Appendix A — Potential Project Opportunities: Specific Channel Rehabilitation Projects

Appendix A — Potential Project Opportunities: Specific Channel Rehabilitation Projects.

Reach ID	Project	Basis For Project	Project Description
1	Channel: 1-a. LWD Placement	1-a. LWD Placement: Minimal channel complexity, medium floodplain connectivity.	1-a. Placement of LWD at strategic locations to improve channel complexity, and improve connectivity to the floodplain and off-channel habitat areas.
	Bank: 1-b. Bank Re-vegetation	1-b. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel.	1-b. Plant native vegetation to improve density and quality. This vegetation will stabilize banks improve future LWD recruitment potential.
	1-c. Structure Removal.	1-c. Structure Removal: Rip-rap along bank toe upstream and downstream of pedestrian bridge limits floodplain connectivity and channel complexity	1-c. Removal of rip-rap where possible and replacement of LWD where necessary to encourage natural channel complexity and floodplain connectivity.
	Floodplain: 1-d. Floodplain Re-vegetation.	1-d. Floodplain Revegetation: Sparse Floodplain vegetation, improve density.	1-d. Floodplain planting to improve future LWD recruitment potential.
2	Bank/Floodplain: 2-a. Bank/Floodplain Re-vegetation	2-a. Bank/Floodplain Revegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel.	2-a. Plant native vegetation along both banks (and floodplains, where present) to improve density and quality of vegetation, where feasible due to consolidated surface geologic deposits. This vegetation will improve future LWD recruitment potential.
3	Channel: 3-a. Grade Control	3-a. Grade Control: Incised channel, disconnected from overbank flooding areas (Low Floodplain Connectivity), high channel velocities.	3-a. Place grade control structures at strategic locations to create connections to overbank and floodplain areas, to prevent further incision, and to decrease peak velocities. [1]
	Bank:	3-b. Bank Re-	3-b. Plant native

Reach ID	Project	Basis For Project	Project Description
	3-b. Bank Re-vegetation	vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel.	vegetation along both banks to improve density and quality. This vegetation will help stabilize banks and provide future LWD recruitment potential.
	3-c. Bank Stabilization.	3-c. Bank Stabilization: Field survey identified chronic erosion: 60 to 100% of the banks have eroded and are slowly eroding.	3-c. Place bank stabilization structures at critical erosion areas to prevent further widening.[1]
4	Channel: 4-a. Grade Control	4-a. Grade Control: Incised channel, somewhat disconnected from overbank flooding areas (medium connectivity).	4-a. Place grade control structures at strategic locations to create connections to overbank and floodplain areas and to prevent nick-point migration and further incision. [1]
	Bank: 4-b. Bank Re-vegetation	4-b. Bank Re-vegetation. Degraded quality and quantity of bank vegetation and lack of LWD in channel.	4-b. Plant native vegetation to improve density and quality. This vegetation will help stabilize banks and improve future LWD recruitment potential.
	4-c. Bank Stabilization	4-c. Bank Stabilization: Chronic eroding banks present throughout reach. Field survey identified 30-60% of the banks have eroded and are slowly eroding. Field survey also identified a specific eroding bank.	4-c. Place bank stabilization structures at critical erosion areas to prevent further widening.[1]
	Floodplain: 4-d. Floodplain Re-vegetation.	4-d. Floodplain Re-vegetation: Degraded quality and quantity of floodplain vegetation and lack of LWD in channel.	4-d. Plant native vegetation to improve quality and density of vegetation.
5	Channel: 5-a. Grade Control	5-a. Grade Control: Incising and widening channel.	5-a. Place grade control structures at strategic locations to prevent further channel incision. [1]
	5-b. LWD	5-b. LWD Placement:	

Reach ID	Project	Basis For Project	Project Description
	Placement	Medium channel complexity, medium floodplain connectivity, channel becoming increasingly disconnected from overbank flooding areas.	5-b. Placement of LWD at strategic locations to improve channel complexity, and improve connectivity to the floodplain.
	Bank: 5-c. Bank Re-vegetation	5-c. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel; invasive vegetation is widespread.	5-c. Remove invasive vegetation and plant native vegetation to improve density and quality. This native vegetation will stabilize banks improve future LWD recruitment potential.
	5-d. Bank Stabilization	5-d. Bank Stabilization: Eroding banks present throughout reach (5 to 30% eroding bank identified during field survey.	5-d. Place bank stabilization structures at meander bends and where the trail and channel collide.[1]
	Floodplain: 5-e. Floodplain Re-vegetation.	5-e. Floodplain Re-vegetation: Degraded quality and quantity of floodplain vegetation and lack of LWD in channel.	5-e. Plant native vegetation to improve quality and density of vegetation.
6.	Channel: 6-a. Grade Control	6-a. Grade Control: Incised and incising channel.	6-a. Place grade control structures at strategic locations to prevent further channel incision.[1]
	6-b. LWD Placement	6-b. LWD Placement: Minimal channel complexity, low floodplain connectivity, channel is disconnected from overbank flooding areas.	6-b. Placement of LWD at strategic locations to improve channel complexity, and improve connectivity to the floodplain.
	Bank: 6-c. Bank Re-vegetation	6-c. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	6-c. Remove invasive vegetation and plant native vegetation to improve density and quality. This vegetation will stabilize banks and improve future LWD recruitment potential.

Reach ID	Project	Basis For Project	Project Description
	6-d. Bank Stabilization	6-d. Bank Stabilization: Chronic eroding banks present throughout reach (30 to 60% identified during field survey).	6-d. Place bank stabilization structures to prevent future exposure of sewer line infrastructure.[1]
	Floodplain: 6-e. Floodplain Re-vegetation.	6-e. Floodplain Revegetation: Degraded quality and quantity of floodplain vegetation and lack of LWD in channel; invasive species dominate.	6-e. Remove invasive vegetation and plant native vegetation to improve quality and density of vegetation.
7.	Channel: 7-a. Grade Control	7-a. Grade Control: Widening channel.	7-a. Place grade control structures at strategic locations to reinforce the channel grade and prevent incision. [1]
	7-b. LWD Placement	7-b. LWD Placement: Medium channel complexity, medium floodplain connectivity, channel is becoming disconnected from overbank flooding areas.	7-b. Placement of LWD at strategic locations to improve channel complexity, reinforce existing LWD that are at risk, and to improve connectivity to the floodplain.
	7-c. Channel Realignment	7-c. Channel Realignment: Field survey identified eroding bank along the sewer line. Sewer line is exposed throughout the project reach.	7-c. Realign the channel to avoid and prevent conflicts with sewer line infrastructure. [1]
	Bank: 7-d. Bank Re-vegetation	7-d. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	7-d. Remove invasive vegetation and plant native vegetation on banks to improve density and quality. This native vegetation will help stabilize banks and improve future LWD recruitment potential.
	7-e. Bank Stabilization	7-e. Bank Stabilization: Eroding banks present throughout reach (5 to 30% identified during field survey).	7-e. Place bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure within the reach-specific identified

Reach ID	Project	Basis For Project	Project Description
			erosion area (s).[1]
	Floodplain: 7-f. Floodplain Re-vegetation.	7-f. Floodplain Revegetation: Degraded quality and quantity of floodplain vegetation and lack of LWD in channel. Invasive species dominate.	7-f. Remove invasive vegetation and plant native vegetation to improve quality and density of vegetation.
	7-g. Structure Removal.	7-g. Structure Removal: Channel is encroaching on sewer infrastructure.	7-g. Removal or relocation of sewer infrastructure to avoid ongoing and future conflicts with Cougar Creek. [1]
8.	Channel: 8-a. LWD Placement	8-a. LWD Placement: Minimal channel complexity, medium floodplain connectivity, channel is becoming disconnected from overbank flooding areas.	8-a. Placement of LWD throughout reach to improve channel complexity and reinforce and improve connectivity to the floodplain.
	Bank: 8-b. Bank Re-vegetation	8-b. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	8-b. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This vegetation will help stabilize banks and provide future LWD recruitment potential.
	8-c. Bank Stabilization	8-c. Bank Stabilization: Eroding banks present throughout reach. Field survey identified 5 to 30% eroding banks.	8-c. Place bank stabilization structures at critical erosion areas, such as at the outside of meander bends.[1]
9.	Channel: 9-a. Grade Control	9-a. Grade Control: Incising and widening channel, disconnected from overbank flooding areas (low connectivity).	9-a. Place grade control structures at strategic locations to reinforce the channel grade, prevent incision, and improve floodplain connectivity. [1]
	9-b. LWD Placement	9-b. LWD Placement: Minimal channel complexity, low floodplain connectivity, channel	9-b. Placement of LWD throughout reach to improve channel complexity and reinforce and improve

Reach ID	Project	Basis For Project	Project Description
		is disconnected from overbank flooding areas.	connectivity to the floodplain.
	Bank: 9-c. Bank Re-vegetation	9-c. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	9-c. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This vegetation will help stabilize banks and provide future LWD recruitment potential.
	9-d. Bank Stabilization	9-d. Bank Stabilization: Chronic eroding present throughout reach. Field survey identified 30-60% eroding banks.	9-d. Place bank stabilization structures at critical erosion areas identified in field survey.[1]
10.	Channel: 10-a. Grade Control	10-a. Grade Control: Incised and widening channel, potential for future incision, somewhat disconnected from overbank flooding areas (low connectivity).	10-a. Place grade control structures throughout reach to prevent future incision and to create connections to overbank and floodplain areas. [1]
	10-b. LWD Placement	10-b. LWD Placement: Minimal channel complexity, low floodplain connectivity, channel is disconnected from overbank flooding areas.	10-b. Placement of LWD throughout reach to improve channel complexity and reinforce and improve connectivity to the floodplain.
	Bank: 10-c. Bank Re-vegetation	10-c. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	10-c. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This vegetation will help stabilize banks and provide future LWD recruitment potential.
	10-d. Bank Stabilization	10-d. Bank Stabilization: Chronic eroding banks present throughout reach. Field survey identified 30-60% eroding banks.	10-d. Place bank stabilization structures at critical erosion areas.[1]

Reach ID	Project	Basis For Project	Project Description
11.	Channel: 11-a. Grade Control	11-a. Grade Control: Incised channel, somewhat disconnected from overbank flooding areas (low connectivity).	11-a. Place grade control structures throughout reach to prevent future incision and to create connections to overbank and floodplain areas. [1]
	11-b. LWD Placement	11-b. LWD Placement: Minimal channel complexity, low floodplain connectivity, channel is disconnected from overbank flooding areas.	11-b. Placement of LWD throughout reach to improve channel complexity and reinforce and improve connectivity to the floodplain.
	Bank: 11-c. Bank Re-vegetation	11-c. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	11-c. Remove invasive vegetation and plant native vegetation to improve density and quality. This vegetation will stabilize banks improve future LWD recruitment potential.
	11-d. Bank Stabilization	11-d. Bank Stabilization: Chronic eroding banks present throughout reach. Field survey identified 30-60% eroding banks and a location of severe bank erosion/failure.	11-d. Place bank stabilization structures at specific erosion area(s) identified in the field survey.[1]
12	Channel: 12-a. Grade Control	12-a. Grade Control: Incised channel, somewhat disconnected from overbank flooding areas (low connectivity).	12-a. Place grade control structures throughout reach to prevent future incision and to create connections to overbank and floodplain areas. [1]
	12-b. LWD Placement	12-b. LWD Placement: Medium channel complexity, medium floodplain connectivity, channel is becoming disconnected from overbank flooding areas.	12-b. Placement of LWD at strategic locations to improve channel complexity, reinforce existing LWD that are at risk, and to improve connectivity to the floodplain.
	12-c. Channel Realignment	12-c. Channel Realignment: Field survey identified	12-c. Realign the channel to avoid and prevent conflicts with

Reach ID	Project	Basis For Project	Project Description
		eroding bank along the sewer line. Sewer line is exposed throughout the project reach.	sewer line infrastructure. [1]
	Bank: 12-d. Bank Re-vegetation	12-d. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate.	12-d. Remove invasive vegetation and plant native bank vegetation to improve density and quality. This vegetation will help stabilize banks and improve future LWD recruitment potential.
	12-e. Bank Stabilization	12-e. Bank Stabilization: Eroding banks present throughout reach (5 to 30% identified during field survey), erosion threatening sewer infrastructure, expansion scour downstream of NW 94th St Culvert and adjacent outfall.	12-e. Place bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure within the reach-specific identified erosion area(s); place LWD/bank stabilization structures at outlet of NW 94th St Culvert and adjacent outfall.[1]
	12-f. Structure Removal.	12-f. Structure Removal: Channel is colliding with sewer infrastructure.	12-f. Removal or relocation of sewer infrastructure to avoid ongoing and future conflicts with Cougar Creek. [1]
13.	Channel: 13-a. Grade Control	13-a. Grade Control: Incised channel, somewhat disconnected from overbank flooding areas (medium connectivity).	13-a. Place grade control structures throughout reach to prevent future incision and to create connections to overbank and floodplain areas. [1]
	13-b. LWD Placement	13-b. LWD Placement: Medium channel complexity, medium floodplain connectivity, channel is becoming disconnected from overbank flooding areas.	13-b. Placement of LWD at strategic locations to improve channel complexity, reinforce existing LWD that are at risk, and to improve connectivity to the floodplain.
	Bank: 13-c. Bank Re-vegetation	13-bc Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in	13-c. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This

Reach ID	Project	Basis For Project	Project Description
		channel. Invasive species dominate.	vegetation will help stabilize banks and improve future LWD recruitment potential.
	13-d. Bank Stabilization	13-d. Bank Stabilization: Chronic eroding banks present throughout reach (5 to 30% identified during field survey). Field survey identified a left bank erosion area/slope failure that needs stabilization.	13-d. Place bank stabilization structures throughout reach and at critical erosion areas. LWD placement at base of identified failing left bank may be necessary to divert channel flows and velocities from bank. [1]
	13-e. Structure Removal.	13-e. Structure Removal: Field survey identified an abandoned roadway embankment and culvert that are failing and being undermined by the channel.	13-e. Remove obsolete culvert and roadway embankment fill and install grade control structures to protect the channel grade and LWD structures to reinforce the bank.
14	Channel: 14-a. Grade Control	14-a. Grade Control: Incised channel, somewhat disconnected from overbank flooding areas (medium connectivity).	14-a. Place grade control structures throughout reach to prevent future incision and to create connections to overbank and floodplain areas. [1]
	14-b. LWD Placement	14-b. LWD Placement: Medium channel complexity, medium floodplain connectivity, channel is becoming disconnected from overbank flooding areas.	14-b. Placement of LWD at strategic locations to improve channel complexity, reinforce existing LWD that are at risk, and to improve connectivity to the floodplain.
	Bank: 14-c. Bank Re-vegetation	14-c. Bank Re-vegetation: Degraded quality and quantity of bank vegetation. Invasive species dominate.	14-c. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This vegetation will help stabilize banks.
15	Bank: 15-a. Bank Re-vegetation	15-a. Bank Re-vegetation: Bank vegetation often lacking; degraded quality and quantity of bank vegetation, where	15-a. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This vegetation will help

Reach ID	Project	Basis For Project	Project Description
		present.	stabilize banks.
	15-b. Structure Removal.	15-b. Structure Removal: rip-rap and concrete walls and bank protection confine channel, cause incision, and prevent floodplain connectivity.	15-b. Remove artificial bank protection where possible and replace with native vegetation to help stabilize banks and promote natural floodplain interaction.
16	Bank: 16-a. Bank Re-vegetation	16-a. Bank Re-vegetation: Bank vegetation often lacking; degraded quality and quantity of bank vegetation, where present.	16-a. Remove invasive vegetation and plant native vegetation along both banks to improve density and quality. This vegetation will help stabilize banks.
	16-b. Structure Removal.	16-b. Structure Removal: rip-rap and concrete walls and bank protection confine channel, cause incision, and prevent floodplain connectivity.	16-b. Remove artificial bank protection where possible and replace with native vegetation to help stabilize banks and promote natural floodplain interaction.
17	Bank**:** 17-a. Bank Re-vegetation Floodplain:	17-a. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel; invasive vegetation dominates; degraded wetland channel.	17-a. Remove invasive vegetation and plant native vegetation to improve density and quality and restore wetland channel function. This vegetation will stabilize bank improve future LWD recruitment potential. s
	17-b. Floodplain Re-vegetation.	17-b. Floodplain Re-vegetation: Sparse Floodplain vegetation.	17-b. Floodplain planting to improve quality and density.
18	Channel: 18-a. Channel Realignment	18-a. Channel Realignment: straightened and degraded channel with minimal complexity.	18-a. Realign and broaden channel to enable recovery of natural wetland channel process.
	Bank**:** 18-b. Bank Re-vegetation	18-b. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate and control channel form; degraded wetland	18-b. Remove invasive vegetation and plant native vegetation to improve vegetation density and quality, to help control invasive species and restore wetland channel function. This vegetation

Reach ID	Project	Basis For Project	Project Description
		channel.	will stabilize banks and improve future LWD recruitment potential.
	Floodplain: 18-c. Floodplain Re-vegetation.	18-c. Floodplain Re-vegetation: Sparse Floodplain vegetation.	18-c. Floodplain planting to improve quality and density.
19	Channel: 19-a. Channel Realignment	19-a. Channel Realignment: straightened and degraded channel with minimal complexity.	19-a. Realign and broaden channel to enable recovery of natural wetland channel process.
	Bank**:** 19-b. Bank Re-vegetation	19-b. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate and control channel form; degraded wetland channel.	19-b. Remove invasive vegetation and plant native vegetation to improve density and quality and to help control invasive species and restore wetland channel function. This vegetation will stabilize banks and improve future LWD recruitment potential.
	Floodplain: 19-c. Floodplain Re-vegetation.	19-c. Floodplain Re-vegetation: Sparse Floodplain vegetation.	19-c. Plant native vegetation in floodplain to improve vegetation quality and density.
20	Channel: 20-a. Channel Realignment	20-a. Channel Realignment: straightened and degraded channel with minimal complexity.	20-a. Realign and broaden channel to enable recovery of natural wetland channel process.
	Bank**:** 20-b. Bank Re-vegetation	20-b. Bank Re-vegetation: Degraded quality and quantity of bank vegetation and lack of LWD in channel. Invasive species dominate and control channel form; degraded wetland channel.	20-b. Plant native vegetation to improve vegetation density and quality and to help control invasive species and restore wetland channel function. This vegetation will stabilize banks and improve future LWD recruitment potential.
	Floodplain: 20-c. Floodplain Re-vegetation.	20-c. Floodplain Re-vegetation: Sparse Floodplain vegetation.	20-c. Floodplain planting to improve quality and density.

[1]. *Further investigations necessary to determine locations and feasibility of such projects.*

Appendix B — Stream Reconnaissance Potential Project Points

Emergency/Immediate Actions

Emergency/Immediate Actions require an immediate site response project to address a potential or imminent threat to public heath, safety, or the environment. Emergency/Immediate Actions identified based on the results of the Feature Inventory are described in Table B-1.

No projects of this type were identified in surveyed reaches of Rockwell Creek, NW 2nd Avenue Tributary, and NW 7th Avenue Tributary in the Salmon Creek (RM 03.83) subwatershed.

Table B-1: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)

ID	Basis for Project	Project Description
Suds Creek		
WQ-33	Water seeping from four separate locations along the left bank. Rust colored algae and deposits are abundant near each seep. Potentially an illicit discharge.	Immediate site inspection by County staff to determine the source and pollutant loading characteristics of the seeps. Develop projects to eliminate the source of flow or treat the water to improve water quality.
Tenny Creek		
OT-127	12-inch diameter outfall pipe to channel, coming from direction of residential development. Small scour pool below outlet. Property owner from Tax Lot 97740000 suggested there could be a sewage overflow somewhere in the reach. Stream smells like sewage during heavy rain.	Contact landowners and conduct a site visit to determine source, drainage area, and pollutant loading characteristics of runoff. Conduct IDDE investigation. Add energy dissipation downstream of pipe outfall.
OT-152	Potential illicit discharge from business to left bank of creek. Pipe tightlined to channel below water surface of in-channel duck pond.	Contact landowners and conduct a site visit to determine source, drainage area, and pollutant loading characteristics of runoff. Conduct IDDE investigation.
ER-24	Adjacent landowner has placed log chunks in channel to halt channel incision and bank erosion. About 200 feet of severe bank erosion and widening present. Channel nickpoint moving through reach at this location.	Contact landowners to conduct a site visit. Investigate erosion more thoroughly. Place grade control structures to reinforce channel grade and prevent incision. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.
MI-35	Failed outfall pipe sections in creek, but could not find hydrologic connection. Severe bank erosion and slope failure present.	Confirm source, drainage area, stormwater volume contribution, and discharge points of runoff to channel. Investigate erosion more thoroughly. Place grade control structures to reinforce channel grade and prevent incision. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.

Table B-1: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
ER-25	Slope failure on left bank hillslope, potentially caused by outfall or simply rain on an unstable slope. Could not locate outfall discharge to upper slope. Large conifers and fern holding slope higher but house set-back only about 10 to12 feet from top of slope.	Further investigation of drainage connections and potential stormwater discharge to unstable slope. Confirm source, drainage area, stormwater volume contribution, and discharge points of runoff to slope. Evaluate slope stabilization, place bank stabilization structures, and plant native vegetation to halt further slope erosion and fine sediment production.
SCC-122	Failing 72-inch diameter culvert is completely clogged with sand. Resulting backwater causes ponding around retaining wall and road embankment.	Conduct further hydraulic and sediment analysis to determine how to redesign and replace culvert to improve conveyance of flow and sediment, and prevent further threats to retaining wall and road embankments.
OT-142	Submerged outfall from wetland located to the north of NE 99th Street, causes ponding along the retaining wall for the road embankment. Ponded water is covered in green algae. Thermal loading impacts to pond water quality may also be a concern.	Investigate and evaluate conveyance system pathways and stormwater connections. Conduct further hydraulic and sediment analysis to support resizing and replacing the culvert to adequately convey flow and sediment. Investigate options for improving aeration and circulation in pond.
TR-47	Container of motor oil in creek. Suds and oil on water surface. Also drum of unknown substance on left bank.	Remove containers from channel immediately. Conduct IDDE investigation. Contact landowners and discuss ways to prevent future dumping.
LaLonde Creek		
SCC-111 SCC-112	Four foot diameter CMP culvert under I-205. Culvert outlet is mostly plugged by boulders, tires, and a large log. Sediment fills the pipe behind debris accumulation. There are rust colored stains on the riprap dissipater. Approximate length is 580 feet. A total barrier to fish and wildlife. The outlet end of the culvert discharges to a scoured channel filled with riprap.	Conduct an immediate site inspection to remove debris from culvert outlet and to determine the nature of rust colored deposits. Monitor outlet for stability and armor outfall more if needed. Conduct additional barrier analysis and consider mitigating elsewhere for lost habitat connectivity since culvert replacement is highly unlikely.

Table B-1: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
TR-39	Accumulation of pressure treated lumber in the channel, blocking the flow path and causing bank erosion.	Remove debris to improve flow conditions.
NE 114th Street Tributary		
OT-98	Small, heavily landscaped open channel drains water from unknown source to right bank of stream channel. Unstable 5-foot headcut is progressing upstream in outfall channel. Outfall channel upstream of headcut is landscaped and armored.	Stabilize inflow channel to prevent additional headcut migration. Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Contact landowner about appropriate flow control and treatment of stormwater.
OT-83	Six inch diameter PVC contributes significant portion of runoff to creek from unknown source. Additional small outfall pipes on right bank, adjacent to apartment building.	Contact landowner and conduct a site visit to determine source, drainage area, and pollutant loading characteristics of runoff. Conduct IDDE investigation.
OT-90 ER-20 AP-21	36-inch diameter outfall to left bank is two-thirds full of sediment and appears to have failed or have been abandoned. Failed energy dissipation at outfall likely has contributed to significant left bank erosion. The left bank slope is near failure. Additional erosion around culvert embankment and right bank from an access trail.	Confirm source, drainage area, and pollutant loading characteristics and volume of runoff to outfall. Repair failed sections of outfall pipe. Provide energy dissipation and slope stabilization. Reestablish native undergrowth and canopy vegetation on floodplain and banks to stabilize banks, enhance riparian habitat, and discourage future erosion from pedestrian access.

Stormwater Facility Capital Improvement Projects

Stormwater Facility Capital Improvement Projects are projects that create new or retrofit existing stormwater flow control or treatment facilities. Facility retrofits include projects that will increase an existing facility's ability to control or treat stormwater in excess of the original facility's design goals. Stormwater Facility Capital Improvement Projects were identified based on the results of the Feature Inventory are described in Table B-2 and B-3.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
Suds Creek		
OT-164 MB-21 MB-22 MB-23 MB-24 MB-25 MB-26 MB-27 OT-165 SCC-132 SCC-133 OT-167	Multiple features combine to form a large bioswale/pond-type stormwater treatment facility. Primary source of stormwater to the facility is via OT-164 which drains from an unknown source – potentially impervious surfaces associated with I-5, NE 99th Street, and surrounding commercial development. OT-167 is the final discharge point to Suds Creek. There are some invasive plant species in the stormwater facility, including reed canary grass, blackberry, and cattail. Facility's effectiveness at treating large volumes of stormwater is unknown.	Monitor flow leaving treatment facility to determine if facility is providing proper treatment at a range of flows. Look for ways to improve treatment through modifications of vegetation or altered management practices. Manage invasive plant species that are not contributing to stormwater treatment and may spread downstream.
MI-39 WQ-35 SCC-142	Stream flow into excavated, on-line pond. SCC-142 is a 24-inch diameter culvert under the access road which appears to act as an outlet structure to the pond. Likely acts as a detention/treatment facility. Pond drains to form new stream channel. Pond outlet may be undersized and lead to flooding of the pond during high flows. Appears to be some erosion of embankment at pond outlet.	Conduct additional hydraulic and barrier analysis to determine if replacement is required. Reinforce embankment at pond outlet to prevent further erosion. Conduct additional hydraulic and barrier analysis to determine if pond outlet replacement is required. Monitor flow leaving treatment facility to determine if facility is providing proper treatment at a range of flows. Look for ways to improve treatment through modifications of vegetation or altered management practices.
OT-166	Four foot diameter CMP outfall is the origin of Suds Creek and drains treated and untreated stormwater runoff from a very large area of residential and commercial development and arterial streets.	Monitor water quality. Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Look for opportunities to reduce stormwater runoff volume in this area through source control and other LID-type solutions.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-168	16-inch diameter CMP outfall pipe drains stormwater from an unknown source directly to the stream at the upstream end of SCC-134.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-169	Two, 4-inch diameter HDPE pipes drain stormwater directly to the channel from the apartments to the east. Likely roof drains.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.
OT-170	Multiple pipes draining roof runoff directly to the stream. Two, 4-inch diameter HDPE pipes drain to the left bank. Two, 4-inch diameter HDPE pipes drain to the right bank. And an 8-inch diameter PVC pipe drains to the right bank 10 feet downstream of the HDPE pipes on the right bank.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.
OT-171	One foot diameter concrete pipe is partially buried and discharges stormwater directly to the channel on left side of SCC-135. Outfall pipe drains stormwater from an unknown source.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-172	Four inch diameter HDPE pipes drain stormwater directly to the channel from the apartments to the east. Likely roof drains.	Confirm source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.
OT-173	18-inch diameter CMP outfall pipe ends at a round, perforated concrete energy dissipater. Delivers stormwater from an unknown source to the left floodplain approximately two feet from the stream. Two outfalls are shown well upslope to the southwest in the County's current GIS data. They may or may not be associated with this outfall.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-175	Two foot diameter rusted metal pipe stubbed out of bank, delivers water from an unknown source directly to channel. Discarded shopping cart in channel at the outfall. Two outfalls are shown well upslope to the southwest in the County's current GIS data. They may or may not be associated with this outfall.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. Remove trash from channel.
OT-177	Four outfall pipes discharge stormwater from an unknown source to a riprap covered slope at the same location. The pipes are a 12-inch diameter CMP, a 24-inch diameter CPP, and two, 4-inch diameter HDPE pipes. An outfall near this location is shown in the County's current GIS data.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-178	A riprap lined channel delivers stormwater to the left bank of the channel from an undetermined source. A 12-foot-long section of 12-inch diameter CMP is lying on the bank perpendicular to the outfall channel. This outfall is shown in the County's current GIS data.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-179	18-inch diameter CMP outfall pipe discharges stormwater from an unknown source to the right bank. There is no energy dissipation and the flow has cut a channel across the floodplain from the outfall to the stream. An outfall near this location is shown in the County's current GIS data.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. Install appropriate energy dissipaters.
OT-180	Two HDPE (8-inch diameter and 4-inch diameter) pipes drain stormwater directly to the channel from the apartments to the east. Likely roof drains or other residential runoff.	Confirm source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.
OT-182	Two foot-deep eroded open channel delivers stormwater to the channel from an unknown source on the right bank.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-183	24-inch diameter CMP outfall pipe on left bank. Outlet discharges to a round concrete energy dissipater.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-184	12-inch diameter rusted and broken CMP outfall pipe on left bank delivers stormwater from an unknown source.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. Install appropriate energy dissipaters. Replace outfall pipe.
OT-185	Four inch diameter outfall pipe discharges to top of right back. Source likely roof drainage. Causing erosion of bank.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.
OT-186	14-inch diameter CMP outfall pipe discharges stormwater to right bank. No energy dissipation. Large hole scoured with approximate dimensions of 5-foot width, 4-foot depth and an 8-foot long eroded gully to the stream. This outfall is shown in the County's GIS data.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. Restore bank and install appropriate energy dissipaters.
OT-187	Four inch diameter HDPE outfall pipe is exposed on left floodplain before discharging to left bank. Source is likely a private residence (Tax Lot 189203015).	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate. Work with landowners to deal with their stormwater more appropriately.
OT-188	14-inch diameter CMP outfall pipe discharges stormwater from unknown source to right bank 10 feet upslope of channel. Gabion structures provide energy dissipation.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-189	12-inch diameter pipe discharges stormwater from wetpond/wetland to left bank of stream channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-190	18-inch diameter outfall discharges stormwater to the left bank at downstream end of culvert crossing. Source of runoff is unknown. County GIS data shows a conveyance pipe ending draining from a large area south of NW Bassel Road at this location, but no discharge point is shown in the data. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-191	24-inch diameter metal pipe drains open channel and wetland on left bank floodplain. Pipe discharges directly to stream. Source of flow to the wetland is unknown.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately.
OT-195	One inch diameter pipe discharges to right bank. Source appears to be footing drainage for small retaining wall.	Confirm source of flow. Develop project if necessary. Work with landowners to deal with their stormwater more appropriately.
OT-174	Narrow, eroded open channel enters stream on right bank. May be from runoff or formed by animals (nutria). It appears to carry flow at some times.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-176	Open channel on left appears to be from a seep under a tree, but may be carrying stormwater at times. Bank above is severely eroded. House is on an unstable slope.	Investigate source of flow to determine if an outfall is causing slope instability that may be threatening a house. Contact landowner about potential threat to their property.
OT-192	Small, open channel discharges stormwater from left bank floodplain to stream channel. Small trickle observed.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-193	Small, open channel discharges stormwater from left bank floodplain to stream channel. No flow observed in outlet channel, but trickle observed coming out of the bank immediately below outlet channel.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-194	Small, open channel discharges stormwater from left bank floodplain to stream channel. Small trickle observed.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-181	18-inch diameter metal pipe in channel along right bank. Pipe is 75percent buried in sediment and may not be functional.	Determine if this is a functional outfall. If it is, investigate source, drainage area, and pollutant loading characteristics of runoff. Replace the outfall. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. If it is not an outfall, remove the pipe.
Tenny Creek		
OT-124	30-inch diameter outlet of pipe is partially crushed and clogged with sediment and debris which blocks flow and reduces capacity.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Conduct further hydraulic and sediment analysis of existing pipe to determine if pipe is adequately sized for conveyance of flow and sediment. Determine if outlet section of pipe needs replacement. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-130	12-inch diameter outfall likely conveys untreated runoff from NE 99th street to the stream.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-144	18-inch diameter pipe conveys roadway runoff through brick wall on right bank slope to a rip-rap lined conveyance pathway to the main channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Add additional energy dissipation to reduce erosion downstream of outfall.
OT-145	Swale conveying runoff from NE 25th Avenue to channel. Facility's effectiveness at treating stormwater is unknown.	Monitor water quality. Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. If necessary, retrofit existing swale to better detain and treat runoff appropriately.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-146	Infiltration ponds treat runoff from NE 25th Avenue before discharging to channel. Some oil in channel. Facility's effectiveness at treating stormwater is unknown.	Monitor water quality. Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. If necessary, retrofit existing infiltration ponds to better detain and treat runoff appropriately. Evaluate need to install an oil/water separator.
OT-147	Infiltration ponds treat runoff from NE 25th Avenue before discharging to channel. Facility's effectiveness at treating stormwater is unknown.	Monitor water quality. Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. If necessary, retrofit existing infiltration ponds to better detain and treat runoff appropriately.
OT-148	Poorly installed outfall, likely draining flow from a depression located at bottom of failing left bank slope.	Confirm source, drainage area, and stormwater volume contribution of runoff. Conduct further hydraulic and sediment analysis of existing pipe to determine if pipe is adequately sized for conveyance of flow and sediment. If necessary, retrofit or replace pipe.
OT-149	Tree fallen on outlet pipe. No outfall found, but riprap-lined channel conveys flow from upper banks to the channel. Seepage in vicinity of channel appears to be contributing to unstable slopes.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff upstream of hillslope. Add additional energy dissipation to reduce erosion downstream of outfall. Move fallen tree away from outfall.
OT-150	Riprap-lined channel extends from base of valley wall to channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Add additional energy dissipation to reduce erosion downstream of outfall.
OT-150	Inadequate/failing riprap energy dissipation at outfall from stormwater facility on right bank hillslope. Channel erosion downstream of outfall.	Monitor water quality. Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. If necessary, retrofit existing facility to better detain and treat runoff appropriately. Add additional energy dissipation downstream of outfall to reduce erosion. Reestablish native undergrowth and canopy vegetation on banks to promote bank stability.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-153	Riprap-lined channel outfall to left bank.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-155	Overland, riprap-lined ditch conveys runoff from Highway 99 directly to the ecology blocks that form the embankment for SCC-124.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-156	Tributary and potential outfall enters stream from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-157	Ditch/swale conveys highway runoff to right bank of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-158	Ditch/swale conveys runoff from unknown source to right bank of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-159	Six inch diameter outfall contributes runoff from direction of apartment buildings and parking lot to channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-160	Six inch diameter outfall contributes runoff from direction of apartment buildings and parking lot to channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff.
OT-161	Rip-rap along bank is potential drainage path for road runoff to right bank of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff. Plant native vegetation to encourage infiltration and stabilize banks.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-162	24-inch diameter outfall discharges from top of right bank slope with riprap cascade down to channel. Outfall invert elevation is perched about four feet above downstream cascade and energy head is causing erosion of riprap and rocks placed in cascade for energy dissipation.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff. Plant native vegetation to encourage infiltration and stabilize banks. Truncate outfall to edge of slope. Install additional energy dissipation and grade control within the drainage cascade to channel.
OT-163	18-inch diameter outfall discharges to embankment above SCC-131. Grass growing on quarry spalls and old silt fence in front of outfall never removed.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff. Plant native vegetation to encourage infiltration and stabilize banks. Remove silt fence and add energy dissipation downstream of outfall.
MI-30	Manhole along storm drain network from unknown source that is a tributary to OT-124. Severe blackberry encroachment.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
MI-31	Unknown outlet for creek overflow structure with emergency overflow inlet at top of embankment. Very little freeboard between RIM elevation for emergency overflow and the adjacent roadway. If culvert outlet for channel exists, it is buried by sediment.	Investigate and evaluate conveyance system pathways and stormwater connections. Conduct further hydraulic and sediment analysis of existing channel conveyance system to determine if pipe is adequately sized for conveyance of flow and sediment. Determine if emergency overflow structure needs to be redesigned to provide additional freeboard. Construct a new stormwater facility to detain and treat runoff appropriately before discharging to the creek.
MI-37	Potential raccoon access to creek on left bank floodplain. Floodplain wetland area appears to be washing area for raccoons. Potential water quality impacts.	Monitor water quality and raccoon activity to confirm source and extent of pollutant loading. If necessary, install a facility to discourage raccoon access to channel or to better treat runoff.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
LaLonde Creek		
OT-131	Eight inch diameter CMP outfall pipe discharges what appears to be untreated stormwater runoff directly to the stream. Source of stormwater is road surfaces and residential development to the north. This outfall is shown in the County's current GIS data.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Armor outfall to prevent scour.
OT-108 WQ-31	12-inch diameter half-pipe outfall drains runoff from intersection of NE 50th Avenue and NE 99th Street. No treatment. Stormwater drains to a pond on the northeast corner of the intersection. Ducks, goats, bare banks, and significant trash in and surrounding the pond. Likely water quality issues. It is unclear if this pond discharges to LaLonde Creek.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Investigate outflow and potential water quality issues associated with the pond. Modify the pond and pond management practices or construct a new stormwater facility to detain and treat runoff and improve water quality. Fortify outfall to prevent scour.
OT-109	3.5-foot diameter CMP outfall pipe with failing riprap dissipater discharges to an incised channel at origin of the surveyed channel. Outfall drains water and runoff from unknown sources. A failed 12-inch diameter half-pipe outfall from the intersection of NE 50th Avenue and NE 99th Street drains to same point.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct new stormwater facilities to detain and treat runoff appropriately. Repair armored outfall to prevent additional scour.
OT-111	9-inch diameter CMP outfall pipe discharges what appears to be untreated stormwater runoff directly to the stream. Outfall is buried by LWD and sediment. Source of stormwater is likely road surfaces and residential development to the north. Current aerial photography and tax lots show a planned, but unbuilt development. This outfall is shown in the County's current GIS data.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility or facilities to detain and treat runoff appropriately. Modify outfall to improve stream conditions and prevent scour. Retain LWD in channel.
OT-114	Oddly oriented section of 1.5-foot diameter CMP pipe. Pipe angles 90 degrees up from horizontal pipe at base. There is evidence that water flows out of the pipe and scours around the outfall. Source of flow could be I-205 to the east.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility or facilities to detain and treat runoff appropriately. Modify outfall to improve stream conditions and prevent scour.
OT-115	18-inch diameter CMP outfall drains stormwater directly to channel from direction of I-205. There is a riprap dissipater, but no visible treatment facility. Substrate and riprap are stained and rust colored near the outfall. A significant deposit of mucky, rust colored sediment is present on the right bank immediately downstream of the outfall.	Conduct IDDE screening. Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility or facilities to detain and treat runoff appropriately. Investigate pollutant characteristics of rust colored sediment deposits. Remove deposit and revegetate banks.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-136 CM-20	18-inch diameter CMP outfall drains stormwater directly to channel. Runoff is likely from NE 119th Street. There is a riprap dissipater, but no visible treatment facility. The right bank of the channel is also armored with riprap where the channel comes closest to the road.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility, or facilities, to detain and treat runoff appropriately.
OT-137	Four inch diameter PVC roof drain pipe drains water directly to the channel.	Educate landowner about alternative ways to deal with roof runoff including disconnecting downspouts to encourage infiltration, and rain barrels or cisterns to trap runoff for reuse.
OT-138	12-inch diameter CPP outfall drains stormwater directly to channel. Runoff is likely from NE 119th Street. There is no dissipater, or signs of significant volume or velocity of discharge. There is no visible treatment facility.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility or facilities to detain and treat runoff appropriately.
OT-139 CM-25	36-inch diameter concrete outfall pipe drains stormwater directly to channel. Runoff is likely from NE 119th Street, NE Salmon Creek Avenue, and surrounding impervious surfaces related to residential development. A County stormwater pond located across NE 119th Street may be providing detention and treatment of water that discharges here. This outfall is shown in the County's current GIS data. Both banks and the channel are armored with riprap. An armored grade control in the form of a three vertical-foot drop in channel bed elevation is located immediately upstream of this outfall.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. Monitor outfall, grade control structure, and stream for signs of instability.
OT-140	18-inch diameter CPP outfall pipe drains stormwater directly to channel. Runoff is likely from NE 119th Street, NE Salmon Creek Avenue, and surrounding impervious surfaces related to residential development. A County stormwater pond located across NE 119th Street may be providing detention and treatment of water that discharges here. This outfall is shown in the County's current GIS data. The outfall is located immediately downstream of OT-139 and CM-25.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Confirm that stormwater is receiving necessary treatment. Modify existing stormwater facilities or construct new stormwater facilities to detain and treat runoff appropriately. Monitor outfall, grade control structure, and stream for signs of instability.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-141	Three inch diameter PVC pipe drains water from the right bank. It looks like a yard drain or sump drain, although it is discharging more water than would be anticipated. The property owner says it drains from a koi pond.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-132	Small channel carrying flow from an unknown source enters the channel from the right bank in the direction of residential development. Flow may be groundwater seep from the toe of the slope or from an outfall located up the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-110	Prominent draw carrying flow from an unknown source enters the channel on the right bank. Not eroding significantly. This may be a natural feature that is now delivering stormwater from residential development on the top of the valley wall. Based on County LiDAR topography, the natural drainage has headwaters at the end of NE 103rd Street, a likely point for an outfall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-113	Small channel carrying flow from an unknown source to channel on the right bank. Flow may be groundwater seep or from an outfall located along I-205.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-116	Small channel carrying flow from an unknown source to channel on the right bank. Flow may be groundwater seep or from an outfall located along I-205, which is visible from the inflow point.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-117	Small channel/ gully carrying flow from an unknown source to channel on the left bank. Channel is eroding and flows from the direction of a residential development. Flow may be groundwater seep or from an outfall located at the top of the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-133	Five foot wide, shallow swale carrying overland flow from an unknown source enters the channel from the left bank in the direction of residential development. Flow may be groundwater seep from the toe of the slope or from an outfall located up the valley wall. There is a County stormwater facility in the housing development at the top of the valley wall near the powerline corridor, but this flow is not believed to be associated with that facility.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-134	Small channel/ gully carrying flow from an unknown source to channel on the left bank. Channel is eroding and flows from the direction of a residential development. Flow may be groundwater seep or from an outfall located at the top of the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-135	Prominent draw carrying flow from an unknown source enters the channel on the right bank. Small channel is not eroding significantly. This may be a natural feature that is now delivering stormwater from low density residential development or I-205 on the top of the valley wall. Based on County LiDAR topography, the natural drainage has headwaters at a private driveway.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
Rockwell Creek		
OT-122	Open channel drains stormwater from detention pond outlet.	Confirm source of stormwater. Develop project if necessary.
OT- 121	18-inch diameter pipe drains stormwater from unknown source to left bank of channel. Logs are present for energy dissipation.	Monitor and evaluate effectiveness of energy dissipater. Investigate source, drainage area, and pollutant loading characteristics of runoff. If necessary, construct a new stormwater facility to detain and treat runoff appropriately.
OT-120	4-inch diameter PVC pipe drains stormwater from unknown source directly into channel on left bank. No apparent treatment.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Conduct IDDE investigation. Develop project if necessary.
OT-118	15-inch diameter CMP pipe drains stormwater to right bank onto gabion dissipaters. No apparent detention or treatment facility. Source appears to be NE 134th Street.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
NE 114th Street Tributary		
OT-91	30-inch diameter pipe is origin of NE 114th Street Tributary. No apparent detention or treatment facility. Sources appear to be NE 114th Street, NE 33rd Avenue, school fields, and surrounding impervious surfaces related to residential development. Riprap provides energy dissipation and grade control for 30 feet downstream. Channel headcut is located at downstream end of riprap. This outfall is shown in the County's current GIS data. According to local landowner (Tax Lot 118254696), this pipe was outlet to drain existing wetlands for development.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Investigate opportunities for large scale wetland construction in this, or another tributary stream to mitigate for impacts of development on Salmon Creek. Monitor headcut at downstream end of armored outfall.
OT-93	36-inch diameter pipe drains stormwater from unknown source to left bank of stream channel. Outfall is perched eight feet above the channel and floodplain. Reused concrete sidewalk pads at base of six foot drop provide inadequate energy dissipation.	Investigate source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Armor outfall more thoroughly to prevent additional scour.
OT-94	Road runoff from NE 28th Avenue drains via open channel to right bank. Active erosion of roadside and hillslope.	Confirm source of stormwater and construct facility retrofits on road ditches to detain and treat runoff appropriately. At minimum, armor outfall to prevent additional erosion.
OT-95	18-inch diameter pipe drains stormwater from detention pond facility to left bank of stream channel. Outfall discharges to headwall with bolted steel dissipaters and riprap for energy dissipation. This outfall is shown in the County's GIS data.	Confirm source of stormwater. Develop project if necessary.
OT-96	18-inch diameter pipe drains stormwater from unknown source to right bank of stream channel. Outfall is undercut by erosion. This outfall is shown in the County's GIS data.	Stabilize outfall and add proper energy dissipation. Investigate source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-97	Open channel drains stormwater from unknown source to right bank. Outfall channel is vegetated. Flowing water observed.	Investigate source of stormwater. Develop project if necessary.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-99	18-inch diameter pipe drains stormwater to left bank of stream channel. Source appears to be NE 110th Street. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-100	12-inch diameter eroded pipe drains stormwater from NE 110th Street to right bank of stream channel. No apparent treatment. View of pipe obstructed by nightshade and blackberry. This outfall is shown in the County's GIS data.	Stabilize eroding outfall and install proper energy dissipation. Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Eradicate nightshade and blackberry.
OT-101	Four inch diameter pipe drains stormwater on right bank directly into stream channel. Source possibly roof drainage. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Eradicate nightshade and blackberry.
OT-102	Small open channel drains water from unknown source to right bank of stream channel. Likely stormwater source. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-103	18-inch diameter pipe drains stormwater from unknown source directly to stream at culvert inlet. No apparent treatment. This outfall is shown in the County's GIS data.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-104	Roadside ditch drains stormwater from NE Highway. No apparent treatment. Erosion of ditch undercuts side of road.	Stabilize ditch and repair road grade as needed. Confirm source of stormwater and construct facility retrofits on road ditches to detain and treat runoff appropriately. At minimum, armor outfall to prevent additional erosion.
OT-105	Four inch diameter pipe drains stormwater from unknown source on right bank directly into stream channel at downstream end of culvert. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-106	12-inch diameter pipe drains stormwater from unknown source directly into manhole. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-107	Four inch diameter pipe drains stormwater from unknown source directly to manhole inlet. No apparent treatment.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
NW 2nd Avenue Tributary		
OT-199	Small, eroding open channel delivering water to the stream on the right bank. Flow is from an unknown source in the direction of residential development. Erosion suggests that the channel may be carrying stormwater at times.	Confirm source of runoff, drainage area, and pollutant loading characteristics. Construct stormwater detention/treatment and water quality enhancement facilities if appropriate. Stabilize eroding inflow channel using LWD grade control.
OT-206	Small, eroding open channel delivering water to the stream on the right bank. Flow is from an unknown source in the direction of residential development. Erosion suggests that the channel may be carrying stormwater at times. The erosion is threatening the right end of a small wooden footbridge over the stream.	Confirm source of runoff, drainage area, and pollutant loading characteristics. Construct stormwater detention/treatment and water quality enhancement facilities if appropriate. Stabilize eroding inflow channel using LWD grade control.
OT-200	Tributary stream (4-feet wide and 2-feet deep) enters stream from the left bank. Bed and banks showing signs of erosion, suggesting that the channel is carrying stormwater at times from the direction of residential development to the east. County GIS data and LiDAR contours suggest that a stormwater outfall is at the head of this unmapped tributary (DNR Stream Layer).	Confirm source of runoff, drainage area, and pollutant loading characteristics. Construct stormwater detention/treatment and water quality enhancement facilities if appropriate. Stabilize eroding tributary stream using LWD grade control.
OT-207	Open gully with eroding bed and banks enters the stream from the right bank. The ravine extends up the valley wall and out of the valley. 6-inch diameter pipe discharges to the gully, from an unknown source. The gully extends uphill beyond this inflow pipe and likely takes on other sources of stormwater. County GIS data shows a stormwater discharge point near the intersection of NW Herman Drive and NW 2nd Avenue that may be the source of this runoff. While hiking out of the NW 7th Avenue Tributary, field crews noticed a significant open channel flowing from that intersection through an existing stormwater facility, manmade ponds and landscape features, and toward the NE 2nd Avenue Tributary.	Confirm source of runoff, drainage area, and pollutant loading characteristics. Retrofit existing stormwater facilities or construct new facilities to improve detention/treatment and water quality enhancement. Stabilize eroding inflow gully using LWD grade control.
OT-202	Stormwater discharge point on the left bank with concrete drywell and riprap dissipater. Source of stormwater is residential development to the east. County GIS data shows a stormwater discharge point here. Treatment and flow control facilities were not observed. Outfall was in good condition.	Confirm source of runoff, drainage area, and pollutant loading characteristics. Retrofit existing stormwater facilities or construct new facilities to improve detention/treatment and water quality enhancement.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-214	Eight inch diameter CPP drains stormwater from an unknown source directly to the stream. The pipe comes down the left (east) valley wall from the direction of residential development. The pipe ends at a small log jam. Treatment and flow control facilities were not observed.	Confirm source of runoff, drainage area, and pollutant loading characteristics. Retrofit existing stormwater facilities or construct new facilities to improve detention/treatment and water quality enhancement.
OT-197	Overland flow from an unknown source enters the channel from the left bank in the direction of residential development. Not a well defined channel. Flow may be groundwater seep from the toe of the slope or the terminus of a flow path from an outfall located up the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-204	Overland flow from an unknown source enters the channel from the right bank in the direction of residential development. Not a well defined channel. Flow may be groundwater seep from the toe of the slope or the terminus of a flow path from an outfall located up the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-205	Small channel carrying flow from an unknown source enters the channel from the left bank in the direction of residential development. Flow may be groundwater seep from the toe of the slope or the terminus of a flow path from an outfall located up the valley wall. Mainstem channel is becoming more defined downstream of this point.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-198	Small channel carrying flow from an unknown source enters the channel from the left bank in the direction of residential development. Flow may be groundwater seep from the toe of the slope or the terminus of a flow path from an outfall located up the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.
OT-203	Small channel carrying flow from an unknown source enters the channel from the left bank in the direction of residential development. Flow may be groundwater seep from the toe of the slope or the terminus of a flow path from an outfall located up the valley wall.	Investigate source of flow. Develop stormwater treatment and water quality enhancement project(s) if appropriate.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
NW 7th Avenue Tributary		
MI-44	Small tributary entering the main channel on the left bank. Tributary is showing signs of instability and incision. Landowner mentioned that flows have increased and that he felled trees in the channel to try and prevent erosion by slowing the flows.	Investigate source of flows to this tributary stream. Construct a new stormwater facility or retrofit existing facilities to properly detain and treat stormwater if necessary. Otherwise, consider channel stabilization and habitat enhancement.
OT-208	Open channel gully enters stream from the right bank. Currently showing some minor evidence if incision and instability. This could be draining from an outfall identified by Jeff Schnabel, but field crews were unable to verify it.	Investigate source of flows to this gully. Construct a new stormwater facility or retrofit existing facilities to properly detain and treat stormwater if necessary. Otherwise, consider channel stabilization and habitat enhancement.
OT-209	Open channel entering stream from the left bank. County GIS data indicates a stormwater outfall upslope that may be draining to this point. The same mapped outfall may also be responsible for the hillslope failure at ER-34 (see Table B-4).	Confirm source of flow. Construct a new stormwater facility or modify and existing facility to detain and treat runoff appropriately. Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
OT-210	Open channel entering stream from the right bank has headwaters at the condos on top of the valley wall. Likely input from gutters. Dense blackberry chokes the upper section of the channel.	Confirm source of flow. Construct a new stormwater facility or modify and existing facility to detain and treat runoff appropriately. Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.

Table B-2: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
OT-211	Open channel gully enters stream on left bank and drains water from an unknown source. Some evidence of incision. Unlikely from the mapped stormwater discharge point in the County GIS layer.	Investigate source of flows to this gully. Construct a new stormwater facility or retrofit existing facilities to properly detain and treat stormwater if necessary. Otherwise, consider channel stabilization and habitat enhancement.
OT-212	Open channel gully enters stream on left bank and drains water from an unknown source. Channel is somewhat eroded and unstable. Based on location, runoff is likely from the mapped stormwater discharge point in the County GIS layer.	Investigate source of flows to this gully. Construct a new stormwater facility or retrofit existing facilities to properly detain and treat stormwater if necessary. Otherwise, consider channel stabilization and habitat enhancement.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-85	Bank erosion around pipe outlet has exposed lower segment of pipe. The bank across from the outfall is also eroding. Culvert likely delivers stormwater from adjacent commercial properties.	Investigate source of runoff and confirm drainage area and pollutant loading characteristics. Work with landowners to implement source control and/or to install a new stormwater facility to treat and retain stormwater. Add energy dissipation at toe of bank at the outlet of outfall.
OT-89	24-inch diameter pipe drains stormwater from NE Hazel Dell Avenue to channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-49	12-inch diameter pipe drains stormwater from NW 94th Street to channel; pipe outlet has collapsed at base of fill slope for stream crossing culvert.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Replace outfall pipe.
OT-50	12-inch diameter pipe drains stormwater from residential neighborhood on upper right bank hillslope. Pipe outlet is partially crushed. An oily sheen is present and swale downstream of outfall ends in minor headcut at the main channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Replace outfall pipe.
OT-52	12-inch diameter pipe drains stormwater from residential neighborhood on upper left bank hillslope. Riprap present in swale downstream of outfall, located midway downslope. Slope and banks are unstable, and left bank shows erosion in channel downstream of outfall.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Extend outfall pipe to base of slope and add energy dissipation.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-53	12-inch diameter pipe discharged untreated stormwater from residential neighborhood on upper right bank hillslope.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-58	Incising ditch contributes stormwater from unknown source in direction of residential area on upper right bank hillslope to right bank of channel, causing significant right bank erosion.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Modify outfall to install energy dissipation and bank protection at outlet.
OT-62	Four inch diameter pipe contributes stormwater to left bank from unknown source in direction of residential area on upper left bank hillslope. Outfall causes localized bank erosion at outlet.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Modify outfall to install energy dissipation and bank protection at outlet.
OT-73	12-inch diameter pipe and incising open channel convey stormwater from unknown source to left bank of channel. Open channel could be conveying flow that was previously carried by the pipe.	Further investigation needed to confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff, as well as to determine whether stormwater pipe has failed or been undermined. Potential need to construct a new stormwater facility to detain and treat runoff appropriately, as well as to construct improved conveyance to the channel. If a pipe is reinstalled, the outfall should be accompanied by energy dissipation and bank protection.
OT-61	Open channel contributing runoff from unknown source enters at left bank of channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Monitor stormwater quality and determine if an existing facility should be retrofitted or whether a new facility should be constructed to adequately treat and retain stormwater runoff. Enhance/stabilize open channel by adding LWD and native vegetation to stabilize channel and banks, improve channel complexity, and promote floodplain connectivity.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-70	Incising open channel contributing runoff from unknown source at left bank of main channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Monitor stormwater quality and determine if an existing facility should be retrofitted or whether a new facility should be constructed to adequately treat and retain stormwater runoff. Enhance/stabilize open channel by adding LWD and native vegetation to stabilize channel and banks, improve channel complexity, and promote floodplain connectivity.
OT-72	Incising open channel contributing runoff from unknown source at left bank of main channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Monitor stormwater quality and determine if an existing facility should be retrofitted or whether a new facility should be constructed to adequately treat and retain stormwater runoff. Enhance/stabilize open channel by adding LWD and native vegetation to stabilize channel and banks, improve channel complexity, and promote floodplain connectivity.
OT-76	Open channel contributing runoff from unknown source enters at left bank of channel.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Monitor stormwater quality and determine if an existing facility should be retrofitted or whether a new facility should be constructed to adequately treat and retain stormwater runoff. Enhance/stabilize open channel by adding LWD and native vegetation to stabilize channel and banks, improve channel complexity, and promote floodplain connectivity.
OT-86	Outfall from road drains along riprap-lined pathway to creek channel.	Monitor stormwater quality. Potential to retrofit riprap drainage pathway with native vegetation and infiltrative soils to encourage infiltration of runoff before reaching the channel. Educate landowner about importance of native riparian vegetation and stream processes.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-87	Outfall contributes significant runoff to right bank, although there had been no rain in previous 24 hours.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Conduct IDDE investigation. Monitor stormwater quality and determine if an existing facility should be retrofitted or whether a new facility should be constructed to adequately treat and retain stormwater runoff.
OT-88	Outfall contributes significant runoff to right bank, although there had been no rain in previous 24 hours. Energy dissipation needed.	Confirm source, drainage area, and pollutant loading characteristics of runoff. Monitor stormwater quality and determine if an existing facility should be retrofitted or whether a new facility should be constructed to adequately treat and retain stormwater runoff. Install energy dissipation at pipe outlet.
OT-51	Outfall pipe ends in 25 feet of exposed/failing pipe at toe of right bank. Unknown source of stormwater. Scour pool in channel at pipe outlet.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Modify outfall pipe and install energy dissipation at pipe outlet.
OT-54	24-inch diameter outfall contributes road runoff from NW 99th Street to channel immediately downstream of stream crossing culvert at NW 99th Street.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-55	24-inch diameter outfall contributes runoff from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-56	Six inch diameter outfall contributes runoff from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-57	12-inch diameter outfall contributes runoff from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-59	Open channel contributes stormwater, from unknown source in direction of residential area on upper right bank hillslope, to right bank of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-60	12-inch diameter outfall contributes runoff from unknown source in direction of residential area and roads on upper right bank hillslope.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-63	Four inch diameter outfall contributes runoff from unknown source in direction of residential area and roads on upper right bank hillslope.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-64	12-inch diameter outfall contributes runoff from unknown source in direction of residential area and roads on upper left bank hillslope.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Extend outfall pipe to toe of bank and add energy dissipation and bank protection at outfall.
OT-65	Open channel contributes stormwater, from unknown source in direction of residential area on upper right bank hillslope, to right bank of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-66	18-inch diameter outfall contributes runoff from unknown source in direction of residential area and roads on upper right bank hillslope.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Extend outfall pipe to toe of bank and add energy dissipation and bank protection at outfall.
OT-67	Three inch diameter outfall contributes runoff from unknown source in direction of residential area on upper right bank hillslope.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-68	12-inch diameter outfall contributes runoff from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Truncate outfall pipe to toe of bank slope and add energy dissipation and bank protection at outfall.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-69	12-inch diameter outfall contributes runoff from unknown source in direction of residential area on upper right bank hillslope.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Truncate outfall pipe to toe of bank slope and add energy dissipation and bank protection at outfall.
OT-71	12-inch diameter outfall contributes runoff from unknown source. Lower 10 feet of pipe are exposed and protruding almost completely across the channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Truncate outfall pipe to toe of bank slope and add energy dissipation and bank protection at outfall.
OT-74	Riprap-lined open channel outfall to right bank of channel delivers runoff from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-75	Open channel contributes stormwater, from unknown source to right bank of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
OT-77	Six inch diameter outfall is being undermined and is contributing runoff to left bank from unknown source.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Truncate outfall pipe to toe of slope and add energy dissipation and bank protection at outfall.
OT-7	12-inch diameter outfall discharges runoff to edge of right bank floodplain. Incised open channel has formed between outfall and main channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Add energy dissipation and bank protection at outfall. Plant native vegetation to promote slope and bank stability.

Table B-3: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
OT-79	12-inch diameter outfall discharges runoff to left bank from unknown source. Invasive vegetation present at and around outfall outlet.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Add energy dissipation and bank protection at outfall. Plant native vegetation to promote slope and bank stability.
OT-80	24-inch diameter outfall contributes runoff from unknown source. Lower eight feet of pipe are exposed and protruding out to center of channel.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Truncate outfall pipe to toe of bank slope and add energy dissipation and bank protection at outfall.
OT-81	Partially crushed metal pipe discharges to a small channel which enters stream at left bank immediately upstream of pedestrian bridge crossing.	Confirm source, drainage area, stormwater volume contribution, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately. Replace or repair outlet section of pipe to improve conveyance. Plant native vegetation around outfall channel to promote bed and bank stability.

Stormwater Infrastructure Maintenance Projects

Stormwater Infrastructure Maintenance Projects include potential projects which address and repair maintenance defects affecting existing stormwater infrastructure. Infrastructure maintenance projects are required by the County's NPDES municipal stormwater permit. Projects in this category with estimated costs exceeding $10,000 are considered under the SCIP process. Projects addressing simpler maintenance defects are referred directly to the County Public Works Operations and Maintenance staff. Stormwater Infrastructure Maintenance Projects identified based on the results of the Feature Inventory are described in Table B-4.

No projects of this type were identified in surveyed reaches of Suds Creek, LaLonde Creek, and NW 2nd Avenue Tributary in the Salmon Creek (RM 03.83) subwatershed.

Table B-4: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
Tenny Creek		
OT-125	Ditch tributary to main channel at OT-124 completely blocked by chunks of wood. Ditch erosion present downstream of wood pile.	Remove debris. Discuss options for improving on-site compost management with landowners. Reestablish native vegetation on ditch banks to shade out invasive plants and stabilize banks.
OT-126	12-inch diameter outfall connects outflow from a detention/infiltration pond for adjacent condos to the channel.	Monitor water quality and flow from outfall.
OT-128	Sediment and vegetation clogging outlet of 12-inch diameter pipe discharging to the wetland.	Remove debris. Monitor water quality. Evaluate whether necessary to construct a new stormwater facility to detain and treat runoff appropriately before discharging to wetland channel.
SCC-118	Leaf litter and shrubs clog culvert inlet. Accumulation of small debris could block high flows.	Remove debris. Conduct further hydraulic and sediment analysis of existing culvert to determine if pipe is adequately sized for conveyance of flow and sediment.
Rockwell Creek		
OT-119	Small open channel drains water to left bank from treatment wetland. Logs that serve as outlet protection show scour on sides and underneath.	Repair or replace log structures to ensure continued function of this treatment wetland. Consider monitoring water quality to evaluate performance of the facility.
NE 114th Street Tributary		
OT-92	Fenced vegetated filter area BMP drains to outfall. Outfall discharges into still basin. Vegetation in filter area poorly established. Facility likely functions as detention, rather than filtration.	Confirm source of stormwater. Establish vegetation to enhance filtration. Develop other projects if necessary.
NW 7th Avenue Tributary		
ER-34	Large hillslope failure on the eastern valley wall. The area upslope of the failure was obscured by dense vegetation. County GIS data indicates a stormwater outfall immediately upslope that may be responsible for the instability. The same mapped outfall may also be responsible for the inflow channel at OT-209	Determine if existing stormwater infrastructure was responsible for causing the hillslope failure on already unstable terrain. Repair/retrofit facilities to minimize risk of future impacts. Revegetate hillslope failure with native vegetation to improve stability.
OT-213	12-inch diameter CPP delivers stormwater into a cylindrical concrete energy dissipater on the left bank. Presence of a treatment facility was not observed. Edge of dissipater structure near the stream is being undercut by erosion being caused by either stream flows or hillslope seeps.	Investigate source of flows to this outfall and existing treatment and flow control. Construct a new stormwater facility or retrofit existing facilities to properly detain and treat stormwater if necessary.

No projects of this type were identified in surveyed reaches of the Cougar Creek subwatershed.

Habitat Restoration/Enhancement Projects
Habitat Restoration/Enhancement Projects include potential projects which result in the restoration or enhancement of wetlands, upland forest, or riparian habitat. In-stream channel habitat and bank protection projects do not fall within the scope of Clark County's CWP, and are placed under the category of Referral Projects for other Groups/Agencies. Habitat Restoration/Enhancement Projects identified based on the results of the Feature Inventory are described in Table B-5 and B-6.

No projects of this type were identified in surveyed reaches of Rockwell Creek, and NW 2nd Avenue Tributary in the Salmon Creek (RM 03.83) subwatershed.

Table B-5: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)

ID	Basis for Project	Project Description
Suds Creek		
ER-31	Both banks eroding. Steep banks are between four and 15-feet high. Riparian vegetation is primarily blackberry.	Install bioengineered bank stabilization treatments to reduce sediment load to the stream. Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
Tenny Creek		
CM-19	Channel is conveyed via a 12-inch diameter PVC pipe that is staked at the ground surface along a former open channel alignment.	Remove channel from pipe. Complete channel rehabilitation project. Eradicate invasive vegetation from culvert inlet, channel banks, and floodplain. Reestablish native undergrowth and canopy vegetation on floodplain and banks
ER-27	Chronic meander erosion and erosion around logs placed for former channel restoration project at and downstream of reach-scale channel restoration.	Install additional LWD to further reinforce existing restoration structures. Conduct hydraulic and geomorphic analysis to determine where channel can be widened or banks set-back further. Eradicate invasive vegetation and reestablish native undergrowth and canopy vegetation on floodplain and banks to promote channel complexity and bank stability.
AP-23	Left bank bare along property line adjacent to residential back yard. Some erosion present.	Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize soils to prevent erosion, and enhance riparian habitat.

Table B-5: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
LaLonde Creek		
CM-21	Riprap on both banks of stream through residential property. Lack of vegetation.	Discuss options with landowner to plant native riparian vegetation to compliment and enhance riprap bank armoring. Consider reducing the vertical extent of the bank armoring. Educate landowner about importance of native riparian vegetation and stream processes.
CM-22	Two 3 by 3-foot aluminum flap gates mounted to the bottom of a fence at the property line. Riprap on right bank for 100-feet and on left bank for 60-feet. Channel is also armored with 4 concrete "ecology blocks" where the channel is closest to the house.	Determine if flap gates are acting as a barrier to flow, fish, or wildlife. Discuss options with landowner to plant native riparian vegetation to compliment and enhance riprap bank armoring. Consider reducing the vertical extent of the bank armoring. Educate landowner about importance of native riparian vegetation and stream processes.
CM-23	Riprap and concrete used to armor approximately 80-feet of the left bank of stream through residential property. Lack of vegetation.	Discuss options with landowner to plant native riparian vegetation to compliment and enhance riprap and concrete bank armoring. Consider reducing the vertical extent of the bank armoring. Educate landowner about importance of native riparian vegetation and stream processes.
NE 114th Street Tributary		
AGR-1 IB-149 SCC-93	Wetland formed immediately upstream of plugged culvert under NE 28th Avenue and serves as a natural detention facility. Channel is poorly defined to undefined. Aggrading fines fill wide bed. Vegetation consists of widespread invasive plant species in riparian area and banks. Predominantly nightshade with ivy on banks. Some blackberry, reed canary grass and horsetail present. Current County GIS data shows unrecorded outfall into wetlands. 36-inch diameter culvert is undersized and completely submerged at downstream end of wetlands. Backwater effects reach approximately 500-feet upstream.	Develop a wetlands restoration project. Replace downstream culvert. Eradicate blackberry and nightshade. Reestablish native wetland vegetation to enhance habitat and provide treatment. Investigate possible outfall and confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
NW 7th Avenue Tributary		
ER-35	Four vertical-foot cascade/headcut. Stream is incising into/through erosion resistant Troutdale Formation sediments. The rate of headcut migration was unclear. Headcut is a partial or total fish passage barrier.	Treat sources of hydrologic alteration that is causing channel response. Consider improving channel stability through installation of LWD grade control structures. Headcutting and channel incision may be so chronic and severe that extremely large scale restoration of the stream and watershed may be required to properly address the issue.

Table B-5: Description of Potential Project Opportunities – Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
ER-36	6-vertical-foot headcut. Stream is incising into/through erosion resistant Troutdale Formation sediments. The rate of headcut migration was unclear. Headcut is a total fish passage barrier.	Treat sources of hydrologic alteration that is causing channel response. Consider improving channel stability through installation of LWD grade control structures. Headcutting and channel incision may be so chronic and severe that extremely large scale restoration of the stream and watershed may be required to properly address the issue.

Table B-6: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
AP-18	Access point to creek at NE 26th Avenue stream crossing. Invasive vegetation is widespread and there is little to no native vegetation present to promote bank and slope stability and channel complexity. Minor bank erosion present.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize soils to prevent erosion, and enhance riparian habitat.
AP-20	Pedestrian access to an already unstable left bank slope contributes to erosion and a source of fine sediment to the channel. Invasive vegetation is widespread and there is little to no native vegetation present to promote bank and slope stability and channel complexity. Minor bank erosion present.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize soils to prevent erosion, and enhance riparian habitat. Develop a trail system along riparian corridor to channel foot traffic where negative impacts to the creek and erosion can be minimized or avoided.
AP-16	Access point to left bank of creek from trail that likely leads from high school. Invasive vegetation is widespread and there is little to no native vegetation present to promote bank and slope stability and channel complexity. Minor bank erosion present.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize soils to prevent erosion, and enhance riparian habitat. Develop a trail system along riparian corridor to channel foot traffic where negative impacts to the creek and erosion can be minimized or avoided.
AP-17	Access point to right bank of creek from boot path leading from Salmon Creek Park Trail. Bank erosion from pedestrian access is present throughout the park. There is little to no native vegetation present to deter foot traffic nor to promote bank and slope stability and channel complexity.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize soils to prevent erosion, and enhance riparian habitat. Install a wood fence and channel viewing areas along riparian corridor to channel foot traffic where negative impacts to the creek and erosion can be minimized or avoided.
MI-20	Four large logs span the channel banks.	Build upon positive LWD features to further enhance channel complexity and promote establishment of native vegetation.

Table B-6: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
MI-21	Large log spans channel bottom, creating natural grade control and pool-forming feature.	Build upon positive LWD features to further enhance channel complexity and promote establishment of native vegetation.
CM-13	Channel is confined by concrete stilling wells and basins immediately downstream of the NW 99th Street culvert, creating an artificial step/pool system. Structures include energy dissipation and have cobble and sand substrate, but drop height between pools might exceed that needed for juvenile fish passage.	Hydraulics evaluation to determine how to prevent fish barriers; physical habitat enhancement to improve native substrate and channel complexity within and around concrete structures.

Property Acquisition for Stormwater Mitigation
Property Acquisition for Stormwater Mitigation Projects includes potential acquisitions of properties for any purpose that meets permit requirements to mitigate for stormwater impacts. This includes preservation or restoration of upland forest and riparian habitat zones.

No projects of this type were identified in surveyed reaches of the Salmon Creek (RM 03.83) subwatershed.

No projects of this type were identified in surveyed reaches of the Cougar Creek subwatershed.

Referral Projects for other Groups/Agencies
Referral Projects for other Groups/Agencies includes potential projects that do not fall within the defined scope of Clark County's CWP. This includes, but is not limited to, in-channel restoration, agricultural BMPs, fish-passage barrier removals, and invasive plant management. It also includes referrals for projects such as trash removal, stream culvert repairs/maintenance, and drainage projects. Referral Projects for other Groups/Agencies identified based on the results of the Feature Inventory are described in Table B-7 and B-8.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
Suds Creek		
SCC-134 ER-29	36-inch diameter CMP culvert acting as grade control and a barrier to fish. Four foot drop to the water surface on the downstream end. There is significant expansion scour eroding the banks at the outlet and forming a deep plunge pool. Pipe is being undercut and roots are growing down along the pipe into the channel.	Conduct additional hydraulic and barrier analysis. Replace crossing and install grade control to improve fish passage and energy dissipation. Stabilize banks downstream of culvert.
SCC-135 CM-28	48-inch diameter CMP culvert under NE 105th Street. Inlet partially blocked by debris and trash. Outlet heavily armored with riprap to protect banks from scour. Culvert is not-flow aligned and directs flow into the right bank. Expansion scour is also occurring.	Remove debris and unblock the inlet. Conduct additional hydraulic and barrier analysis to determine if replacement is required. Monitor stability of banks downstream of culvert.
SCC-136	48-inch diameter CMP culvert under NE 112th Street. Inlet blocked by large woody debris. Sediment deposition at culvert outlet.	Remove debris and unblock the inlet. Conduct additional hydraulic and barrier analysis to determine if replacement is required.
SCC-137 MB-29	72-inch-wide and 60-inch-tall elliptical culvert. Culvert outlets to large riprap cascade. 2-man boulders downstream of outlet create a fish barrier.	Conduct additional hydraulic and barrier analysis to determine if replacement is required.
SCC-138	Undersized, 48-inch diameter culvert under access road. Embankment is failing. Observed flowing approximately one-third full. Potential flooding hazard at high flows.	Reinforce embankment to prevent further erosion. Conduct additional hydraulic and barrier analysis to determine if replacement is required.
SCC-139	Undersized, 48-inch culvert. Embankment is eroding at inlet and outlet. Culvert slope is flat with sediment deposited in channel and culvert. Observed flowing more than half full. Potential flooding hazard at high flows.	Reinforce embankment to prevent further erosion. Conduct additional hydraulic and barrier analysis to determine if replacement is required.
SCC-140	60-inch diameter culvert under NE 117th Street. Outfall discharges midspan into culvert. Upstream and downstream ends reinforced with riprap.	Conduct additional hydraulic and barrier analysis to determine if replacement is required.
SCC-141	60-inch diameter culvert under access road. Riprap on both banks at inlet and outlet. Sediment and leaves are deposited to a depth of at least one foot in the culvert.	Conduct additional hydraulic and barrier analysis to determine if replacement is required.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
CM-29	Concrete cubes piled across the stream channel and along left bank form a grade control structure. Channel drops approximately two feet downstream of where the cubes across stream. Structure appears to be in poor condition.	Conduct a site visit to determine stability and value of the grade control structure. Consider enhancing the structure with LWD or other natural materials.
CM-30	18-inch tall concrete barrier acting as a dike/levee at top of right bank. Prevents flooding into park.	Conduct a site visit to determine stability and value of the concrete structure. Develop project of necessary.
CM-31	Old concrete riprap in channel forms a grade control structure.	Conduct a site visit to determine stability and value of the grade control structure. Consider enhancing the structure with LWD or other natural materials.
SCB-54	Wooden deck spans stream and covers approximately 12 feet of length of the stream.	Conduct a site visit to determine safety and stability of deck and determine potential flooding and fish passage hazards. Contact landowners regarding proper maintenance of deck.
SCF-1 ER-30	Trail crosses at wider portion of the stream. Outside meander bends are eroding downstream of the crossing for approximately 150 feet.	Reestablish native undergrowth and canopy vegetation on banks to improve bank stability, shade out invasive plants, and enhance riparian habitat.
UT-10	Two sewer manhole structures exposed by the stream channel. No apparent leakage. Downstream structure directs flow into the bank causing erosion.	Joint county-sewer district effort needed to determine the need for further action. Potential project could include placement of bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure. Channel realignment may be necessary.
UT-11	Sewer manhole structure exposed by the stream channel. No apparent leakage.	Joint county-sewer district effort needed to determine the need for further action. Potential project could include placement of bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure. Channel realignment may be necessary.
UT-12	Sewer manhole structure exposed approximately five feet from the stream channel. No apparent leakage. Bank is being undercut by stream.	Joint county-sewer district effort needed to determine the need for further action. Potential project could include placement of bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure. Channel realignment may be necessary.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
IB-196	Widespread invasive plant species in riparian area near outfall. Predominantly reed canary grass with some blackberry and ivy.	Eradicate reed canary grass, blackberry, and ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-197	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-198	Widespread invasive plant species dominate the plant community in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-199	Widespread invasive plant species in riparian area near private pedestrian footbridge. Predominantly ivy and blackberry.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-200	Widespread invasive plant species in riparian area. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-201	Widespread invasive plant species in riparian area near private pedestrian footbridge. Predominantly ivy and blackberry.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-202	Widespread invasive plant species in riparian area. Predominantly blackberry with some nightshade.	Eradicate blackberry and nightshade. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of blackberry control.
IB-203	Widespread invasive plant species on LB slope. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of blackberry control.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
IB-204	Widespread invasive plant species in riparian area. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-205	Widespread invasive plant species in riparian area. Predominantly reed canary grass.	Eradicate reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
ER-28	The remains of some type of barrier (rebar stakes, wooden stakes, and silt fence) are causing bank erosion by forcing flow into the right bank.	Remove debris associated with the failed barrier.
TR-49	Discarded flowerpots on right bank and miscellaneous debris in the channel: Chicken wire, a metal plate from an appliance, old siding, and a tire.	Remove debris. Contact landowner about more appropriate disposal options.
TR-50	Bottles, cans, construction debris, metal sheeting, iron pipe, sheet glass, etc. discarded in the channel.	Remove debris. Contact landowner about more appropriate disposal options.
TR-51	Trash and debris in channel: broken pipe, fence post, and construction debris. Discarded plastic on the right bank.	Remove debris.
TR-52	Abandoned concrete pipe and tires in the channel.	Remove debris.
TR-53	Four inch pipe in channel, visible for approximately 100 feet. Tire in channel.	Remove debris.
TR-54	20-foot long segment of abandoned pipe in channel.	Remove pipe.
MB-28	Chain link fence across the channel at the park boundary is collecting trash, logs and debris, and forming a jam that blocks the creek.	Remove trash and debris. Modify fence to improve flow conditions.
AP-24	Small foot path provides access to stream.	Conduct site visit to determine safety and stability of foot path. Restore native vegetation on banks and around footpath to enhance riparian habitat and reduce bank erosion.
Tenny Creek		
ER-23	Failed concrete embankment along channel associated with severe bank erosion.	Investigate erosion more thoroughly. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.
ER-26	Left bank of channel eroding up to six feet high. Source of fine sediment to channel.	Investigate erosion more thoroughly. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
SCC-106	18-inch diameter culvert inlet has a trash rack that is clogged by invasive vegetation and sediment. Culvert conveys channel to pipe network that is not flow-aligned.	Eradicate invasive vegetation from culvert inlet, channel banks, and floodplain. Reestablish native undergrowth and canopy vegetation on floodplain and banks. Further analysis to confirm that culvert is adequately sized for conveying flow and sediment.
SCC-107	Culvert at an abandoned roadway. Embankment around culvert is sloughing. Invasive vegetation, especially reed canary grass, is prevalent throughout reach.	Work with landowners to investigate the potential for removing the abandoned culvert and associated embankment. Replace with LWD used for grade control. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat. Educate landowner on importance of native riparian vegetation.
MB-15	Blackberry follows fence line along property boundary, and together they act as a flow and sediment barrier. Signs of backwater and flooding.	Work with landowners and investigate the potential for setting back or removing the fence. Eradicate invasive vegetation from both properties. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat. Educate landowner on importance of native riparian vegetation.
SCC-166	Submerged culvert inlet and outlet. Culvert backwater creates a large in-channel pool that is covered in green algae. Thermal loading impacts to pond water quality may also be a concern.	Investigate and evaluate conveyance system pathways and stormwater connections. Conduct further hydraulic and sediment analysis to determine if culvert is adequately sized for conveyance of flow and sediment. Investigate options for improving aeration and circulation in pond.
SCC-117	Sediment deposition composes about a third of the culvert depth. Culvert inlet has a metal plate restricting flow. Some erosion and incision along creek downstream of culvert outlet.	Conduct further hydraulic and sediment analysis to determine if culvert is adequately designed for conveyance of flow and sediment.
SCB-50	Pedestrian bridge across the top of bank within residential backyard potentially impedes high flows. No native vegetation on banks.	Educate landowners about importance of stream processes and native riparian vegetation. Plant native vegetation along banks to enhance bank stability around bridge.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
SCC-119	Triple-barreled culvert under driveway associated with bank and channel erosion downstream. No native vegetation on banks.	Educate landowners about importance of stream processes and native riparian vegetation. Plant native vegetation along banks to enhance bank stability downstream of culverts. Conduct further hydraulic and sediment analysis to determine if culvert adequately designed for conveyance of flow and sediment.
SCC-120	Failing 18-inch corrugated metal culvert. Outlet is partially crushed and filled and blocked by sand and gravel. Riprap around culvert inlet and outlet is failing and falling into holes created by eroding banks. No native vegetation on banks.	Investigate the potential for removing the culvert and associated embankment. Investigate erosion more thoroughly. If culvert is removed, place grade control structures to reinforce channel grade and prevent incision. Reestablish native undergrowth and canopy vegetation on floodplain and banks to promote bank stability.
SCC-121	Vertical inlet to culvert causes whirlpool at inlet. Culvert is a fish barrier. Culvert embankment is eroding and failing. Widespread invasive vegetation.	Investigate the potential for removing the culvert and associated embankment. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
SCC-124	Box culvert is half full of gravel/sand. Unsure of design depth. Outlet is not flow-aligned. Some erosion of riprap embankment above culvert. Widespread invasive vegetation.	Conduct further hydraulic and sediment analysis to determine if culvert adequately designed for conveyance of flow and sediment. Determine if culvert needs sediment removal maintenance or replacement. Reestablish native undergrowth and canopy vegetation on floodplain and banks to promote bank and embankment stability.
SCC-125	106th Street culvert has log protruding into culvert inlet causing a drop of about one foot into culvert. Increased velocity and energy apparent within the culvert downstream of the log. Culvert diameter originally 30 inches, but shape is warped. Scour pool in channel downstream of culvert outlet.	Debris removal and maintenance needed to remove log from culvert. Further evaluation of structural integrity of culvert needed. Potential need to replace culvert with a size that is adequate for conveying flow and sediment.
MB-18	Wire fence across creek trapping litter and debris and causing bed scour.	Work with landowners to investigate the potential for setting back or removing the fence.
SCC-126	First section of 48-inch diameter concrete culvert inlet has failed. Logs block culvert inlet and some bank erosion around failing culvert section.	Conduct hydraulic and structural analyses to replace or repair culvert inlet.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
SCC-127	Expansion scour downstream of 48-inch diameter culvert outlet. Sloughing on right bank hillslope.	Add energy dissipation and grade control downstream of culvert outlet, and plant native vegetation and install bank protection structures to prevent additional erosion.
MB-19	Fence across creek is a debris and flow barrier	Work with landowners to investigate the potential for setting back or removing the fence.
SCC-128	30-inch diameter concrete culvert under former driveway. Now a pedestrian path with a spillway. Debris (planks, concrete chunks) blocking inlet. Invasive vegetation prevalent.	Work with landowners to investigate the potential for removing the culvert and embankment and replacing with a pedestrian bridge and grade-control structure. Educate landowners about importance of stream processes and native riparian vegetation.
SCC-129	30-inch diameter concrete culvert under former driveway. Blackberry partially blocking inlet. Unstable riprap around inlet embankment. Expansion scour and scour pool downstream of outlet and embankment is failing on downstream. Invasive vegetation prevalent.	Add energy dissipation and grade control downstream of culvert outlet, and plant native vegetation and install bank protection structures to prevent additional erosion.
SCC-130	42-inch diameter culvert conveys channel beneath I-5. Slope appears steep within culvert.	Add additional grade-control and energy dissipation upstream and downstream of culvert. Conduct further hydraulic analyses regarding whether baffles are necessary within the culvert.
SCC-131	42-inch diameter culvert conveys channel beneath NE 117th Street. High velocity in culvert. Grass growing over top of inlet. Culvert outlet to Salmon Creek has a larger diameter (48 inch) and protrudes at different angle than inlet. Heavy riprap at outlet, some scour.	Investigate and evaluate conveyance system pathways and stormwater connections. Remove grass from inlet. Reestablish native undergrowth and canopy vegetation on floodplain and banks to promote bank and embankment stability. Add additional grade-control and energy dissipation upstream and downstream of culvert.
MB-16 SCC-123	Concrete dam across floodplain. Ponding extends upstream to roadway embankment at NE 99th Street. Wetland vegetation on pond perimeter. Culvert leads from dam intake/control structure to a downstream pond. Trash rack on culvert outlet. Dam and conveyance structure are fish barriers. Ponded water is covered in green algae. Thermal loading impacts to pond water quality may also be a concern. Downstream pond also has a dam.	Investigate the potential for removing the dam and outfall. Conduct further hydraulic and sediment analysis to support channel rehabilitation and grade-control design. If removing the dam is not a possibility, investigate options for improving aeration and circulation in pond.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
MB-17, CM-26, SCC-147	Concrete dam, with road crossing embankment behind dam creates an on-channel pond. Dam and conveyance structure are fish barriers. Ponded water is covered in green algae. Thermal loading impacts to pond water quality may also be a concern. CM-26 is a concrete manhole control structure for MB-17, with several large orifices (24-inch diameter) inside, and a trash rack on top. Culvert discharges flow from upstream pond and control structure to creek downstream of road embankment/dam. Trash rack on outlet.	Investigate the potential for removing the dam, dam control structure, roadway embankment, and outfall. Conduct further hydraulic and sediment analysis to support channel rehabilitation and grade-control design. If removing the dam is not a possibility, investigate options for improving aeration and circulation in pond.
CM-27	Concrete dam and concrete box with spillway induce backwater to upstream dam.	Investigate the potential for removing the structure. Conduct further hydraulic and sediment analysis to support channel rehabilitation and grade-control design.
IB-173	Widespread invasive plants, primarily blackberry and ivy, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-174	Widespread invasive plants, primarily reed canary grass and blackberry, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-187	Widespread invasive plants, primarily ivy, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-188	Widespread invasive plants, primarily blackberry, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-189	Widespread invasive plants, primarily blackberry, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
IB-190	Widespread invasive plants, primarily blackberry, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
IB-191	Widespread invasive plants, primarily ivy, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
IB-192	Widespread invasive plants, primarily ivy, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
IB-193	Widespread invasive plants, primarily blackberry, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
IB-194	Widespread invasive plants, primarily ivy, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
IB-195	Widespread invasive plants, primarily ivy and blackberry, surround the creek channel and banks.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, promote bank stability, and enhance riparian habitat.
TR-34	Piles of blackberry brush (from removal efforts) and yard waste dumped in ditch/channel along fence and west side of field adjacent to channel.	Remove yard waste. Discuss options for improving on-site compost management with landowners.
TR-41	Yard waste, shopping carts, tires, concrete chunks on top of slope above channel.	Remove yard waste and garbage.
TR-42	Failing sections of multiple pipes in creek. Abandoned sewer and water utility infrastructure in channel and on banks.	Investigate utility connections and remove failed structures from creek.
TR-43	Failing sections of multiple pipes in creek. Abandoned sewer and water utility infrastructure in channel and on banks.	Investigate utility connections and remove failed structures from creek.
TR-44	Shopping cart in stream, blocking flow, and accumulating additional debris.	Remove shopping cart and debris.
TR-45	Tires in the channel.	Remove debris.
TR-46	Trash dump adjacent to vacant lot and right bank hillslope of channel. Cars, tires, glass, wood chunks, concrete, metal present.	Remove debris and discuss with adjacent landowners means of discouraging future dumping.
TR-48	Shopping carts, wood planks, bikes, chairs, tires, and drums in channel and on right bank and floodplain.	Remove debris and discuss with adjacent landowners means of discouraging future dumping.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
LaLonde Creek		
MI-25 MI-26 MI-27	Riparian corridor is fairly wide and in excellent condition. Minimal invasive plant species and large, older trees make up the riparian forest canopy. Significant LWD in stream with great recruitment potential. Multiple sightings of pileated woodpeckers and other bird species.	Property acquisition for habitat protection. Consider conservation easements if property acquisition is not feasible.
SCC-100	Two foot diameter CMP culvert under NE 109th Street is partially clogged with sediment and creating a backwater.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required.
SCC-101	Three foot diameter culvert under a private driveway is half full of sediment and clogged with vegetation and debris.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required.
SCC-102	Two foot diameter concrete culvert under abandoned private road that follows the property line. Crossing is not being used. Flow goes subsurface, flowing through riprap and quarry spoils for 25 feet after exiting the culvert.	Contact landowner about the purpose of the crossing. Restore channel and eliminate the crossing if deemed feasible.
SCC-104	Two foot diameter CMP culvert under a private pedestrian path that follows the property line. May be providing some grade control.	Contact landowner about the use and value of the crossing. Restore channel and eliminate the crossing if deemed feasible.
SCB-40	Failing footbridge on private property blocks flow and catches debris.	Remove footbridge and restore channel.
SCC-105 SCC-110	Three foot diameter culvert under NE 50th Avenue. LWD blocking inlet. Steep grade, perched outlet, and large fill area make the culvert and road grade a likely barrier to fish and other organisms using the riparian corridor for migration. Armored channel at culvert outlet drops approximately 15feet over a short distance.	Remove debris that is blocking the inlet. Monitor channel downstream of culvert for instability. Conduct additional barrier analysis to determine if this crossing should be replaced with one that allows passage of fish and wildlife.
AP-22	Access road and boat launch on right bank of manmade impoundment.	Meet with landowner to look at the access point and confirm that no significant water quality impacts are present.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
MB-12	15-foot high earthen dam/driveway creates a wetland pond extending back to just downstream of OT-109. Outlet works include a five foot diameter CMP outlet pipe and screened glory hole with no formal emergency spillway. Embankment appears in good condition. A small sinkhole is forming adjacent to the glory hole. Outlet of pipe is submerged and discharges to another large pond. Significant algae present in the pond.	Site investigation by engineering staff to confirm stability, condition, and hydraulic capacity of manmade dam and outlet structures. Conduct a study to determine potential water quality impacts of pond – both positive and negative. Develop additional projects if necessary to address dam instability or water quality. This and the pond immediately downstream may be acting as large scale stormwater detention and treatment facilities and improving conditions farther downstream. Look into ways to enhance the ponds ability to treat flows and reduce potential for thermal loading.
MB-13	15-foot high earthen dam/grass access road creates a pond extending back upstream to MB-12. Outlet works include a 1.5-foot diameter CMP outlet pipe and screened glory hole with no formal emergency spillway. Embankment appears in good condition. No evidence of overtopping in large storm events of November-December 2008. Inventory was conducted before large flow event in January 2009. Dam has 1.5 to two feet of freeboard. Significant algae present in the pond.	Site investigation by engineering staff to confirm stability, condition, and hydraulic capacity of manmade dam and outlet structures. Conduct a study to determine potential water quality impacts of pond – both positive and negative. Develop additional projects if necessary to address dam instability or water quality. This and the pond immediately upstream of MB-12 may be acting as large scale stormwater detention and treatment facilities and improving conditions farther downstream. Look into ways to enhance the ponds ability to treat flows and reduce potential for thermal loading.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
MB-14 AGR-2 IB-160	15-foot high earthen dam/road crossing is creating a significant backwatered reach that has aggraded to form a large floodplain wetland. It may have formed a pond at one point. Outlet is a 3-foot diameter CMP culvert with the inlet fitted with weir boards to control water surface elevation. Inlet likely clogs with reed canary grass and woody debris. Upstream face is armored and grouted with a small notch in the crest acting as an emergency overflow spillway. Dam appears to have been overtopped during high flows in November-December 2008. Inventory was conducted before large flow event in January 2009. Outlet pipe has a 3-foot drop to the channel bed creating a total barrier to fish. The channel is very confined and incised downstream for approximately 150 feet. The confinement appears to be artificial and caused by human earthwork. Large depositional reach of fines and sand upstream of manmade dam and road crossing at MB-14. Widespread invasive plant species in riparian area and floodplain of aggraded reach upstream of MB-14. Predominantly reed canary grass and cattail. The upstream end of the aggraded reach is not well vegetated due to ongoing and recent deposition.	Site investigation by engineering staff to confirm stability, condition, and hydraulic capacity of manmade dam and outlet structures. Conduct a study to determine potential water quality impacts of the dam – both positive and negative. Develop additional projects if necessary to address dam instability or water quality. Removing the dam and installing another method of grade control would be a massive project. One of the key factors would be managing the large volume of sediment that is currently impounded behind the structure. Eradicate reed canary grass and manage cattail. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
WQ-75	Four inch diameter PVC pipe delivers flow to the stream from a pond on the upper property. The pond water supposedly comes from a well.	Confirm pond's water source and landowner's water rights. Investigate the effects of the pond and waterfowl concentrations on water quality. Modify facility to achieve improved water quality.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
MB-43	30-foot high earthen dam spans the entire floodplain, extending from valley wall to valley wall. The dam creates an impoundment extending approximately 350 feet upstream. Swans and ducks use the pond. The concentrated bird presence combined with potential thermal loading could produce negative impacts to stream water quality. The outlet structure is submerged and not visible. Stream water exits the dam via a 24-inch diameter culvert, discharging to a riprap armored cascade channel on the downstream embankment. Embankment appears to be in good condition.	Site inspection by engineering staff to determine structural integrity of the dam and hydraulic capacity of outlet works. Results of inspection may warrant modification or removal of the dam and restoration of tributary stream. At minimum, project should appropriately mitigate for water quality impacts of the dam and pond.
WQ-32	Orange-colored precipitates on rocks and stream gravel downstream of manmade dam. Could be iron precipitate or algae indicating a nutrient concentration problem with the upstream pond.	Determine the nature and cause of the colored precipitate and develop a project to address the problem accordingly.
WQ-34	10 by 10-inch metal grate inlet for manmade Koi pond. There were leaves on the intake side so it is actively used, though probably does not withdraw much flow. Pond discharges flow to the stream approximately 100 feet downstream.	Confirm landowner's water rights. Investigate the effects of the pond and on water quality and modify the pond accordingly. Determine if non-native fish are present in the pond and could escape into the stream. If so, confront landowner about eliminating the pond.
SCB-35	Widespread invasive plant species in riparian area near private pedestrian footbridge. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-170	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-171	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
SCB-36	Widespread invasive plant species in riparian area near private pedestrian footbridge. Predominantly ivy with some blackberry.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
IB-172	Widespread invasive plant species in riparian area. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
SCB-37 SCB-38 SCB-39	Widespread invasive plant species in riparian area near private pedestrian footbridge. Predominantly ivy with some blackberry.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-176	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-177	Widespread invasive plant species on the right bank in riparian area. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-178	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-157	Widespread invasive plant species in riparian area along large wetland pond. A combination of nightshade, reed canary grass, and blackberry.	Eradicate invasive plants. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-164	Widespread invasive plant species in riparian area along large wetland pond. Ivy on the ground and large trees on the left bank and blackberry on the right bank of large manmade impoundment.	Eradicate invasive plants. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-158	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-161	Widespread invasive plant species in riparian area. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-162	Widespread invasive plant species in riparian area. Predominantly blackberry with reed canary grass.	Eradicate blackberry and reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
IB-179 IB-163	Widespread invasive plant species in riparian area. Blackberry fills the canyon down to the stream and partially clogs the channel throughout the powerline corridor.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-180	Widespread invasive plant species in riparian area. Predominantly blackberry with reed canary grass.	Eradicate blackberry and reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-181	Widespread invasive plant species in riparian area. Predominantly blackberry with intermittent reed canary grass on the right bank.	Eradicate blackberry and reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-182	Widespread invasive plant species in riparian area. Predominantly blackberry with reed canary grass.	Eradicate blackberry and reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-183	Widespread invasive plant species on the right near outfall pipe. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-184 SCB-43	Widespread invasive plant species on both banks of stream through residential property. Predominantly ivy. Lack of riparian vegetation in other areas. Mowed turf.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
SCB-45	Widespread invasive plant species on both banks of stream through residential property. Predominantly ivy. Lack of riparian vegetation in other areas. Mowed turf.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-185 SCB-46 SCB-47	Widespread invasive plant species throughout residential reach. Predominantly ivy.	Eradicate ivy. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowners about the importance of ivy control.
IB-186	Widespread invasive plant species in riparian area. Predominantly reed canary grass.	Eradicate reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
MI-32	Cinderblock structures with unknown purpose on the left bank and in the channel. The one on the left bank has a barrel inside covered with corrugated metal roofing material. The barrel has a spigot. A second structure is located in the stream with multiple pipes running out towards the first structure. The structures are in poor condition.	Determine purpose of structures and address any potential problems with a project.
MI-33	Brick well-like structure with unknown purpose on the left bank of stream with flow seeping out of the bottom. Structure situated in low spot. Could be an old shallow well. The structure is in poor condition.	Determine purpose of structures and address any potential problems with a project.
MI-34	Two inch diameter iron pipe crosses perpendicular to the channel, approximately 2 feet above the channel bed. Pipe is buried in both banks. No sign of leaks, discharge, or a withdrawal point.	Determine purpose of pipe and address any potential problems with a project. The elevation of the pipe may indicate the degree to which this channel has incised if the pipe was installed below grade.
TR-35	Tires, bottles, and broken PVC pipe in stream. Discarded lumber on valley slope. Additional debris is common in the channel for approximately 80 feet downstream. Additional debris includes a failed wooden footbridge and metal corrugated roofing material.	Remove debris. Contact landowner about more appropriate disposal options.
TR-36	Tires, a metal drum, plastic pipe and what appears to be an old washing machine shell discarded in the stream.	Remove debris. Contact landowner about more appropriate disposal options.
TR-28	Tires in the channel.	Remove tires.
TR-38	Lumber, fence posts, and barbed wire in the middle of the channel. Fence is flattened against stream channel and forms a low flow barrier. High flows can easily go over top.	Remove fence and debris to improve flow conditions.
TR-40	Small accumulation of buckets, tires, and metal debris on the right bank.	Remove debris. Contact landowner about more appropriate disposal options.
Rockwell Creek		
SCC-98	Culvert under NE 134th Street is likely a fish passage barrier due to steep slope and some existing baffles no longer holding natural streambed material.	Conduct additional barrier analysis to determine if culvert retrofit or replacement is required.
SCC-99	Undersized culvert under NE Salmon Creek Avenue has potential slope of concern. Channel is armored heavily upstream of inlet to prevent headcutting. Culvert outlet has a four foot vertical drop over angular boulders and is partially blocked by large woody debris.	Conduct additional barrier and hydraulic analysis. Replace culvert with a crossing that is passable by fish and other aquatic species.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
CM-17	Grade control structure formed from riprap and concrete waste.	Conduct additional barrier and hydraulic analysis. Develop project of necessary.
IB-167	Reed canary grass present on left bank in riparian area and floodplain. Right bank is mowed grass and woodchipped landscaping.	Eradicate reed canary grass. Reestablish native vegetation to enhance riparian habitat.
IB-168	Widespread invasive plant species in riparian area and floodplain. Predominantly ivy and blackberry.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-169	Widespread invasive plant species in riparian area and floodplain. Predominantly ivy with blackberry on right side of gully.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-166	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry overlaying native salmonberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
TR-29	Full-sized refrigerator in the stream channel.	Remove refrigerator.
TR-33	Metal pipe discarded in upland area near the intersection of NE 134th Street and NE 23rd Avenue.	Remove pipe.
TR-32	Yard debris accumulated at top of gully slope. Could wash into stream and plug culverts.	Contact landowner about removing debris. Educate landowner on proper ways to dispose of yard debris.
TR-31	Yard debris accumulated at top of gully slope. Could wash into stream and plug culverts.	Contact landowner about removing debris. Educate landowner on proper ways to dispose of yard debris.
TR-30	Yard debris accumulated at top of gully slope. Could wash into stream and plug culverts.	Contact landowner about removing debris. Educate landowner on proper ways to dispose of yard debris.
ER-22	Six-foot vertical eroding bank comprised of cobble and fines threatens a small masonry structure. Erosion is most likely caused by Salmon creek high flows, not Rockwell Creek stream processes.	Reinforce bank to resist erosion and enhance habitat using LWD structures. Notify landowner of potential failure.
NE 114th Street Tributary		
ER-21	Nickpoint at downstream end of clogged culvert forms the initiation of a defined channel.	Monitor channel stability to determine if current erosion is a threat to upstream culvert. Conduct additional barrier and hydraulic analysis. Develop project to prevent further migration of headcut and other projects as necessary.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
IB-147	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry and nightshade.	Eradicate blackberry and nightshade. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-148	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry and nightshade.	Eradicate blackberry and nightshade. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-150	Widespread invasive plant species in riparian area and floodplain. Predominantly nightshade with some iris, ivy and blackberry.	Eradicate nightshade, iris, ivy, and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-151	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry on right bank and ivy on left bank with some nightshade and horsetail. Ivy is smothering trees.	Eradicate blackberry, ivy, nightshade and horsetail. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-152	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry with some horsetail.	Eradicate blackberry and horsetail. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-153	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry with some horsetail.	Eradicate blackberry and horsetail. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-154	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry with some horsetail.	Eradicate blackberry and horsetail. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-155	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry with some horsetail and nightshade.	Eradicate blackberry, horsetail and nightshade. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-156	Lack of vegetation. Mowed grass to edge of stream.	Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat. Educate landowner about importance of native riparian vegetation.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
MB-10	10 foot manmade riprap dam is causing an estimated backwater effect of 100 feet. Dam forms a pond immediately upstream which is impounding fine sediment. Current County GIS data shows an unrecorded outfall into the pond. The stream channel is deeply incised immediately downstream of dam.	Determine purpose of dam and address any potential problems with a project. Investigate possible outfall and confirm source, drainage area, and pollutant loading characteristics of runoff. Construct a new stormwater facility to detain and treat runoff appropriately.
MB-11 TR-26	Manmade dam with asphalt driveway crossing causes pond immediately upstream with backwater influence reaching the culvert crossing upstream. Yard waste accumulated on downstream slope of dam.	Conduct additional barrier and hydraulic analysis. Develop project if necessary. Remove yard debris from dam. Educate owner on proper ways to dispose of yard debris.
SCC-94	Undersized culvert under NE 110th has potential slope of concern. Culvert appears to be causing upstream deposition. Culvert outlet is armored with riprap extending 10 feet downstream. Culvert outlet has a four foot vertical drop over angular boulders and is partially blocked by large woody debris. Likely barrier to fish.	Conduct additional barrier and hydraulic analysis. Retrofit or replace the crossing.
SCC-95	Significantly undersized culvert under NE Highway 99 has potential slope of concern.	Conduct additional barrier and hydraulic analysis to determine if culvert retrofit or replacement is required.
SCC-96	Undersized culvert under property fence serves no apparent purpose. Long-term tenant (tax lot 189517000) reported problems with flooding at culvert during high flows.	Conduct additional barrier and hydraulic analysis to determine if culvert removal, retrofit or replacement is required.
SCC-97	Culvert under NE 117th Street is a definite barrier between Salmon Creek and NE 114th Street Tributary. Inlet is manhole with approximate eight foot drop to culvert inlet. Approximate 40 foot grade change between culvert inlet and the presumed outlet to Salmon Creek. No outlet was found. Manhole inlet has trash rack. Long-term tenant (Tax Lot 189517000) reported that trash rack clogged during 2007 December storms and resultant flooding of NE 117th Street.	Conduct additional barrier and hydraulic analysis to determine if culvert retrofit or replacement is required or feasible. Look for areas in the subwatershed to mitigate for the habitat loss caused by disconnecting this stream from Salmon Creek.
TR-25	Car tire near left bank of wetlands area.	Remove tire.
TR-27	Shopping cart partially buried in stream channel.	Remove shopping cart.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
UT-9	Exposed manhole on left bank. Manhole is closed.	Investigate manhole for leaking or other urgent problems. Develop channel restoration project to minimize bank erosion in reach. At minimum, restore bank around manhole and armor to protect against erosion.
NW 2nd Avenue Tributary		
SCC-145	18-inch diameter CPP and concrete culvert through an earthen berm across the channel. The crossing and berm do not appear to be serving any current purpose. If the culvert became clogged, significant water, sediment, and debris could be stored behind the berm until a catastrophic failure occurred. Such an event would pose minimal risk to humans but could have significant environmental impacts downstream.	Conduct additional barrier analysis and an investigate the function and stability of the berm/and crossing. Remove the crossing and berm to eliminate risk of clogging and potential debris flows.
IB-206	Widespread invasive plant species in riparian area and floodplain. Predominantly blackberry. Note that there is a significant amount of native blackberry in addition to invasive Himalayan blackberry.	Eradicate Himalayan blackberry while attempting to retain the native blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-208	Widespread invasive plant species in riparian area and floodplain. Predominantly ivy and blackberry.	Eradicate ivy and blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-207	Widespread invasive plant species in riparian area and floodplain. Predominantly reed canary grass.	Eradicate reed canary grass. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
OT-196	Origin of NW 2nd Avenue Tributary at base of large wood retaining wall. Flow appears to originate as groundwater seep, but a culvert outfall could potentially be obscured by dense vegetation and debris.	Remove tree/yard debris and determine if a piped outfall is present. Educate landowners on proper disposal of yard debris.
NW 7th Avenue Tributary		
SCC-143	Culvert under NE 7th Avenue. Outlet is perched 2.5-feet creating a likely fish passage barrier. A landowner mentioned to us that trout populations in the creek had declined in recent years. Downstream embankment is failing.	Conduct additional barrier analysis and replace the crossing. At minimum, repair failing embankment.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
SCC-144 CM-33	Stream is piped approximately 150 feet through a large berm/historic road grade at the end of NW Heerman Drive. The crossing and channel modification isolates the upstream portion of the creek from the Salmon Creek floodplain. Embankments and culvert appear to be in good condition. However, the culvert is undersized and steep with impassable outlet conditions and is also providing grade control. Downstream of the outlet, the stream flows into a series of manmade ponds and a beaver complex that has formed in a historic channel of Salmon Creek.	Conduct additional barrier analysis. Investigate potential benefits of a large scale project with a goal of reconnecting this tributary stream with Salmon Creek. Consider risks of a major hillslope failure or debris flow blocking the culvert. This could result in overtopping and failure of the berm/historic road grade, and significant damage to property as well as habitat.
ER-32	Hillslope failure is a chronic problem at this location. Landowner has tried to stabilize the site multiple times. Jeff Schnabel visited this site with the concerned landowner on December 16, 2008.	Maintain contact with landowners and continue offering technical support. Develop project as needed.
IB-209	Widespread invasive plant species in riparian area, floodplain, and up the valley walls. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-210	Widespread invasive plant species in riparian area, floodplain, and up the valley walls. Predominantly blackberry.	Eradicate blackberry. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-211	English ivy on left bank has not completely taken over riparian area yet. Source of invasive plant may be one of the outfalls upstream.	Eradicate ivy before it becomes more mature and established. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
IB-212 MI-47	Widespread invasive plant species in riparian area, and floodplain of tributary stream and Salmon Creek. Predominantly reed canary grass. Site was recently planted with alder, cedar, and dogwood but trees are not yet large enough to effectively out-compete the invasive species.	Continue invasive plant species management program and expand into surrounding areas. Reestablish native undergrowth and canopy vegetation on floodplain to shade out invasive plants and enhance riparian habitat.
TR-55	One rusted steel drum and an old wooden palette on the right bank. Drum does not appear to be leaking any hazardous material.	Remove debris.
ER-17	40-foot long stretch of failing right bank. Banks are six feet-high, vertical, and bare.	Investigate erosion more thoroughly. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
ER-18	Failing right bank. Banks are four feet high, vertical, and bare.	Investigate erosion more thoroughly. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.
ER-19	Channel incising through conglomerate deposits. Channel nick point is migrating upstream through this reach of channel. Failing banks are vertical and bare	Investigate erosion more thoroughly. Place grade control structures to reinforce channel grade and prevent incision. Place bank stabilization structures and plant native vegetation to halt further bank erosion and fine sediment production.
SCC-87	Some sediment deposition in channel upstream of culvert at NE 83rd Street. Invasive vegetation also prevalent on banks.	Monitor culvert capacity and sediment deposition. Educate landowners about importance of native riparian vegetation and stream processes.
SCC-88	Bank erosion and expansion scour downstream of culvert at NE 85th Street. Concrete pillows and bank armoring present at culvert inlet, and failed concrete bank armoring now lies in the scour pool at the outlet. One-foot drop height between culvert outlet invert elevation and pool water surface.	Conduct hydraulic analyses to re-evaluate and determine best methods for promoting outlet and bank protection and energy dissipation at culvert outlet. Educate landowners about importance of native riparian vegetation and stream processes. Plant native vegetation to replace or enhance riprap bank armoring.
SCC-79	Undersized culvert under NE 26th Avenue. Half-full of sediment. Widespread invasive plant species, including reed canary grass and blackberry, in riparian area and floodplain.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
SCC-81 IB-134 AP-19 SCC-80 MI-23	Potentially undersized culverts at two private access road-stream crossings. Erosion along roadway embankments at crossings. Widespread invasive plant species, especially reed canary grass, in riparian area. Historic wetland channel has likely been channelized and straightened through pasture and between property boundaries.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required. Stabilize banks around the road crossings to prevent erosion and prevent threats to structural stability. Realign and broaden channel to enable recovery of natural wetland channel process and floodplain connectivity. Remove invasive vegetation from channel banks, and plant native vegetation on banks and floodplain to improve vegetation density and quality and to help control invasive species and restore wetland channel function.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
SCC-83	Potentially undersized culvert under NE 78th Street. Outlet is full of sediment and clogged by invasive plant species, especially reed canary grass. Channel at outlet is also confined by adjacent private properties and fences.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
SCC-89	Undersized culvert associated with old access road to vacant property has a partially plugged and backwatered outlet.	Investigate potential for culvert removal or replacement.
SCC-84	Undersized culvert associated with abandoned access road to vacant property has a partially plugged and backwatered inlet. The embankment is eroding and the riprap armoring is failing. Widespread invasive plant species, including reed canary grass and blackberry, in riparian area and floodplain.	Investigate the potential for removing the abandoned culvert and associated embankment. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
SCC-85	Undersized culvert at NE 13th Avenue backwaters the inlet and is clogged with sediment.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required.
SCC-86	Widespread invasive plant species, including reed canary grass and blackberry, may inhibit conveyance and could contribute to localized flooding. Erosion along banks and culvert embankments at inlet to storm drain system that carries stream beneath Highway 99 and I-5.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
SCB-34	Pedestrian bridge across the top of bank within residential backyard. Riprap present on both banks upstream of the bridge.	Educate landowners about importance of native riparian vegetation and stream processes. Plant native vegetation to replace or enhance riprap bank armoring.
SCC-90	Double-barreled culvert at NE Hazel Dell Avenue with outlet flush with channel bottom, but embankment erosion on upstream. Widespread invasive vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize banks, and enhance riparian habitat.
SCC-91	Culvert for embankment for abandoned roadway or sewer line. Culvert entrance almost completely blocked by logs. Manhole lid in creek just upstream of culvert entrance. Embankment erosion around culvert inlet and severe bank erosion and expansion scour downstream of culvert outlet.	Investigate the potential for removing the abandoned culvert and associated embankment. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants stabilize banks, and enhance riparian habitat. Stabilize failing left bank.

Table B-7: Description of Potential Project Opportunities - Salmon Creek (RM 03.83)		
ID	**Basis for Project**	**Project Description**
SCC-75	Minor expansion scour at downstream end of NW 94th Street culvert. Widespread invasive vegetation.	Place LWD/bank stabilization structures at outlet of NW 94th Street Culvert and adjacent outfall. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants stabilize banks, and enhance riparian habitat.
SCC-76	Six foot diameter culvert under NW 99th Street is not flow-aligned. Widespread invasive vegetation and sedimentation occurring upstream of culvert.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants stabilize banks, and enhance riparian habitat.
SCB-29	Footbridge crossing creek. Only one 12-inch by 12-inch beam left, rest in river.	Remove remains of footbridge from channel. Add bank protection.
SCC-77	Six foot diameter culvert under NW 119th Street has a potential slope of concern and is causing bed scour at the downstream end.	Conduct additional hydraulic and sediment deposition analysis to determine if culvert retrofit or replacement is required. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize banks, and enhance riparian habitat.
SCC-78	Culvert for embankment for abandoned roadway or sewer line. Erosion on embankment around culvert inlet. Two foot-drop to a two foot-deep scour pool at outlet. Expansion scour.	Investigate the potential for removing the abandoned culvert and associated embankment. Replace with LWD used for grade control. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize banks, and enhance riparian habitat.
SCB-30	Severe downcutting and incision both upstream and downstream of pedestrian bridge. Erosion likely driven by streamflows.	Use LWD for grade control upstream and downstream of the bridge to prevent further incision. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize banks, and enhance riparian habitat.
SCB-31	Small pedestrian bridge across bankfull channel. Causes a flow barrier in medium to high flows. Some local bank erosion and incision upstream and downstream of the pedestrian bridge.	Use LWD for grade control upstream and downstream of the bridge to prevent further incision and erosion. Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants, stabilize banks, and enhance riparian habitat.
SCB-32	Pedestrian bridge across bankfull channel. Causes a flow barrier in overbank flows. Riprap along bank toe upstream and downstream of pedestrian bridge limits floodplain connectivity and channel complexity.	Remove riprap where possible and replace with LWD where necessary to encourage natural channel complexity and floodplain connectivity.

Table B-8: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
CM-14	Concrete wall armors and confines the left bank.	Work with landowners to consider possibilities for removing concrete wall and adjacent parking area to provide more space for natural channel geomorphic function.
CM-15	Creek is channelized and rectangular, as well as artificially confined and armored as it passes through several residential properties.	Educate landowner about importance of native riparian vegetation and stream processes. Consider working with landowners to obtain conservation easements or to restore native riparian vegetation.
MI-22	Barbed wire fence across creek could disrupt high flow capacity.	Work with landowners to discuss possibilities of limiting the fence extent to beyond the channel banks.
MB-9	Chain-link fence spans creek and likely disrupts high flow capacity.	Work with landowners to discuss possibilities of limiting the fence extent to beyond the channel banks, or removing fence from floodplain completely.
IB-135	Channel is completely choked by reed canary grass. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-136	Widespread invasive plants, especially blackberry, along the banks and in the floodplain. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat. Educate landowner on importance of native riparian vegetation.
IB-138	Widespread invasive plants, especially blackberry, nightshade, reed canary grass, and thistle, surround creek along the banks and in the floodplain. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-140	Widespread invasive plants, especially blackberry surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-141	Widespread invasive plants, especially blackberry surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat. Educate landowner on importance of native riparian vegetation.
IB-142	Widespread invasive plants, especially blackberry, surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.

Table B-8: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
IB-143	Widespread invasive plants, especially ivy, surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-144	Widespread invasive plants, especially blackberry, surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-145	Widespread invasive plants, especially ivy, surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-146	Widespread invasive plants, especially blackberry, surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-123	Widespread invasive plants, especially ivy, nightshade, blackberry, and some reed canary grass, surround the creek channel and banks. Lack of native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-124	Widespread invasive plants, especially reed canary grass, nightshade, blackberry, and ivy, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-125	Clump of bamboo present on right bank.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-126	Widespread invasive plants, especially ivy, blackberry, nightshade, and horsetail, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-127	Widespread invasive plants, especially blackberry, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-128	Widespread invasive plants, especially blackberry, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-129	Widespread invasive plants, especially ivy, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.

Table B-8: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
IB-130	Widespread invasive plants, especially blackberry, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-131	Widespread invasive plants, especially ivy, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-132	Widespread invasive plants, especially ivy, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
IB-132	Widespread invasive plants, especially reed canary grass, surround the creek channel and banks. Minimal native vegetation.	Eradicate invasive vegetation. Reestablish native undergrowth and canopy vegetation on floodplain and banks to shade out invasive plants and enhance riparian habitat.
UT-4 UT-5	Channel banks eroding around sewer manholes. The existing sewer alignment that parallels the channel through much of this portion of Cougar Creek is threatened by channel erosion and channel migration.	Joint county-sewer district effort needed to determine the need for further action. Potential project could include placement of bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure. Channel realignment may be necessary.
UT-6	Channel has completely eroded around the sewer manhole, which now sits in the center of the channel. The existing sewer alignment that parallels the channel through much of this portion of Cougar Creek is threatened by channel erosion and channel migration.	Joint county-sewer district effort needed to determine the need for further action. Potential project could include placement of bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure. Channel realignment may be necessary.
UT-7 UT-8	Channel banks eroding around sewer manholes. The existing sewer alignment that parallels the channel through much of this portion of Cougar Creek is threatened by channel erosion and channel migration.	Joint county-sewer district effort needed to determine the need for further action. Potential project could include placement of bank stabilization structures at locations where the sewer line infrastructure is exposed or at threat of exposure. Channel realignment may be necessary.
TR-9	Accumulation of various trash and debris, including cable spool and buckets which potentially previously contained paint, in left bank floodplain.	Remove debris. Conduct IDDE investigation. Work with landowners to implement source control and avoid further dumping in channel.
TR-17	Yard waste and compost from apartment buildings on right bank floodplain.	Discuss options for improving on-site compost management with landowners.
TR-18	Old couch and other household and automotive debris in the channel and on both banks.	Contact landowners about removing debris and discuss ways to limit access to the creek to prevent future dumping.

Table B-8: Description of Potential Project Opportunities - Cougar Creek		
ID	**Basis for Project**	**Project Description**
TR-20	Automotive debris in channel.	Contact landowners about removing debris and discuss ways to limit access to the creek to prevent future dumping.
TR-21	Automotive debris in channel.	Contact landowners about removing debris and discuss ways to limit access to the creek to prevent future dumping.
TR-22	Large metal grates, large amounts of hard plastic, and concrete blocks in the channel.	Contact landowners about removing debris and discuss ways to limit access to the creek to prevent future dumping.
TR-23	Wood planks in the channel and across the banks.	Contact landowners about removing debris and discuss ways to limit access to the creek to prevent future dumping.
TR-24	36-inch concrete pipe sections in channel and on right bank.	Remove debris.
TR-8	Metal debris present in left bank floodplain.	Remove debris.
TR-10	Metal debris present in channel.	Remove debris.
TR-11	24-inch concrete pipe sections in channel.	Remove debris.
TR-12	Tires and 24-inch pipe in channel.	Remove debris.
TR-13	Tires, lumber, and tarp in channel.	Remove debris.
TR-14	Rebar, fence, lumber, collapsed bridge in channel.	Remove debris.
TR-15	Failed 18-inch diameter metal pipe in creek: three pieces, each three feet-long.	Remove debris.
TR-16	Metal debris present in channel.	Remove debris.

Stormwater Management Recommendations

Salmon Creek (RM 03.83) Subwatershed

A number of general stormwater management measures should be implemented throughout the Salmon Creek (RM 03.83) subwatershed:

- Systematically investigate the existing stormwater infrastructure and flow sources related to outfalls located during the Feature Inventory. Confirm drainage areas and pollutant loading characteristics. Develop large scale, regional detention and treatment facilities to mitigate for stormwater impacts from historic development.
- In residential areas, encourage landowners to adopt green solutions such as disconnecting gutter down spouts that encourage infiltration of stormwater close to the source.
- Educate private landowners concerning importance of invasive plant removal and suggest removal techniques.
- Educate landowners to discourage disposal of trash and yard debris in streams or other receiving waters.
- Educate private landowners on importance of native riparian vegetation and intact riparian forests for shading streams and preserving hydrology. Emphasize conservation of undeveloped and forested areas, especially within the riparian corridor and floodplain.
- Provide a list of suggested plants for stream revegetation and local nurseries that stock them for distribution to landowners. Excellent choices include Alder and Big Leaf Maple, which thrive in riparian areas, grow quickly, and have been shown to be more effective at shading out invasive plants than conifers in the short term.
- Encourage transmission of stormwater through open channels such as grass lined conveyance ditches or bioswales rather than using piped systems to encourage filtration of suspended sediment.
- Confirm that County ditch maintenance practices minimize vegetation removal whenever possible.
- Post stream identification signs where roads cross streams. Repair or replace deteriorated signs if necessary.
- Manmade ponds are widespread. Verify water rights of pond owners. Develop literature and distribute to landowners educating about the water quality impacts and other potential hazards on on-line and off-line ponds.

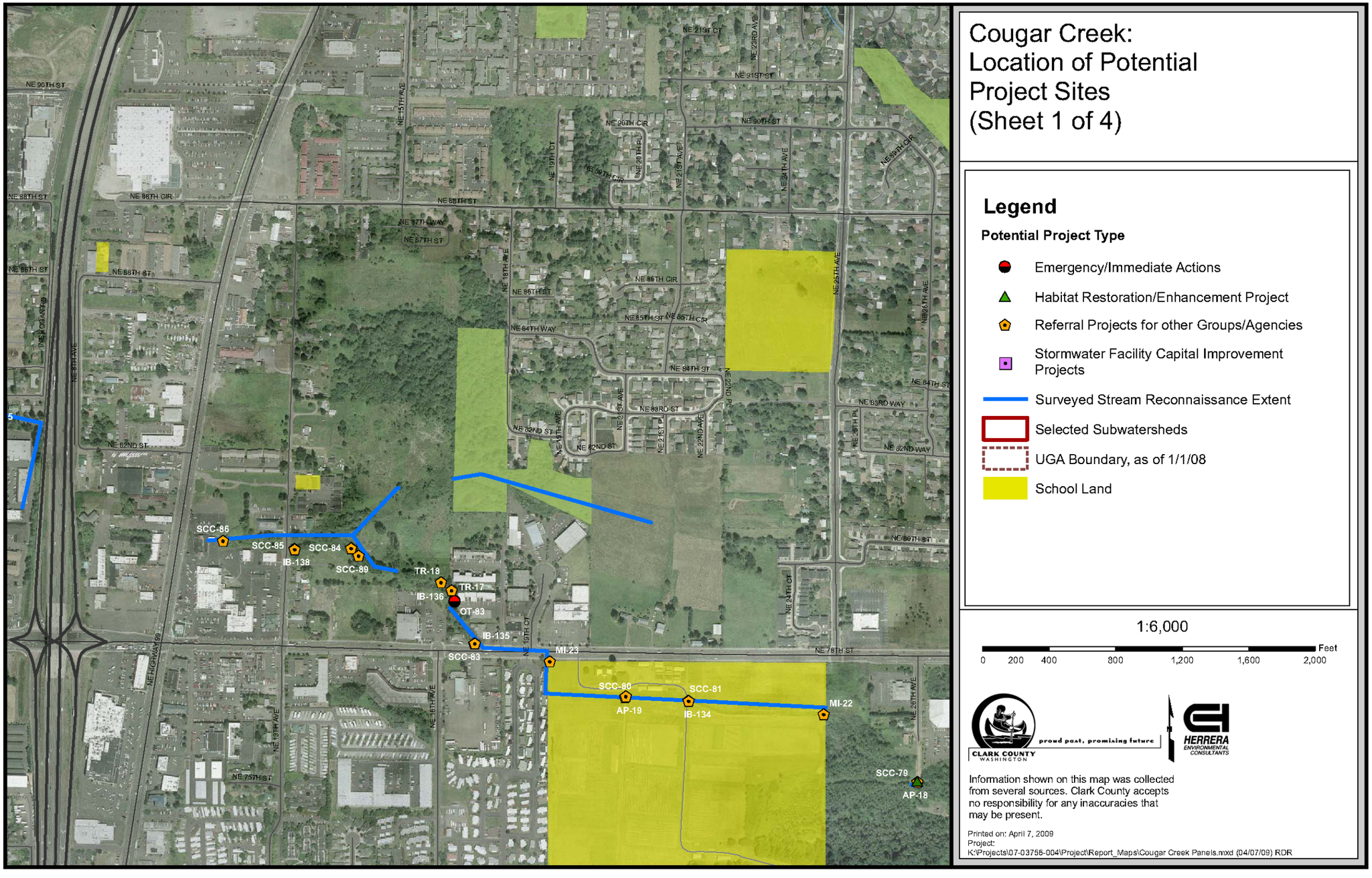
Cougar Creek Subwatershed

A number of general stormwater management measures should be implemented throughout the Cougar Creek subwatershed:

- Systematically investigate the existing stormwater infrastructure and flow sources related to outfalls located during the Feature Inventory. Confirm

drainage areas and pollutant loading characteristics. Develop large scale, regional detention and treatment facilities to mitigate for stormwater impacts from historic development.

- In residential areas, encourage landowners to adopt green solutions such as disconnecting gutter down spouts that encourage infiltration of stormwater close to the source.
- Educate private landowners concerning importance of invasive plant removal, and suggest removal techniques.
- Educate private landowners on importance of native riparian vegetation for shading streams and preserving hydrology. Emphasize conservation of undeveloped and forested areas, especially within the riparian corridor and floodplain.
- Educate landowners to discourage disposal of trash and yard debris in streams or other receiving waters.
- Provide a list of suggested plants for stream revegetation and local nurseries that stock them for distribution to landowners
- Encourage transmission of stormwater through open channels such as grass-lined conveyance ditches or bioswales rather than using piped systems.
- Post stream identification signs where roads cross streams. Repair or replace deteriorated signs if necessary.
- Do not overlook stormwater inputs to small tributary streams that were not surveyed as a part of this Feature Inventory. These inputs may be more numerous than originally anticipated.
- Protect first-order tributary streams from further stormwater impacts by creating stream buffers, establishing conservation easements, and eliminating existing stormwater and agricultural runoff impacts. Encourage reforestation of lower gradient headwaters.
- Discuss current management practices with agricultural land users and residential land users in the upper and middle subwatersheds, respectively. Look for ways to reduce sediment and nutrient loads to the headwaters.



Cougar Creek: Location of Potential Project Sites (Sheet 1 of 4)

Legend

Potential Project Type

- Emergency/Immediate Actions
- Habitat Restoration/Enhancement Project
- Referral Projects for other Groups/Agencies
- Stormwater Facility Capital Improvement Projects
- Surveyed Stream Reconnaissance Extent
- Selected Subwatersheds
- UGA Boundary, as of 1/1/08
- School Land

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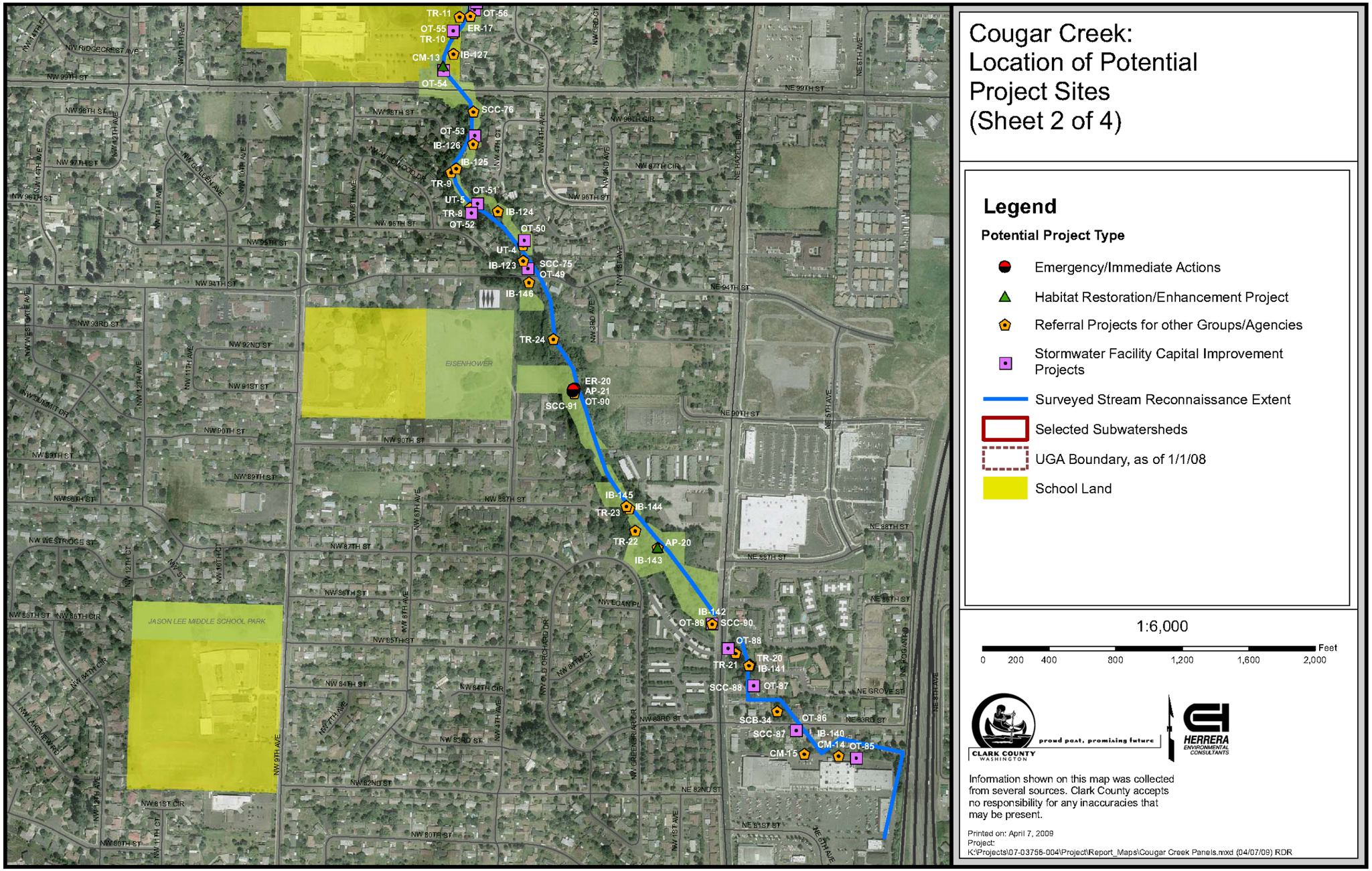
Figure B-1: Cougar Creek Location of Potential Project Sites



Cougar Creek: Location of Potential Project Sites (Sheet 2 of 4)

Legend

Potential Project Type

- ● Emergency/Immediate Actions
- ▲ Habitat Restoration/Enhancement Project
- ⬟ Referral Projects for other Groups/Agencies
- ■ Stormwater Facility Capital Improvement Projects
- — Surveyed Stream Reconnaissance Extent
- ☐ Selected Subwatersheds
- ⬚ UGA Boundary, as of 1/1/08
- 🟨 School Land

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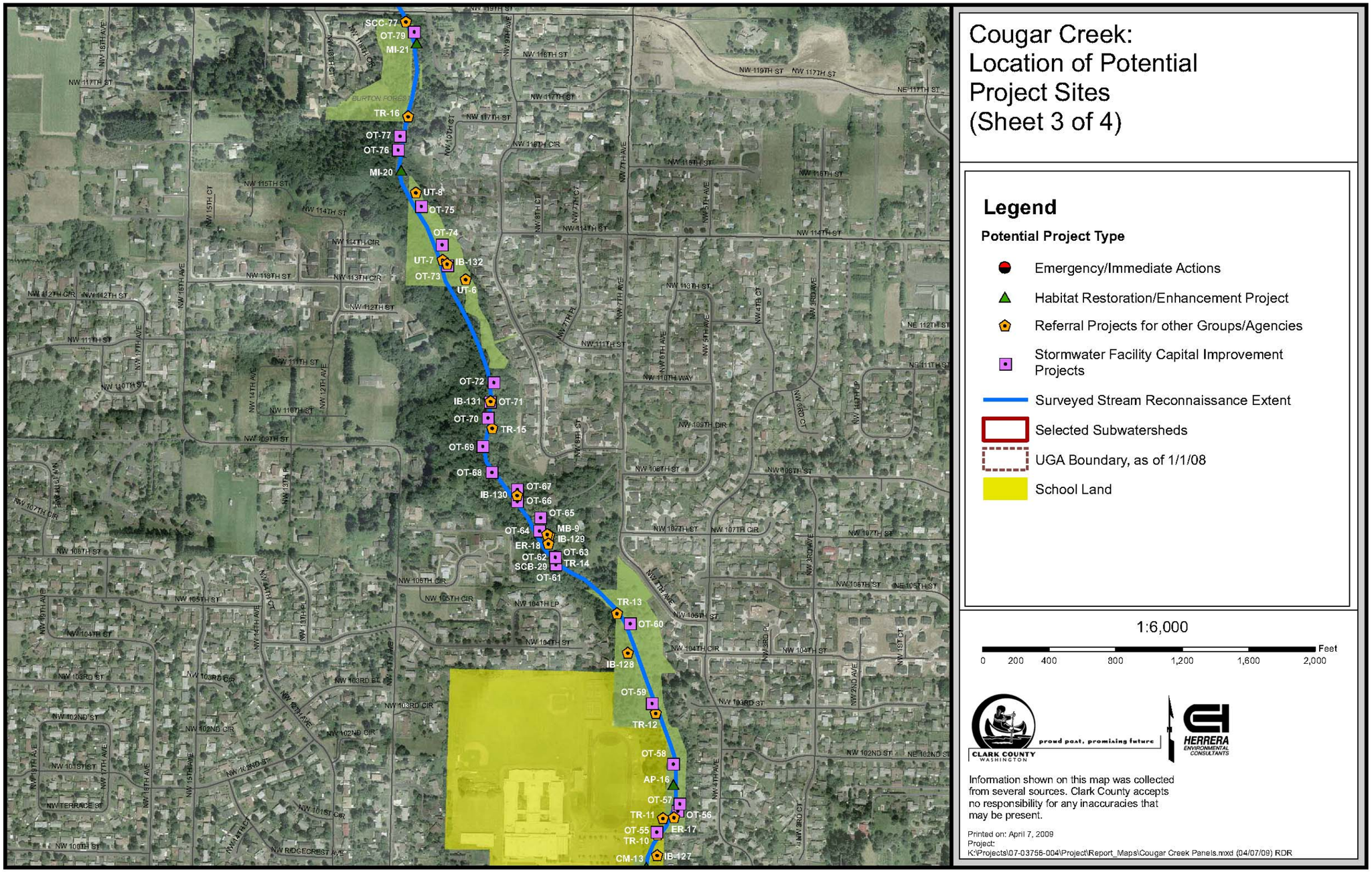
Figure B-2: Cougar Creek Location of Potential Project Sites



Cougar Creek: Location of Potential Project Sites (Sheet 3 of 4)

Legend

Potential Project Type

- Emergency/Immediate Actions
- Habitat Restoration/Enhancement Project
- Referral Projects for other Groups/Agencies
- Stormwater Facility Capital Improvement Projects
- Surveyed Stream Reconnaissance Extent
- Selected Subwatersheds
- UGA Boundary, as of 1/1/08
- School Land

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Figure B-3: Cougar Creek Location of Potential Project Sites

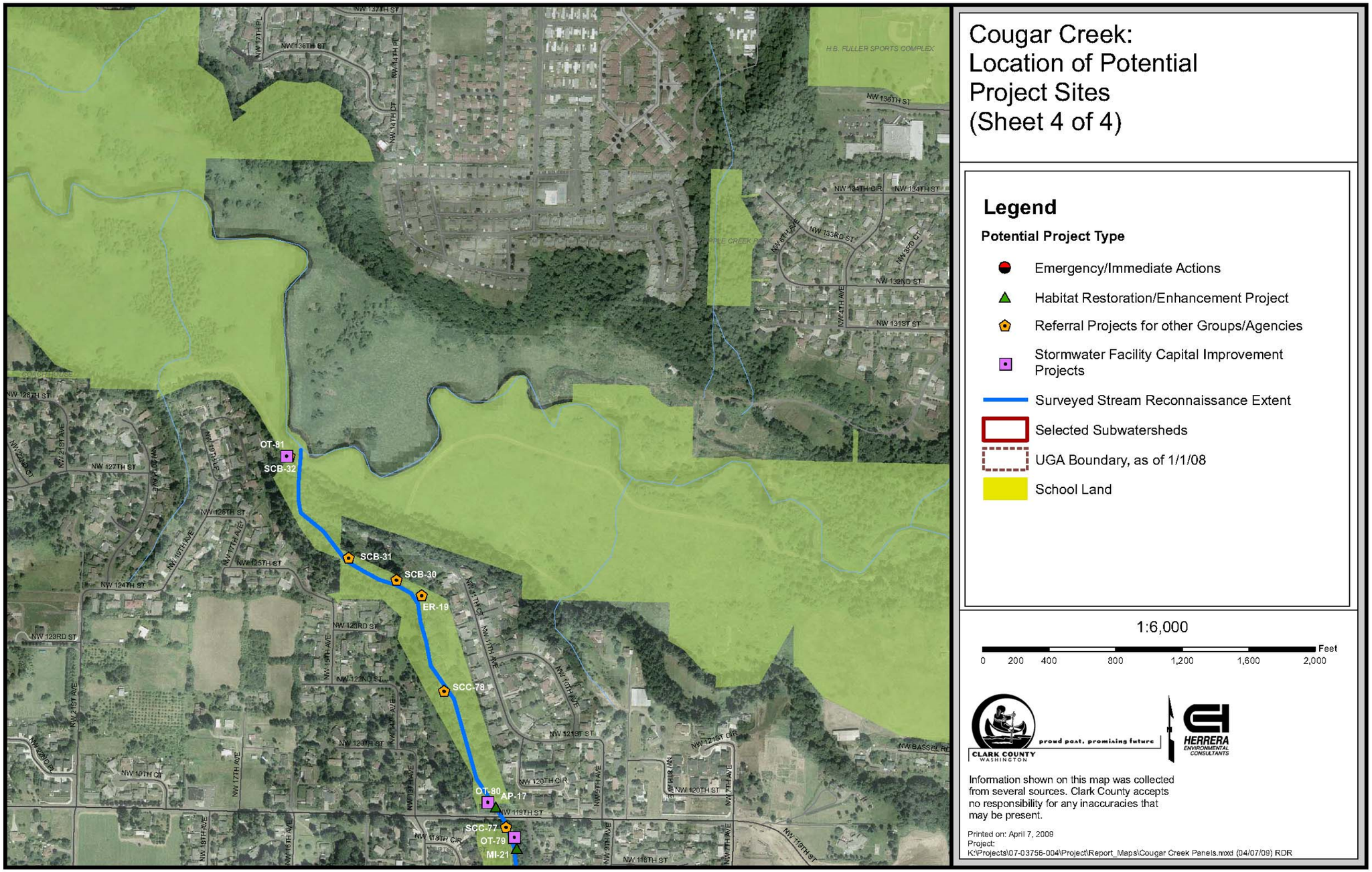
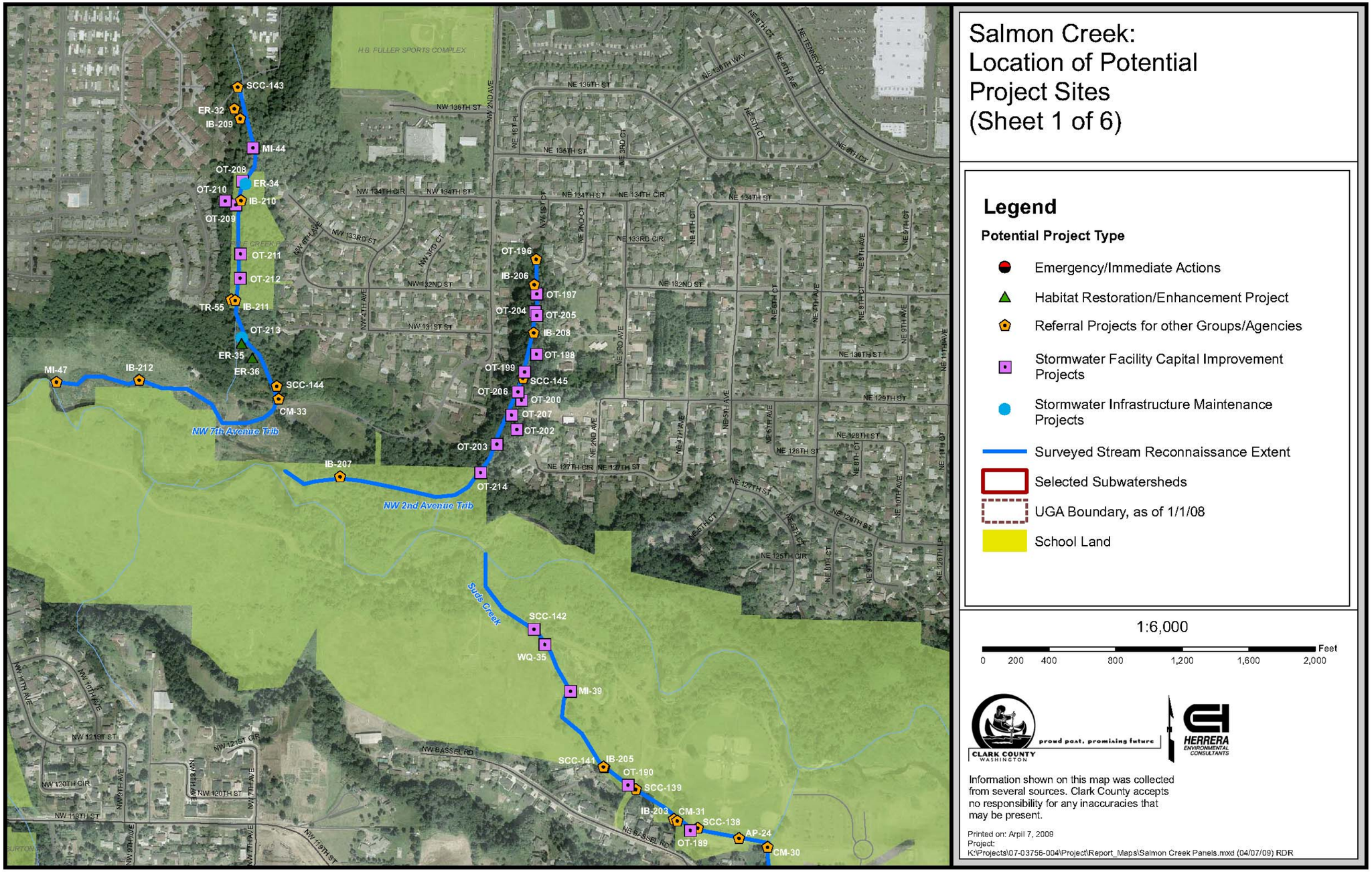


Figure B-4: Cougar Creek Location of Potential Project Sites



Salmon Creek: Location of Potential Project Sites (Sheet 1 of 6)

Legend

Potential Project Type

- Emergency/Immediate Actions
- Habitat Restoration/Enhancement Project
- Referral Projects for other Groups/Agencies
- Stormwater Facility Capital Improvement Projects
- Stormwater Infrastructure Maintenance Projects
- Surveyed Stream Reconnaissance Extent
- Selected Subwatersheds
- UGA Boundary, as of 1/1/08
- School Land

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Figure B-5: Salmon Creek Location of Potential Project Sites

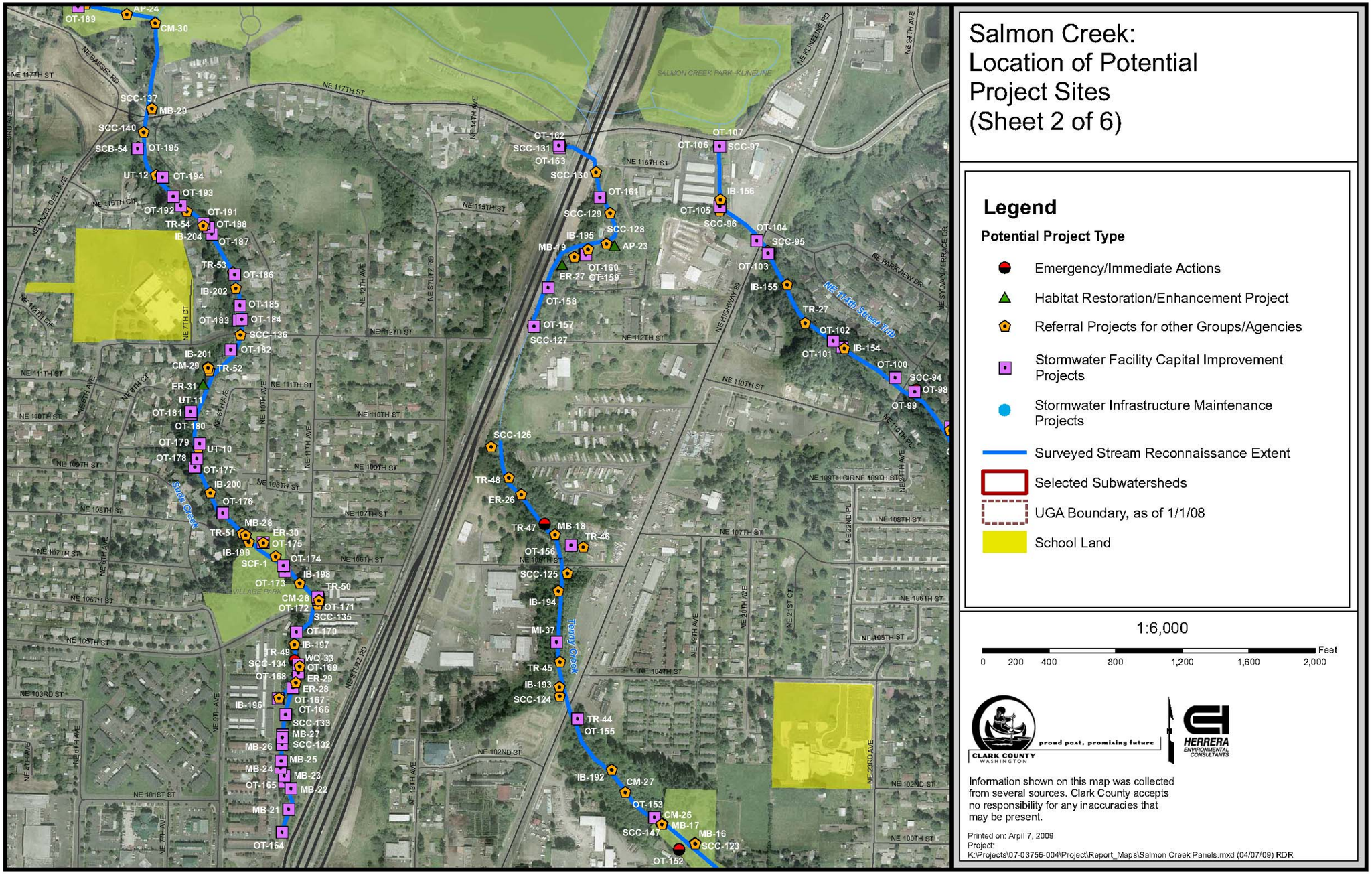


Figure B-6: Salmon Creek Location of Potential Project Sites

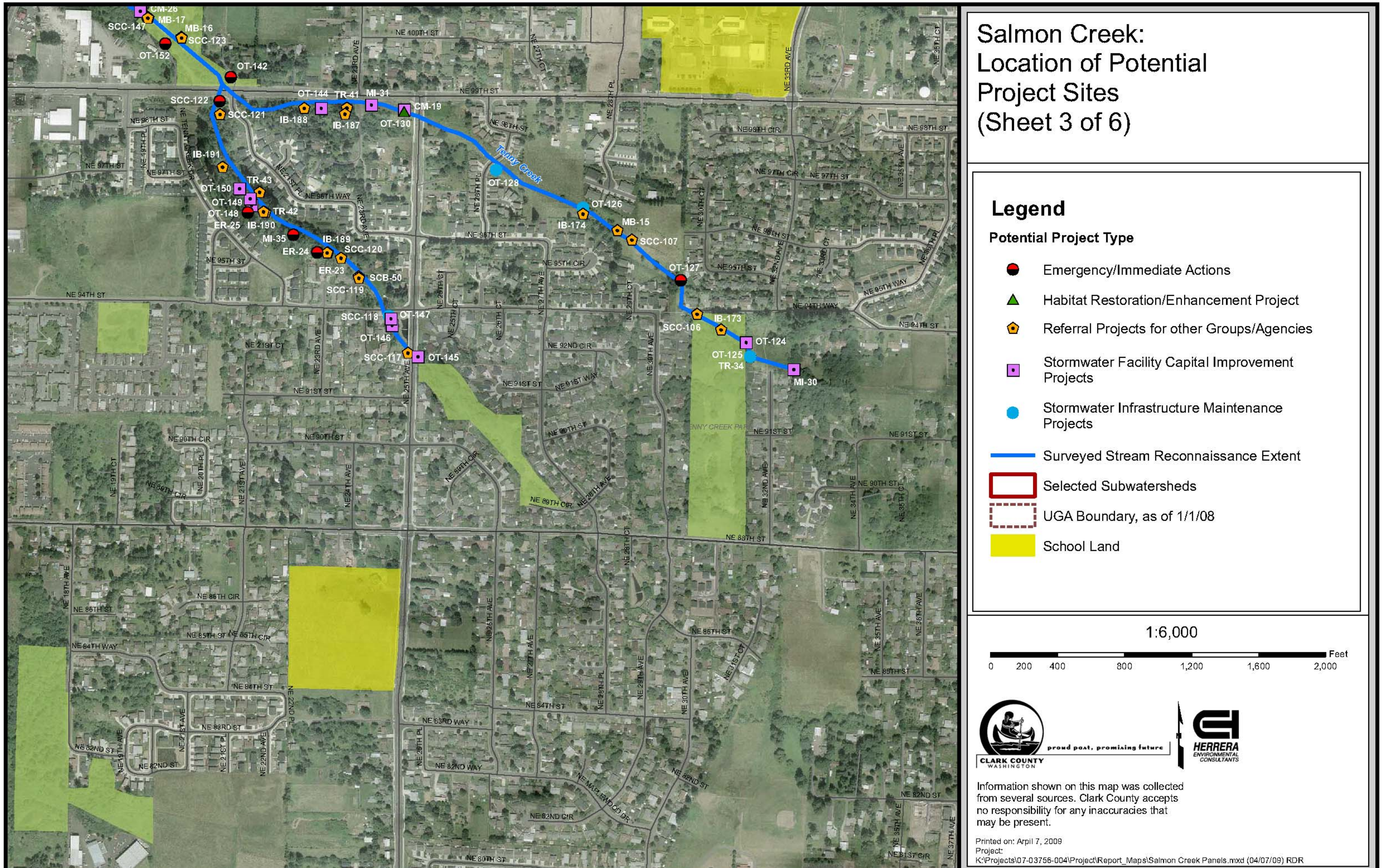
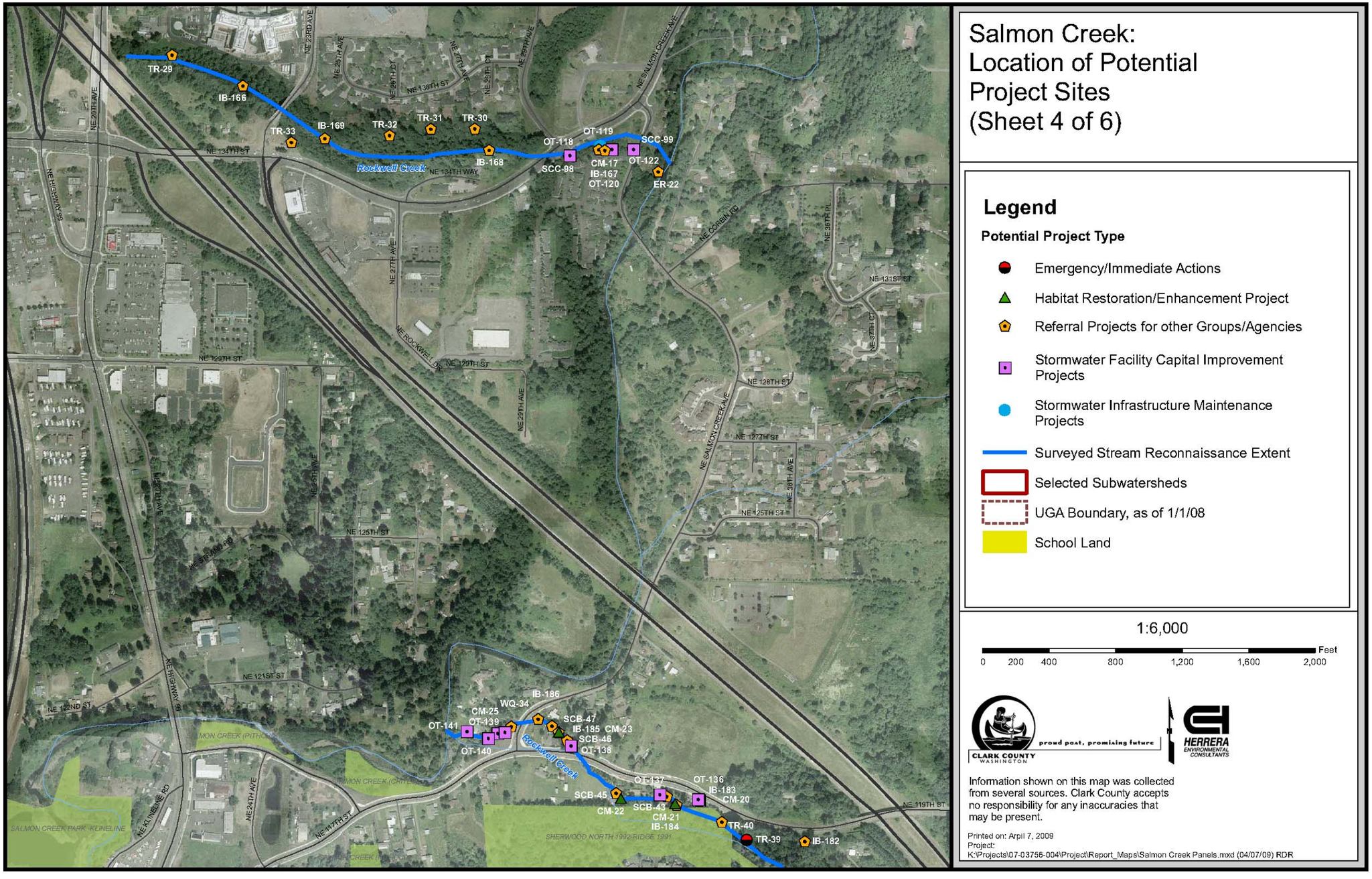


Figure B-7: Salmon Creek Location of Potential Project Sites



Salmon Creek: Location of Potential Project Sites (Sheet 4 of 6)

Legend

Potential Project Type

- Emergency/Immediate Actions
- Habitat Restoration/Enhancement Project
- Referral Projects for other Groups/Agencies
- Stormwater Facility Capital Improvement Projects
- Stormwater Infrastructure Maintenance Projects
- Surveyed Stream Reconnaissance Extent
- Selected Subwatersheds
- UGA Boundary, as of 1/1/08
- School Land

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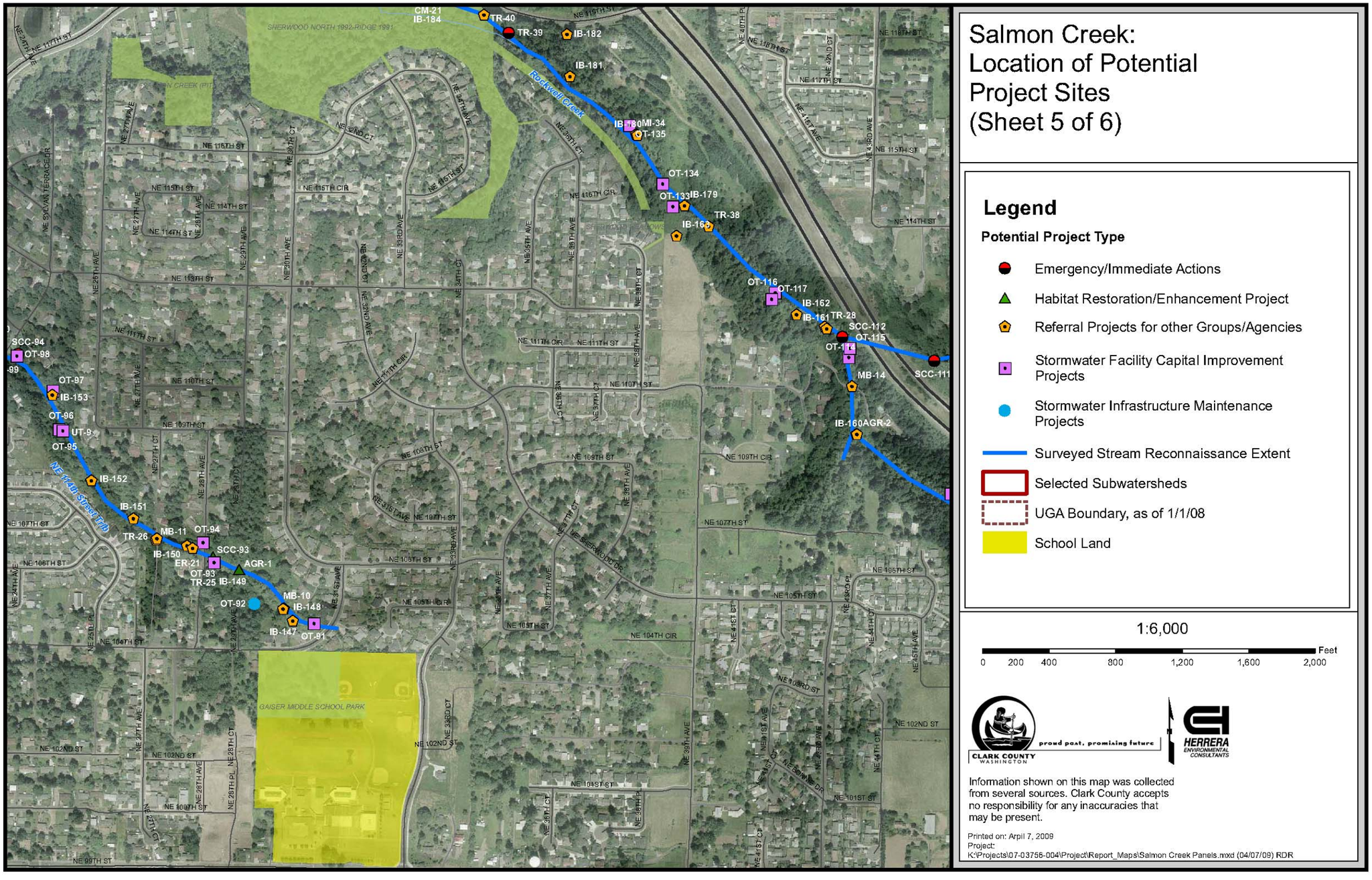
Figure B-8: Salmon Creek Location of Potential Project Sites



Salmon Creek: Location of Potential Project Sites (Sheet 5 of 6)

Legend

Potential Project Type

- Emergency/Immediate Actions
- Habitat Restoration/Enhancement Project
- Referral Projects for other Groups/Agencies
- Stormwater Facility Capital Improvement Projects
- Stormwater Infrastructure Maintenance Projects
- Surveyed Stream Reconnaissance Extent
- Selected Subwatersheds
- UGA Boundary, as of 1/1/08
- School Land

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Figure B-9: Salmon Creek Location of Potential Project Sites

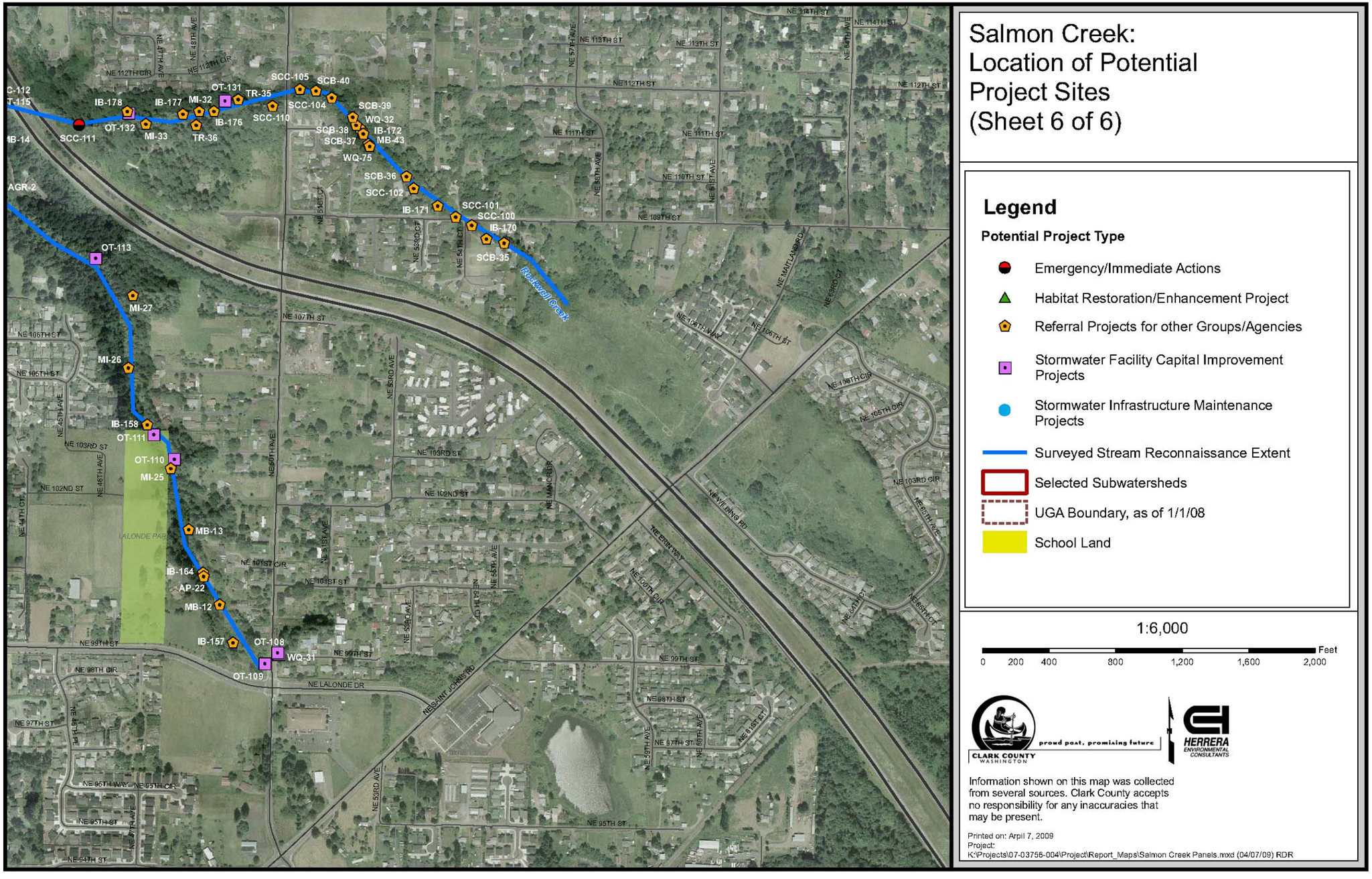

Figure B-10: Salmon Creek Location of Potential Project Sites

Appendix C — Geomorphic Assessment

Geomorphic Assessment

Purpose

This report is an assessment of physical conditions in the Salmon Creek (RM 03.83) subwatershed, based on field reconnaissance and review of remote sensing data. The field reconnaissance included characterizations of the channel, bank, and floodplain conditions on portions of seven Salmon Creek tributaries within the subwatershed, from their confluences with the mainstem of Salmon Creek to their headwaters. In this report, named tributaries are referred to by their names, and unnamed tributaries are named for a road near the stream. The surveyed tributaries include Suds Creek, Tenny Creek, LaLonde Creek, Rockwell Creek, NE 114th Street Tributary, NW 2nd Avenue Tributary, and NW 7th Avenue Tributary.

The objectives of this geomorphic assessment were to:

- Detail the geomorphic factors and processes influencing hydrology, sediment delivery, channel form, water quality, and habitat.
- Describe the apparent influence of past land use on geomorphic processes.
- Identify reaches that are unstable or moving toward unstable conditions under current channel morphologic and hydrologic conditions.
- Identify reaches that are stable or moving toward stable conditions under current channel morphologic and hydrologic conditions.
- Identify reaches that are most and least sensitive to future changes in hydrologic conditions.

Geomorphic field reconnaissance and remote sensing analysis results are used to make management recommendations and identify project types that might be implemented by Clark County to protect reaches that are currently unstable or sensitive to future disturbance, and to enhance the reaches that are currently stable or are less sensitive to future disturbance.

Methods

The geomorphic assessment is based on a reconnaissance of several tributaries of the Salmon Creek (RM 03.83) subwatershed from their confluences with the mainstem of Salmon Creek to their headwaters. The geomorphic reconnaissance was conducted in parallel with the stream reconnaissance and feature inventory. Channel, bank, and floodplain conditions were documented during the reconnaissance in December 2008 and January 2009. A detailed description of the methods used to document each channel, bank, and floodplain characteristic is provided in the see Stream Reconnaissance and Feature Inventory chapter.

Documented channel conditions included:

- Bankfull channel width and depth (or bank height where bankfull depth was not discernible).
- Channel gradient.

- Substrate material conditions.
- Sinuosity.
- Amount of functioning large woody debris (LWD).
- Channel type.
- Channel stability.

Channel types were based on the Montgomery and Buffington (1997) process-based classification system, which includes the cascade, step pool, plane bed, pool/riffle, dune/ripple, bedrock, and colluvial channel types. Additional channel types identified included glide-cohesive/rectangular, excavated/constructed, wetland, impounded, and other. Channel stability of the surveyed reach was a field determination based on the channel's relative equilibrium within the context of its hydrologic regime, sediment supply, and riparian vegetation. Each reach's channel stability was based on visual determination of whether the channel appeared to be stable (dynamic equilibrium), actively incising, actively widening, actively incising and widening, or actively aggrading. It was also noted when a channel was forced into stability by unnatural processes (e.g., mechanical armoring).

Documented bank conditions included the location and relative percentage of active bank erosion, bank material conditions, and a classification of bank stability. Bank stability classification was based on a protocol that uses bank vegetation, undercutting, erosion and scalloping, exposed tree roots, and downed trees to classify a stream channel as stable, slightly unstable, moderately unstable, or completely unstable (Scholz and Booth 2001). This classification, combined with other bank assessment methods, provides a way to describe current and potential future bank stability conditions.

Documented floodplain conditions included the floodplain width and a classification describing the relative degree of floodplain connectivity between the active channel and the floodplain. This floodplain connectivity metric was used to describe how frequently the stream channel currently accesses the adjacent floodplain. Floodplain connectivity was assessed using the following qualitative categories:

- **Low connectivity**: The stream rarely exceeds the horizontal and vertical limits of the active/bankfull channel.
- **Medium connectivity**: The stream shows signs of occasionally overflowing the active/bankfull channel.
- **High connectivity**: The stream appears to exceed the limits of the active, bankfull channel, and inundates significant portions of the adjacent floodplain or overbank areas at regular (approximately annual) intervals.

Geomorphic field reconnaissance data were collected and entered in a geodatabase then reviewed using a geographic information system (GIS) and pertinent and available remote sensing data. For this geomorphic assessment, the

reviewed GIS layers were Clark County's stormwater and sewer utility alignments, parcel boundaries, and two foot contours based on light detection and ranging (LiDAR) data (Clark County 2009).

The geomorphic reconnaissance and remote sensing data was used to delineate the channel network into reaches, and to define the response potential for each reach. The response potential is a qualitative classification that describes the likelihood that a reach will experience future channel degradation resulting from hydrologic changes. Each channel reach was classified as having low, moderate, or high response potential. Response potential is a function of the channel, bank, and floodplain conditions including existing channel and bank stability, channel and bank material conditions, channel gradient and level of functional LWD, underlying geologic conditions, and the existing level of development within the drainage areas contributing to the reach. Response potential classifications are as follows:

- **Low response potential**: May have geologic conditions that are resistant to channel change or may be artificially confined, armored, or lined to limit channel response.
- **Moderate response potential**: Has geologic or geomorphic conditions susceptible to alluvial changes caused by historic, ongoing, or future land use and hydrologic change in the watershed.
- **High response potential**: Exhibits alluvial characteristics, and is susceptible to extreme channel or geomorphic change if land use or the watershed's hydrologic patterns change.

Also, response potential generally increases as functional LWD and floodplain connectivity decrease.

Geologic Setting

The geology of the Salmon Creek (RM 03.83) subwatershed includes limited outcrops of the Troutdale Formation and widespread deposits of cataclysmic flood deposits. The Troutdale Formation is between 3 to 15 million years old (Pliocene/Miocene) and includes fluvial deposits by the ancestral Columbia River from source areas east of the Cascade Range (Everts 2004). In the Salmon Creek (RM 03.83) subwatershed tributary networks, the Troutdale Formation outcrops as massive sandstone overlain by conglomerate containing small gravel to boulder-sized material. Both the sandstone and conglomerate are well-consolidated and relatively resistant to erosion; however, the uppermost layers are commonly weathered to clay or clay and resistant clasts such as quartzite pebbles. This weathered zone can range from a few feet to over 50 feet in depth.

Cataclysmic flood deposits mantle the Troutdale Formation and are widespread throughout the watershed. These silt to sand-sized sediments are interpreted as slack-water deposits of large floods initiated by the failure of ice dams at Glacial Lake Missoula in western Montana during the late Pleistocene, regionally dated between 17,000 and 13,000 years ago (Everts 2004). Flood deposits are

unconsolidated and are susceptible to erosion.

The Troutdale Formation and cataclysmic flood deposits are overlain throughout the watershed by various silt loam soils. These soils are characterized by moderate to poor permeability that may locally inhibit infiltration.

Results

The findings of the geomorphic field reconnaissance indicate that the streams within the Salmon Creek (RM 03.83) subwatershed have been, and continue to be, influenced by both natural geologic characteristics and human development within the subwatershed. The geomorphic characteristics of the channel were also found to be influenced by localized features such as bank hardening, channel crossings, riparian vegetation, and stormwater and sewer infrastructure.

A total of 66 stream reaches were identified on seven tributary streams in the Salmon Creek (RM 03.83) subwatershed. Figures C-1 through C-6 illustrate the locations of each tributary, and the delineated geomorphic reaches. The geomorphic data collected for each reach are grouped by tributary and summarized in Table C-1.

The following discussion focuses on the response potential of surveyed geomorphic reaches, and the specific physical characteristics and factors that determine the response potential in the Salmon Creek (RM 03.83) subwatershed. Refer to Table C-1 and Figures C-1 through C-6 for the response potential and geographic location of individual reaches.

Table C-1: Geomorphic Survey Results for the Salmon Creek (RM 03.83) Subwatershed

				Channel Conditions									Bank Conditions					Floodplain Conditions		Response Potential
							Substrate Material									Bank Material				
Reach	Inventory Site ID #	Subwatershed	Tributary	Bankfull Channel Width (ft)	Bankfull Channel Depth (ft)	Channel Gradient (%)	Primary	Secondary	Sinuosity	Functional LWD	Channel Type	Channel Stability	Active Bank Erosion	Eroded Banks (%)	Bank Stability	Primary	Secondary	Floodplain Width (ft)	Floodplain Connectivity	
LaLo-01	GG-51	Salmon Creek	LaLonde Creek	6	3	2-4 %	Cobble	Boulder	Low (1.0-1.2)	Not prop functioning	Step pool	Stable	None	< 5%	Stable	Fines		15	Low	Low
LaLo-02	GG-50	Salmon Creek	LaLonde Creek	8	2	1-2 %	Sand	Fines	Low (1.0-1.2)	Not prop functioning	Dune ripple	Incising and Widening	Both banks	30 - 60%	Slightly Unstable	Fines	Sand	30	Medium	High
LaLo-03	GG-49	Salmon Creek	LaLonde Creek	5	2	1-2 %	Cohesive fines	Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising and Widening	Both banks	60 - 100%	Slightly Unstable	Fines	Cohesive fines	40	Medium	High
LaLo-04	GG-48	Salmon Creek	LaLonde Creek	6	3	1-2 %	Sand	Cohesive Fines	Low (1.0-1.2)	Prop functioning	Dune ripple	Widening	Both banks	60 - 100%	Slightly Unstable	Fines	Cohesive fines	25	Medium	High
LaLo-05	GG-34	Salmon Creek	LaLonde Creek	9	1.5	1-2 %	Sand	Fines	Low (1.0-1.2)	Prop functioning	Pool riffle	Incising and Widening	Both banks	5 - 30%	Slightly Unstable	Fines	Sand	30	Medium	High
LaLo-06	GG-33	Salmon Creek	LaLonde Creek	N/A	N/A	< 1%	Sand	Fines	Low (1.0-1.2)	Prop functioning	Dune ripple	Aggrading	None	< 5%	Stable	Fines	Sand	40	High	Moderate
LaLo-07	GG-32	Salmon Creek	LaLonde Creek	10	2	1-2 %	Sand	Fines	Low (1.0-1.2)	Prop functioning	Pool riffle	Stable	Both banks	5 - 30%	Slightly Unstable	Fines	Sand	13	Medium	High
LaLo-08	GG-31	Salmon Creek	LaLonde Creek	8	2	1-2 %	Sand	Fines	Low (1.0-1.2)	Prop functioning	Pool riffle	Incising	Both banks	5 - 30%	Slightly Unstable	Fines	Sand	10	Medium	High
LaLo-09	GG-30	Salmon Creek	LaLonde Creek	NA/NR	NA/NR	< 1%	Fines	Fines	Straight (1.0)	Not prop functioning	Impounded	Stable	None	< 5%	Stable	N/A	N/A	NA/NR	High	Low
LaLo-10	GG-47	Salmon Creek	LaLonde Creek	15	3	1-2 %	Sand	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Pool riffle	Incising	Both banks	5 - 30%	Slightly Unstable	Fines	Cohesive fines	25	Medium	High
LaLo-11	GG-43	Salmon Creek	LaLonde Creek	6	3	< 1%	Fines	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Pool riffle	Stable	Both banks	5 - 30%	Stable	Cohesive fines	Fines	20	Medium	High
LaLo-12	GG-42	Salmon Creek	LaLonde Creek	N/A	N/A	< 1%	Fines	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Impounded	Stable	None	< 5%	Stable	Cohesive fines	Fines	50	Low	Low
LaLo-13	GG-40	Salmon Creek	LaLonde Creek	6	2	< 1%	Fines	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Stable	Both banks	5 - 30%	Slightly Unstable	Cohesive fines	Fines	12	Low	Moderate
LaLo-14	GG-41	Salmon Creek	LaLonde Creek	6	2	< 1%	Fines	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Stable	Both banks	< 5%	Stable	Cohesive fines	Fines	40	Medium	Moderate
N114-01	GG-29	Salmon Creek	NE 114th Street Trib	5	2	1-2 %	Cobble	Sand	Straight (1.0)	Not prop functioning	Excavated/constructed	Incising	Right bank	60 - 100%	Slightly Unstable	Cohesive fines	Fines	5	Low	Moderate
N114-02	GG-28	Salmon Creek	NE 114th Street Trib	7	2.25	< 1%	Sand	Fines	Low (1.0-1.2)	Not prop functioning	Plane bed	Stable	Both banks	60 - 100%	Slightly Unstable	Cohesive fines	Sand	30	Medium	Moderate
N114-03	GG-27	Salmon Creek	NE 114th Street Trib	8	2	1-2 %	Cobble	Sand	Low (1.0-1.2)	Not prop functioning	Plane bed	Incising and Widening	Both banks	60 - 100%	Slightly Unstable	Fines	Sand	15	Low	Moderate
N114-04	GG-26	Salmon Creek	NE 114th Street Trib	7	1.5	1-2 %	Sand	Fines	Low (1.0-1.2)	Not prop functioning	Plane bed	Incising	Both banks	5 - 30%	Slightly Unstable	Fines	Sand	15	Low	High
N114-05	GG-25	Salmon Creek	NE 114th Street Trib	3.5	1.5	< 1%	Fines	Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising	Both banks	30 - 60%	Slightly Unstable	Fine	Fines	50	High	High
N114-06	GG-24	Salmon Creek	NE 114th Street Trib	NA/NR	NA/NR	< 1%	Fines	Fines	Low (1.0-1.2)	Not prop functioning	Wetland	Stable	None	30 - 60%	N/A	N/A	N/A	NA/NR	High	High
N114-07	GG-23	Salmon Creek	NE 114th Street Trib	3	2	Not Recorded	Cohesive fines	Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising	Both banks	60 - 100%	Slightly Unstable	Cohesive fines	Fines	40	Medium	High
NW2T-01	GG-79	Salmon Creek	NW 2nd Avenue Trib	3	1	< 1%	Fines	Fines	Medium (1.2 - 1.5)	Not prop functioning	Glide - rectangular	Stable	None	< 5%	Stable	Fines	Fines	NA/NR	High	Low
NW2T-02	GG-78	Salmon Creek	NW 2nd Avenue Trib	6	3	> 8%	Cobble	Boulder	Low (1.0-1.2)	Not prop functioning	Step pool	Incising	Both banks	60 - 100%	Moderately Unstable	Fines	Gravel	8	Low	Moderate
NW2T-03	GG-77	Salmon Creek	NW 2nd Avenue Trib	4	2	2-4 %	Fines	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Pool riffle	Incising	Both banks	30 - 60%	Slightly Unstable	Fines	Cohesive fines	8	Low	High
NW7T-01	GG-85	Salmon Creek	NW 7th Avenue Trib	NA/NR	NA/NR	< 1%	Fines	Fines	Low (1.0-1.2)	Not prop functioning	Wetland	Stable	None	< 5%	Stable	Fines	Fines	1000	High	Low
NW7T-02	GG-84	Salmon Creek	NW 7th Avenue Trib	4	2	> 8%	Cobble	Sand	Low (1.0-1.2)	Prop functioning	Cascade	Incising	Both banks	60 - 100%	Moderately Unstable	Cobble	Sand	9	Low	High
NW7T-03	GG-83	Salmon Creek	NW 7th Avenue Trib	4.5	1.75	2-4 %	Cobble	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Pool riffle	Stable	Both banks	5 - 30%	Slightly Unstable	Fines	Cohesive fines	20	Medium	High

Table C-1: Geomorphic Survey Results for the Salmon Creek (RM 03.83) Subwatershed

				Channel Conditions									Bank Conditions					Floodplain Conditions		Response Potential
							Substrate Material									Bank Material				
Reach	Inventory Site ID #	Subwatershed	Tributary	Bankfull Channel Width (ft)	Bankfull Channel Depth (ft)	Channel Gradient (%)	Primary	Secondary	Sinuosity	Functional LWD	Channel Type	Channel Stability	Active Bank Erosion	Eroded Banks (%)	Bank Stability	Primary	Secondary	Floodplain Width (ft)	Floodplain Connectivity	
NW7T-04	GG-82	Salmon Creek	NW 7th Avenue Trib	4.5	2	2-4 %	Sand	Fines	Low (1.0-1.2)	Not prop functioning	Plane bed	Incising and Widening	None	60 - 100%	Moderately Unstable	Fines	Cohesive fines	20	Low	High
NW7T-05	GG-81	Salmon Creek	NW 7th Avenue Trib	3.5	2	1-2 %	Sand	Fines	Low (1.0-1.2)	Not prop functioning	Plane bed	Incising	Both banks	60 - 100%	Moderately Unstable	Fines	Sand	15	Low	High
Rkwl-01	GG-37	Salmon Creek	Rockwell Creek	9	2.5	2-4 %	Cobble	Sand	Low (1.0-1.2)	Not prop functioning	Plane bed	Widening	Both banks	60 - 100%	Completely Unstable	Cobble	Sand	NA/NR	Low	High
Rkwl-02	GG-36	Salmon Creek	Rockwell Creek	6	1	1-2 %	Cobble	Sand	Low (1.0-1.2)	Not prop functioning	Excavated/constructed	Forced Stable	Both banks	5 - 30%	Stable	Fines	Cobble	NA/NR	Low	Low
Rkwl-03	GG-38	Salmon Creek	Rockwell Creek	9	1.5	1-2 %	Cobble	Sand	Low (1.0-1.2)	Not prop functioning	Pool riffle	Widening	Both banks	30 - 60%	Slightly Unstable	Fines	Sand	40	Medium	Moderate
Rkwl-04	GG-39	Salmon Creek	Rockwell Creek	9	1.5	Not Recorded	Cohesive fines	Cobble	Low (1.0-1.2)	Not prop functioning	Pool riffle	Widening	Both banks	5 - 30%	Slightly Unstable	Fines	Cohesive fines	30	Medium	High
Rkwl-05	GG-35	Salmon Creek	Rockwell Creek	7	2	< 1%	Cohesive fines	Sand	Low (1.0-1.2)	At risk	Glide - rectangular	Stable	Both banks	60 - 100%	Moderately Unstable	Fines	Cohesive fines	50	Low	High
Suds-01	GG-80	Salmon Creek	Suds Creek	15	4	< 1%	Fines	Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Stable	None	< 5%	Stable	Fines	Fines	60	High	Low
Suds-02	GG-76	Salmon Creek	Suds Creek	4	3	< 1%	Fines	Cohesive Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Stable	None	< 5%	Stable	Fines	Cohesive fines	40	High	Low
Suds-03	GG-74	Salmon Creek	Suds Creek	6	2	1-2 %	Cobble	Sand	Straight (1.0)	Not prop functioning	Excavated/constructed	Incising	Both banks	60 - 100%	Moderately Unstable	Fines	Cobble	500	Low	Moderate
Suds-04	GG-73	Salmon Creek	Suds Creek	12	2	1-2 %	Cobble	Gravel	Low (1.0-1.2)	Not prop functioning	Plane bed	Stable	Both banks	30 - 60%	Slightly Unstable	Cobble	Fines	30	Medium	Moderate
Suds-05	GG-72	Salmon Creek	Suds Creek	15	3	2-4 %	Cobble	Gravel	Low (1.0-1.2)	Prop functioning	Excavated/constructed	Forced Stable	None	< 5%	Stable	Boulder	Fines	20	Low	Low
Suds-06	GG-75	Salmon Creek	Suds Creek	10	2	< 1%	Cobble	Sand	Low (1.0-1.2)	Not prop functioning	Pool riffle	Stable	Right bank	30 - 60%	Slightly Unstable	Fines	Sand	30	Medium	Moderate
Suds-07	GG-71	Salmon Creek	Suds Creek	6	2	1-2 %	Sand	Gravel	Low (1.0-1.2)	Not prop functioning	Dune ripple	Incising and Widening	Both banks	60 - 100%	Moderately Unstable	Fines	Sand	25	Medium	High
Suds-08	GG-70	Salmon Creek	Suds Creek	6	2	1-2 %	Sand	Gravel	Low (1.0-1.2)	Not prop functioning	Dune ripple	Incising and Widening	Both banks	30 - 60%	Moderately Unstable	Fines	Sand	20	Medium	High
Suds-09	GG-69	Salmon Creek	Suds Creek	8	2	1-2 %	Sand	Gravel	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising and Widening	Both banks	30 - 60%	Moderately Unstable	Fines	Sand	30	Medium	High
Suds-10	GG-68	Salmon Creek	Suds Creek	6	2	1-2 %	Cohesive fines	Sand	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising and Widening	Both banks	60 - 100%	Moderately Unstable	Fines	Cohesive fines	10	Low	High
Suds-11	GG-67	Salmon Creek	Suds Creek	8	2	< 1%	Cohesive fines	Sand	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising	None	30 - 60%	Slightly Unstable	Fines	Cohesive fines	10	Low	High
Suds-12	GG-66	Salmon Creek	Suds Creek	NA/NR	NA/NR	< 1%	Fines	Fines	Low (1.0-1.2)	Not prop functioning	Wetland	Stable	None	< 5%	Stable	Fines	Fines	15	High	Low
Teny-01	GG-65	Salmon Creek	Tenny Creek	15	3	2-4 %	Cobble	Sand	Low (1.0-1.2)	At risk	Step pool	Stable	Right bank	5 - 30%	Slightly Unstable	Fines	Sand	15	Medium	Moderate
Teny-02	GG-64	Salmon Creek	Tenny Creek	6	1.5	1-2 %	Gravel	Sand	Low (1.0-1.2)	At risk	Pool riffle	Widening	Both banks	30 - 60%	Moderately Unstable	Fines	Sand	30	High	Moderate
Teny-03	GG-63	Salmon Creek	Tenny Creek	12	3	1-2 %	Sand	Fines	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Incising and Widening	Both banks	60 - 100%	Moderately Unstable	Fines	Cohesive fines	50	Low	High
Teny-04	GG-62	Salmon Creek	Tenny Creek	8	2	1-2 %	Cohesive fines	Fines	Straight (1.0)	At risk	Excavated/constructed	Incising	Right bank	5 - 30%	Slightly Unstable	Cohesive fines	Fines	8	Low	Moderate
Teny-05	GG-61	Salmon Creek	Tenny Creek	10	2.5	< 1%	Sand	Fines	Low (1.0-1.2)	At risk	Glide - rectangular	Widening	Both banks	60 - 100%	Moderately Unstable	Fines	Sand	100	Medium	Moderate
Teny-06	GG-60	Salmon Creek	Tenny Creek	12	2.5	< 1%	Fines	Sand	Low (1.0-1.2)	Not prop functioning	Glide - rectangular	Widening	Both banks	30 - 60%	Moderately Unstable	Fines	Sand	50	Medium	Moderate
Teny-07	GG-59	Salmon Creek	Tenny Creek	12	2	1-2 %	Gravel	Sand	Low (1.0-1.2)	Not prop functioning	Plane bed	Incising and Widening	Both banks	60 - 100%	Moderately Unstable	Fines	Sand	75	Low	Moderate
Teny-08	GG-58	Salmon Creek	Tenny Creek	8	2	1-2 %	Gravel	Cobble	Low (1.0-1.2)	Not prop functioning	Plane bed	Stable	None	< 5%	Stable	Fines	Fines	70	High	Moderate
Teny-09	GG-57	Salmon Creek	Tenny Creek	10	2	< 1%	Cohesive	Sand	Low (1.0-	Prop functioning	Wetland	Stable	None	< 5%	Stable	Fines	Cohesive fines	50	High	Low

Table C-1: Geomorphic Survey Results for the Salmon Creek (RM 03.83) Subwatershed

Reach	Inventory Site ID #	Subwatershed	Tributary	Channel Conditions								Bank Conditions					Floodplain Conditions		Response Potential
				Bankfull Channel Width (ft)	Bankfull Channel Depth (ft)	Channel Gradient (%)	Substrate Material		Sinuosity	Functional LWD	Channel Type	Channel Stability	Active Bank Erosion	Eroded Banks (%)	Bank Stability	Bank Material		Floodplain Width (ft)	Floodplain Connectivity	
							Primary	Secondary								Primary	Secondary			
							fines		1.2)											
Teny-10	GG-56	Salmon Creek	Tenny Creek	8	2	1-2 %	Sand	Fines	Low (1.0-1.2)	At risk	Glide - rectangular	Stable	Both banks	5 - 30%	Slightly Unstable	Fines	Sand	75	Medium	Moderate
Teny-11	GG-55	Salmon Creek	Tenny Creek	15	1.5	1-2 %	Sand	Gravel	Low (1.0-1.2)	At risk	Dune ripple	Stable	None	< 5%	Stable	Fines	Sand	60	High	Moderate
Teny-12	GG-147	Salmon Creek	Tenny Creek	12	6	2-4%	Cohesive fines	Sand	Low (1.0-1.2)	At risk	Plane bed	Incising	Both banks	60 - 100%	Completely Unstable	Cohesive fines	Sand	25	Low	High
Teny-13	GG-54	Salmon Creek	Tenny Creek	12	1	1-2 %	Cohesive fines	Fines	Low (1.0-1.2)	Not prop functioning	Excavated/constructed	Stable	Both banks	5 - 30%	Slightly Unstable	Fines	Fines	20	Medium	Moderate
Teny-14	GG-53	Salmon Creek	Tenny Creek	3	1	1-2 %	Cohesive fines	Sand	Low (1.0-1.2)	Not prop functioning	Excavated/constructed	Incising	Both banks	30 - 60%	Moderately Unstable	Cohesive fines	Sand	25	Medium	High
Teny-15	GG-52	Salmon Creek	Tenny Creek	6	1	1-2 %	Sand	Fines	Medium (1.2 - 1.5)	At risk	Glide - rectangular	Stable	Both banks	5 - 30%	Slightly Unstable	Fines	Sand	50	High	Low
Teny-16	GG-146	Salmon Creek	Tenny Creek	NA/NR	NA/NR	< 1%	Fines	Sand	Straight (1.0)	Not prop functioning	Wetland	Stable	None	< 5%	Stable	Fines	Fines	50	High	Low
Teny-17	GG-46	Salmon Creek	Tenny Creek	NA/NR	NA/NR	< 1%	Cohesive fines	Fines	Straight (1.0)	Not prop functioning	Wetland	Aggrading	None	< 5%	Stable	N/A	N/A	50	High	Moderate
Teny-18	GG-145	Salmon Creek	Tenny Creek	NA/NR	NA/NR	< 1%	Fines	Sand	Straight (1.0)	Not prop functioning	Wetland	Stable	None	< 5%	Stable	Fines	Fines	50	High	Low
Teny-19	GG-45	Salmon Creek	Tenny Creek	10	1	< 1%	Gravel	Cohesive Fines	Straight (1.0)	Not prop functioning	Excavated/constructed	Incising	Both banks	30 - 60%	Moderately Unstable	Fines	Sand	50	High	Moderate
Teny-20	GG-44	Salmon Creek	Tenny Creek	2	.25	1-2 %	Cohesive fines	Sand	Low (1.0-1.2)	Not prop functioning	Step pool	Stable	None	< 5%	Stable	Fines	Sand	100	High	Moderate

LWD = Large woody debris

NA/NR = Not Applicable or Not Recorded

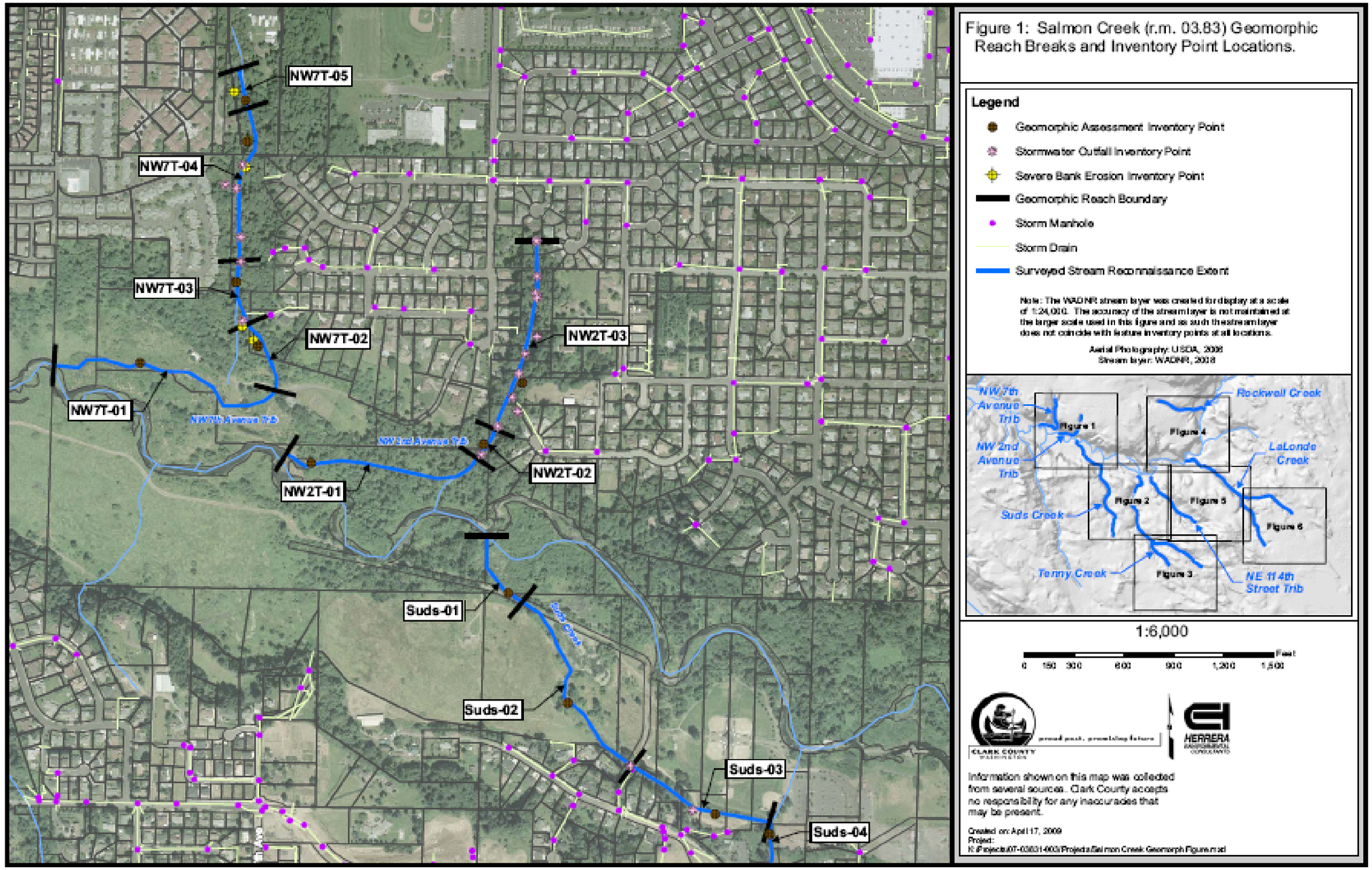

Figure C-1: Salmon Creek (RM 03.83) Geomorphic Reach Break and Inventory Point Locations

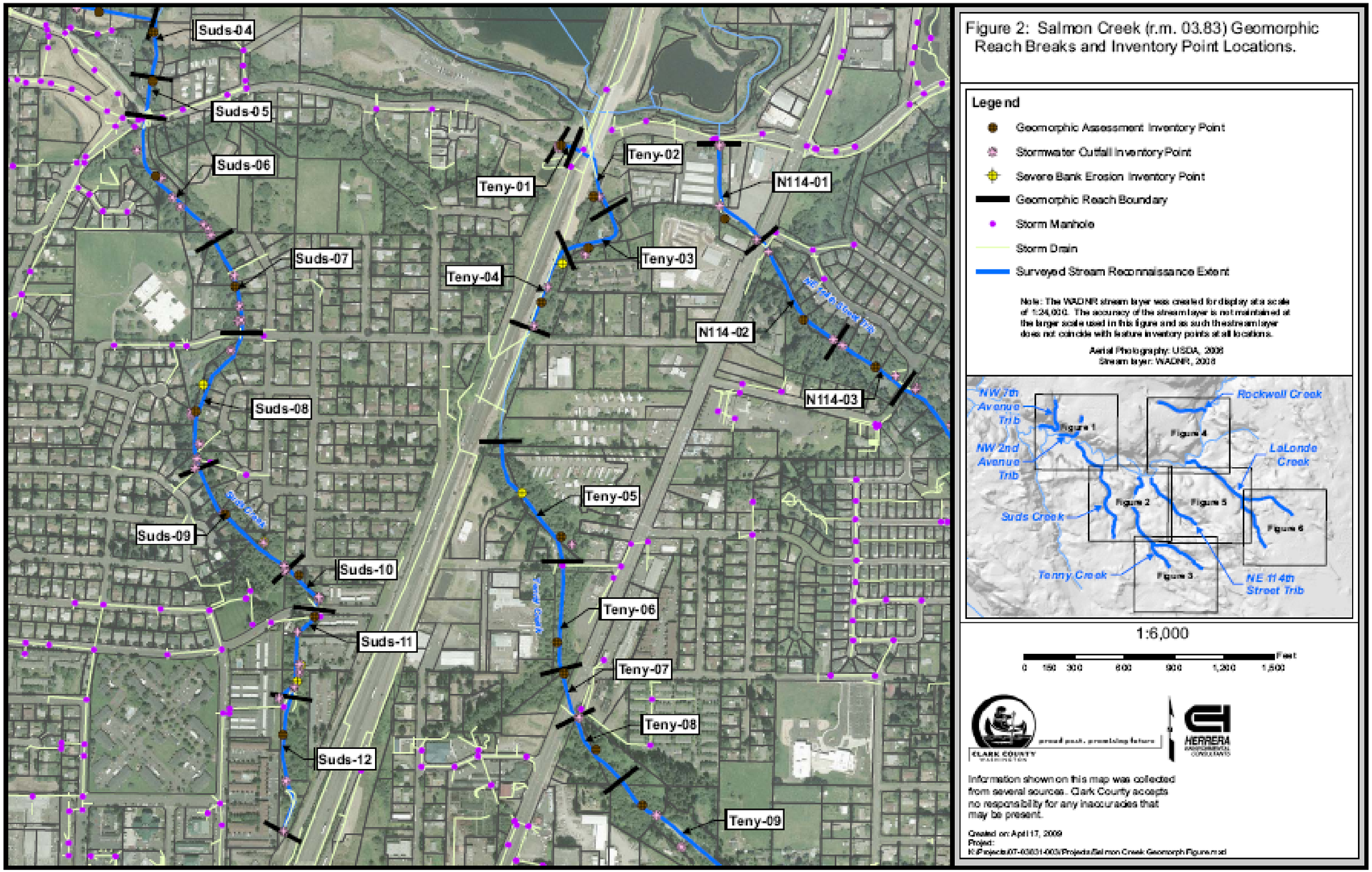

Figure C-2: Salmon Creek (RM 03.83) Geomorphic Reach Breaks and Inventory Point locations

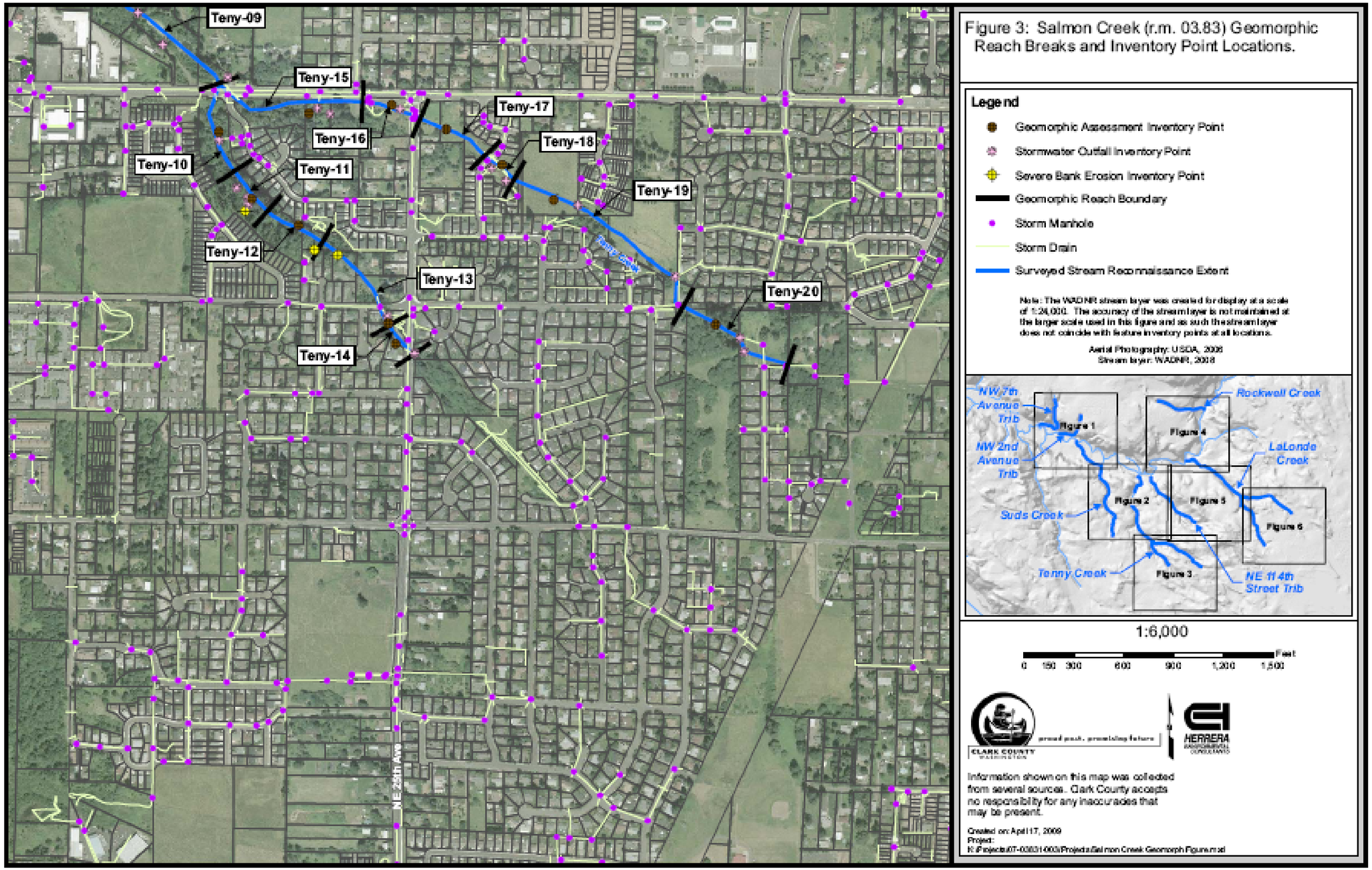

Figure C-3: Salmon Creek (RM 03.83) Geomorphic Reach Breaks and Inventory Point Locations

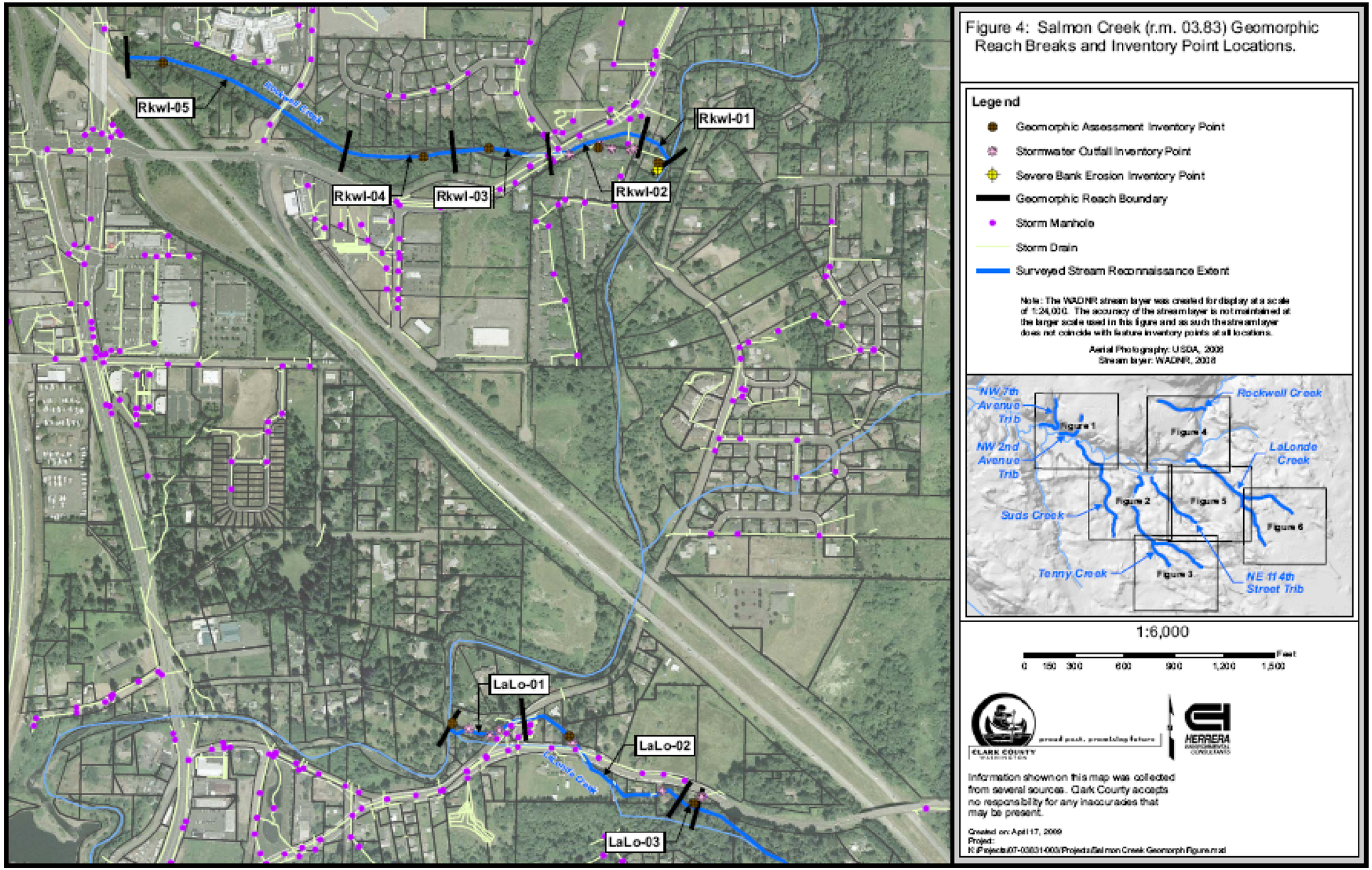

Figure C-4: Salmon Creek (RM 03.83) Geomorphic Reach Breaks and Inventory Point Locations

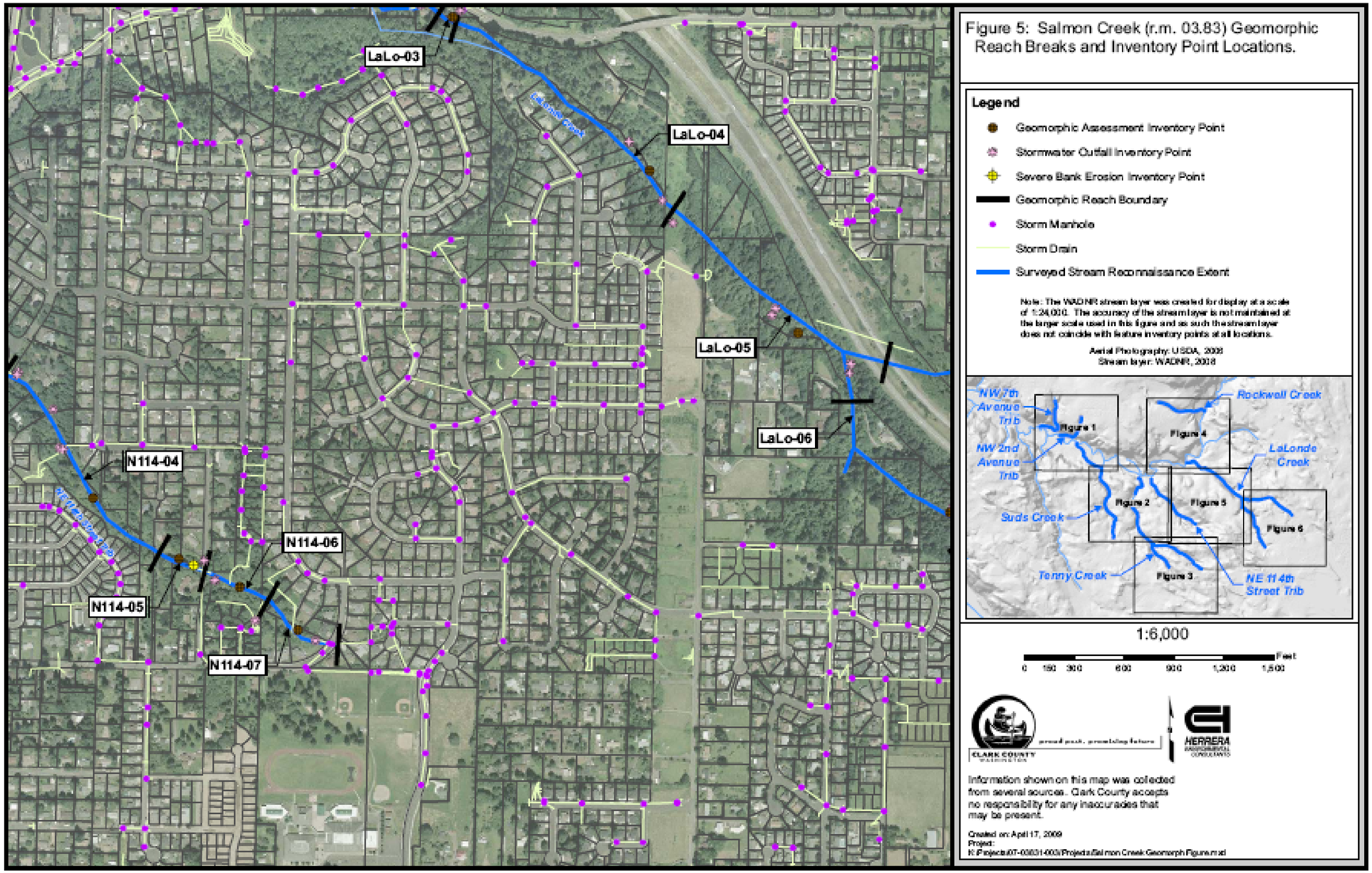

Figure C-5: Salmon Creek (RM 03.83) Geomorphic Reach Breaks and Inventory Point Locations

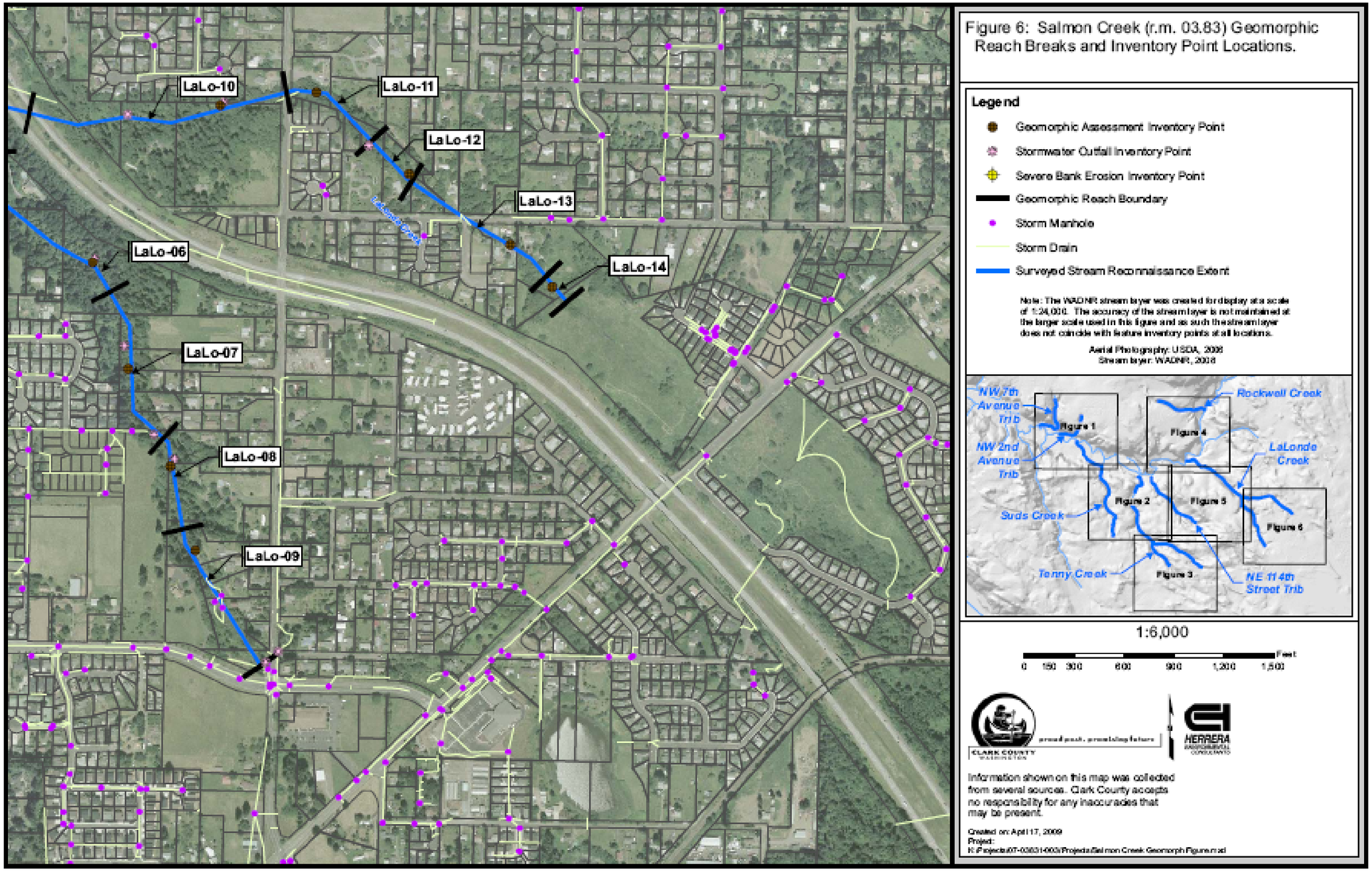

Figure C-6: Salmon Creek (RM 03.83) Geomorphic Reach Breaks and Inventory Point Locations

High Response Potential

Twenty-eight of the 66 delineated geomorphic reaches were classified as having a high response potential. Many of these reaches either already show signs of widespread instability, or are highly susceptible to future channel or geomorphic instability if land use or hydrologic conditions change due to development. Reaches already deeply incised are generally isolated from their floodplains. This isolation results in the continued concentration of erosive forces on the channel bed and banks from increased peaks flows associated with urbanizing basins. Most reaches with a high response potential are within historic flood deposits, which are generally fine grained and highly susceptible to erosion. Several reaches with a high response potential also have relatively steep gradients and are found in flood deposits. Channels with stream buffers dominated by shallow rooting invasive species (e.g., Himalayan blackberry) are also far more likely to respond to altered hydrology.

Moderate Response Potential

Twenty-four of the 66 delineated geomorphic reaches were classified as having a moderate response potential. Many of these reaches are located within former flood deposits and so have fine-grained substrate and bank material susceptible to channel and geomorphic change. Many of these reaches also have coarser substrate derived from Troutdale formation deposits.

Evidence of channel degradation (e.g., incising or widening) was observed within most of these reaches, but was not widespread or severe. However, reaches classified as moderate tend to have some LWD that provides grade control or bank and floodplain vegetation that helps to provide some channel complexity and thus some resistance to increased shear stresses and increased peak flows. Other reaches were considered less susceptible to altered hydrology due to their lower gradients. Many of these have the potential for positive responses to riparian revegetation or bank stabilization measures.

Low Response Potential

Fourteen of the 66 reaches were classified as having a low response potential. Low response potential reaches are often located within the upper watersheds, where wetlands were historically present and impounded water may exist today. The Salmon Creek floodplain, where gradient is low and grade control is provided by beaver dams or other manmade structures, also contains these reaches.

Road crossings, dams, and other hydromodifications serve as grade controls and also can result in low response potential. Such constructed channel modifications have negative impacts on water quality and habitat connectivity. Those serving as grade control features, however, may limit the extent of incision from increased peak flows and provide some channel stability for reaches within potentially erosive geologic units that might otherwise have a moderate or high response potential. Some of the reaches classified as having a low response potential are

characterized by channel and bank armoring, which force stability and indicate historically unstable bank or channel conditions.

Management Recommendations

Based on geomorphic assessment results and information from other relevant inventories (e.g., stream features inventory), management recommendations have been developed that emphasize the following objectives:

- Protecting reaches that are currently unstable or sensitive to future disturbance.
- Enhancing reaches that are currently stable or are less sensitive to future disturbance.

Recommendations to protect reaches include the implementation of projects that will prevent further channel degradation from changes in the watershed land use and hydrology. Enhancement recommendations include projects that will improve and help rehabilitate the geomorphic functions of existing reaches. For example, enhancement is recommended in reaches that exhibit self-forming alluvial channel characteristics.

In general, the management recommendations have been grouped according to broadly defined watershed management strategies for each geomorphic reach group, and specific rehabilitation project categories: channel, bank, and floodplain. The watershed management strategies and channel, bank, and floodplain rehabilitation projects are described in the following subsections.

Watershed Management Strategies

The geomorphic processes of the Salmon Creek (RM 03.83) subwatershed are inextricably linked with hydrologic processes and land use management in its watershed. Therefore, geomorphic-based management recommendations cannot succeed without addressing development trends and processes in the watershed. Practically speaking, the existing hydrologic regime is unlikely to significantly change, assuming the use of stormwater best management practices (BMPs) to address additional runoff from future development. Stormwater management should direct protection and restoration efforts where they have the greatest opportunity for success.

The seven tributaries within the Salmon Creek (RM 03.83) subwatershed present unique management opportunities and challenges. The following management strategies and recommendations may be effective at restoring geomorphic process and reducing the effects of altered hydrology when applied in the appropriate areas.

- **Manage runoff**: If runoff from existing developed areas can be managed effectively, the frequency of erosive flows in the channel network may be reduced, thereby reducing the potential for future channel degradation. However, much of the Salmon Creek (RM 03.83) subwatershed was

developed before the establishment of stringent flow control requirements (Ecology 2005). Consequently, the watershed management strategies should consider opportunities for retrofitting existing stormwater facilities to increase infiltration and detention to limit durations of potentially erosive flows. Projects could also include numerous small projects throughout the watershed to infiltrate and disperse significant volumes of runoff.

- **Protect and enhance high-risk reaches**: The majority of reaches, regardless of tributary, were classified as having a moderate to high channel response potential to ongoing and future changes in hydrology. Therefore, actions for those reaches should focus on both protection and enhancement. Most of the stormwater from residential developments and transportation land uses in the subwatershed are piped directly to streams. Therefore, ideal management includes improving flow control from already developed areas in conjunction with in-stream enhancement focused on short to moderate term channel stability and large scale bank and floodplain revegetation focused on long-term recruitment sources of LWD. Many outfalls have inadequate energy dissipaters and eroding stream banks. These outfalls should be systematically addressed evaluated and repaired.
- **Support channel function and encourage natural features:** Several reaches of Suds Creek, NW2nd Avenue Tributary, and NW 7th Avenue Tributary are located within the Salmon Creek floodplain. These tributary channels have easy access. Given the depositional nature and strong potential for hydrologic connectivity within these reaches, management strategies could focus on providing the channel with space to function without impediment or modification, and encouraging a mosaic of channel alignments, depositional features, and wetlands similar to that which might naturally occur. The management strategies could continue to preserve riparian areas, while limiting or controlling access points to the creek. In addition, promoting the establishment of native vegetation, particularly conifers, would promote the success of channel rehabilitation projects as well as the natural ability of the channel to sustain physical channel complexity. Continued use or recolonization of these areas by beavers would likely further enhance channel, wetland, and riparian function.
- **Conserve and protect areas with established LWD**: A very limited number of areas in the subwatershed (primarily in the middle reaches of LaLonde Creek) have properly functioning levels of LWD in the channel, as well as mature or nearly mature riparian vegetation as a source of LWD recruitment. These areas provide excellent opportunities for property acquisition, conservation easement, or protection through programs such as the Legacy Lands Program.
- **Protect and preserve wetlands and established hydrologic processes**: Historically, the upper reaches of several tributaries within the Salmon Creek (RM 03.83) subwatershed were wetlands. As a result, the few open spaces still present in these areas provide unique opportunities to protect and restore

both wetland and stream hydrologic processes. Land acquisition and preservation, in turn, can help prevent future hydrologic changes downstream and improve summer low flows by increasing recharge. Several areas have already been set aside as wetland areas and are protected from future development. Opportunities may exist for Clark County to acquire properties and set aside additional areas for parks or rehabilitated wetlands. Parks and rehabilitated reaches could also serve as opportunities to further educate nearby landowners on watershed processes. At a minimum, the county could work to preserve riparian buffer areas, rehabilitate native vegetation, and work with nearby landowners to educate them on minimizing hydrologic and geomorphic impacts.

Channel, Bank, and Floodplain Rehabilitation Projects

This section describes and categorizes potential projects that could be implemented to improve or maintain channel, bank, and/or floodplain conditions in the Salmon Creek (RM 03.83) subwatershed tributaries. Table C-2 summarizes (by reach) where project categories are most appropriate.

Channel Rehabilitation

Potential actions that could promote in-channel stabilization throughout the Salmon Creek (RM 03.83) subwatershed tributaries include the following.

Grade Control. Grade control features are intended to limit channel incision, increase the base channel elevation, and improve overbank and floodplain connectivity. Placement of grade control structures is recommended in reaches where reducing channel incision would improve stream stability and function.

Grade control would be most appropriate in reaches where incision is common and ongoing, and where the channel exhibits self-forming alluvial characteristics and the potential for rehabilitating floodplain connectivity. Also, grade control structures could be especially beneficial if added in strategic locations where nickpoint migration threatens to cause increasing channel incision and channel degradation, or where further incision or associated bank erosion could threaten infrastructure, such as road crossings and utility alignments.

Table C-2: Potential Channel, Bank, and Floodplain Rehabilitation Projects for the Salmon Creek (RM 03.83) Subwatershed

		Channel Rehabilitation Project Categories						
		Channels			Banks			Floodplain
Tributary	Reach	Grade Control	LWD Placement	Channel Realignment	Stabilization	Revegetation	Structure Removal	Revegetation
LaLonde Creek	LaLo-01					X		
LaLonde Creek	LaLo-02				X	X	X	X
LaLonde Creek	LaLo-03	X	X			X		X
LaLonde Creek	LaLo-04		X			X		X
LaLonde Creek	LaLo-05	X	X			X		X
LaLonde Creek	LaLo-06					X	X	X
LaLonde Creek	LaLo-07					X		
LaLonde Creek	LaLo-08	X				X		
LaLonde Creek	LaLo-09							X
LaLonde Creek	LaLo-10	X	X			X		X
LaLonde Creek	LaLo-11		X			X		X
LaLonde Creek	LaLo-12		X			X	X	X
LaLonde Creek	LaLo-13	X	X		X	X		X
LaLonde Creek	LaLo-14		X			X		X
NE 114th Street Trib	N114-01				X	X	X	X
NE 114th Street Trib	N114-02	X	X			X		X
NE 114th Street Trib	N114-03	X	X			X		X
NE 114th Street Trib	N114-04	X	X			X		X
NE 114th Street Trib	N114-05		X			X		X
NE 114th Street Trib	N114-06		X			X		X
NE 114th Street Trib	N114-07	X	X			X		X
NW 2nd Avenue Trib	NW2T-01					X		X
NW 2nd Avenue Trib	NW2T-02	X	X					

Table C-2: Potential Channel, Bank, and Floodplain Rehabilitation Projects for the Salmon Creek (RM 03.83) Subwatershed

		Channel Rehabilitation Project Categories						
		Channels			Banks			Floodplain
Tributary	Reach	Grade Control	LWD Placement	Channel Realignment	Stabilization	Revegetation	Structure Removal	Revegetation
NW 2nd Avenue Trib	NW2T-03	X	X			X		
NW 7th Avenue Trib	NW7T-01			X		X		X
NW 7th Avenue Trib	NW7T-02	X					X	
NW 7th Avenue Trib	NW7T-03	X	X					
NW 7th Avenue Trib	NW7T-04	X	X			X		
NW 7th Avenue Trib	NW7T-05	X	X			X		
Rockwell Creek	Rkwl-01	X			X	X		X
Rockwell Creek	Rkwl-02					X		
Rockwell Creek	Rkwl-03	X	X			X		X
Rockwell Creek	Rkwl-04	X	X			X		X
Rockwell Creek	Rkwl-05	X	X			X		X
Suds Creek	Suds-01		X			X		X
Suds Creek	Suds-02		X			X		X
Suds Creek	Suds-03	X	X		X	X		X
Suds Creek	Suds-04		X			X	X	X
Suds Creek	Suds-05					X		X
Suds Creek	Suds-06	X	X			X	X	X
Suds Creek	Suds-07	X	X		X	X		X
Suds Creek	Suds-08	X	X		X	X		X
Suds Creek	Suds-09	X	X		X	X		X
Suds Creek	Suds-10	X	X		X	X		X
Suds Creek	Suds-11	X	X		X	X	X	X
Suds Creek	Suds-12					X		X

Table C-2: Potential Channel, Bank, and Floodplain Rehabilitation Projects for the Salmon Creek (RM 03.83) Subwatershed

		Channel Rehabilitation Project Categories						
		Channels			Banks			Floodplain
Tributary	Reach	Grade Control	LWD Placement	Channel Realignment	Stabilization	Revegetation	Structure Removal	Revegetation
Tenny Creek	Teny-01	X			X			
Tenny Creek	Teny-02		X		X			
Tenny Creek	Teny-03	X	X		X	X		X
Tenny Creek	Teny-04	X	X		X			
Tenny Creek	Teny-05	X	X		X	X		X
Tenny Creek	Teny-06		X			X		X
Tenny Creek	Teny-07	X	X		X	X		X
Tenny Creek	Teny-08		X			X		X
Tenny Creek	Teny-09						X	
Tenny Creek	Teny-10		X			X	X	X
Tenny Creek	Teny-11		X			X	X	X
Tenny Creek	Teny-12	X	X		X	X		X
Tenny Creek	Teny-13		X		X	X		X
Tenny Creek	Teny-14	X	X		X	X		X
Tenny Creek	Teny-15		X			X		X
Tenny Creek	Teny-16		X			X		X
Tenny Creek	Teny-17		X			X		X
Tenny Creek	Teny-18							
Tenny Creek	Teny-19	X	X	X	X	X		X
Tenny Creek	Teny-20		X			X		X

Large Wood Debris Placement. In-channel LWD creates hydraulic and habitat complexity. Placement of LWD is recommended where it can improve stream function by increasing channel complexity and stability and enhance floodplain connectivity. LWD can also be placed to function as grade control. Due to the elevated risk of failure in the urban environment, LWD placement should be carefully engineered.

Channel Realignment. There are opportunities in the Salmon Creek (RM 03.83) subwatershed to realign the channel, especially where it has been previously straightened and artificially confined. Channel realignment in these areas would help to improve and rehabilitate the geomorphic and hydrologic processes.

Bank Revegetation. Bank revegetation is intended to restore vegetation quality and quantity. Revegetation with native species can help control the spread of invasive species. Bank revegetation can improve bank stability, stream cover, and eventually supply large wood debris for restoring and preserving channel habitat. These goals are applicable in almost any stream reach. They can be leveraged on county open space improvements such as trail construction. Revegetation efforts would need to be coupled with the removal of invasive species and regular maintenance to ensure the survival of native plant species.

Bank Structure (Hydromodification) Removal (e.g. Riprap Removal). Previous treatments may no longer function as originally intended, or may be failing altogether. Removal of these structures is recommended where removal can improve stream function and habitat.

Floodplain Revegetation
Floodplain revegetation is intended to restore vegetation quality and quantity that influence flood plain habitat, woody debris delivery, shade, and flood control functions. Reestablishment of native species can help control invasive weeds throughout the creek's floodplain areas. Floodplain revegetation should be considered in conjunction with other riparian planting strategies such as bank revegetation.