

PCC ROCK CREEK FLOODPLAIN ENHANCEMENT PROJECT

ECOLOGICAL ENHANCEMENT PLAN



CleanWater  Services

 **Portland
Community
College**

January 2018

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Introduction

This document is written to guide enhancement and stewardship efforts of ecological resources at the PCC Rock Creek Floodplain Site. The project partners include Clean Water Services (District), Portland Community College (PCC), Metro, private landowners, and several community partners including The Tualatin Riverkeepers (TRK), Friends of Trees (FOT) and Adelantes Chicas. This partnership was created when PCC and Clean Water Services entered into an agreement on the property for ecological enhancement. The Memorandum of Understanding (MOU) grants the District access to the property, outlines our mutual goals and provides long term protection to the PCC Rock Creek Floodplain project (otherwise known as the PCC Environmental Studies Center). The Ecological Enhancement Plan documents the goals of this partnership, guides management and community engagement activities, and can be used as an educational tool for PCC student research. Aspects of this plan—like all ecological restoration efforts—have been written as adaptive. Some plan elements such as desired future conditions (DFCs) and plant community lists are to be considered goals for the site over time. Site level activities support the vision and landscape level goals and are based on cost effective planning, regulatory requirements and partner agreements.

Vision

The PCC Rock Creek Floodplain site presents the District and its partners with an exceptional opportunity to protect a healthy urban stream, restore a degraded floodplain and improve ecological functions at a basin-wide scale. It integrates urban, rural and ecological communities across a natural and dynamic floodplain. Floodplain restoration on this site will connect high quality riparian, aquatic and upland habitats for diverse and sensitive wildlife species and efficiently incorporate changes in storm water runoff from the ongoing development in the adjacent North Bethany area. The site will be a beautiful place for exploration, study and inspiration.

Landscape Context

This vision of diverse habitats and dynamic floodplains extends throughout Rock Creek. The Rock Creek basin was identified as high priority by Metro's Regional Conservation Strategy and in the District's Landscape Conservation Strategy. It is ideally located to provide connectivity from high priority sites on Abbey Creek and the headwaters of the north Tualatin Mountains to established enhancement projects downstream. The District is partnering with Tualatin Hills Park and Recreational District (THPRD) to enhance wetlands along Springville and Bethany creeks. Metro and Tualatin Soil and Water Conservation District (TSWCD) are actively working upstream within Abbey creek. The PCC Rock Creek Floodplain project will preserve the connection between these tributaries. The project will enhance wetland floodplain functions, support habitat for migratory species, and protect the downstream infrastructure and ecosystem. It will support healthy stream and riparian ecosystems supporting red-legged frogs, winter steelhead, bobcat, Roosevelt Elk and over 75 species of resident and neo-tropical migrant songbirds,. By fostering relationships and developing new outreach activities, we strive to create opportunities for the community to help advance our shared ecological goals and enhance our ability to implement innovative solutions. The project location on the PCC campus and edge of the expanding Urban Growth Boundary (UGB) will offer expanded opportunities for diverse community engagement and stewardship.

Partnerships

Successful implementation of a basin-wide ecological enhancement program depends upon mutually beneficial relationships with our partner organizations. With a collaborative effort under the Tree for All program, 5 million native trees and shrubs have been planted, 15,000 acres are managed for watershed health, and 70 farmers are

engaged in agriculture incentive programs. Through these relationships, we advance our shared ecological goals and expand our ability to implement innovative solutions.

Clean Water Services

Everything we do at the District aims to protect public health while enhancing the natural environment of the Tualatin River Watershed. Combining science and nature, we work in partnership with others to safeguard the river's health and vitality, ensure the economic success of our region, and protect public health for more than 570,000 residents and businesses in urban Washington County.

Clean Water Services conducts ecological enhancement activities across the Tualatin Watershed to improve watershed health and maintain vibrant agricultural and urban communities. By enhancing wetland and riparian areas and adding complexity to degraded streams, the District and its partners have improved water quality, created habitat for wildlife, re-connected floodplains and enhanced community livability.

The District will lead habitat enhancement activities at the site. The District brings technical expertise as a water resources management utility with an integrated approach to managing stormwater which includes regional detention, water quality treatment and ecological enhancement. Floodplain enhancement will support development in North Bethany while protecting and enhancing wetland resources along Rock Creek. Our partnerships will create more enhancement opportunities and explore innovative community engagement and educational opportunities along Rock creek.

Partner contact information:

- Tracey Dulin, PWS, Water Resources Project Manager / Watershed Management Department

Portland Community College - Rock Creek Campus

Portland Community College supports student success by delivering access to quality education while advancing economic development and promoting sustainability in a collaborative culture of diversity, equity and inclusion. As the largest post-secondary institution in Oregon, PCC serves nearly 78,000 full-time and part-time students. They fill a unique role, one that offers high quality education and opportunities for our students, which in turn contributes to the vibrancy of Portland's economic community. Students enrolled in PCC programs reflect Washington County's diverse population. As the landowner of 3 of the 5 tax lots within the project, PCC manages a portion of the floodplain known as the Rock Creek Environmental Studies Center (RCESC). By working together, the District and PCC adds expanded opportunities for diverse and underrepresented communities to gain practical experience in environmental fields along with opportunities for research, long term monitoring and stewardship activities.

Partner contact information:

- Valance Brenneis, PhD, Instructor / Department of Biology-Environmental Studies and Resources
- Kevin Lien, Instructor / Department of Biology-Environmental Studies and Resources
- Terry Lookabill, Farm Coordinator / Department of Vet Support

Metro

Metro works with communities, businesses and residents in the Portland metropolitan area to chart a wise course for the future while protecting the things we love about this place. Clean Water Services and Metro have an established partnership working together to protect, enhance and restore ecosystems throughout the Tualatin Basin. Grants through Metro's Nature in Neighborhoods Capital Grants Program help fund projects to improve water and air quality, fish and wildlife habitat, promote partnerships that protect and enhance nature in neighborhoods, and access to nature by all residents. Funding through Metro's Grant Program will increase the

opportunities for diverse and inclusive community engagement. It will add depth to the ecological enhancement actions through funding for oak woodland management and increase structural complexity through addition of large wood and snags and increase diversity of understory species.

Partner contact information:

- Mary Rose Navarro, Natural Areas Grants Coordinator / Parks and Nature

Community Engagement Partners

To support our shared ecological and community goals, this project includes several community engagement partners that will lead new and innovative monitoring and stewardship activities with diverse communities. Through the pilot year of wildlife monitoring, the District identified transportation as a barrier to authentically engaging with underserved communities. The partnership with The Tualatin Riverkeepers (TRK) will support education programming and provide transportation to address this barrier. TRK will engage several latino groups including Adelante Chicas in hands-on experiential learning, develop bi-lingual naturalists and support their workforce development program. Friends of Trees (FOT) will lead community planting events that will engage residents in the new North Bethany providing a connection to integrated approach to stormwater management. Confluence AmeriCorps members lead community science trainings and events to monitor wildlife and look at new ways to work towards our shared equity, diversity and inclusion goals and engage underserve communities.

Partner contact information:

- Logan Lauvray, Green Space Manager / Friends of Trees
- Charissa Jones, Environmental Educator / The Tualatin Riverkeepers
- Lara Jones, Program Director / Confluence Environmental Center (AmeriCorps)

Project Background

Much of the Rock Creek floodplain contains wetlands degraded by past management activities aimed at draining the site. Prior to PCC acquisition, the property and surrounding landscape was used for agriculture. Historic aerial photographs show that existing agricultural ditches are located along the lowest elevation of the floodplain and were created prior to 1936 effectively draining the floodplain. Active vegetation management within the Bonneville Power Administration (BPA) Right of Way encourages invasive species and creates ongoing disturbance to the native plant communities. Restriction in height limits vegetation to low growing plant communities like emergent wetlands and wet prairie. This has led to the spread of invasive grasses throughout the site. As a result, the site consists of degraded wetlands and requires significant improvements to the site's hydrology, water quality, and wildlife functions to address these as well as other threats and stressors (see Table 1).

Table 1. Threats and Stressors for PCC Rock Creek Floodplain

Threat	Source(s)	Intensity	Scope	Overall Rank	Comments
Introduced Plants	Previous Land Uses	Moderate	Entire site	High	Remove blackberry, reed canarygrass, meadow foxtail, Japanese knotweed, shiny geranium
Herbivore browse	Elk, deer and beaver	Moderate	Entire site	Moderate	Site has large populations of herbivores including Elk, deer and beaver
Increase volume of stormwater at outfall	Development in North Bethany	Moderate	Additional treated stormwater from impervious sources	Low	Install bioengineering methods downstream of stormwater outfall. Modeling supports capacity available in existing floodplain.
Alteration of eastern forest	Development in North Bethany	Moderate	Removal of existing forest beyond regulated buffer	Moderate	Plant additional plantings along eastern project boundary to stabilize reduced forest
Removal of native vegetation	BPA Right of Way (ROW)	High	125-foot ROW	High	Height restrictions within ROW actively enforced
Low plant establishment	Trampling from educational and outreach activities	Low	Entire site	Low	Designated trails should reduce impact to new plants during establishment phase and allow for educational access

Despite the alterations in hydrology and invasive species, Rock creek remains an important site for migratory species and stream corridor connectivity. The site provides habitat to several species listed in the Oregon Conservation Strategy as “Species of Concern”. Rock creek is listed as Essential Salmon Habitat with winter steelhead (*Oncorhynchus mykiss*) and Coho (*O. kisutch*) present for migration, rearing and foraging. Monitoring by PCC has documented red-legged frogs, river otter, bobcats and Roosevelt Elk. Prior avian monitoring revealed over 50 species of resident and migratory birds including Pileated Woodpecker, Willow Flycatcher, Spotted Sandpiper and Yellow-breasted Chat.

The project will enhance existing emergent wetlands dominated by reed canary grass (PHAR) and non-native pasture grasses (ALPR, HOLA) to a mix of forested, scrub-shrub, and emergent plant communities. Project design emphasizes natural processes including natural succession, large wood placement and integrating beaver into the floodplain design. Restoring dynamic natural processes will mitigate the hydrologic and water quality impacts of urbanization; promote ground-water recharge; provide habitat diversity for birds, waterfowl, reptiles and aquatic species; and mitigate the potential impacts of climate change on long-term water supplies.

PCC owns and manages portions of the site through the RCESC and farm programs. New partnerships have expanded opportunities for ecological enhancement and increased educational access to the entire 115 acre floodplain and forest. The District's integrated stormwater approach allows for new ways to incorporate changing stormwater flows from development to improve the hydrologic functions of the floodplain.

Project Goals

The restoration of dynamic natural processes presents the District and its partners with an exceptional opportunity to protect a healthy urban stream and improve ecological functions along Rock Creek. Diverse partnerships provide an opportunity to explore common goals and objectives. The project integrates urban, rural and ecological communities across a natural and dynamic floodplain. Floodplain restoration on this site will connect high quality riparian, aquatic and upland habitats for diverse and sensitive wildlife species and efficiently incorporate changes in stormwater runoff from the adjacent development that is on-going in the North Bethany area. The site will be a beautiful place for exploration, study and inspiration. To achieve this vision, the ecological enhancement plan establishes these priority goals including:

Goal 1: Provide Public Education and Community Outreach

- Objective 1: Support PCC education programs
- Objective 2: Support PCC agriculture program by incorporating grazing into stewardship strategy
- Objective 3: Engage diverse community partners and volunteers through planting and community science activities

Goal 2: Enhance Ecological Processes and Functions

- Objective 1: Restore diverse native plant communities
- Objective 2: Improve complexity, connectivity and diversity of wildlife habitat
- Objective 3: Increase floodplain roughness and complexity
- Objective 4- Plan for cost effective stewardship strategies for early succession plant communities
- Objective 5- Maximize floodplain benefits of beaver

Goal 3: Support Integrated Water Resources Strategies

- Objective 1: Provide healthy riparian cover and shade
- Objective 2: Meet stormwater regulations for development of North Bethany Planning Area
- Objective 3: Meet BPA vegetation standards within easement

Ecological Enhancement Approach

In order to meet these goals and objectives, the District has developed both landscape level and site specific strategies for ecological enhancement. Projects follow a 20 year timeline that outlines steps from site prep, establishment and stewardship activities (Figure 1). Best management practices will maximize ecological effectiveness, reduce costs and showcase sustainable use of resources. Partnerships with PCC and the community to monitor the site over time will enable us to learn from the project and refine the District's adaptive management approaches.

Initial investment of invasive species management (aka. site prep) prior to installation of native plant material will reduce overall invasive species management costs as the site develops. Bare root stock and strategic native grass seed use will reduce planting costs. Clean Water Services contracts with native nurseries and revegetation contractors with multi-year Master Service Agreements that fix rates and ensure competitive pricing. All plants used will be sourced locally and all wood is locally sourced and salvaged. Vegetation will be installed during the wet winter months to reduce planting shock and take advantage of natural precipitation and hydrology. Project enhancement efforts follow CWS's Integrated Vegetation and Animal Management Guidance for invasive species management. Routine maintenance may include mowing, herbicide treatments, thinning upland trees and shrubs and replanting and or reseeding with native herbaceous species. Disturbed areas from construction activities are seeded with native grasses to address state and federal erosion control standards. The agricultural channel that runs through the site typically dries completely by September/October and allows for targeted herbicide use. Native grass and forb seed will be broadcast in the fall to establish understory and herbaceous plant communities.

Figure 1: Timeline for Management Activities

	Calendar Years (2015-2035)																					
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Baseline Monitoring																						
Site Prep																						
Establish native herbaceous strata																						
Cattle Grazing																						
Installation of LWD																						
Plant Riparian Forest																						
Plant Forested Wetlands																						
Plant Scrub Shrub Wetland																						
Plant Oak Communities																						
Invasive species management																						
Maintain Plantings																						
Monitor Plantings																						

While the Riparian forest along Rock Creek has snags, downed wood and backwater channels, the grass dominated floodplain lacks complexity and structure. By installing log structures throughout the floodplain, water will slow down and spread across the site. The District will plant vegetation as needed for forage and building materials along the channel to encourage beaver activity on the floodplain. Large wood additions for floodplain roughness and structural diversity will be placed on the site and might provide anchor points for beavers to build dams. This will extend the duration of ponding and saturated soil conditions longer into the growing season and add to the wetland's effectiveness in providing aquatic habitat such as nesting habitat for waterfowl and breeding habitat for amphibians. This will improve groundwater recharge, floodplain connection and aquatic habitat in the floodplain. Integration of stormwater through upland water quality facilities will allow for more opportunities to improve the water storage functions of the floodplain and provide more water throughout the year in the wetlands. Snags will be created with selective thinning to release oaks from competition within the oak woodland community and installation of snags within the emergent wetlands to

enhance nesting and perching sites for the multiple species of cavity nesters. Downed wood in both uplands and wetlands will provide refuge for multiple species.

Invasive species management prior to construction and installation of native material improves long term success and reduce future maintenance costs. Herbicide and mowing treatments should decline over time as native plant communities become established. The project has had invasive species management since 2015 with herbicide and grazing activities throughout the wetlands. Cattle grazing have been slowly phased out during site prep phase and will be reintroduced as a management tool when native oak savanna and prairie communities have been established. Native grasses and forbs will be established that support grazing including early spring forbs that will die back before grazing. This will avoid conflicts with species incompatible with cattle and allow for a diverse prairie community. In partnership with NRCS and the PCC farm manager, a cattle management plan will be developed to design a rotational grazing schedule and native plant palette compatible with both ecological and economic goals of the project.

PCC Rock Creek Floodplain has riparian, wetlands and upland habitats of interest. Each of these communities are described as ecological targets, with key ecological attributes (KEAs) of the target identified which can serve as measures of the target condition. Initial plant lists for each community type are included in Appendix A along with the KEA tables. These plant communities are suggested by reference conditions, available stock and success at similar sites for reestablishing the goal desired future conditions. Species lists are adjusted to encourage natural recruitment of native species present at the site (i.e. Oregon ash). Plant communities and plant numbers will be adjusted per year to allow for adequate site prep and changing site hydrology. See Plant Community Map for conceptual plant community locations within the site. The planting plan will include multiple habitat types with species that flower, berry and seed throughout the growing season.

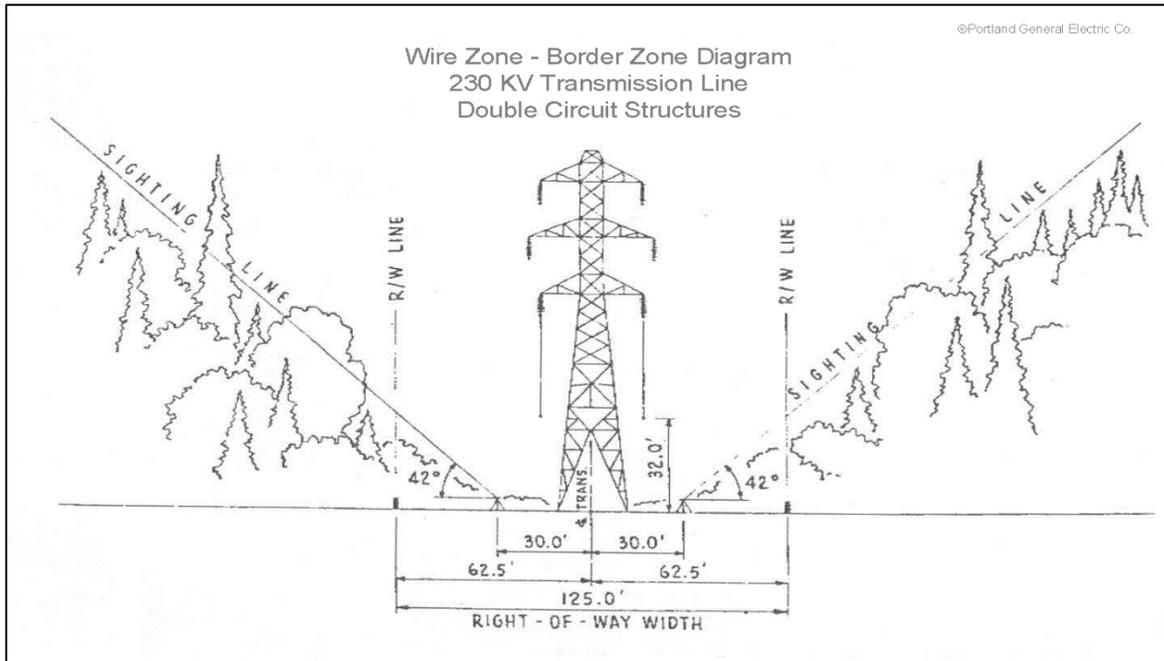
Developer led enhancement areas adjacent to the site will be integrated into management activities as permit requirements are met. This will improve the resiliency of habitats located along the edge of the site and adjacent North Bethany development area. The District will enhance the regulated Vegetative Corridor (VC) up to District standards and lead site prep, establishment of oak woodland habitat and invasive species management through the Vegetated Corridor Enhancement Fee program on PCC property. The VC will be planted to District standards and incorporated into the adjacent Oak Woodland plant community. Invasive species management of VC adjacent to SW 185th and PCC emergency egress road and developer led enhancement adjacent to North Bethany development will be wrapped into the site once released from permit requirements (estimated 2018-19).

To provide cost effective stewardship strategies for early successional plant communities, cattle grazing will be used within the oak savanna and prairie. Innovative strategies for meeting BPA ROW plant height restrictions are needed to reduce long term cost and management (Figure 2). The BPA ROW will include a plant pallet of low-stature, dense emergent wetland species in inundated areas (*Carex obnupta*, *Juncus patens*, and *Spirea douglasii*). Within the oak savanna and prairie communities, native grasses and forbs suitable for cattle grazing will be established. Traditional methods of vegetation management include annual mowing, prescribed burning and herbicide treatment to keep woody plant encroachment. A cattle management plan to incorporate rotational grazing as a way to manage non-native grass is being developed in partnership with PCC, Metro, NRCS and Clean Water Services. Existing fencing on the site will be removed and fences will be rebuilt to exclude cattle from forested and scrub-shrub wetlands. This will enable management of early successional plant communities and develop a low impact grazing regime compatible with educational and enhancement goals.

Table 2. Summary of Management Activities in Oak Habitats

Activity	Estimated Date	Notes	Lead partner
Oak release	2018	Remove competitive trees near mature or young oaks	CWS and contractors
Oak understory improvement	2018	Remove competitive seedlings and saplings near mature or maturing oaks	CWS and CWS contractors
Propagate oaks	2017-19	Preserve genetics of successful oaks on site, especially large open-grown specimen	PCC Landscape Technology Program
Establish oak savanna herbaceous community	2018-20	Establish large prairie type community that can also be grazed by livestock	CWS and contractors
Develop grazing plan for savanna site	2018	Work with PCC to suggest management of cattle or other livestock among oaks	PCC, CWS, Metro and NRCS
Plant oaks in savanna	2020-21	Establish oaks at wide spacing with livestock protection	PCC and CWS
Monitor vegetation	2018-38	Vegetative monitoring for plant community success and change	PCC and contractors
Cattle grazing in oak savanna	2020	Install temporary/seasonal fencing around 6.5 acre pasture and allow livestock to manage herbaceous vegetation on site.	PCC and CWS

Figure 2: Vegetation Management Requirements under BPA Right of Way



Wire Zone: 30 feet either side of the centerline of transmission. Vegetation is restricted to a height at maturity of no greater than 15 feet.

Border Zone: From 30 feet to 62.5 feet from centerline of transmission. Vegetation is restricted to a height at maturity of not greater than 35 feet.

Danger Tree: Trees with obvious signs that indicate a potential failure risk which extend above the sighting line and which, when falling, could come within 30 feet of the centerline of transmission.

Community Engagement

To support our shared ecological and community goals, this project will lead new and innovative monitoring and stewardship activities. By fostering relationships and performing outreach activities, we strive to create opportunities for the community to help advance our shared ecological goals and enhance our ability to implement innovative solutions. Public education and community outreach goals will be met through the support of existing PCC programs and community science activities. Wildlife monitoring uses a combination of qualitative and quantitative techniques that will vary by project phase throughout the evolution of the site. Wildlife monitoring data can be used to for a deeper understanding of which wildlife species are utilizing enhancement sites and which habitat types they prefer. This can provide site managers with information that could be used to adaptively manage vegetation in ways that would more fully support a diversity of wildlife species and are appropriate for site conditions. In this way, wildlife monitoring complements existing vegetation monitoring programs. Community science events connect people to the work we do in their community in new ways and gather ecological data that will inform and improve the effectiveness of enhancement projects throughout the Tualatin Basin. Through scientific study and exploration we will support our vision, landscape conservation strategy goals and provide field experience for future science professionals.

Community Partners

Through the pilot year of wildlife monitoring, the District identified transportation as a barrier to authentically engaging with underserved communities. The partnership with The Tualatin Riverkeepers (TRK) will support education programming and provide transportation to address this barrier. TRK will engage several Latino groups including Adelantes Chicas in hands-on experiential learning, develop bi-lingual naturalists and support their workforce development program. Friends of Trees (FOT) will lead community planting events that will engage residents in the new North Bethany area providing a connection to integrated approach to stormwater management. Confluence AmeriCorps members will lead community science trainings and events to monitor wildlife and look at new ways to work towards our shared equity, diversity and inclusion goals and engage underserve communities.

Educational Partners

By working together, the District and PCC adds expanded opportunities for diverse and underrepresented communities to gain practical experience in environmental fields along with opportunities for research, long term monitoring and stewardship activities. To support these activities, PCC will continue to manage the boardwalk and bark trails for community and educational access. PCC's RCESC program prepares students to integrate ecological principles into the design and management of restoration and low-impact development projects. By introducing students to the PCC Rock Creek Floodplain Enhancement project, we can engage students in the design, implementation and monitoring of an ongoing restoration project and provide field experience for future restoration practitioners.

Since the beginning of the project, over 100 students have participated in a myriad of classroom presentations, facility tours, and field trips that were organized and led by District and PCC faculty. This include plant propagation of native plants, independent research, planting events, wildlife monitoring and work study stewardship activities within the floodplain (Table 3).

Table 3. Summary of Community Engagement Activities

Activity	Estimated Date	Notes	Lead partner
PCC Community Planting	Nov. 2017	FOT will organize and lead container planting for PCC campus.	FOT, PCC
Community Planting	Jan. 2018	FOT will organize and lead bare root planting event for community. It will target adjacent landowners in North Bethany to make connection between urban stormwater and floodplain connection.	FOT
Amphibian Egg Mass Surveys	Jan-March 2018	AmeriCorps member will lead trainings and multiple surveys during the 2018 season. TRK will arrange for transportation for Adelantes Chicas. PCC classes will be combination of in class training and field experience.	PCC, TRK, Adelantes Chicas, AmeriCorps
Wildlife Camera	Ongoing	PCC to maintain wildlife cameras throughout project to document diversity of species	PCC
Propagate oak seedlings	Sept 2017	PCC to harvest oaks from project and grow 200 oaks seedlings to be planting in 2019	PCC
3 community events	2018	As part of Metro Grant. Events TBD	TBD
3 community events	2019	As part of Metro Grant. Events TBD	TBD
Develop grazing plan for oak savanna and prairie communities	2018	Work with PCC to use management of cattle or other livestock among oaks to minimize woody plant encroachment.	PCC, Metro, NRCS, CWS
Plant oaks in savanna	Nov. 2020	Establish oaks at wide spacing with livestock protection	PCC and CWS

Financial Plan

Funding for the site will be provided from multiple sources over a 20 year cycle including District Capital Improvement Program, RSMC, Metro Nature in the Neighborhood Capital Grant and PCC funded Vegetative Corridor Enhancement Fee. The District Capital Improvement Program will provide funding through multiple sources including temperature management credit, surface water management fees and Regional Stormwater Management Charges (RSMC) from North Bethany Planning Area. Clean Water Services will lead implementation of the ecological enhancements with regularly scheduled site visits and consultation with PCC staff. For revegetation treatments, annual scopes will be developed prior to treatment implementation. PCC will continue to maintain the trails and boardwalk to provide educational and community access. Bi-annual reports will be submitted to Metro per grant requirements for 3 years. Activities funded include:

- **Regional Stormwater Management Charges (RSMC):** Large wood installation, hydraulic modeling, design, plant community establishment, monitoring
- **Metro Nature in Neighborhood Grant:** Large wood and habitat features, oak woodland management activities, community engagement, understory species establishment, habitat friendly fencing

- **District Capital Improvement Plan:** Design, permitting, construction, plant community establishment, monitoring
- **District Vegetated Corridor Enhancement Fee:** Oak Woodland plant community establishment

Project Evaluation and Monitoring

Vegetation Monitoring

Vegetation monitoring shall be conducted every other year during the early fall, prior to leaf-drop. Site visits to assess treatment needs will occur throughout the year. Vegetation monitoring protocol shall follow the District’s Wetland Monitoring Protocol and include the Performance Standards for each plant community included in Appendix A. Photo monitoring will be taken annually during the spring at established fixed locations. If performance standards are not met, then adaptive management strategies will be developed. Adaptive management strategies include revised invasive species management, seasonal planting and seeding.

Wildlife Monitoring

Surveys for wildlife will follow established protocols, occur annually and vary per season (see Table 4). Presence/Absence surveys will collect species diversity and abundance data per plant community type. Wildlife monitoring will be performed by community science activities, PCC students and under contracts with professional biologists.

Table 4: Monitoring Plan for Wildlife Monitoring

Target Species or Group	Spring	Summer	Fall	Winter
Amphibian Egg Mass				
Winter Waterfowl				
Songbird/Neo-Tropical Migrants				
Dragonfly/Damselfly				
Beaver Dam Activity				
Wildlife Camera Trap				

Community Engagement

The Community Engagement evaluation will depend upon the shared goals and outcomes agreed upon by the partners. Some performance outcomes include; number of new and returning participants from diverse and underserved communities, hours in the field and personal values about being outdoors before and after field experiences. Longer term evaluation measures may include number of participants that attend another event on their own or with their family.

Community engagement monitoring by partners will include the following and will be reported on an annual basis:

- Name of engaged schools & community groups
- Number of students or volunteers
- Volunteer hours
- Number and date of events
- Number of volunteer planted plants
- Additional information may needed as part of grant or agreement.

Appendix A

Table 5: Ecological Criteria/Performance Standards for Habitat Types by Project Phase

Criteria for Transition from Implementation to Establishment

Plant Community Type	Initial Stems/Acre	Target Stems/Acre	Native Aerial Cover (%)	Prevalence Index
Emergent Wetland	NA	NA	≥ 60 herbaceous	<3.0
Scrub-Shrub Wetland	2600	≥ 1600	≥ 60 woody	<3.0
Forested Wetland	2600	≥ 1600	≥ 60 woody	<3.0
Riparian Forest	2600	≥1600	≥ 60 woody	NA
Upland Forest	2300	≥ 1400	≥ 60 woody	NA
Oak Woodland	1600	≥ 1000	≥25 woody	NA
Oak Savanna	20	5	≥10 woody	NA
Wet Prairie	NA	NA	≥ 60 herbaceous	<3.0

Criteria for Transition from Establishment to Stewardship

Plant Community Type	Invasive Species (%)	Composition/Diversity/Structure (# native sp.)	Canopy	Native Aerial Cover (%)
Emergent Wetland	≤ 20	≥ 5 herbaceous	<5%	≥ 90 herbaceous
Scrub-Shrub Wetland	≤ 20	≥ 5 shrubs ≥ 3 herbaceous	≥85 %	NA
Forested Wetland	≤ 20	≥ 5 shrubs ≥ 3 trees	≥85 %	NA
Riparian Forest	≤ 20	≥ 5 shrubs ≥ 3 trees	≥85 %	NA
Upland Forest	≤ 20	≥ 5 shrubs ≥ 3 trees	≥85 %	NA
Oak Woodland	≤ 20	≥ 5 shrubs ≥ 1 trees	<50 %	25-50% woody
Oak Savanna	≤ 20	≥ 1 trees ≥ 5 herbaceous	<25%	≥ 80 herbaceous
Wet Prairie	≤ 20	≥ 5 herbaceous	<5%	≥ 80 herbaceous

Table 6: Species List by Plant Community Type

Plant Community Type	Scientific Name	Common Name	Wetland Indicator Status
Ash Forested Wetland	<i>Camassia leichtlinii</i>	Great Camas	FACW
	<i>Carex obnupta</i>	Slough sedge	OBL
	<i>Carex deweyana</i>	Dewey's sedge	FAC
	<i>Juncus patens</i>	Spreading rush	FACW
	<i>Oemleria cerasiformis</i>	Indian plum	FACU
	<i>Rubus spectabilis</i>	Salmonberry	FAC
	<i>Symphoricarpos albus</i>	Snowberry	FACU
	<i>Spiraea douglasii</i>	Douglas spiraea	FACW
	<i>Cornus sericea</i>	Red-osier dogwood	FACW
	<i>Physocarpus capitatus</i>	Pacific ninebark	FACW
	<i>Fraxinus latifolia</i>	Oregon ash	FACW
	<i>Alnus rubra</i>	Red alder	FAC
Emergent Wetland	<i>Beckmannia syzigachne</i>	American sloughgrass	OBL
	<i>Glyceria occidentalis</i>	Western Mannagrass	OBL
	<i>Leersia oryzoides</i>	Rice cutgrass	OBL
	<i>Carex unilateralis</i>	Lateral Sedge	FACW
	<i>Juncus patens</i>	Spreading rush	FACW
	<i>Carex obnupta</i>	Slough sedge	OBL
	<i>Carex stipata</i>	Saw beaked sedge	OBL
	<i>Alisma plantago-aquatica</i>	American water plantain	OBL
	<i>Eleocharis palustris</i>	Creeping spike rush	OBL
	<i>Juncus acuminatus</i>	Tapertip rush	OBL
	<i>Sagittaria latifolia</i>	Wapato	OBL
	<i>Schoenoplectus tabernaemontani</i>	Softstem Bulrush	OBL
	<i>Scirpus microcarpus</i>	Small-fruited bulrush	OBL
	<i>Sparganium eurycarpum</i>	Giant Bur-reed	OBL
Oak Communities: Prairie/Woodland/Savanna	<i>Danthonia californica</i>	California Oatgrass	FAC
	<i>Elymus glaucus</i>	Blue Wild Rye	FACU
	<i>Festuca californica</i>	California Fescue	FACU
	<i>Bromus carinatus</i>	California Brome	UPL
	<i>Lupinus polyphyllus</i>	Large leaf lupine	FAC
	<i>Sidalcea campestris</i>	Checkermallow	FACW
	<i>Camassia leichtlinii</i>	Great Camas	FACW
	<i>Crataegus douglasii</i>	Douglas hawthorn	FAC
	<i>Amelanchier alnifolia</i>	Western Serviceberry	FACU
	<i>Mahonia aquifolium</i>	Tall Oregon grape	FACU

Plant Community Type	Scientific Name	Common Name	Wetland Indicator Status
	<i>Polystichum munitum</i>	Sword fern	FACU
	<i>Symphoricarpos albus</i>	Snowberry	FACU
	<i>Holodiscus discolor</i>	Oceanspray	FACU
	<i>Quercus garryana</i>	Oregon white oak	FACU
	<i>Rhamnus purshiana</i>	Cascara	FACU
Riparian Forest	<i>Amelanchier alnifolia</i>	Western Serviceberry	FACU
	<i>Lonicera involucrata</i>	Black twinberry	FAC
	<i>Mahonia aquifolium</i>	Tall Oregon grape	FACU
	<i>Rubus parviflorus</i>	Thimbleberry	FACU
	<i>Symphoricarpos albus</i>	Snowberry	FACU
	<i>Cornus sericea</i>	Red-osier dogwood	FACW
	<i>Sambucus racemosa</i>	Red elderberry	FACU
	<i>Crataegus douglasii</i>	Douglas hawthorn	FAC
	<i>Rhamnus purshiana</i>	Cascara	FAC
	<i>Pseudotsuga menziesii</i>	Douglas Fir	FACU
	<i>Acer macrophyllum</i>	Big leaf maple	FACU
	<i>Alnus rubra</i>	Red alder	FAC
Scrub/Shrub Wetland	<i>Spiraea douglasii</i>	Douglas spiraea	FACW
	<i>Cornus sericea</i>	Red-osier dogwood	FACW
	<i>Physocarpus capitatus</i>	Pacific ninebark	FACW
	<i>Malus fusca</i>	Western crabapple	FACW
	<i>Salix sitchensis</i>	Sitka willow	FACW
	<i>Salix lasiandra</i>	Pacific willow	FACW
	<i>Salix scouleriana</i>	Scouler willow	FAC

Table 7: Ecological Targets, Desired Future Conditions, and Key Ecological Attributes

		Native Aerial Cover	Invasive Species	Composition/ Diversity/ Structure	Education/ Outreach	Comments/Description
Palustrine Scrub Shrub Wetland (PSS)						
Current		<20% native trees/shrubs.	Dominated by PHAR	Mostly invasive PHAR. Little canopy besides some willow and hawthorne.	Ongoing PCC educational activities.	Man-made ditch drains floodplain and limits groundwater connection.
Short-term		All native. Establish native herbaceous and shrub strata	At or below 20%	Install log structures to aggrade channel.	Wildlife monitoring with PCC and community science. Community planting by Friends of Trees.	Plant diverse woody species tolerant of inundation. Seed with native OBL grasses. Allow for native recruitment of herbaceous species. Encourage beaver dam building and forage.
Long-term		All native	At or below 20%	Support natural channel evolution and beaver activity.	Wildlife monitoring with PCC	Maintain BPA ROW height requirements.
Palustrine Forested Wetlands (PFO)						
Current		20% native tree canopy.	Non-native roses, cherry, PHAR and ALPR.	Mostly ash canopy with some native shrubs. Limited snags with non-native herbaceous strata.	Ongoing PCC educational activities.	
Short-term		All native	At or below 20%	Allow for natural recruitment of FRLA and camas.	Wildlife monitoring with PCC and community science	Expand PFO into existing pastures and along North Bethany boundary. Manage and remove invasives in understory.
Long-term		All native	At or below 20%	Allow for natural recruitment of FRLA and camas	Wildlife monitoring with PCC	Manage invasive species. Encourage natural recruitment of camas and FRLA.
Riparian Forest (RF)						
Current		>85% native canopy cover, 25% native shrub cover, diverse native herbaceous species along Rock creek	FAJA, GELU along Rock Creek, ALPR in open ag fields	Mixed deciduous and coniferous forest.		Established native forest along Rock creek with diverse native understory. New plantings along N. Bethany in Vegetative Corridor.

Short-term		Establish native understory species in forest. Establish trees/shrubs in newly planted areas.	At or below 20%	Add snags and large wood in new riparian forest for increased complexity. Incorporate adjacent VC plantings.	Wildlife monitoring with PCC and community science. Community planting with Friends of Trees.	Expand Riparian forest into existing ag pasture and along North Bethany. Treat FAJA and GELU patches along Rock Creek. Plant and maintain BPA ROW height requirements.
Long-term		All Native. >85% native canopy cover.	At or below 20%	Target 12-18 snags/acre.	Wildlife monitoring with PCC	Goal of 85% canopy closure. Monitor and remove invasives. Maintain BPA ROW height requirements.
Palustrine Emergent Wetlands (PEM)						
Current		<20% native cover.	Dominated by PHAR and ALPR	Mostly invasive PHAR with pockets of native sedges.	PCC cattle grazing in pastures.	Dominated by PHAR with pockets of native vegetation. Areas with cattle grazing are dominated by ALPR. .
Short-term		Establish native herbaceous strata. Plant to BPA ROW height standards.	At or below 20%	Allow for natural recruitment. Establish a variety of perennial sedges/rushes.	Wildlife monitoring with PCC and community science.	Plant to BPA ROW standards. Allow for natural recruitment of herbaceous species and beaver activity. Selectively plant perennial sedges/rushes to support existing amphibian population.
Long-term		All native.	At or below 20%	Support natural channel evolution, beaver activity and natural recruitment of <20% woody cover.	Wildlife monitoring with PCC	Manage for BPA ROW height requirements through grazing and selective woody removal.
Oak Woodland (OW)						
Current		Few mature oaks. <20% native herbaceous cover.	Non-native roses, cherry, PHAR and ALPR.	Mixed understory species and non-native grasses. Ash and cherry encroaching on oaks.	PCC managed boardwalk in poor condition.	Former ag field dominated by ALPR and PHAR. Mature oaks present along boardwalk and in floodplain forest. Past community planting adjacent to oaks.
Short-term		Establish native understory. Plant additional oaks.	At or below 20%	Oak release in floodplain forest. Create snags. Establish snowberry, cascara, OR grape & other oak associates.	Wildlife monitoring with PCC and community science. PCC to grow oak seedlings. PCC to remove and relocate trail/boardwalk.	Manage non-native grasses and establish native shrub and herbaceous strata associated with oak communities.
Long-term		All native.	At or below 20%	Maintain native oaks and understory.	Wildlife monitoring with PCC	Monitor native understory and cohort population.

Oak Savanna-Prairie (OS)						
Current		<20% native cover. Lone oak in pasture.	Dominated by ALPR, PHAR	Mostly invasive PHAR and ALPR with pockets of native sedges.	PCC cattle grazing in pastures.	Former ag field dominated by ALPR and PHAR. Lone oak in pasture. BPA ROW limits woody species.
Short-term		Establish diverse native herbaceous strata. Plant additional oaks.	At or below 20%	Add additional oaks. Establish diverse herbaceous strata. Create snags to improve cavity nesting habitat.	Wildlife monitoring with PCC and community science. PCC to grow oak seedlings.	Seed native grasses and forbs complimentary with cattle grazing. Maintain BPA ROW height requirements.
Long-term		All native.	At or below 20%	Maintain native oaks and understory. Manage for spread of woody species.	Wildlife monitoring with PCC. PCC cattle rotational grazing.	PCC cattle grazing to maintain early successional community. Monitor native understory and cohort population.



Wetlands



Amphibians



Scrub-shrub Wetlands



Beaver



Waterfowl



Oak Prairie & Woodlands



Riparian Forest



FLOODPLAIN ENHANCEMENT PROJECT



WETLAND BOUNDARIES

PCC ROCK CREEK FLOODPLAIN ENHANCEMENT

The Rock Creek Floodplain Enhancement Project integrates urban, rural and ecological communities across a natural and dynamic floodplain. Water on the floodplain will flow and recede in concert with the seasons. It will connect high quality habitat for diverse and sensitive wildlife species. The site will be a beautiful place for exploration, study and inspiration.



