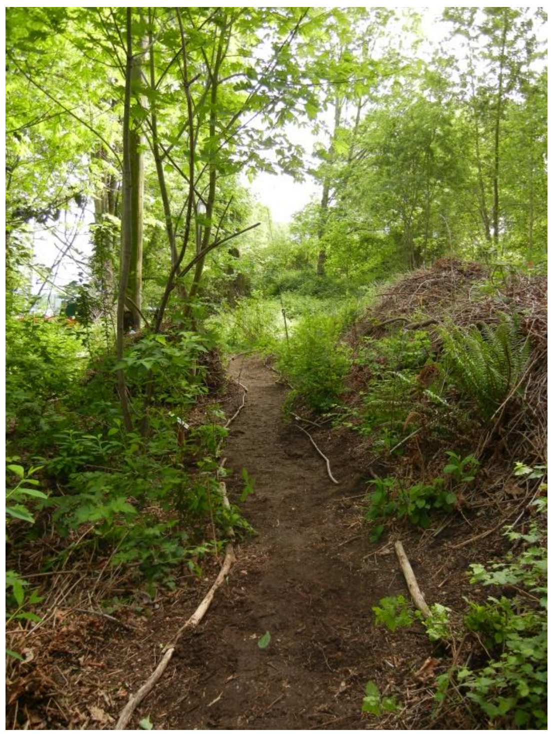
Kincaid Ravine Restoration Project: A Two Year Progress Report with a Focus on Hydrology Improvements and Place Making



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List of Abbreviations (in order of appearance in paper)

I. Introduction

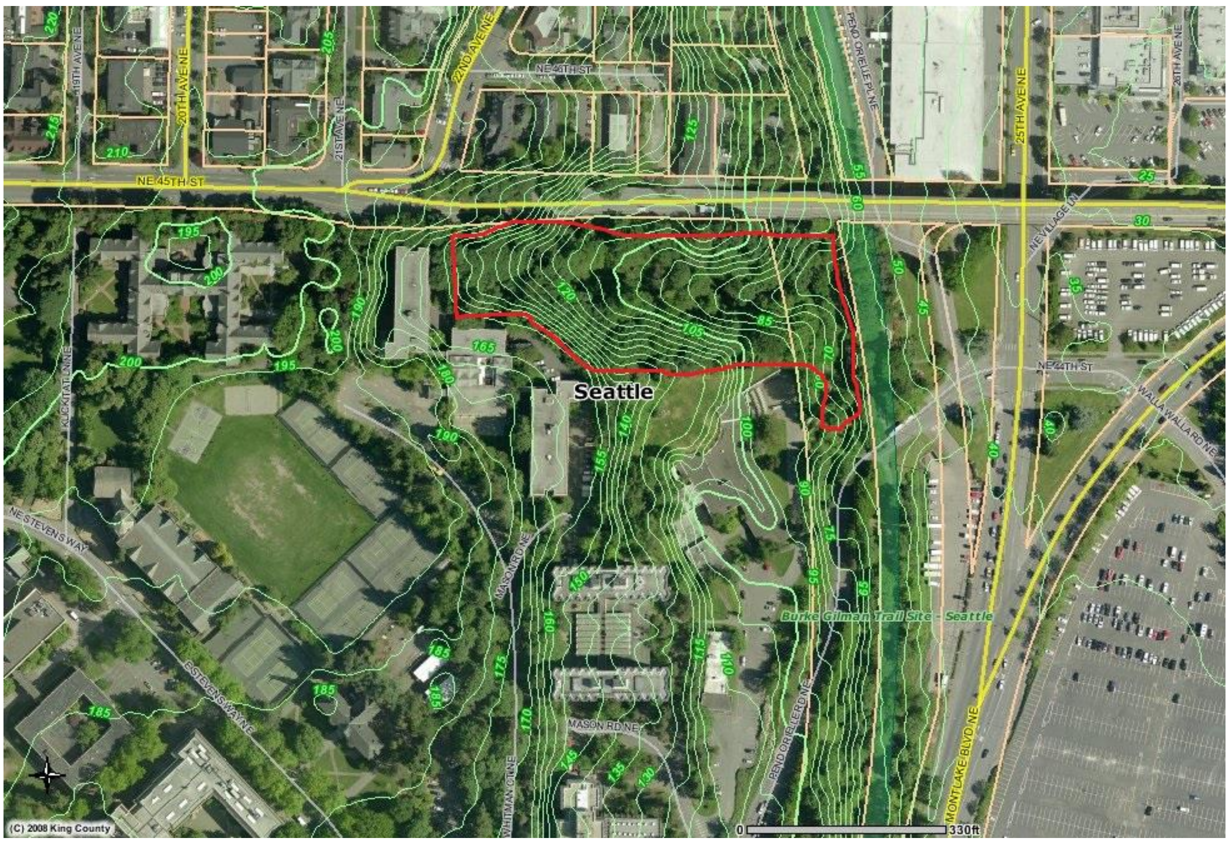


Figure 1-A: Location of Kincaid Ravine (outlined in red)

II. Project Management

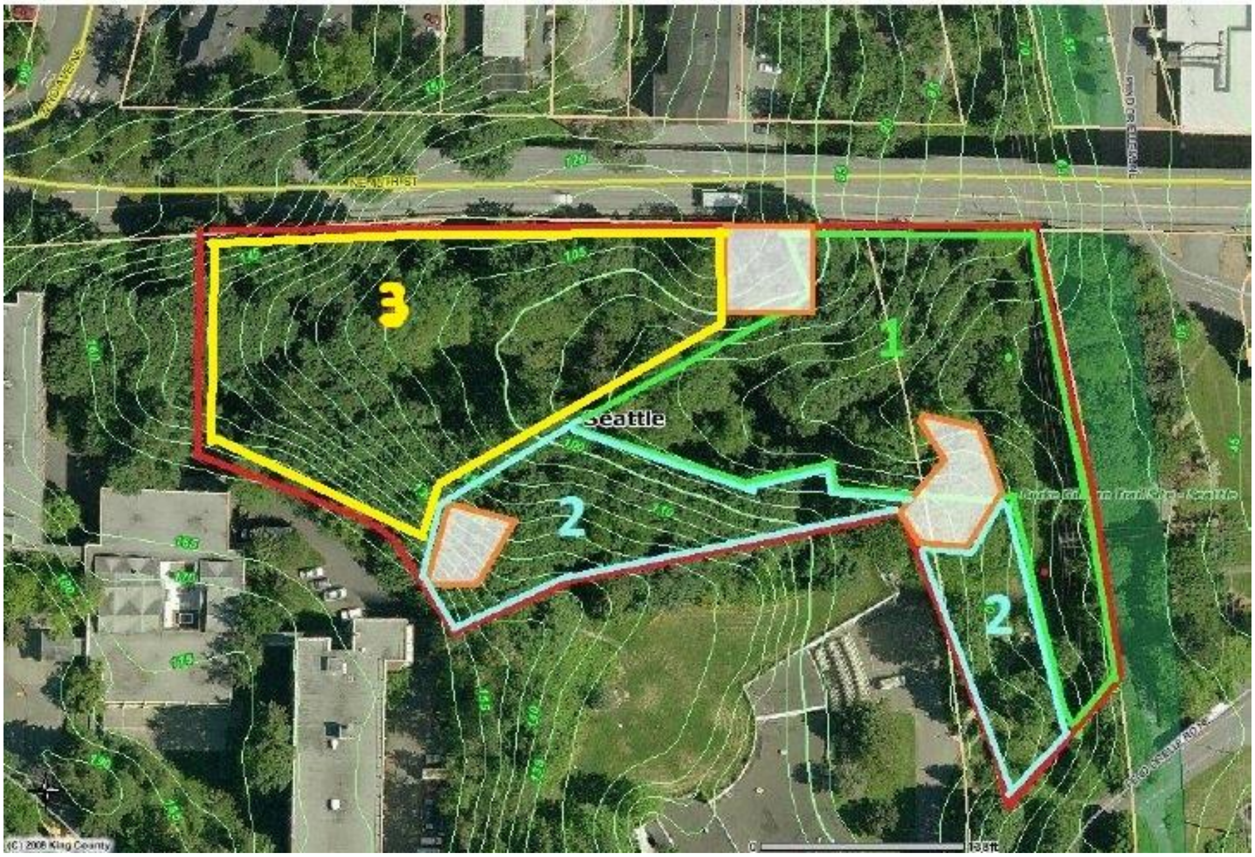


Figure 2-A: Work Area, January 2014 – June 2016. *Original Map credit: King County 2008*

Red →

Area 1 Green →

Area 2 Blue →

Area 3 Yellow →

Orange →

Updated Project Timeline

Project History and Accomplishments

Prunus laurocerasus

(Ilex aquifolium

-

-

-

-

-

-

-

-

-

-
-
-
-

Project Management Responsibilities

Grant Funding and Budget Management

May 2013 - $70,179.

June 2014 - $29,455.

June 2014 - $38,696.

February 2016 - $35,000.

February 2015 - $3,385.

February 2015 - $5,000.

Narrative Scope of Work: Since February of 2014, EarthCorps has partnered with the University of Washington Campus Sustainability Fund in the effort to restore Kincaid Ravine, an ecologically and socially valuable urban forest in the northeast corner of campus. Primary goals of the project include control of invasive vegetation, re-establishment of appropriate native plant communities, erosion control, and community engagement. This scope of work reflects the need for adaptive management based on recent site expansion and learnings from previous work accomplished. EarthCorps will provide a crew of 5-6 including a WA State pesticide licensed crew supervisor, project management, materials acquisition, and all tools necessary to accomplish the following tasks: Task 1 - Surface Water Drainage Improvements: Re-direct storm water flow away from the Burke-Gilman trail and into pre-existing draining ditches to minimize flooding and promote groundwater recharge. Task 2 - Tree Planting: Install 500 large stock (2-5 gal) trees throughout the 1.75 acres already under active restoration to accelerate regeneration of the tree canopy. Task 3 - North Slope Invasive Removal: A combination of manual, mechanical, and chemical methods will be used to control a complex area of dense Western clematis, Himalayan blackberry, and English ivy. Task 4 - Site Maintenance: Continued monitoring and invasive removal to tackle regrowth through the end of the calendar year, 2016. In addition, watering of dry and exposed planting sites will occur once per month during the summer of 2016 to enhance survivorship during dry months.

				Crew Days or Hours	Crew Day Rate	Project Manager Rate	Materials Cost	Subtotals
			Task 1: Surface Water Drainage Improvements					
		$ 2,440.00	Days in field:	2	$ 1,220.00			
00		$ 300.00	Project Management	4		$ 75.		
		$ -	Materials					
	$ 30.00	$ 30.00	Parking ($15/day)					
		$ 2,770.00						
			Task 2: Conifer Tree Planting					
		$ 4,880.00	Days in field:	4	$ 1,220.00			
00		$ 600.00	Project Management	8		$ 75.		
		$ -	Materials					
	$ 3,575.00	$ 3,575.00	Plants (500 @ $7.00 ea, $75 delivery)					
	$ 60.00	$ 60.00	Parking ($15/day)					
		$ 9,115.00						
			Task 3: North Slope Invasive Removal					
		$ 7,320.00	Days in field:	6	$ 1,220.00			
00		$ 900.00	Project Management	12		$ 75.		
		$ -	Materials					
	$ 90.00	$ 90.00	Parking ($15/day)					
		$ 8,310.00						
			Task 4: Site Maintenance					
		$ 4,880.00	Days in field:	4	$ 1,220.00			
00		$ 1,500.00	Project Management	20		$ 75.		
	$ 60.00	$ 60.00	Parking ($15/day)					
		$ 6,440.00						
		$ 26,635.00	**Total of Sub-Totals**					
		$ 26,635.00	**TOTAL FEE**					
		$ 2,556.96	**Sales Tax: 9.60%** **Location Code:** 1726					
		$ 29,191.96	**TOTAL PAYABLE**					

Figure 2-B. Budget Amendment (2016) Scope of Work

Outreach Activities

Internet Presence

-
-
-

Posters and Presentations

Outreach Materials

Project Partners and Volunteer Development

Future Project Management

III. Vegetation Management and Monitoring

List of Plants Installed

Trees

Abies grandis		
Acer circinatum		
Arbutus menziesii		
Corylus cornuta		
Acer macrophyllum		
Alnus rubra		
Fraxinus latifolia		
Picea sitchensis		
Pinus contorta		
Prunus emarginata		
Prunus virginiana		
Pseudotsuga menziesii		
Rhamnus purshiana		
Salix hookeriana		
Salix lasiandra		
Salix scouleriana		
Salix sitchensis		
Taxus brevifolia		
Thuja plicata		
Tsuga heterophylla		
TOTAL		**1125**

Shrubs

Amelanchier alnifolia		
Cornus sericea		
Fragaria chiloensis		
Gaultheria shallon		
Holodiscus discolor		
Lonicera ciliosa		
Lonicera involucrata		
Lonicera hispidula		
Berberis aquifolium		
Berberis nervosa		
Oemleria cerasiformis		
Oplopanaz horridus		
Philadelphus lewisii		
Physocarpus capitatus		
Ribes lacustre		
Ribes sanguineum		
Rhododendron macrophyllum		

Rosa gymnocarpa		
Rosa nutkana		
Rubus leucodermis		
Rubus parviflorus		
Rubus spectabilis		
Sambucus racemosa		
Symphoricarpos albus		
Vaccinium ovatum		
Vaccinium parvifolium		
Viburnum edule		
TOTAL		**2234**

Herbaceous

Achillea millefolium		
Aquilegia formosa		
Asarum caudatum		
Athyrium filix-femina		
Blechnum spicant		
Carex hendersonii		
Carex obnupta		
Carex sitchensis		
Claytonia sibirica		
Dicentra formosa		
Eriophyllum lanatum		
Erythranthe guttata		
Gaultheria shallon		
Geum macrophyllum		
Juncus ensifolius		
Lilium columbianum		
Lupinus latifolius		
Maianthemum dilatatum		
Oxalis oregana		
Penstemon serrulatus		
Polystichum munitum		
Pteridium aquilinum		
Solidago canadensis		
Stachys chamissonis var. colleyeae		
Tellima grandiflora		
Tolmiea menziesii		
Trillium ovatum		
TOTAL		

Table 3-1. Plant Installation List, Jan. 2014 – May 2016

Vegetation Monitoring

Figure 3-A. Location of VMP A and Photo Points

Native Tree Regeneration

Thuja plicata (

Picea sitchensis

Alnus rubra *Acer*

macrophyllum

A. rubra

T. plicata

P. sitchensis

Shrub and Understory Diversity

Rubus spectabilis *Oemlaria cerasiformis*

Salix lucida, Physocarpus capitatus, Ribes lacustre,

Cornus sericea *Oplopanax horridus*

Equisetum hyemale

Lysichiton americanus

Athyrium filix-femina, Polystichum munitum,

Dryopteris expansa *Tellima grandiflora*

Table 3-2. Monitoring Data and Restoration Targets for VMP A

Table 3-3. Number of Stems and Percent Cover of Dominant Species within VMP A

Invasive Species Cover

Hedera helix

H. helix

Ilex aquifolium

I. aquifolium

Lactuca muralis

L. muralis

Coarse Woody Debris and Snags

Alnus rubra *Acer macrophllum*

A. rubra

KR Restoration and Stewardship Plan *KR Baseline Monitoring Report*

Cyanocitta stelleri *Melospiza melodia*

Corvus brachyrhynchos *Turdus migratorius*

Calypte anna

Recommendations for Restoration Based on Monitoring Data

Picea sitchensis

T. plicata

T. plicata *P. sitchensis*

P. sitchensis

P. sitchensis

I. aquifolium

Polystichum munitum *Berberis nervosa*

Potential Inconsistencies with Monitoring Data

A. rubra

H. helix

Photo Point Monitoring

Figure 3-B. PP 1, October 3, 2013

Figure 3-C. PP 1, March 13, 2014

Figure 3-D. PP 1, March 25, 2016

Figure 3-E. PP 3, October 3, 2013

Figure 3-F. PP 3, March 13, 2014

Figure 3-G. PP 3, March 25, 2016

Figure 3-H. PP 5, March 13, 2014

Figure 3-I. PP 5, March 25, 2016

Kincaid Ravine Tree Inventory

Pinus monticola

Acer macrophyllum *Alnus rubra* *Populus trichocarpa* *Prunus avium*

Prunus avium

Reed Canarygrass (RCG) Treatment

Phalaris arundinaceae

Cornus sericea *Salix lucida*

Figure 3-J. Treatment 1 in April 2016

Figure 3-K. Treatment 2 in April of 2016

Garlic Mustard in Kincaid Ravine

Alliaria petiolata)

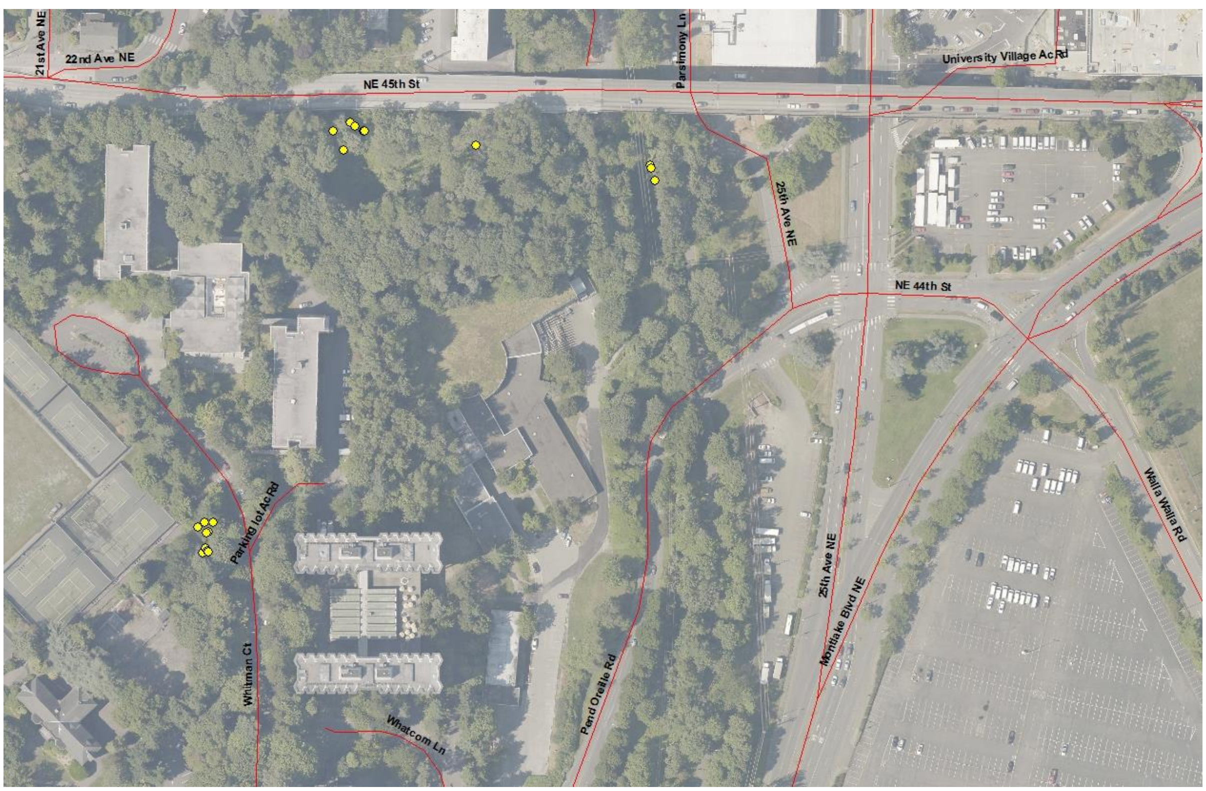


Figure 3-L. Garlic Mustard Locations 2015. *Map Credit: Karen Peterson, King County Noxious Weed Control Program*

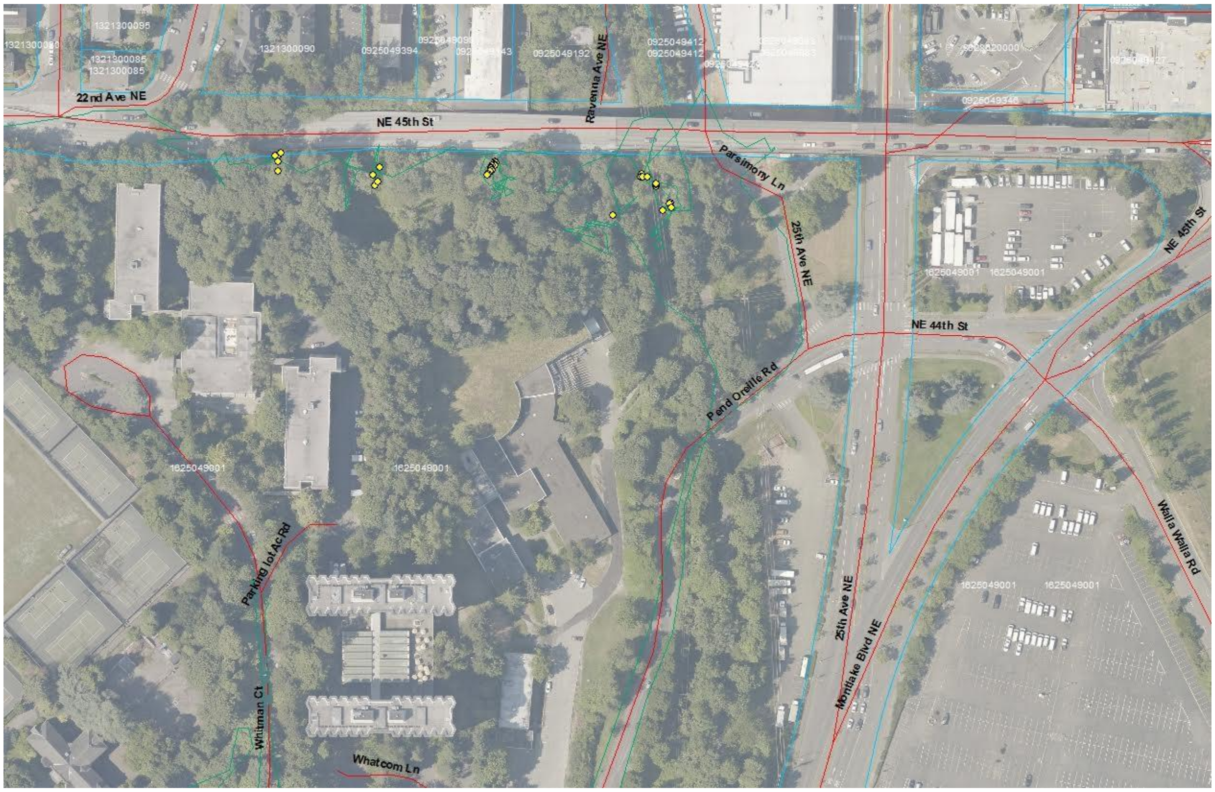


Figure 3-M. Garlic Mustard Locations 2016. *Map Credit: Karen Peterson, King County Noxious Weed Control Program*

IV. Wetland Restoration and Hydrology Improvements

Assessment of Hydrology in Kincaid Ravine

Figure 4-A. Locations of Groundwater Seeps feeding central Wetland and Stream. *Map Credit: King County Imap 2013.*

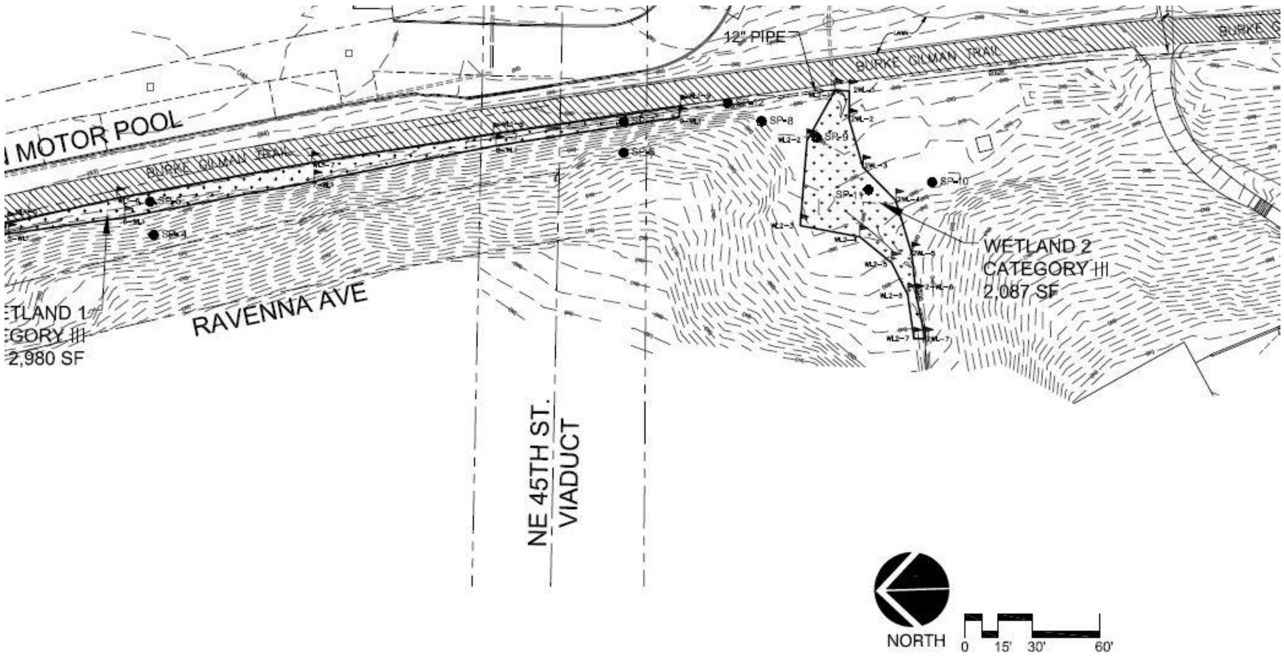


Figure 4-B. 2014 Raedeke Associates, Inc. Wetland Delineation of Eastern Portion of KR

Water Quality Testing

Actions Taken

Installation of Picket Fence Check Dams and CWD

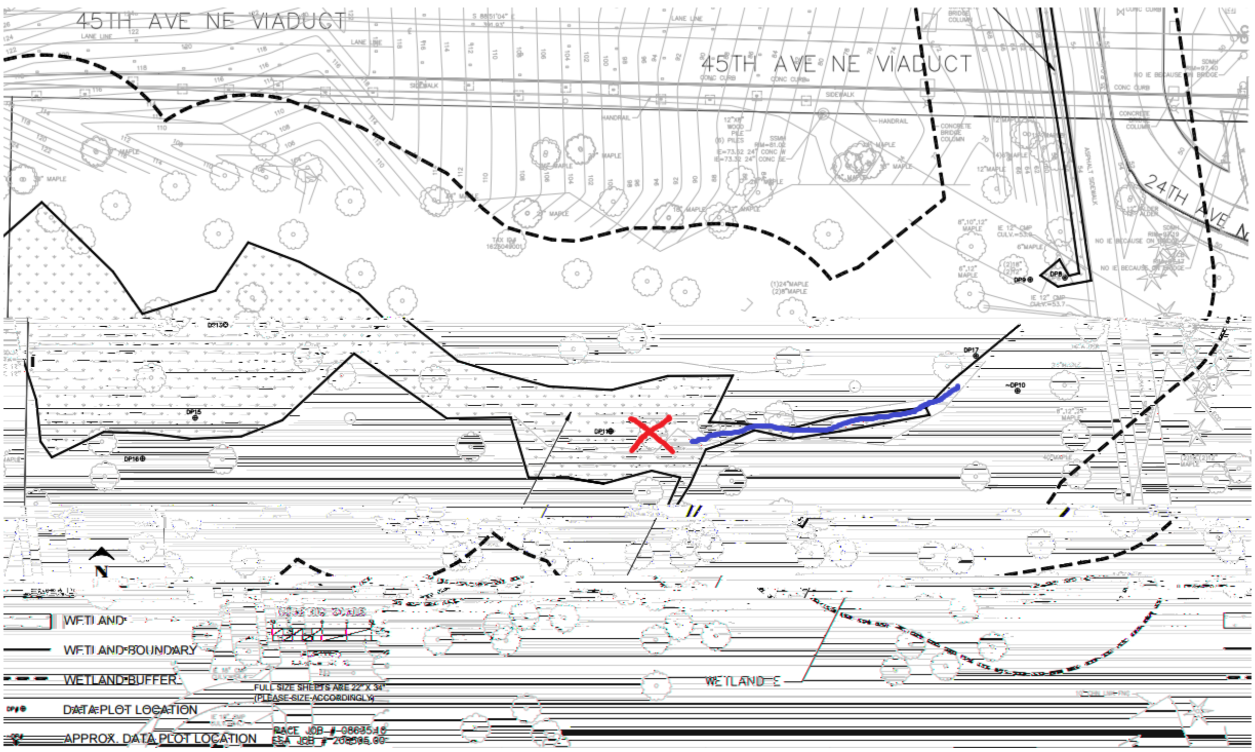


Figure 4-C. Red X marks start of stream channelization where Red Alder tree has uprooted and blue line represents stretch of incised stream channel where Picket Fences and CWD were installed. *Map Credit: ESA Adolfson, prepared for Seattle Department of Transporation*

Figure 4-D. Picket Fences 2 months after installation shown increasing sediment deposition

Use of Trailside Ditches as Infiltration Galleries

Figure 4-E. Trail Side Ditch flowing south used for infiltration. Photo taken 1/8/2016

Future Options for Hydrology Improvements

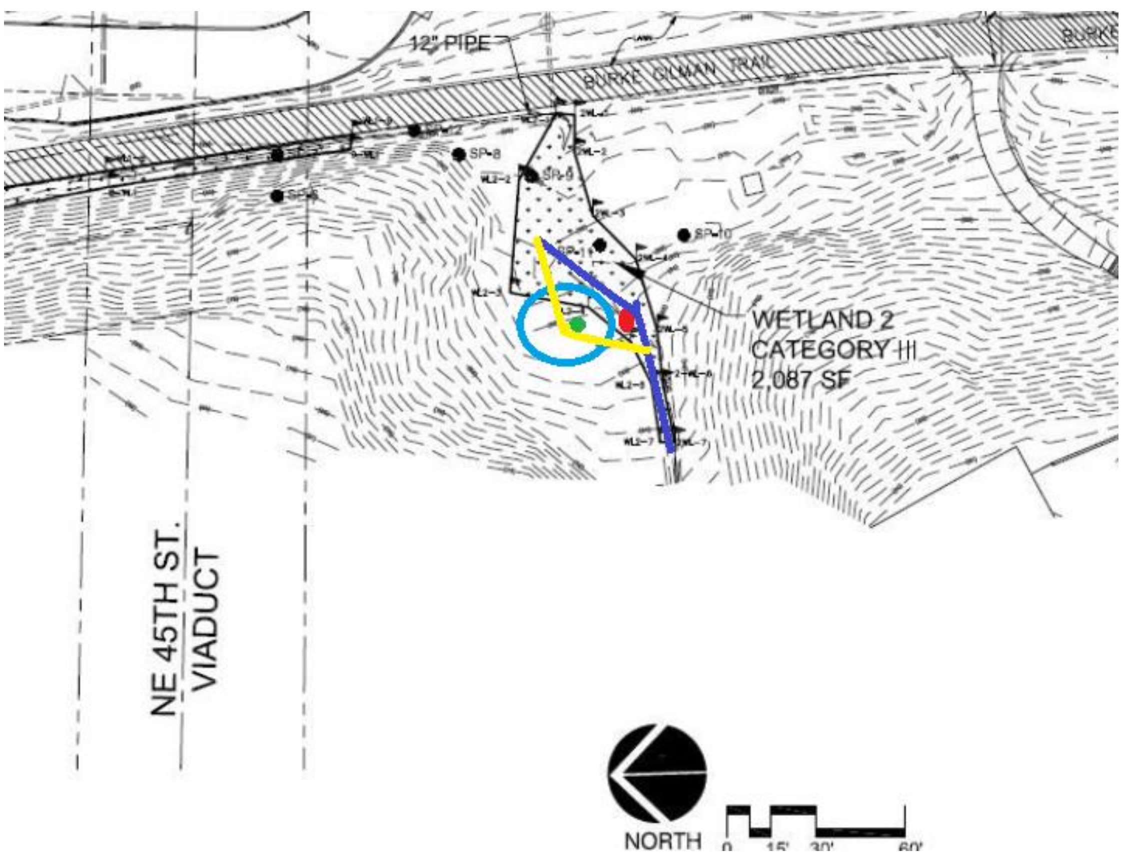


Figure 4-F. Proposed location for expanded infiltration (Area marked by Blue circle, Red dot is location of flow measurements and Green dot is location of infiltration test. Blue line marks existing water course and Yellow line is proposed redirection of flow). *M Credit: Raedeke Associates, Inc. 2014*

Acer macrophyllum

Flow Data Collection

Date	Flow (Q=VA)	Precipitation (previous 24 hours)	Precipitation (previous 72 hours)

Table 4-1. Stream Flow Data at point of potential infiltration gallery

V. Place Making

Health Benefits of Urban Green Spaces

Landscape Preferences

Stress Reduction Theory

Attention Restoration Theory (ART)

Development of Landscape Features at KR

Interpretive Trail

Figure 5-A. Interpretive Trail (left) and one of 6, mini native species ID signs installed along the trail (right).

Figure 5-B. Proposed site for seating and educational signage on value of wetland habitats

Maintenance of Welcome to Kincaid Area

Figure 5-C. Welcome to Kincaid Ravine sign area

VI. Conclusion

Literature Cited

Appendices

Appendix A – KR Hydrology Assessment Report

Appendix B – SER NW Conference Poster

Restoration of a Degraded Urban Forest in a Campus Setting: A Two Year Review of work at Kincaid Ravine

Dan Hintz | djhintz@uw.edu | Master of Environmental Horticulture Candidate | University of Washington - School of Environmental and Forest Sciences

Project History

Kincaid Ravine is a 4-acre forested open space with two delineated wetlands located in the northeast corner of the University of Washington campus. Until student led restoration work began at the ravine in the spring of 2014, the site was covered with a suite of invasive species, trash and lacked any conifer canopy. With the help of funding from the Campus Sustainability Fund, contract work from EarthCorps and SER-UW led student volunteer events, over 3 acres of the ravine are now in active restoration and 4,000 native trees and shrubs have been planted.

Project Location

Focused Objectives

1. Increase plant biodiversity, conifer canopy and wildlife habitat.
2. Enhance wetland habitat and limit erosion and flooding on the Burke-Gilman Trail through increased infiltration of stormwater into soils on site.
3. Engage students in stewardship, research and educational opportunities.
4. Transform Kincaid Ravine into an amenity on campus that students and the broader community can enjoy for education, exploration and mental respite.

Place Making

Development of "Educational Nook" that includes:

- Two cedar benches
- Interpretive signs on the importance of urban forests for pollinator habitat and climate change mitigation
- Small trail with mini native plant identification signs

Kincaid Ravine's proximity to the Burke-Gilman Trail gives the project excellent visibility which has attracted many visitors.

Vegetation Monitoring

*Monitoring data collected for 1/10 acre plot partially located in central wetland

Parameter	8/19/2013	3/25/2016
Trees (stems)	THPL: 1 (seedling) ACMA: 1 ALRU: 3	THPL: 10 (ave. height = 19") PISI: 5 (ave. height = 34") ALRU: 1 (7" DBH)
Shrubs (% cover)	RUSP: 80% OECE: 5%	RUSP: 35% OECE: 25% SALU: 8%
Groundcovers (% cover)	EQHY: 85% LYAM: 60% ATFI: 5%	EQHY: 50% LYAM: 22 % ATFI: 5 %
Invasive Species	ILAQ: 1 (mature) HEHE: 90% RUAR: 10%	ILAQ: 16 (ave. height = 12") HEHE: 6% RUAR: 5%

Photo Point Monitoring

Photo Point pictures taken in October, 2013 (above) at entrance to Kincaid Ravine before restoration work began and again in March of 2016 (left) two years into active restoration.

Notes on Monitoring Data

- Invasive removal and planting at monitoring plot occurred in Feb. of 2014 with one maintenance crew day in 2015.
- 83% tree planting survival (71% for PISI and 90% for THPL)
- Only dominant species listed in above table. Other species present (< 5% cover) PHCA, RILA, COSE, OPHO, POMU, DREX, TEGR and invasive species CASE and LAMU.
- Timing of monitoring may have skewed % cover estimates.
- Large ALRU in plot uprooted in Dec. 2014 which broadened the flow of water, possibly favoring wetland species.
- Invasive species regrowth concentrated around brush piles.

Wetland Improvements

- Development of Kincaid Ravine Hydrological Assessment report documenting the groundwater seeps and channels in the ravine with a goal of improving wetland habitat and limiting flooding on the Burke-Gilman Trail.
- Use of trail side ditch for infiltration gallery which has greatly reduced the frequency of trail flooding this past winter and limited amount of water entering storm sewers (below right).
- Installation of "Picket Fence" check dams (below left) to limit channel incision and slow down transport of water and sediments.
- Planting of willow and dogwood live stakes treated with natural "willow water" rooting hormone.
- Reduction of reed canarygrass cover when cut and covered with 2-3 layers of burlap sacks as compared to just mowing.

Student Involvement

- 3rd year of MEH student project management
- 3rd year of UW-REN capstone class working on site
- SER-UW coordinated volunteer events and other RSO partnerships
- Interns from ESRM and MLA
- Class field trips in ESRM 362

Thanks to our Project Partners!

CSF Campus Sustainability Fund, University of Washington

King Conservation District

Stewardship Partners: Helping Landowners Preserve the Environment

EarthCorps

W Grounds Management

University of Washington Botanic Gardens

Appendix C – VMP A Monitoring Data Sheet

Dan Hintz
monitored on 3/25/16

Monitoring Data: Plot A

		#	3/30 stems/acre	Ave. height
Trees:	Picea sitchensis	5 (2 dead)	50	34"
	Thuja plicata	10 (1 dead)	100	18.5"
	Alnus rubra	1	10	7" DBH

Mortality rate = 15/18 = 83% → 17%, 71% for PISI, 90% for THPL → but small

		% cover	
Shrubs:	Rubus spectabilis	35%	
	Oemleria cerasiformis	24%	
	Salix sp. (Lucida stakes?)	8%	
	Physocarpus capitatus	1%	1-2 plants of each
	Ribes lacustre	1%	1-2 plants of each
	Cornus sericea	1%	1-2 plants of each
	Oplopanax horridus	2%	

		% cover	
Groundcovers:	Equisetum hyemale	48%	
	→ some arvense too?	15%	
	Lysichiton americanus	↓	
	Athyrium filix-femina	5%	
	Polystichum munitum	4%	
	Dryopteris expansa	<1%	→ 1 plant
	Tellima grandiflora	1%	

		#/or %	stems/acre	Ave. Height
Invasives:	Ilex aquifolium	16	160	12"
	Hedera helix	6%		
	Rubus armeniacus	4%		
	Calystegia sepium	3%		
	Lactuca muralis	1%		

Imazapyr injection & no cherry laurel

Nov/Dec. 2019

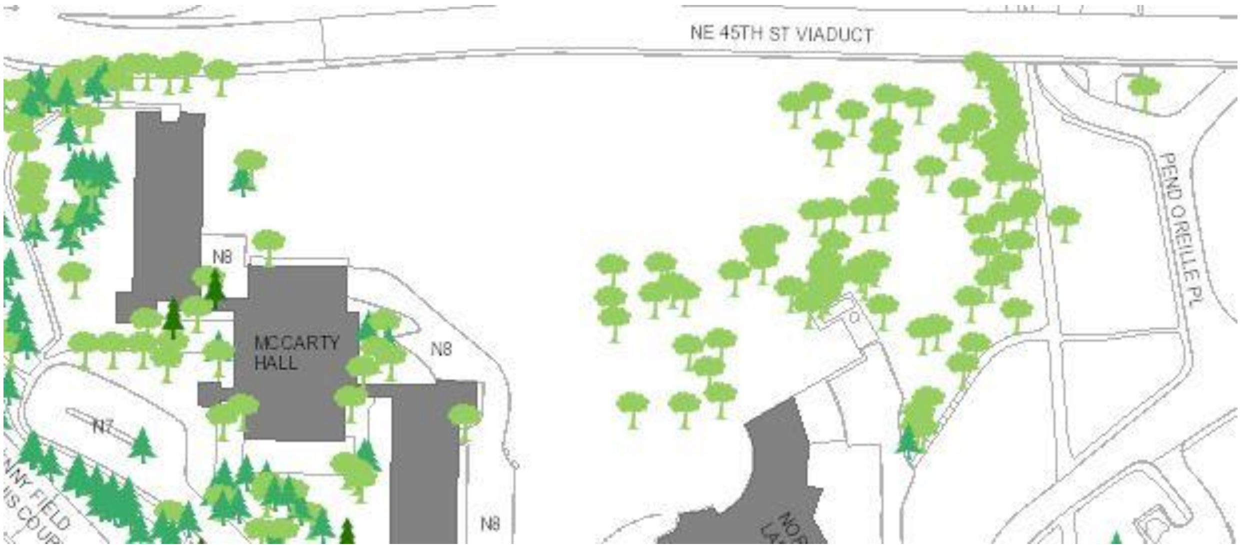
CWD: Alder (16" DBH) down, branches from snags. CWD = 25% cover.
willow stakes that didn't take, maple branch, 4 snags (6-12")

* invasives CBB, B-weed & ivy around brush piles
* Alder tree down altered hydrology, broadened the flow
* % cover maybe slightly underestimated since early in growing season → compare to 8/13

Appendix D- List of Bird Species Identified at KR

Species	Notes/observations
American crow	
American goldfinch	
American robin	nesting
Anna's hummingbird	
bewicks wren	
black-capped chickadee	
brown creeper	
bushtit	nesting
cooper's hawk	
downy woodpecker	
golden-crowned kinglet	
lincoln sparrow	
northern flicker	
Pacific wren	
pileated woodpecker	
red-breasted nuthatch	
ruby-crowned kinglet	
rufus hummingbird	
song sparrow	nesting
Stellar's jay	
wilson's warbler	
wood duck	nesting

Appendix E – Tree Inventory Map and Data Table



FID	Shape *	TREE_NUMBE	SPECIES_NA	DBH	HEIGHT
0	Point	11880	Acer macrophyllum	21.8	80
1	Point	11881	Acer macrophyllum	32.8	90
2	Point	11882	Acer macrophyllum	21.1	70
3	Point	11883	Acer macrophyllum	8.4	60
4	Point	11884	Acer macrophyllum	14.7	75
5	Point	11885	Acer macrophyllum	17.8	60
6	Point	11886	Acer macrophyllum	19.2	65
7	Point	11887	Acer macrophyllum	22	50
8	Point	11888	Acer macrophyllum	13.6	65
9	Point	11889	Populus trichocarpa	5.8	35
10	Point	11890	Populus trichocarpa	7.3	45
11	Point	11891	Pinus sp	5.5	40
12	Point	11892	Acer macrophyllum	23.4	70
13	Point	11893	Acer macrophyllum	26.3	80
14	Point	11894	Acer macrophyllum	31.8	75
15	Point	11895	Acer macrophyllum	26	80
16	Point	11896	Alnus sp	11.3	50
17	Point	11897	Alnus sp	13.6	60
18	Point	11898	Populus trichocarpa	40.7	80
19	Point	11899	Populus trichocarpa	38.4	80
20	Point	11900	Alnus sp	9.8	55
21	Point	11902	Acer macrophyllum	8.5	40
22	Point	11903	Alnus sp	6	35
23	Point	11904	Acer macrophyllum	10	50
24	Point	11905	Acer macrophyllum	36.5	75
25	Point	11906	Acer macrophyllum	13	60
26	Point	11907	Acer macrophyllum	16.5	65
27	Point	11908	Acer macrophyllum	26	80
28	Point	11909	Acer macrophyllum	14.5	50
29	Point	11910	Acer macrophyllum	34	80
30	Point	11911	Acer macrophyllum	40	85
31	Point	11912	Prunus sp	5.5	35
32	Point	11913	Acer macrophyllum	9.5	50
33	Point	11914	Acer macrophyllum	22.5	75
34	Point	11915	Prunus sp	4	25
35	Point	11916	Acer macrophyllum	9.5	45
36	Point	11917	Prunus sp	6.5	45
37	Point	11918	Acer macrophyllum	23	70
38	Point	11919	Prunus sp	7	45
39	Point	11920	Prunus sp	4	40

39	Point	11920	Prunus sp	4	40
40	Point	11921	Acer macrophyllum	18	75
41	Point	11922	Prunus sp	6.5	50
42	Point	11923	Acer macrophyllum	17	70
43	Point	11924	Acer macrophyllum	19.5	70
44	Point	11925	Prunus sp	7	50
45	Point	11926	Prunus sp	6	45
46	Point	11927	Acer macrophyllum	22	40
47	Point	11928	Thuja plicata	37	90
48	Point	11929	Acer macrophyllum	28	70
49	Point	11930	Acer macrophyllum	10.5	45
50	Point	11931	Acer macrophyllum	17.3	65
51	Point	11932	Acer macrophyllum	28.4	75
52	Point	11933	Acer macrophyllum	32.6	70
53	Point	11934	Acer macrophyllum	21.2	65
54	Point	11935	Acer macrophyllum	26.5	55
55	Point	11936	Acer macrophyllum	26	70
56	Point	11937	Populus trichocarpa	20	90
57	Point	11938	Acer macrophyllum	29	90
58	Point	11939	Prunus sp	6.5	50
59	Point	11940	Acer macrophyllum	26	75
60	Point	11941	Acer macrophyllum	17.7	75
61	Point	11942	Alnus sp	10.5	50
62	Point	11943	Alnus sp	16	55
63	Point	11944	Alnus sp	18.5	70
64	Point	11945	Alnus sp	11	55
65	Point	11946	Alnus sp	12.5	55
66	Point	11901	Acer macrophyllum	8.5	40

Alnus sp   *Alnus rubra*   *Prunus sp.*   *Prunus avium*   *Pinus sp. = Pinus monticola*

Appendix F – Water Quality Test Results

King County Environmental Lab Analytical Report

	L61949-4	L61949-5	L61949-9
Project:	421874-984	421874-984	421874-984
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L61949-4	L61949-5	L61949-9
Matrix:	LG STORM WTR	LG STORM WTR	LG STORM WTR
ColDate:	4/21/15 20:30	4/21/15 20:30	4/21/15 20:30
TimeSpan:			
TotalSolid:			
ClientLoc:			
SampDepth:			
WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
ES NONE															
Sample Information	Kincaid Ravine				none	E1 Detention Pond				none	Kincaid Ravine				none
MT EPA 200.8*SW846 6020A															
Copper, Total, ICP-MS											19.7		0.2	2	ug/L
Lead, Total, ICP-MS											91.6		0.1	0.5	ug/L
OR EPA 1664B															
Hem (oil, total)		<MDL	1.6	5.6	mg/L		<MDL	1.5	5.2	mg/L					
SGT-Hem (oil, nonpolar)		<MDL	1.6	5.6	mg/L		<MDL	1.5	5.2	mg/L					

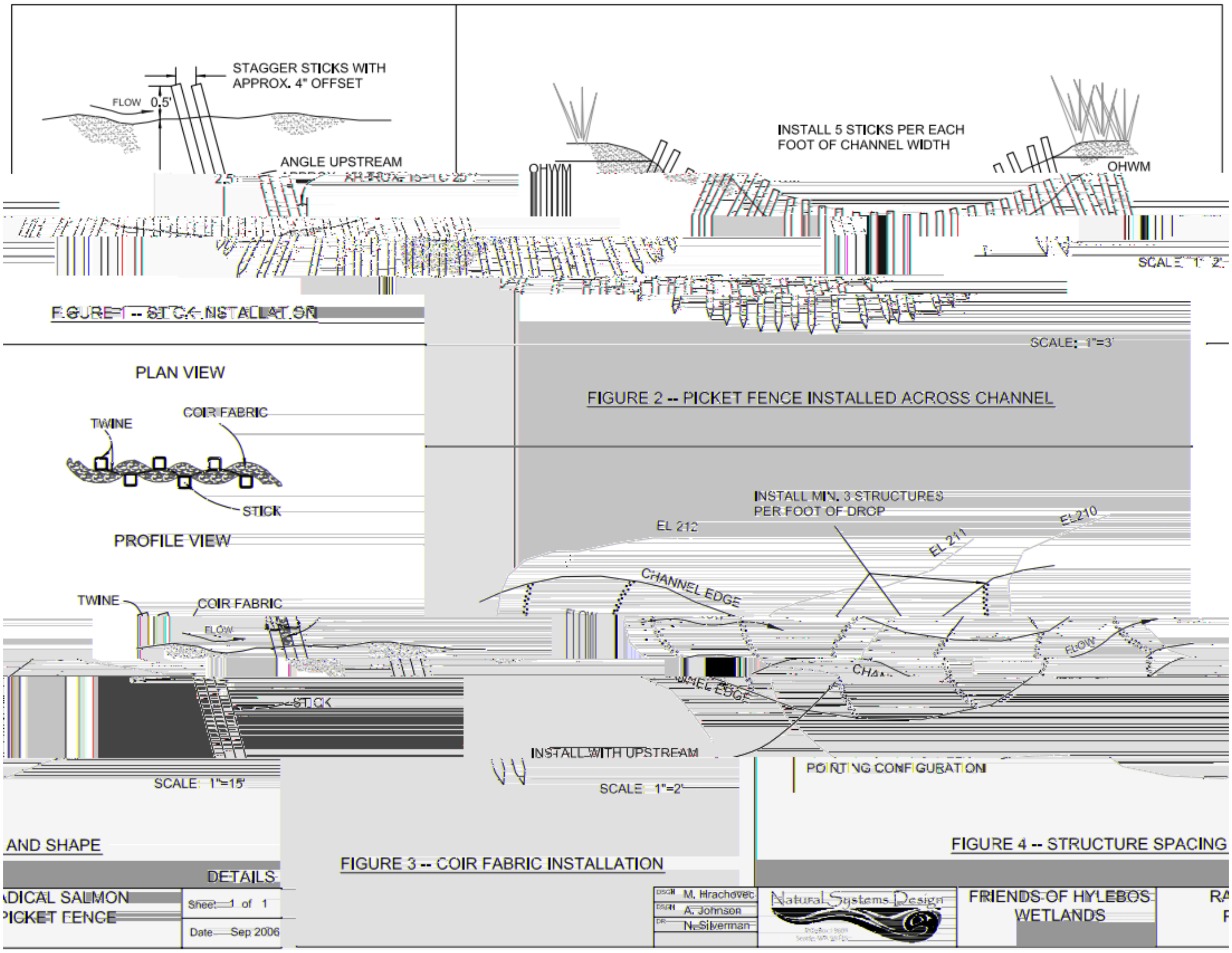
Qualifier Definitions:
<MDL = Less than the method detection limit
<RDL = Less than the reporting detection limit. Quantitative accuracy may be limited due to low response.

Project:	421874-984
Locator:	NONE
Descrip:	UNKNOWN LOCATOR
Sample:	L61949-10
Matrix:	LG STORM WTR
ColDate:	4/21/15 20:30
TimeSpan:	
TotalSolid:	
ClientLoc:	
SampDepth:	
WET Weight Basis	

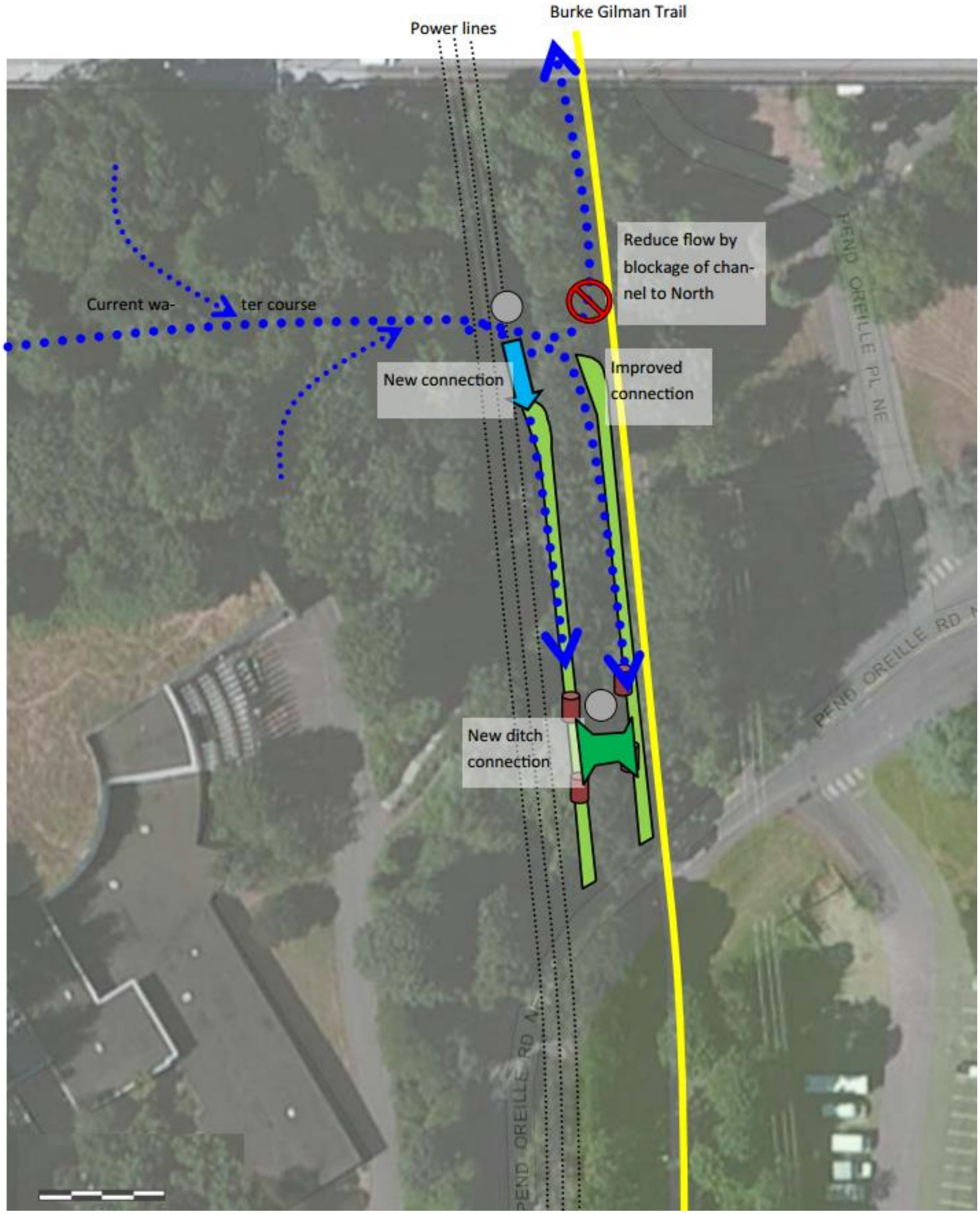
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**
ES NONE					
Sample Information	E1 Detention Pond				none
MT EPA 200.8*SW846 60					
Copper, Total, ICP-MS	0.48	<RDL	0.2	2	ug/L
Lead, Total, ICP-MS	0.14	<RDL	0.1	0.5	ug/L
OR EPA 1664B					
Hem (oil, total)					
SGT-Hem (oil, nonpolar)					

Qualifier Definitions:
<MDL = Less than the m
<RDL = Less than the re

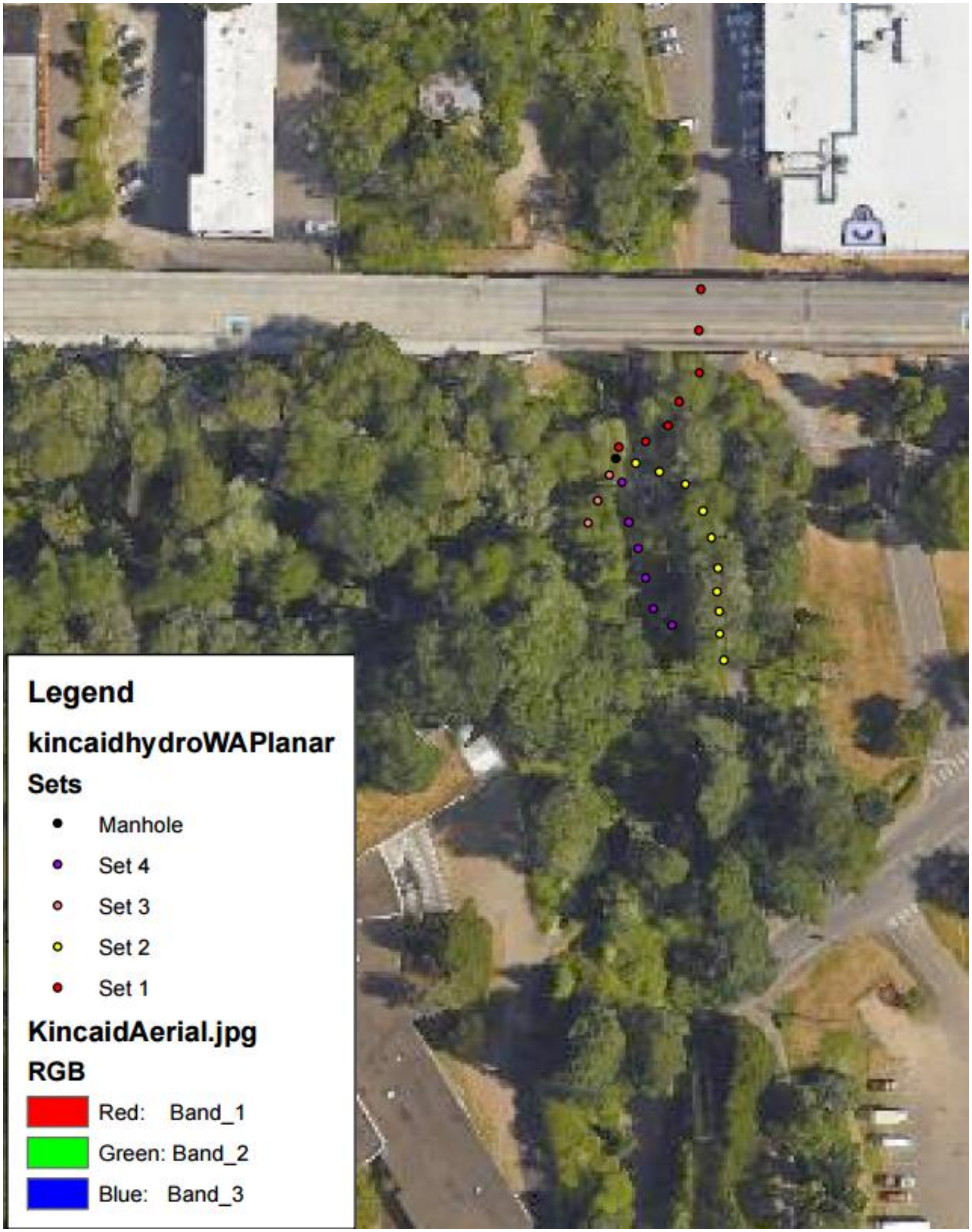
Appendix G – Picket Fence Check Dam Installation Instructions



Appendix H – Trailside Ditch Infiltration Design



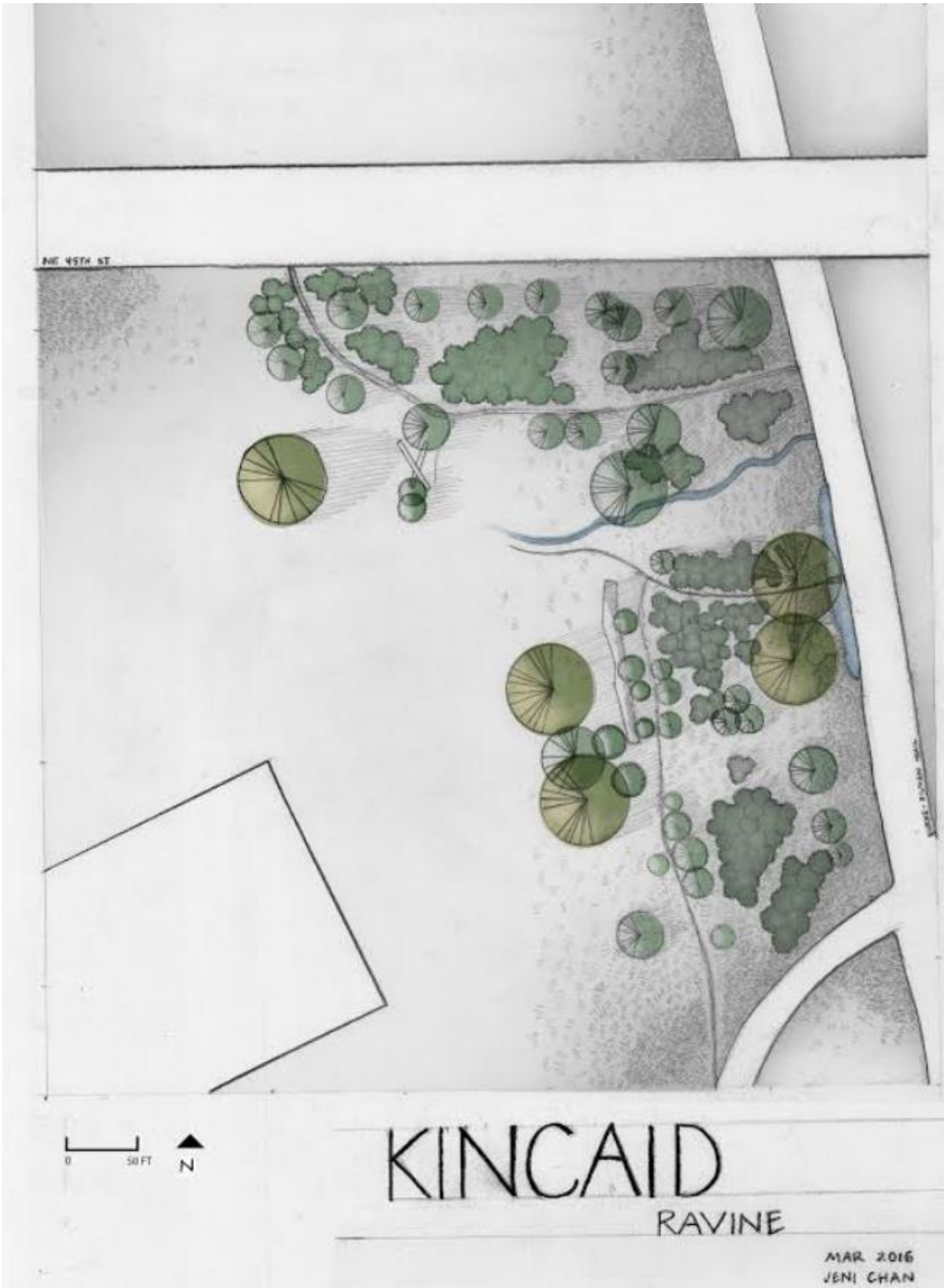
Appendix I – Elevation Map and Data for Existing Stream Course and Ditches



Line vectors for Kincaid ravine surveyed on 8/3/15 (aaron clark and Dan hintz)

Waypoint	elevation change	elevation relative to manhole (mm)
Set 1 MANHOLE TO NORTHBOUND DITCH/WETLAND		
	0	0
88	-250	-250
89	-330	-580
90	-500	-1080
91	-110	-1190
92	-26	-1216
93	-50	-1266
94	-30	-1296
Set 2 MANHOLE TO SOUTHBOUND TRAILSIDE DITCH (DITCH 1)		
manhole	0	0
95	-295	-295
96	-265	-560
97	-300	-860
98	-180	-1040
99	-190	-1230
100	30	-1200
101	-122	-1322
102	-100	-1422
103	-30	-1452
104	65	-1387
Set 3 MANHOLE TO NEXT UPHILL BEND IN CREEK		
manhole	0	0
105	140	140
106	265	405
107	455	860
Set 4 MANHOLE TO POWERLINE TO DITCH #2		
manhole	0	0
108	65	65
109	40	105
110	-75	30
111	-170	-140
112	-160	-300
113	-510	-810

Appendix J – Landscape Design: Sketch of Existing Plan



Appendix K – List of Project Contacts