTES
75%	Closed forest: riparian and wetland	Ash-alder-willow swamp, sometimes with bigleaf maple. Often with vine maple, ninebark, hardhack, cattails and coarse gr. Ground very soft, mirey or muddy, usually with extensive beaver d.
25%	Closed forest; upland	Douglas fir forest, often with bigleaf maple, grand fir, dogwood, hazel, yew. No other conifers present. No oak.

RECENT MANAGEMENT HISTORY

The Wetlands have been managed largely via protection via acquisition and localized restoration in the western portion of the site. As described above, hydrology has not been altered at the site, due to likely flood impacts to adjacent neighbors. The wetlands just east of Killin Road and just south of Cedar Canyon Road near Killin Road have been managed via a focused site-preparation regime involving mowing, spraying, disking and reseeding with native grasses in the early 2000s to prepare for native shrub and riparian forest revegetation. Near perennial flooding in that project area limited the extent of revegetation, and presents a challenge for future efforts to suppress reed canarygrass, which is by far the most prominent and deleterious non-native species, and reestablish native trees and shrubs.

The upland habitat flanking these western wetlands has also been managed to suppress non-native blackberry and pasture grasses, and replant native woody vegetation including Douglas fir, Western redcedar, Oregon ash, Pacific ninebark, Oregon grape, snowberry and other native trees and shrubs.

The upland fields northeast of the wetlands are actively farmed through annual easements with a local farmer.

ACCESS AND RECREATION

Primary access points to Killin Wetlands are along Hwy. 6 and Cedar Canyon Road. Cedar Canyon Road bisects the western portion of the natural area. Graham Road is gravel surfaced and provides access to the upper portions of the site. Two existing driveways provide access to the rental house, barn and miscellaneous outbuildings. Several access driveways also exist along Cedar Canyon Road.

There is currently no formal public access at Killin Wetlands. Bird watching is popular at Killin Wetlands, providing opportunities for viewing several rare bird species. Currently, visitors park on the shoulder at the intersection of Killin and Cedar Creek roads and set up viewing scopes along the shoulder of Cedar Creek Road, creating an unsafe condition.

NATURAL RESOURCES OF SPECIAL INTEREST

The Killin Wetlands are rich in native wildlife. Ducks and other waterfowl are abundant and the emergent and perennial wetlands provide breeding habitat to hundreds of state sensitive northern red-legged frogs as well as other pond breeding amphibians. The flanking shrub wetlands and bottomland forests provide habitat for many native bird species including the declining willow flycatcher, and the site's emergent wetlands host several species of shorebirds and wading birds. The site is well known and often visited by bird-watchers for its rail and bittern populations. Bald eagles have regularly nested at the site. The site likely provides valuable rearing habitat for cutthroat trout and other juvenile salmonids. Nutria and bullfrogs are among the most abundant non-native animal species.

The vegetation at the wetlands is diverse, but not fully characterized. Historically, the plant communities at a small collection of Willamette Valley peat-laden wetlands including Killin Wetlands, Lake Labish and Wapato Lake supported several typically montane or coastal plant species that are otherwise not found in other parts of the Willamette Valley, such as Geyer willow (*Salix geyeriana*), bogbean (*Menyanthes trifoliata,* Oregon bentgrass *(Agrostis oregonensis)* and narrowleaf cattail *(Typha augustifolia).* Because Lake Labish and Wapato Lake were heavily developed for agriculture and other purposes, Killin Wetlands persists as perhaps the last relatively unaltered remnant of these wetlands. Geyer willow (*Salix geyeriana*) is one of the regionally uncommon species still occurring at the site. Geyer willow is now almost completely absent in the rest of the Willamette Valley.

Table 3: Rare species known to occur at Killin Wetlands

	ORBIC LIST	FEDERAL STATUS	URBANIZING FLORA (2009)
Carex amplifolia			Rare
Juncus nevadensis			Rare
Salix geyeriana			Rare
Rana aurora aurora			State Sensitive
Empidonax trailii			State Sensitive
Actinemys marmorata	Imperiled		

CONSERVATION TARGETS

The conservation targets for Killin Wetlands are:

1. Upland forest
2. Shrub wetlands
3. Emergent wetlands – open water
4. Riparian forest

CURRENT AND DESIRED FUTURE CONDITION OF CONSERVATION TARGETS

Table 4: Non-technical status and desired future condition of targets

TARGET	CURRENT CONDITION	DESIRED FUTURE CONDITION
Emergent wetlands – open water	One of two dominant habitats at the site, the emergent wetland, aquatic wetland, open water spectrum is evident throughout most of the central core of the site's large swamp. Water levels fluctuate with beaver dam activity, changing the boundaries of these habitats by controlling how much of the swamp is emergent and vegetated. The wetlands provide important habitat to many of the site's less common species.	Full recovery of the emergent and aquatic wetlands at the site is challenged by incomplete ownership of the larger wetland complex, and the damage resulting from decades of artificial dewatering from previous farming and rangeland practices. Measures to thoughtfully nurture the rebuilding of the organic soil layer are planned. The future emergent wetland will flourish in a more shallow slough once the organic soils have re-accumulated.
Shrub wetlands	This habitat represents most of the higher (drier) wetland areas on the site's west side, as well as the fringe of the large swamp. The western shrub wetlands are relatively recently re-established via restorative revegetation after suppressing the dense reed canarygrass community that had established after grazing was discontinued from these artificially-dewatered floodplain acres. The shrub community in the larger swamp is similarly recovering from a major shift in hydrology after ditch dredging was discontinued by the previous landowner in the early 1990s.	The shrub community is an important habitat component of the site, providing habitat to many important species (beaver, flycatchers), and also competing well, once established, with reed canarygrass cover in areas of the wetland where persistent spring flooding is not deep enough to suppress canarygrass. Whereas Metro management can go a long way toward enhancing the shrub cover in higher portions of the site, and this should be a desired condition in those areas, the larger swamp may take decades to recover from artificial dewatering and re-flooding, delaying the recovery of the shrub wetlands in the swamp.
Upland closed forest (ac.)	Generally very good habitat structure throughout most of the established forest habitat inherited when the site was acquired. Mature conifer and deciduous trees provide a dense mixed canopy suppressing non-natives but supporting a dense, diverse native understory community.	In the near future, the forest should be expanded into the adjacent agricultural fields to eliminate forest edge weed populations and expand and connect some of the forest fragments at the site.
Riparian forest	Generally good condition, although existing as a relatively narrow band on the northeastern edge of the site.	Opportunities to enhance stream canopy cover/shading, % native vegetation cover, and improve instream structure are likely present. Further investigation and planning necessary before associated project can be implemented.

Table 5a: Key ecological attributes for shrub wetlands

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Native shrub richness	Number of native shrub species per acre	<2 species	3-4 species	4-5 species	>6 species	TBD	Very Good		Currently using species list from McCain and Christy 2005, Technical Paper R6-NR-ECOL-TP-01-05.
Condition	Vegetative structure: shrub layer	Percent native shrub canopy cover	<30% cover or >80% cover	30-50% cover	50-70% cover	70-80% cover	TBD	Fair to Very Good	Fair to Very Good	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

Table 5b: Key ecological attributes for emergent wetlands

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Native wetland plant cover in emergent area	Dominance of native herbaceous plants characteristic of the region's wetlands	<25% cover of vegetated areas	25-50% cover of vegetated areas	50-75% cover of vegetated areas	>75% cover of vegetated areas	TBD	Fair	Good	Estimate based on site walk. Based on page 44 in the Division of State Lands HGM-based assessment guidebook (Adamus and Field 2001).
Condition	Hydrology	Hydroperiod	Both the filling/inundation and drawdown/drying of the site deviate from natural conditions (either increased or decreased magnitude and/or duration)	Site's filling or inundation patterns are characterized by natural conditions, but thereafter are subject to more rapid/extreme drawdown or drying compared to more natural wetlands. OR Patterns are of substantially lower magnitude or duration than under natural conditions, but thereafter site is subject to natural drawdown or drying.	The filling or inundation patterns in the site are of greater magnitude (and greater or lesser duration than would be expected under natural conditions, but thereafter, the site is subject to natural drawdown or drying.	Hydroperiod of the site is characterized by natural patterns of filling or inundation and drying or drawdown.	TBD	Good	Very Good	From WDNR's *Ecological Integrity Assessment: Temperate Pacific Freshwater Emergent Marsh* (Rocchio 2011).

*Desired future condition.

**Some bare ground/mudflat area is important to native turtles, ground-nesting bees and some grassland birds. Evaluate on a site-by-site basis for species' needs.

Table 5c: Key ecological attributes for upland forest

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)	TBD (likely Good)	Good	Very Good	Estimate overall via site walk. Native wildlife species diversity is associated with native vegetation. A diversity of shrubs is more likely to provide food and shelter for species over the seasons. Shrub diversity is particularly important to pollinators and songbirds. (Hagar 2003; Hennings 2006; Burghardt et al. 2009).

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	TBD (likely Good)	Good or 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.

*Desired future condition

Table 5d: Key ecological attributes for riparian forest (streams or rivers)

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ---------- POOR	FAIR	GOOD	VERY GOOD	CURRENT RATING	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
Condition	Vegetative structure: tree layer	% native tree canopy cover	<20% cover	20-30% cover	30-40% cover	40% or more	TBD (likely Fair)	Very Good	Very Good	Estimate via site walk. Based on data from local study at 54 riparian study sites. In these sites, the best mix of native tree and shrub cover occurred when both were in the 40-60% range. Tree cover tended to support healthy shrub communities and helped control European starlings. Note that some species, such as yellow-breasted chat, rely on native shrub habitat rather than forest; therefore, if specific species are involved separate KEAs should be developed. (Hennings 2001)
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	TBD (likely Poor)	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. Puget Sound studies suggest that fragmentation of upland vegetation and the total amount of riparian vegetation explain the greatest amount of variation in aquatic conditions. Studies document that some birds and small mammals are unwilling to cross vegetation gaps, with the most typical threshold being 50 m (164 ft). (Hennings and Soll 2010).

*Desired future condition

** This KEA may not be appropriate where native turtles are present, because nesting turtles require some open habitat. Patches of bare ground may accommodate turtles and are important to native ground-nesting bees.

THREATS TO CONSERVATION TARGETS AT THE KILLIN WETLANDS

The Killin Wetlands are primarily threatened by several of the factors that typically degrade wetlands, including habitat loss due to artificial dewatering, encroachment by invasive, non-native species (plant and animal), and degraded water quality. The fact that the majority of the wetland is now under protective management reduces these threats, to some extent. The site is bordered to the south by a rural highway, which will pose a threat to the wetlands in the form of contaminated runoff. Given the highway's narrow road prism, and steep banks, little can be done to abate this threat. Over the long term, agriculture poses a threat to the wetlands in the form of chemical and sediment being transported from the flanking uplands into the wetlands. Some of the major threats to the site are summarized in the following table.

CONSERVATION TARGET	STRESS (DEGRADED KEA)	SEVERITY	SCOPE	OVERALL STRESS RANK	SOURCE (THREAT)	CONTRIBUTION	IRREVERSIBILITY	OVERALL SOURCE RANK	OVERALL THREAT RANK	COMMENTS
Emergent wetlands	Hydrology and vegetation structure	Very High	High	Very High	Degraded organic soil layer	Very High	High	Very High	Very High	The land management practices creating this threat have been discontinued, but recovery will likely be a very protracted process.
Shrub wetlands	Hydrology and vegetation structure	Very High	High	Very High	Degraded organic soil layer	Very High	High	Very High	Very High	The artificially increased depth of the wetlands is threatening the Geyer and native willow population, and the broader shrub wetland community in general.
Upland forest	Vegetation structure	Low	Low	Low	Non-native vegetation	Low	Low	Low	Low	
Riparian vegetation	Canopy cover and continuity	High	Moderate	High	Fragmentation	High	Moderate	High	High	Restoration options limited by ownership

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 attributes 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, drier 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.

NATURAL RESOURCE STRATEGIES

Table 6: List of proposed strategies

STRATEGY	SOURCES OF STRESS IT ADDRESSES	FOCAL CONSERVATION TARGETS/KEAS AFFECTED	WHY IS IT IMPORTANT AND ANY TIMING ISSUES	MEASURE(S) OF SUCCESS	RANK
Treat to suppress targeted exotic plants, especially reed canarygrass and *Rubus armeniacus*	Competition from exotic plants	Emergent wetlands: Native wetland plant cover in emergent area Upland forest: % native tree and shrub canopy cover (combined) Upland shrub: % native shrub canopy cover	Periodic treatments of certain exotics are essential to avoid losing native plants. Canarygrass and blackberry are major competitors with native plants for cover and resources.	Establish and maintain KEA rating of Good	High
Identify and seek to implement "correct" hydrologic regime in the wetlands	Agricultural dewatering and loss of willow to support beaver dams that play a key role in maintaining seasonal flooding	Hydrology	Hydrology is the key factor supporting the recovery of the swamp vegetation and organic soil layer.		High
Collect and preserve remaining genetic diversity of Geyer willow, and any other rare plant species that appear threatened	Loss of rare genetic heritage from this isolated population due to hydrologic stress and disease	Shrub diversity	Geyer is all but non-existent elsewhere in the Willamette Valley. Killin is the last remnant of a once broader Valley population (Wapato Lake, Lake Labish, etc.)		High

STRATEGY	SOURCES OF STRESS IT ADDRESSES	FOCAL CONSERVATION TARGETS/KEAS AFFECTED	WHY IS IT IMPORTANT AND ANY TIMING ISSUES	MEASURE(S) OF SUCCESS	RANK
Property acquisition	Habitat Fragmentation and hydrology	All targets, but especially emergent and shrub wetlands	Hydrologic enhancements are limited by incomplete ownership of the floodplain.		High

Strategy ranking:
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

SPECIFIC ACTIONS AND FUNDING REQUIREMENTS

Table 7: Specific actions to implement strategies

STRATEGY	TARGET	PRIORITY (HOW SOON)	SPECIFIC TASKS	ESTIMATED COST
Promote regeneration of the native vegetation and organic soil layer in the larger swamp	Emergent wetlands and shrub wetlands	High (next 1-3 years and ongoing)	Map beaver dams, evaluate options to manipulate water levels and refine and implement strategies to partially lower water levels to provide short-term access to areas of the swamp that are dominated by reed canarygrass to allow suppression and woody shrub planting. This will promote better habitat cover and accelerate swamp bottom regeneration.	$50,000 - $100,000
Release recent native plantings from weed competition	Shrub wetlands	High (next 1-5 years)	Combination mow and spot spray.	$10,000 - $20,000
Advance revegetation of the slope below the barn	Upland forest	High (ASAP)	Sweep upland forest unit habitat to treat exotics and interplant to cover bare areas.	$10,000-$20,000
Preserve Geyer willow population	Shrub wetlands	High (next 1-3 years)	Seed collection and live cutting, coordinated with native nursery outgrowth for use at Killin and other peat soil sites.	$10,000
Revegetate the upland ag fields	Upland forest and woodland	Low-Moderate (next 10 years)	Plant native trees and shrubs to reforest the active ag lands. This should advance at some point, given the proximity of these fields to the wetlands, and the benefits to be realized from improved water quality and higher organic material recruitment into the regenerating wetlands.	$200,000
Evaluate opportunities to relocate pond turtles and promote turtle breeding habitat conditions at the site	Swamp and flanking uplands	Moderate (next 5-10 years)	The perennial wetlands are present at the site, and western pond turtles have been seen. Breeding habitat enhancement (strategic mowing, brush clearing, soil amendments) is likely the key feature that could be enhanced for turtle occupation. Otherwise, the site's isolation may be the only thing limiting its use as a turtle haven.	$20,000

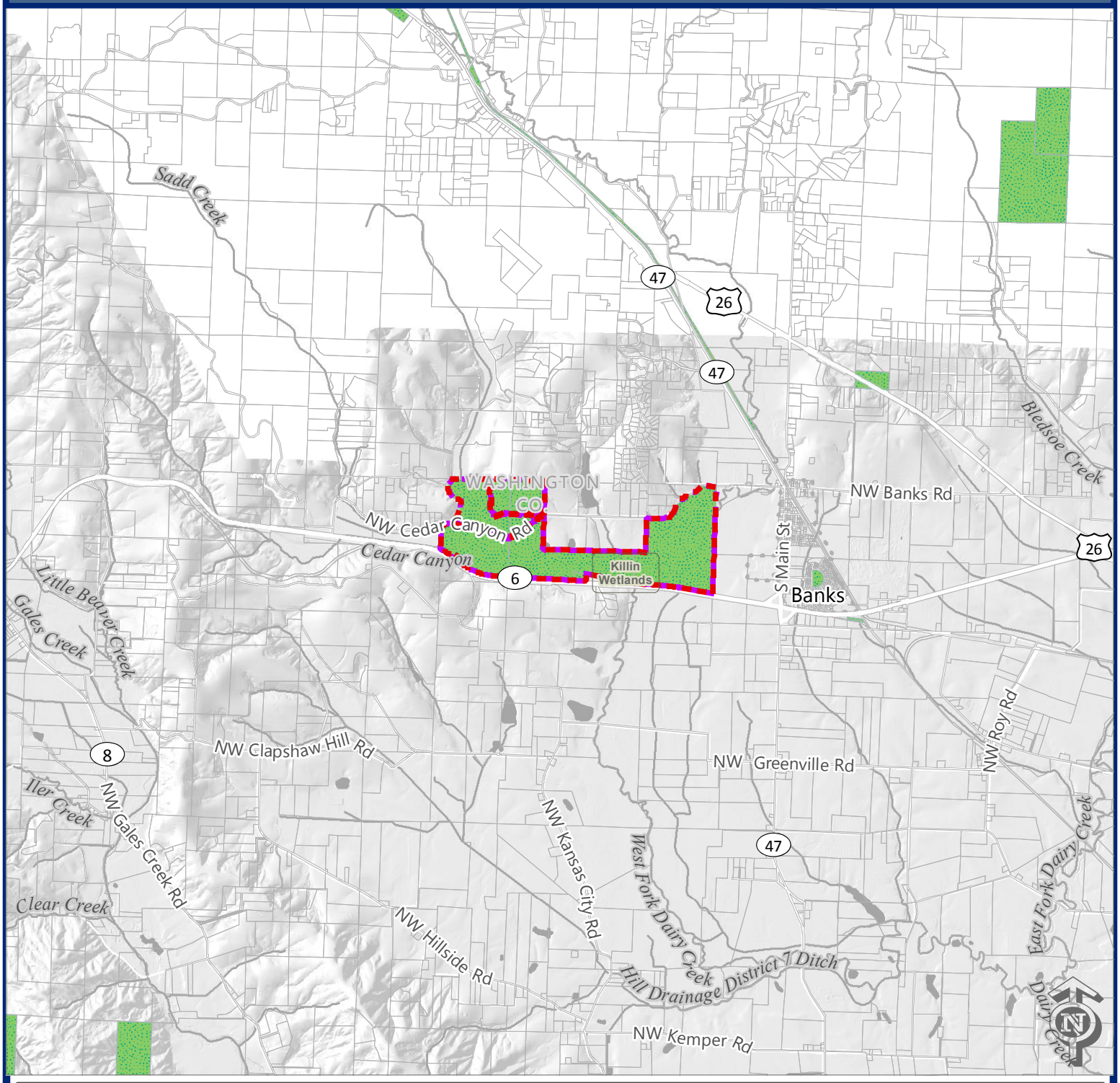
MONITORING PLAN

In addition to periodic botanic surveys at the site, pond-breeding amphibians and breeding birds have been a focus of volunteer-mediated and professional monitoring/research. In particular, northern red-legged frogs and willow flycatchers have been a focus of monitoring and recovery efforts. The site seems to have great potential for turtle populations, and a single western pond turtle was spotted at the site during the last decade (Zonick, personal observation).

PARTNERS

- Tualatin Riverkeepers
- The Wetlands Conservancy
- Banks High School
- Pacific University
- Clean Water Services
- Ducks Unlimited
- Natural Resources Conservation Service
- Oregon Watershed Enhancement Board
- National Oceanic and Atmospheric Administration
- Oregon Department of Fish & Wildlife

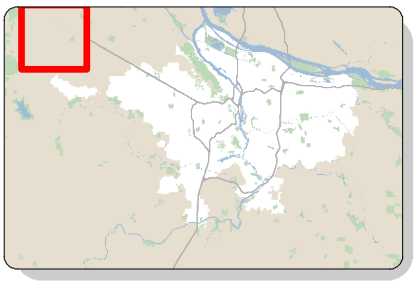
Vicinity Map



Killin Wetlands site

Other Metro sites

Park and/or natural area



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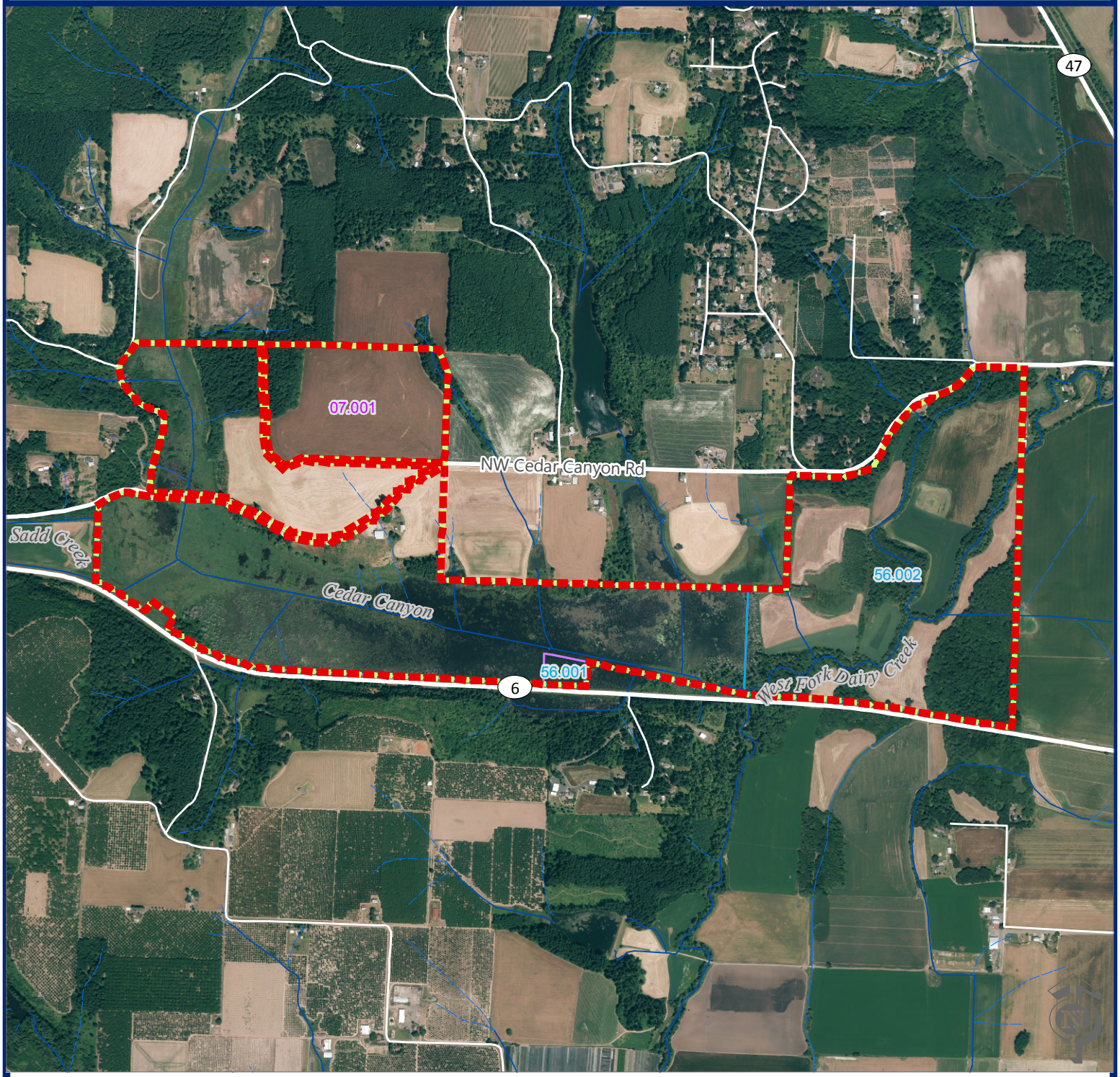
Killin Wetlands Site Conservation Plan

map date: 2/21/2014

Site Map



Killin Wetlands site

Other Metro sites

Bond Measure

1995 Bond Measure

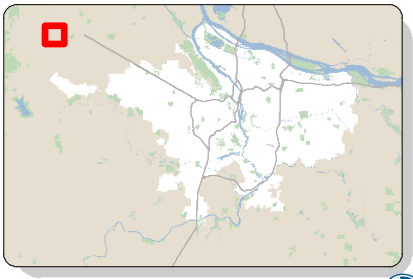
2006 Bond Measure

0 2,000 4,000 Feet

NHD Flowlines

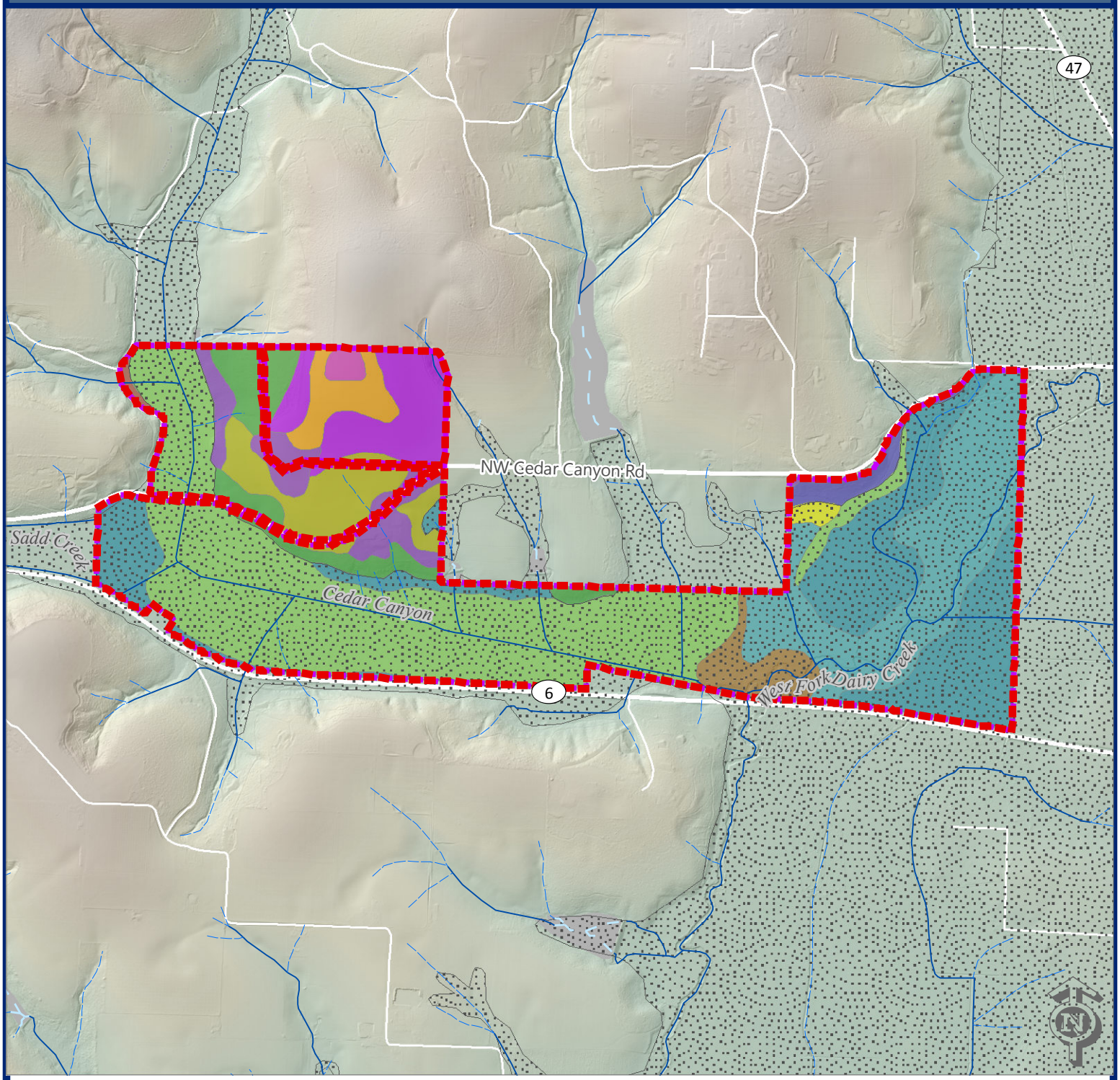
Intermittent stream

Perennial stream



Metro

Soils



Killin Wetlands site
Other Metro sites
Hydric soils

NRCS soils

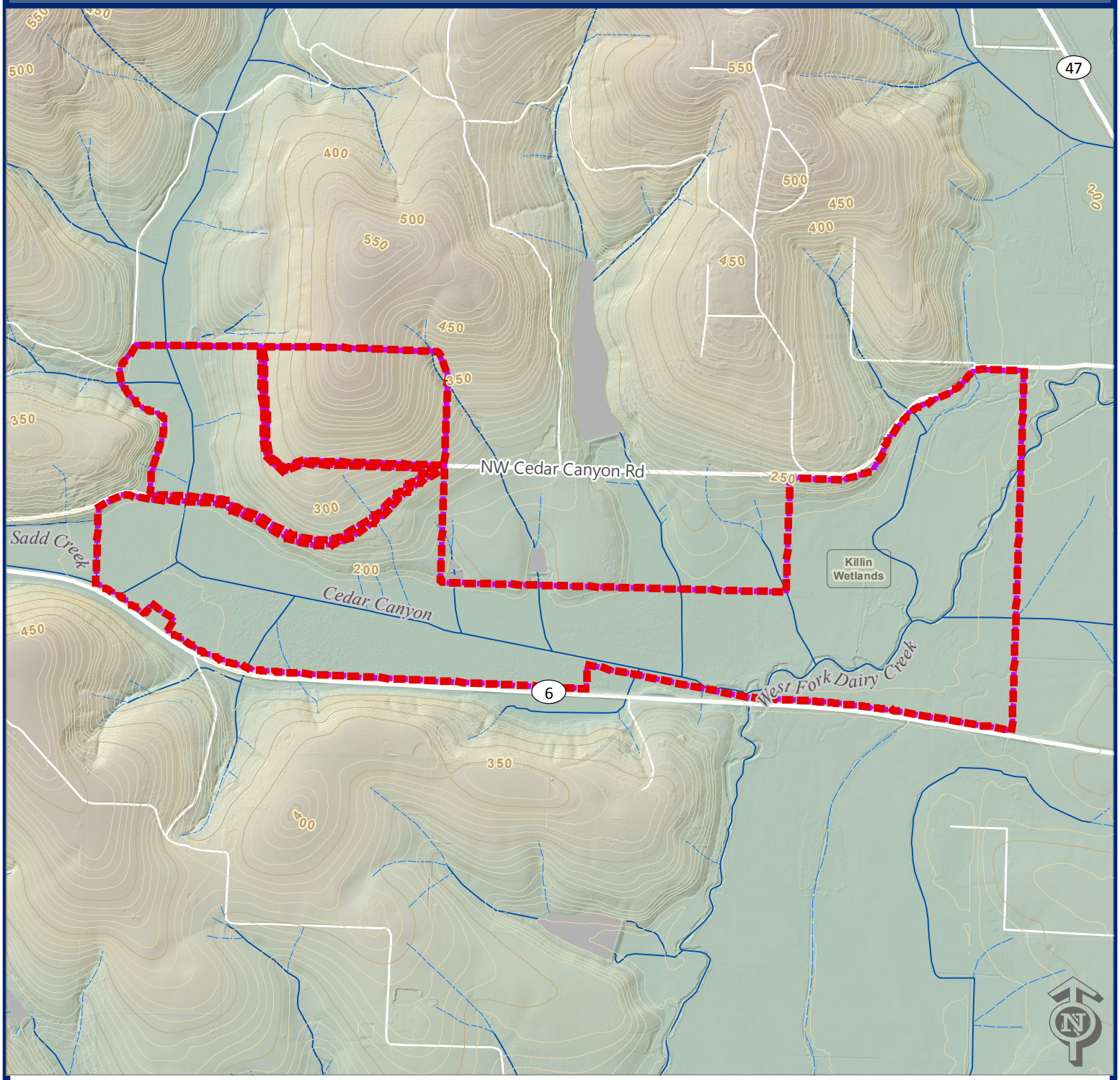
- Chehalis silty clay loam, occasional overflow
- Cornelius and Kinton silt loams, 12 to 20 percent slopes
- Cornelius and Kinton silt loams, 2 to 7 percent slopes
- Cornelius and Kinton silt loams, 20 to 30 percent slopes
- Cornelius and Kinton silt loams, 7 to 12 percent slopes
- Cove silty clay loam
- Helvetia silt loam, 12 to 20 percent slopes
- Helvetia silt loam, 20 to 30 percent slopes
- Jory silty clay loam, 30 to 60 percent slopes
- Labish mucky clay
- Laurelwood silt loam, 12 to 20 percent slopes
- Laurelwood silt loam, 3 to 7 percent slopes
- Laurelwood silt loam, 7 to 12 percent slopes
- McBee silty clay loam
- Wapato silty clay loam
- Water

0 2,000 4,000 Feet

Metro

map date: 2/21/2014

Topography



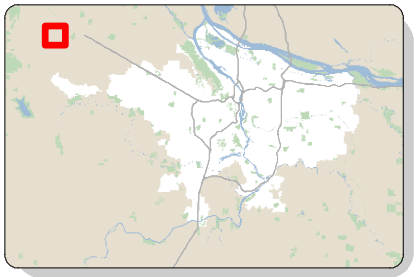
Killin Wetlands site

Other Metro sites

NHD Flowlines

Intermittent stream

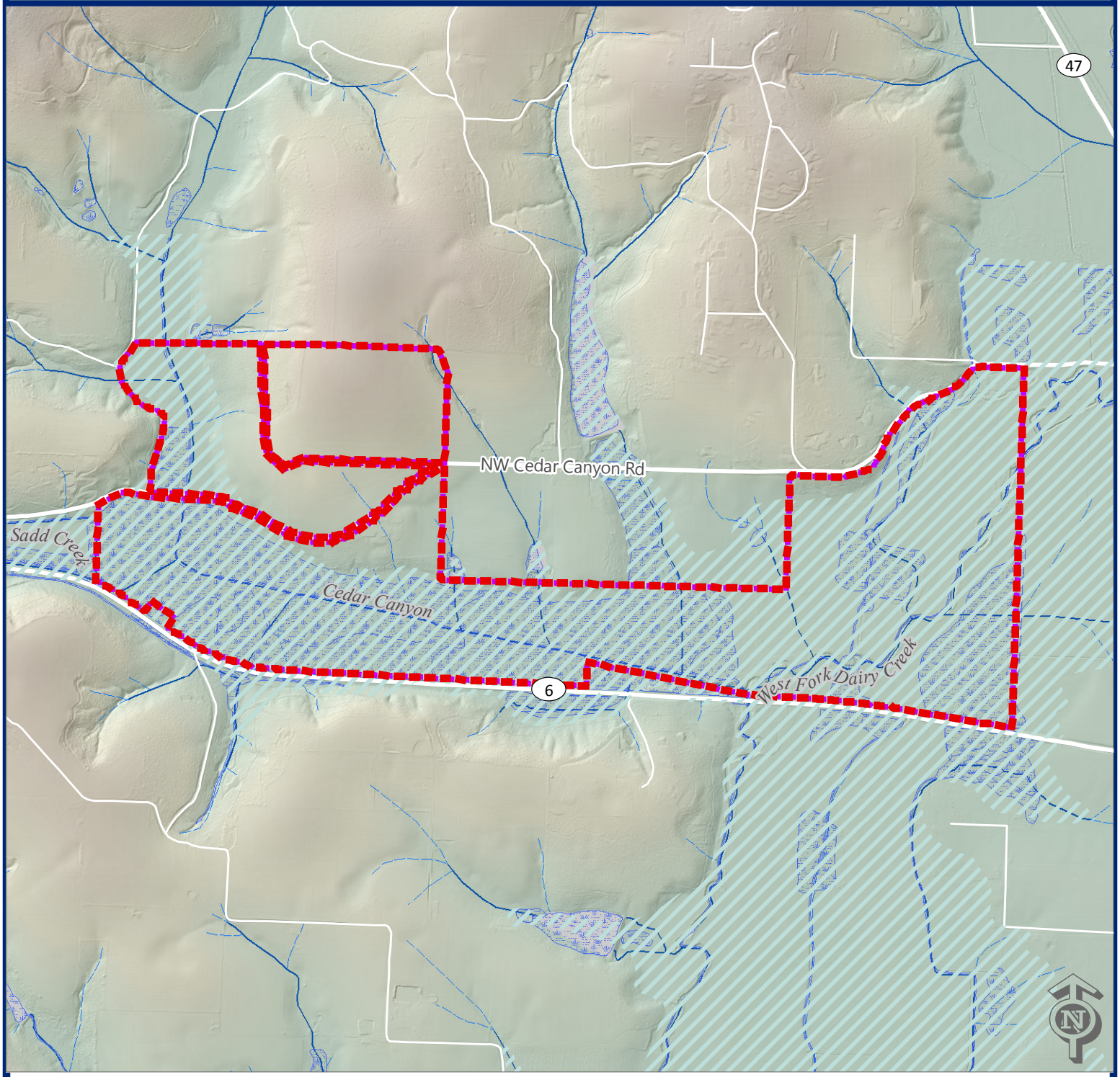
Perennial stream



0 2,000 4,000 Feet

Metro

Hydrology



Killin Wetlands site

Other Metro sites

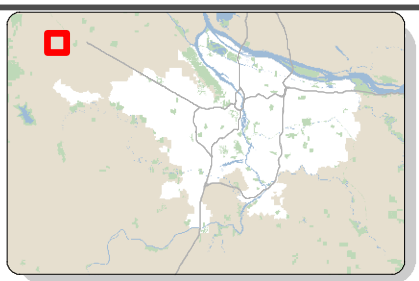
100 year floodplain

Wetlands

NHD Flowlines

Intermittent stream

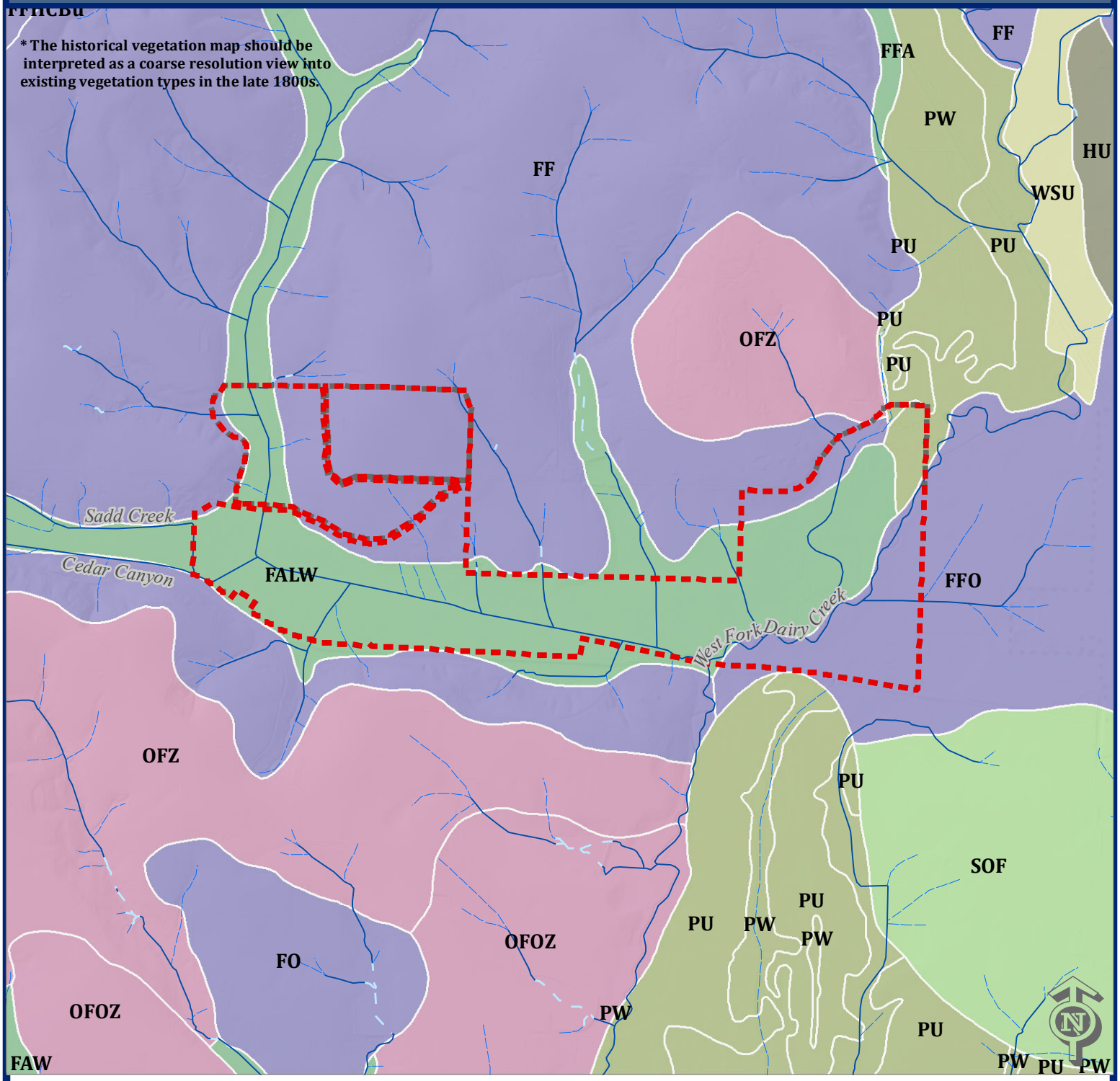
Perennial stream



0 2,000 4,000 Feet

Metro

Historical Vegetation (1851-1910)



Killin Wetlands site

Other Metro sites

Historical vegetation

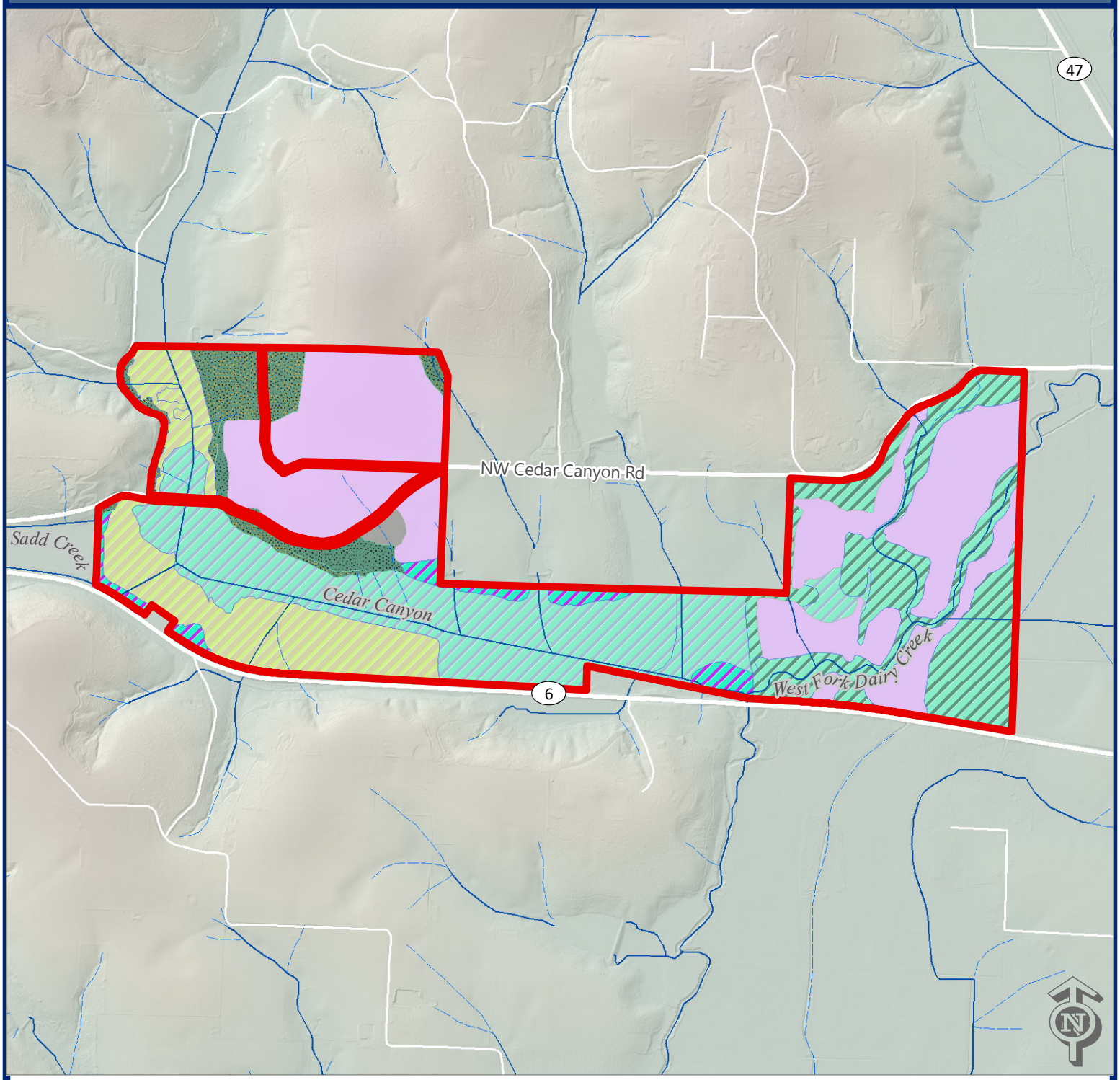
- Closed forest; Riparian & Wetland
- Closed forest; Upland
- Emergent wetlands
- Prairie
- Savanna
- Shrubland
- Woodland

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

0 2,000 4,000 Feet

Metro

Current Cover



Killin Wetlands site

Other Metro sites

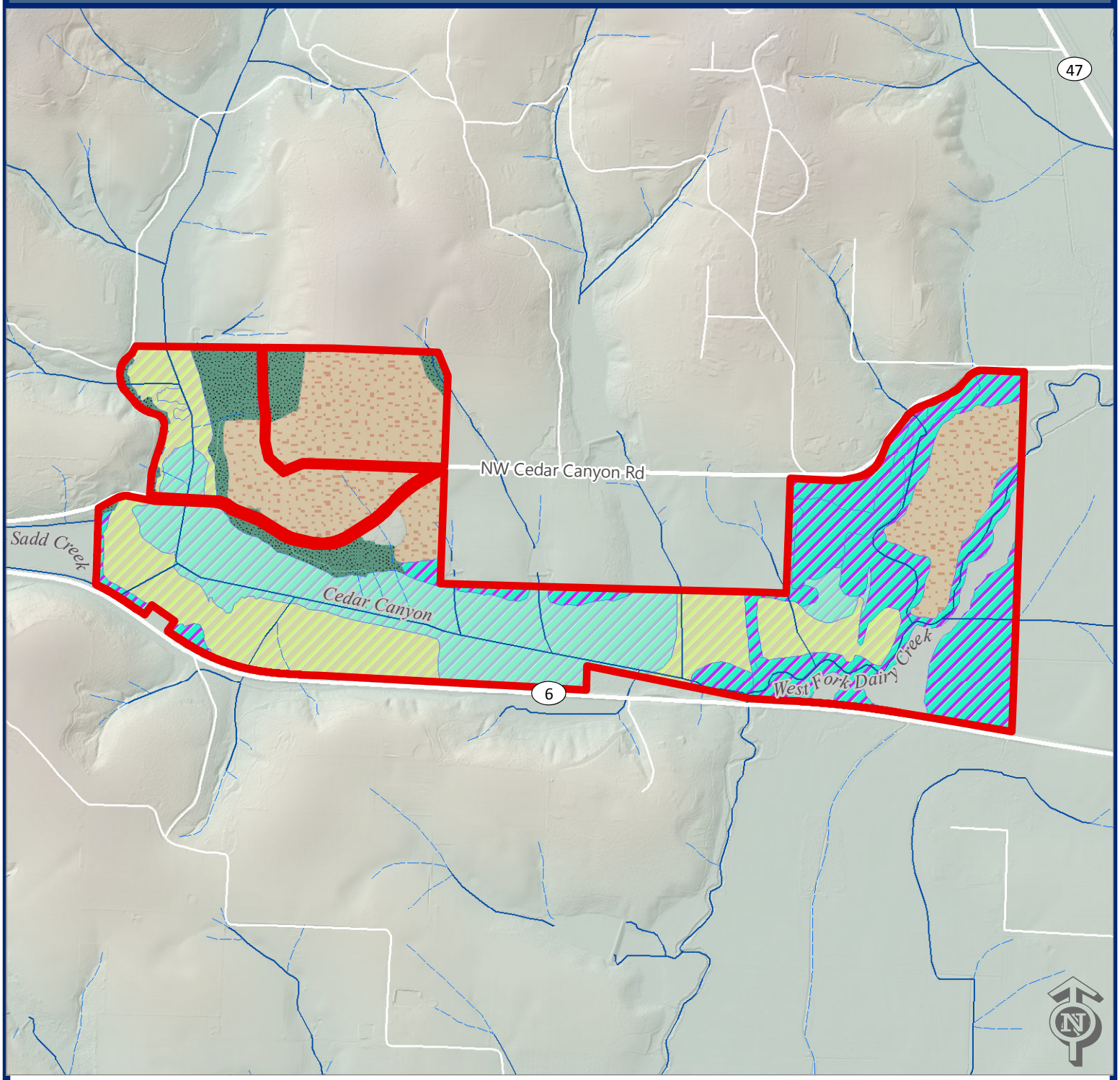
Current cover

- Agriculture
- Developed - (impervious)
- Upland forest - coniferous
- Upland forest - mixed
- Wetland - bottomland hardwood
- Wetland - emergent
- Wetland - forested
- Wetland - shrub

0 2,000 4,000 Feet

Metro

Conservation Targets



Killin Wetlands site

Other Metro sites

Conservation targets

- No targets
- Bottomland hardwood wetland
- Emergent wetland
- Oak woodland
- Shrub dominated wetland
- Upland forest

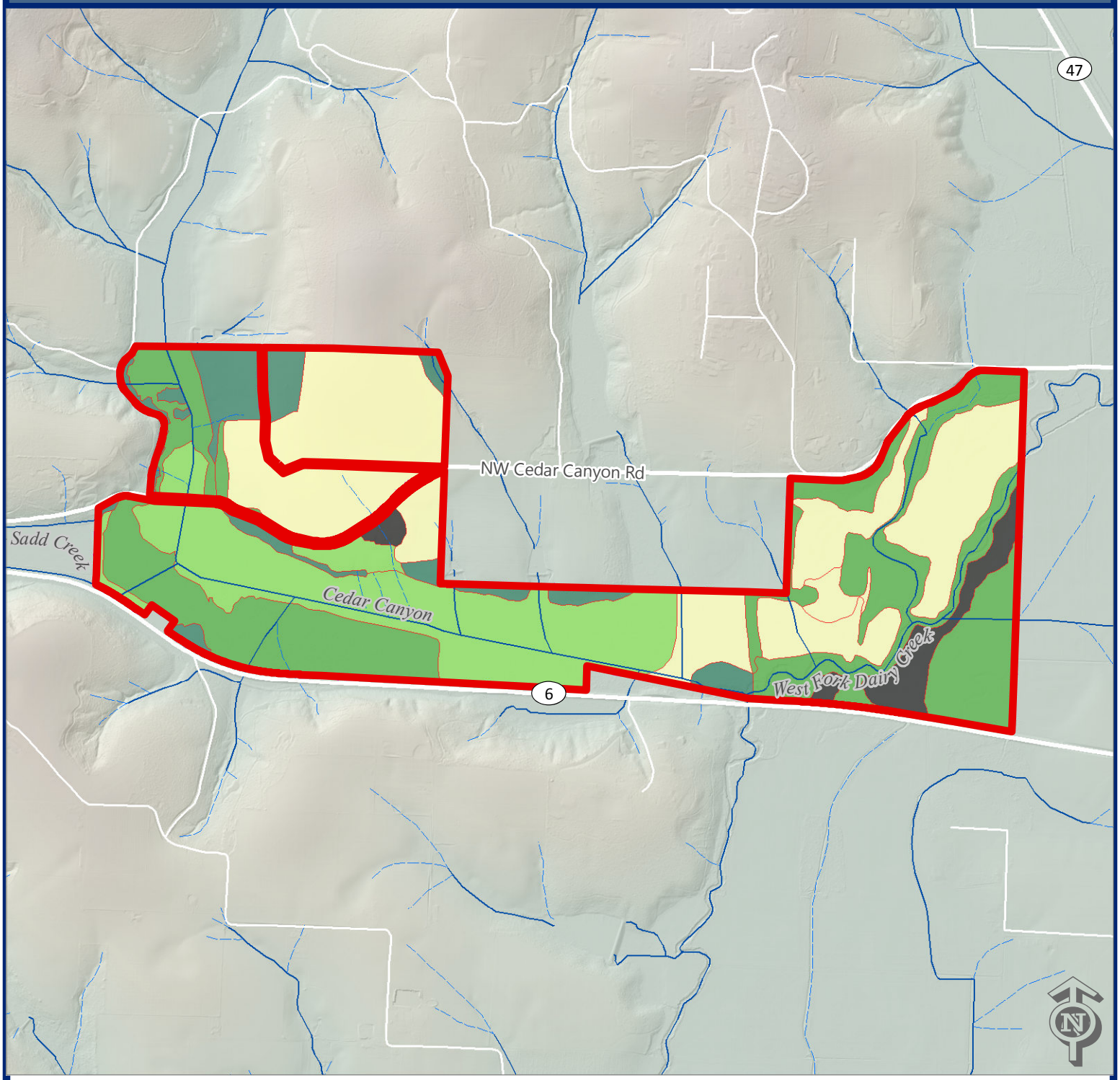
NHD Flowlines

- Intermittent stream
- Perennial stream

0 2,000 4,000 Feet

Metro

Management Status



Killin Wetlands site

Other Metro sites

Management status

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

NHD Flowlines

- Intermittent stream
- Perennial stream

0 2,000 4,000 Feet

Metro