FINAL

GEOGRAPHIC RESPONSE PLAN

LOWER CLACKAMAS RIVER

Prepared for
Clackamas River Water Providers

Prepared by
Herrera Environmental Consultants, Inc.

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Prepared for
Clackamas River Water Providers
14275 Clackamas River Drive
Oregon City, Oregon 97045

Prepared by
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FINAL
February 7, 2018

SPILL RESPONSE CONTACT SHEET

Notification for Hazardous Substance Releases or Oil Spills	
Federal Notification Center - National Response Center	**(800) 424-8802***
State Notification Center - Oregon Emergency Response System	**(800) 452-0311***

U.S. Environmental Protection Agency (EPA)	
Region 10 Spill Response	(206) 553-1263*
Oregon Ops Office	(503) 326-3250
RCRA/CERCLA Hotline	(800) 424-9346
Public Affairs	(206) 553-1203

National Oceanic Atmospheric Administration	
24 hour Hazmat	(206) 526-4911
Weather (NWS Portland)	(503) 261-9246

Other Federal Agencies	
U.S. Department of Interior (has info for on call cell #)	(503) 326-2489

Tribal Contacts	
Grand Ronde Confederated Tribes (Natural Resource Department)	(503) 879-2424
Warm Springs Confederated Tribes	(541) 553-1161*

Response Contractors	
NRC Environmental Services	(800) 337-7455*
Clean Harbors/Safety Clean	(800) 645-8265*

Oregon State	
Department of Environmental Quality Headquarters (Portland)	(503) 229-5153 (Mike G's # for non emergencies)
Oregon State Police NW HQ	(503) 378-3387
Department of Fish and Wildlife	(503) 947-6000
Oregon Parks and Recreation State Historic Preservation Office	(503) 986-0707 (503) 986-0674
Health Authority (Drinking Water) - Outside of normal business hours	(971) 246-1789 (971) 246-1789*
Department of Transportation State Historic Preservation Office	(888) 275-6368 (503) 986-0690

Local Government	
City of Estacada Water Treatment Plant	(503) 849-5435
Clackamas River Water (District) Water Treatment Plant	(503) 722-9220 (503) 656-1513**
North Clackamas County Water Commission Water Treatment Plant	(503) 849-4133
South Fork Water Board Water Treatment Plant	(503) 657-5030*
Lake Oswego/Tigard Water Treatment Plant	(503) 701-2978
Water Environment Services	(503) 742-4567
Clackamas Fire District #1 Hazmat 27	(503) 754-2902 (971) 806-1694
COMM (have Clackamas County Disaster Management paged)	(503) 655-8211
Clackamas County Sheriff	(503) 785-5000
Public Health	(503) 742-5387

Utilities and Railroads	
PGE	(800) 544-1795*
Union Pacific Railroad	(800) 877-7267*

*** Contact numbers staffed 24 hours/day**

**** Follow the prompts for after-hours emergency service**

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1. INTRODUCTION

This Geographic Response Plan (plan) focuses on sensitive resource protection after a hazardous material or oil spill occurs. It serves as the local response during the initial phase of a hazardous material spill response in the Lower Clackamas River watershed. Changes to this document are expected as more testing is conducted through drills, site visits, and actual use in spill situations.

This plan covers the waters of the Lower Clackamas River from just downstream of Mount Hood National Forest boundary (RM 30) to the confluence with the Willamette River near Gladstone and Oregon City. Major tributaries to the Clackamas River downstream of Estacada include Eagle River, Clear Creek, and Deep Creek, as well as many other creeks and streams. Although the Clackamas River watershed lies in both Clackamas and Marion Counties, the Lower Clackamas River is entirely within Clackamas County. Most of the upper Clackamas River watershed (outside the planning area) lies in rugged, heavily forested terrain within the Mount Hood National Forest and is managed by the US Forest Service. Most land in the lower watershed is privately owned. The lower watershed is partly agricultural and partly developed, generally becoming more urbanized and more heavily populated as the river runs toward, and then into, the Portland metropolitan area. The Clackamas River supplies drinking water to more than 300,000 people in Clackamas and Washington Counties (CRISP 2015). The cities of Estacada, Gladstone, Lake Oswego and Tigard, as well as Clackamas River Water (District), Oak Lodge Water Services, Sunrise Water Authority, and the South Fork Water Board all draw water from the Clackamas.

1.1 PURPOSE AND USE OF THIS PLAN

This plan constitutes the local response to the initial phase of an oil or hazardous material spill, from the time a spill occurs until a Unified Command is established. Its main focus is sensitive resource protection. The plan prioritizes tactical response strategies based on where spills could occur and the proximity of those locations to natural, cultural, and economic resources at risk of injury.

By using this plan, it's hoped that immediate and proper action can be taken to reduce the impact of spilled hazardous material or oil on sensitive resources within the planning area. After a spill occurs, control and containment at or near the spill source are top priorities. Beyond those efforts, the tactical response strategies provided in this plan should be implemented using the strategy tables in Chapter 4 based on the proximity of a spill to downstream surface water intakes and other sensitive resource, unless spill trajectory models or unique circumstances dictate otherwise.

This plan also provides specific information about the type and location of natural and economic resources in the area.

The bulk of this plan is contained in Chapter 4, which provides information on tactical response strategies, based on potential upstream spill origin points and their proximity to sensitive resources downstream. Area maps and information on staging areas and boat launch locations are also provided in that chapter.

Control and Containment of a Hazardous Material Spill are a Higher Priority than Implementation of Response Strategies in this Plan.

If, in the responder's best judgment, control and containment of a hazardous material spill at or near the source of a spill is not feasible, or if the source is controlled and contained but hazardous material has spread out beyond initial containment, then the strategies laid out in Section 4.3 of this plan should take precedence until a Unified Command is formed. It is important to note that spill response strategies, beyond those described in this plan, should rely on observations and spill trajectory modeling. A booming strategy listed in Section 4.3 would not necessarily be implemented if a spill trajectory did not warrant action in that area. However, the strategy tables should be used until spill trajectory information becomes available. During an incident, modifications may be made to the deployment strategies provided in Section 4.3 of this plan if they are approved by the Incident Commander or Unified Command.

The downstream movement of hazardous material and the time it takes to mobilize resources to deploy response strategies must always be considered when setting strategy implementation priorities. The strategies described in this plan have been primarily designed for use with persistent oils that float on water and may not be suitable for other petroleum products or hazardous substance spills. However, this plan provides estimated hazardous materials travel times based on buoyancy in Section 2.2 for planning purposes only. For information on non-floating oil spill response, refer to the Non-Floating Oil Spill Response Tool in the Northwest Area Contingency Plan (NWACP), Section 9412. For hazardous substance spills, refer to the NWACP, Chapter 7000. For policy on gasoline and flammable liquid spills, refer to the NWACP, Section 4622.

Information meant to support initial Environmental Unit functions is in Chapter 6 (Resources at Risk). Chapter 6 and its appendix provide specific information about the type and location of natural and economic resources in the area.

1.2 Elements of this Plan

This plan is organized into seven chapters, with additional materials provided in five appendices:

Chapter 1 Introduction

Chapter 2 Site Description

Chapter 3 Spill Response Options and Considerations

Chapter 4 Response Strategies and Priorities

APPENDIX 4A Response Strategies

Chapter 5 (Reserved)

Chapter 6 Resources at Risk

APPENDIX 6A List of Economic Resources

Chapter 7 References

1.3 Plan Development Process

This geographic response plan was developed through workshops and meetings with representatives from local emergency response organizations (Clackamas Fire District #1), the Oregon Department of Environmental Quality, the Environmental Protection Agency, Clackamas County Disaster Management, the Oregon Department of Transportation, Clackamas County Water Environment Services, Clackamas County 9-1-1 (C-COM), and other stakeholders. At the workshops and meetings, participants were asked to identify resources that may be at risk of injury from spills and attempt to develop hazardous spill response or notification strategies to reduce the chance of injury to those resources. After compiling information on sensitive resources in the area, site visits were conducted to gather data and determine if spill response strategies near those resources were needed. Through this process, effective strategies were developed. Unfortunately, the dynamics of the Clackamas River and the present limitations of response technology make the development of strategies for all resource locations impracticable.

1.4 Standardized Response Language

In order to avoid confusion in response terminology, this plan uses standard National Interagency Incident Management System, Incident Command System (NIIMS ICS) terminology.

1.5 Terminology and Definitions

The glossary provided in Section 1910 of the NWACP and other sections of the area plan with glossaries independent of Section 1910 should be used when seeking the meaning of terms used in this plan.

2. SITE DESCRIPTION

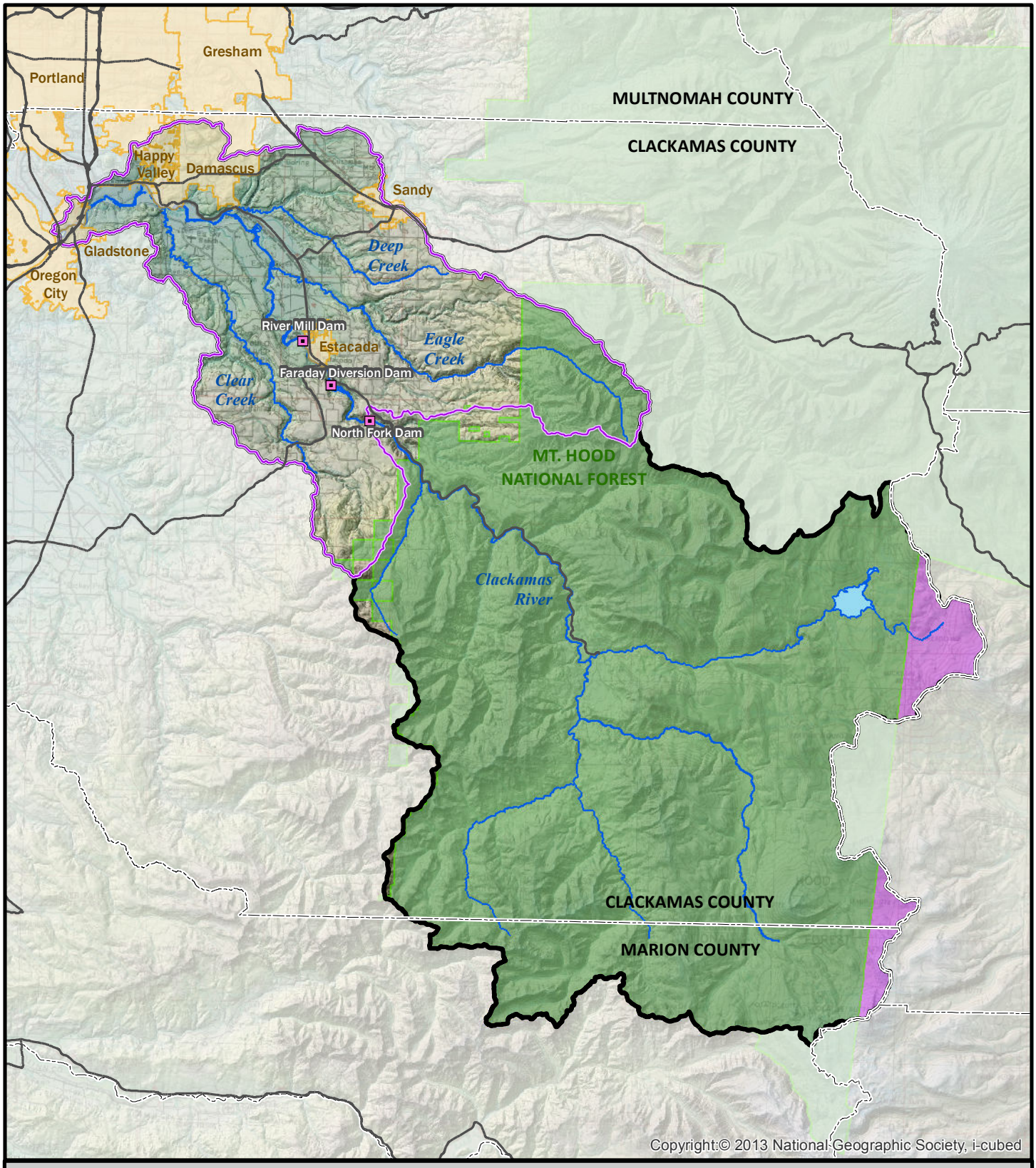
This chapter provides a description of the area's physical features, hydrology, and climate and includes an overview of hazardous material spill risks in the Lower Clackamas River planning area. The planning area for this plan starts at river mile (RM) 0, at the Willamette confluence, and ends at RM 30 just downstream of the boundary of Mount Hood National Forest. The character of the lower watershed transitions from sparsely populated and rural to densely populated and urbanized as the river flows from above Estacada to its confluence with the Willamette River. Upstream to downstream, the river passes through forested, agricultural, and rural residential areas, the Clackamas Industrial Area around State Highways 212 and 224, urbanized areas along Interstate 205 (I-205), and the cities of Happy Valley, Gladstone and Oregon City.

2.1 PHYSICAL FEATURES

The Clackamas River flows 82 miles from its headwaters in the Mt. Hood National Forest to its confluence with the Willamette River. It enters the Willamette River at approximately RM 25 and is the last major tributary stream downstream of Willamette Falls. The Clackamas River watershed is approximately 941 square miles and elevations in the watershed range from approximately 12 feet at the confluence with the Willamette River to over 7,200 feet at Olallie Butte located along the southeast boundary of the basin. Mean elevation and slopes generally increase from the mouth of the Clackamas River upstream to the headwater areas.

The entire Clackamas River watershed is in Clackamas County and a small portion of Marion County, Oregon, east and south of the Portland Metropolitan area (Figure 1). Portions of the cities of Sandy, Gladstone, Oregon City, Happy Valley, and Damascus and Estacada are located within the Clackamas River watershed. Major roadways passing through the watershed include State Highways 211, 212, 213, and 224; US Highway 26, and I-205; the north-south mainline of the Union Pacific Railroad also goes through the watershed. The basin provides water to more than 300,000 people and contains three large dams that provide electricity, water storage, and flood control (CRISP 2015).

The Clackamas River watershed can roughly be divided in half. Nearly all the upper watershed (outside of the planning area) is within the Mt. Hood National Forest and managed by the USFS. In contrast, most of the lower reaches flow through agricultural and densely populated areas. The area in between the national forest and the lower watershed include parcels of land owned by private timber companies and the BLM. The lower watershed contains a complex mosaic of land uses including agriculture, industrial areas, forestry, conservation, and urban/rural residential tracts. Overall the Clackamas River watershed is made up of approximately 72% publicly owned land, 3% tribally owned land, and 25% privately owned land.



Legend

- Clackamas River watershed boundary
- Lower Clackamas River watershed boundary
- Highway
- County boundary
- City limits
- Forest land
- River
- Major waterbody
- Warm Springs Indian Reservation
- Hydroelectric dam

Figure 1.
Vicinity Map of the Clackamas River Watershed.

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0 3 6 12 Miles

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2.2 HYDROLOGY

2.2.1 Peak Flows

In Oregon, peak stream flows are generated mainly by rainfall, snowmelt, and rain on snow. "Rain on snow" is the common term used to describe wintertime conditions when relatively warm wind and rain combine to produce rapid snowmelt. In the Clackamas River watershed, rainfall is considered the primary process generating peak flows in areas below about 2,300 feet elevation and rain on snow is the primary process generating peak flows in areas above that elevation. Rain-on-snow events may generate peak flows within all elevation ranges, but rain on snow is the process that most significantly affects peak flows above 2,300 feet (outside of the planning area).

2.2.2 Flow Travel Time

The downstream movement of hazardous material and the time it takes to mobilize resources to deploy response strategies must always be considered when setting strategy implementation priorities. While flow velocities vary along the length of the Clackamas River, for the purposes of this plan, average low, medium, and high flow velocities can be used to estimate the approximate travel time (in hours) of contaminant releases in the river. Potential contaminants are grouped into two categories for this analysis: Floating (buoyant and dissolved materials) and Non-Floating (negatively buoyant particles).

Floating

Floating contaminants are assumed to migrate with the average velocity in the water column. Velocities were estimated and were used to develop rating curve relationships. These relationships are relatively consistent using data from Estacada and Oregon City and therefore it is expected the velocity and depths are reasonably accurate despite the simplicity of the approach.

Low Flow

Low flow was determined to be approximately 900 cubic feet per second (cfs) at Oregon City (USGS 14211010) and Estacada (USGS 14210000) based upon monthly statistics using the August monthly mean discharge rates from 1908 to 2017 (USGS 2017a and 2017b). Flows are similar at each gage. Depth variability for flow is based upon rating curve information developed for the USGS gage at Estacada (USGS 2017a and 2017b) and assumes a flow depth of 5 feet at 2,000 cfs.

Medium Flow

Medium flow was assumed to be approximately 3,000 cfs, which is close to the mean annual flow in the river at both Oregon City and Estacada. Again, depth variability is based upon the rating curve information at Estacada and Oregon City (USGS 2017a and 2017b).

High Flow

High flow was based on peak flow statistics at both Estacada and Oregon City. 10,000 cfs is typically encountered each year at Oregon City and is significantly less than flood stage. Depth variability is based upon the rating curve at Estacada and Oregon City. Note that this flow is several feet below flood stage, so it is assumed that all flow remains within the banks of the river. During floods, when flow is out of the channel banks, travel times are far more unpredictable.

Tables 2-1, 2-2, and 2-3 provide approximate travel time (in hours) of a floating contaminant release between different landmarks in the plan area at low, medium, and high flows. These times are based on baseline conditions, assuming winds are calm, ice is not present, and the river is not in flood.

Non-Floating

Velocity of transport for negatively buoyant particulates is estimated using the shear velocity, the characteristic velocity of near-bed sediment transport. The shear velocity is the square root of the product of the gravitational acceleration, depth of flow and the slope of the channel. The flow depth is the same as for the three flows described for floating contaminants. The slope of the channel below the River Mill Dam is a relatively constant 0.3%.

Implicit in these estimates is that the material is readily transportable by the river flow. More than likely negatively buoyant particulates will encounter areas of reduced near-bed transport, particularly during low flow periods. This will reduce travel times significantly over those listed in the table. For higher flows, particulates may become suspended in the water column. If this is the case, the particulates should be treated as floating contaminants, and the travel times reduced accordingly.

Tables 2-4, 2-5, and 2-6 provide approximate travel time (in hours) of a non-floating contaminant release between different landmarks in the plan area at low, medium, and high flows. These times are based on baseline conditions, assuming winds are calm, ice is not present, and the river is not in flood.

2.3 CLIMATE

The Clackamas River watershed is located within two distinct climatic zones, Oregon Climate Zone 2 (Willamette Valley) and Oregon Climate Zone 4 (Northern Cascades) (OCS 2005a). While

the Lower Clackamas River watershed is primarily in Oregon Climate Zone 2, climate information for the entire watershed is provided for context.

The climate of the Willamette Valley is relatively mild, characterized by cool-wet winters and warm-dry summers (OCS 2005a). The growing season is long, and moisture is abundant during most of the year, although summer irrigation is common. The Willamette Valley has a predominant winter rainfall climate, with 50 percent of the annual precipitation typically occurring from December through February, lesser amounts occurring in the spring and fall, and almost no precipitation falling during July and August). Annual rainfall tends to increase with elevation. Extreme temperatures are rare. Historically, days with maximum temperature above 90 degrees Fahrenheit (°F) occur only 5 to15 times per year on average (although recent trends indicate overall warming), and below-zero temperatures occur only about once every 25 years. Mean high temperatures range from the low 80s in the summer to about 40°F in the coldest months. Average low temperatures are generally in the low 50s in summer and low 30s in winter. The mean growing season is 150 to 180 days in the lower elevations and 110 to 130 days in the foothills (above about 800 feet). Snow typically falls every year; however, amounts are generally quite low. Snowfall in the valley floor averages 5 to 10 inches per year, mostly during December through February, with totals increasing with elevation in the foothills. Severe storms are rare. Ice storms occur occasionally as a result of cold air flowing westward through the Columbia Gorge, and high winds occur several times per year in association with major weather systems.

The climate of the Northern Cascades and of adjacent climate zones, is strongly influenced by the Cascade Mountains. Storms approaching from the west are forced to rise as they encounter the Cascades, resulting in large amounts of orographic (terrain-induced) precipitation on the western slopes (OCS 2005a). Most areas in the Northern Cascades climate zone receive more than 80 inches of precipitation annually, and the highest peaks collect more than 150 inches per year, mostly in the form of snow. As in the Willamette Valley, most of the precipitation in the Northern Cascades falls during the winter months; more than 75 percent of the annual precipitation falls from November through March. Total precipitation, and the proportion that occurs as snowfall, increases significantly with elevation. Mean monthly temperatures have a strong inverse correlation with elevation, and growing seasons are typically much shorter than in the Willamette Valley.

Table 2-1. Approximate travel time in hours of a floating product release on the Clackamas River (RM 0.0 to 24.8) during low flow periods (July through September).

	City of Estacada Surface Water Intake (RM 24.8)**	Carver Park (RM 7.9)	Carli Creek Confluence (RM 3.7)	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Cow Creek Confluence (RM 2.4)	South Fork Water Board Surface Water Intake (RM 1.6)	Lake Oswego Municipal Surface Water Intake (RM 0.8)	Confluence with the Willamette River (RM 0.0)
City of Estacada Surface Water Intake (RM 24.8)	0	22:32	1 day 4:08	1 day 4:48	1 day 5:28	1 day 5:52	1 day 6:56	1 day 8:00	1 day 9:04
Carver Park (RM 7.9)		0	5:36	6:16	6:56	7:20	8:24	9:26	10:30
Carli Creek Confluence (RM 3.7)			0	0:40	1:20	1:44	2:48	3:52	4:56
Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)				0	0:40	1:04	2:08	3:12	4:16
North Clackamas County Water Commission Surface Water Intake (RM 2.7)					0	0:24	1:28	2:32	3:36
Cow Creek Confluence (RM 2.4)						0	1:04	2:08	3:12
South Fork Water Board Surface Water Intake (RM 1.6)							0	1:04	2:08
Lake Oswego Municipal Surface Water Intake (RM 0.8)								0	1:04
Confluence with the Willamette River (RM 0.0)									0

*Assumed velocity of 1.1 ft/sec based on USGS gage at Estacada with an average discharge of 900 c.f.s. (approximately monthly average flow in August), channel width of 200 feet, and average depth of 4 feet.

**Travel times assume immediate bypass of the River Mill Dam

Table 2-2. Approximate travel time in hours of a floating product release on the Clackamas River (RM 0.0 to 24.8) during average flow conditions (3000 cfs).

	City of Estacada Surface Water Intake (RM 24.8)**	Carver Park (RM 7.9)	Carli Creek Confluence (RM 3.7)	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Cow Creek Confluence (RM 2.4)	South Fork Water Board Surface Water Intake (RM 1.6)	Lake Oswego Municipal Surface Water Intake (RM 0.8)	Confluence with the Willamette River (RM 0.0)
City of Estacada Surface Water Intake (RM 24.8)	0	9:20	11:48	12:00	12:18	12:29	12:57	13:25	13:53
Carver Park (RM 7.9)		0	2:28	2:46	3:04	3:15	3:43	4:16	4:44
Carli Creek Confluence (RM 3.7)			0	0:18	0:36	0:47	1:05	1:33	2:01
Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)				0	0:18	0:29	0:57	1:25	1:53
North Clackamas County Water Commission Surface Water Intake (RM 2.7)					0	0:11	0:39	1:07	1:35
Cow Creek Confluence (RM 2.4)						0	0:28	0:56	1:24
South Fork Water Board Surface Water Intake (RM 1.6)							0	0:28	0:56
Lake Oswego Municipal Surface Water Intake (RM 0.8)								0	0:28
Confluence with the Willamette River (RM 0.0)									0

*Assumed velocity of 2.5 ft/sec based on USGS gage at Estacada with an average discharge of 3000 c.f.s. (approximate annual average flow), channel width of 200 feet, and average depth of 6 feet.

**Travel times assume immediate bypass of the River Mill Dam

Table 2-3. Approximate travel time in hours of a floating product release on the Clackamas River (RM 0.0 to 24.8) during high flow periods (10,000 cfs)

	City of Estacada Surface Water Intake (RM 24.8)**	Carver Park (RM 7.9)	Carli Creek Confluence (RM 3.7)	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Cow Creek Confluence (RM 2.4)	South Fork Water Board Surface Water Intake (RM 1.6)	Lake Oswego Municipal Surface Water Intake (RM 0.8)	Confluence with the Willamette River (RM 0.0)
City of Estacada Surface Water Intake (RM 24.8)	0	4:30	5:37	5:45	5:53	5:58	6:11	6:24	6:37
Carver Park (RM 7.9)		0	1:07	1:15	1:23	1:28	1:41	1:54	2:07
Carli Creek Confluence (RM 3.7)			0	0:08	0:16	0:21	0:34	0:47	1:00
Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)				0	0:08	0:13	0:26	0:39	0:52
North Clackamas County Water Commission Surface Water Intake (RM 2.7)					0	0:05	0:18	0:31	0:44
Cow Creek Confluence (RM 2.4)						0	0:13	0:26	0:39
South Fork Water Board Surface Water Intake (RM 1.6)							0	0:13	0:26
Lake Oswego Municipal Surface Water Intake (RM 0.8)								0	0:13
Confluence with the Willamette River (RM 0.0)									0

*Assumed velocity of 5.5 ft/sec based on USGS gage at Estacada with an average discharge of 10,000 cfs, channel width of 200 feet, and average depth of 9 feet. Note that this calculation assumes that flow is primarily within the banks of the river.

**Travel times assume immediate bypass of the River Mill Dam

Table 2-4. Approximate travel time in hours of a non-floating product release on the Clackamas River (RM 0.0 to 24.8) during low flow periods (July through September).

	City of Estacada Surface Water Intake (RM 24.8)**	Carver Park (RM 7.9)	Carli Creek Confluence (RM 3.7)	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Cow Creek Confluence (RM 2.4)	South Fork Water Board Surface Water Intake (RM 1.6)	Lake Oswego Municipal Surface Water Intake (RM 0.8)	Confluence with the Willamette River (RM 0.0)
City of Estacada Surface Water Intake (RM 24.8)	0	1 day 17:19	2 days 3:35	2 days 4:48	2 days 6:01	2 days 6:45	2 days 8:42	2 days 10:39	2 days 12:36
Carver Park (RM 7.9)		0	10:16	11:29	12:42	13:26	15:23	17:20	19:17
Carli Creek Confluence (RM 3.7)			0	1:13	2:26	3:10	5:07	7:04	9:01
Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)				0	1:13	1:57	3:54	5:51	7:48
North Clackamas County Water Commission Surface Water Intake (RM 2.7)					0	0:44	2:41	4:38	6:35
Cow Creek Confluence (RM 2.4)						0	1:57	3:54	5:51
South Fork Water Board Surface Water Intake (RM 1.6)							0	1:57	3:54
Lake Oswego Municipal Surface Water Intake (RM 0.8)								0	1:57
Confluence with the Willamette River (RM 0.0)									0

*Assumed velocity of 0.6 ft/sec based on shear velocity, assuming average depth of 4 feet.

**Travel times assume immediate bypass of the River Mill Dam

Table 2-5. Approximate travel time in hours of a non-floating product release on the Clackamas River (RM 0.0 to 24.8) during average flow conditions (3000 cfs).

	City of Estacada Surface Water Intake (RM 24.8)**	Carver Park (RM 7.9)	Carli Creek Confluence (RM 3.7)	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Cow Creek Confluence (RM 2.4)	South Fork Water Board Surface Water Intake (RM 1.6)	Lake Oswego Municipal Surface Water Intake (RM 0.8)	Confluence with the Willamette River (RM 0.0)
City of Estacada Surface Water Intake (RM 24.8)	0	1 day 6:59	1 day 14:41	1 day 15:36	1 day 16:31	1 day 17:04	1 day 18:32	1 day 20:00	1 day 21:28
Carver Park (RM 7.9)		0	7:42	8:37	9:32	10:05	11:33	13:01	14:29
Carli Creek Confluence (RM 3.7)			0	0:55	1:50	2:23	3:51	5:19	6:47
Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)				0	0:55	1:28	2:56	4:24	5:52
North Clackamas County Water Commission Surface Water Intake (RM 2.7)					0	0:33	2:01	3:29	4:57
Cow Creek Confluence (RM 2.4)						0	1:28	2:56	4:24
South Fork Water Board Surface Water Intake (RM 1.6)							0	1:28	2:56
Lake Oswego Municipal Surface Water Intake (RM 0.8)								0	1:28
Confluence with the Willamette River (RM 0.0)									0:00

*Assumed velocity of 0.8 ft/sec based on shear velocity, assuming an average depth of 6 feet.

**Travel times assume immediate bypass of the River Mill Dam

Table 2-6. Approximate travel time in hours of a non-floating product release on the Clackamas River (RM 0.0 to 24.8) during high flow periods (10,000 cfs)

	City of Estacada Surface Water Intake (RM 24.8)**	Carver Park (RM 7.9)	Carli Creek Confluence (RM 3.7)	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Cow Creek Confluence (RM 2.4)	South Fork Water Board Surface Water Intake (RM 1.6)	Lake Oswego Municipal Surface Water Intake (RM 0.8)	Confluence with the Willamette River (RM 0.0)
City of Estacada Surface Water Intake (RM 24.8)	0	1 day 3:32	1 day 10:23	1 day 11:12	1 day 12:01	1 day 12:30	1 day 13:48	1 day 15:06	1 day 16:24
Carver Park (RM 7.9)		0	6:51	7:40	8:29	8:58	10:16	11:34	12:52
Carli Creek Confluence (RM 3.7)			0	0:49	1:38	2:07	3:25	4:43	6:01
Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)				0	0:49	1:18	2:36	3:54	5:14
North Clackamas County Water Commission Surface Water Intake (RM 2.7)					0	0:29	1:47	3:05	4:23
Cow Creek Confluence (RM 2.4)						0	1:18	2:36	3:54
South Fork Water Board Surface Water Intake (RM 1.6)							0	1:18	2:36
Lake Oswego Municipal Surface Water Intake (RM 0.8)								0	1:18
Confluence with the Willamette River (RM 0.0)									0

*Assumed velocity of 0.9 ft/sec based on shear velocity, assuming an average depth of 9 feet. Note that this calculation assumes that flow is primarily within the banks of the river. Also see caveats in explanatory text.

**Travel times assume immediate bypass of the River Mill Dam

2.4 Risk Assessment

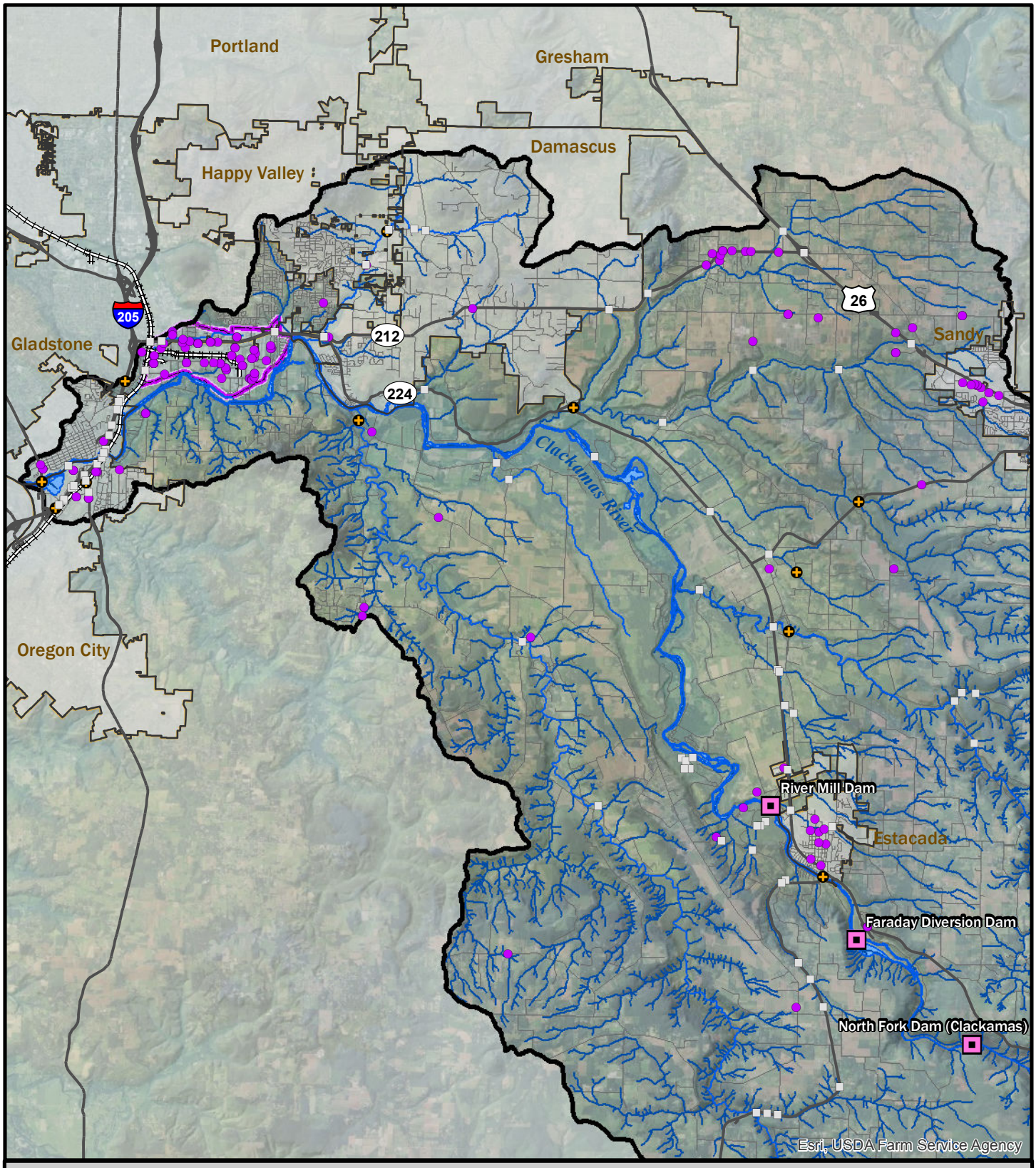
2.4.1 Roads and Bridges

High vehicle usage and other transportation-related activities increase the risk of leaks or spills of petroleum and other hazardous materials that can have a significant impact on sensitive resources and drinking water quality in the Clackamas River watershed (CRWP 2010). The Lower Clackamas River watershed has more than 125 miles of highways and major arterials, as well as major freight routes along State Highways 212 and 26. Vehicle traffic on roadways poses a significant spill risk in the planning area. Commercial trucks can contain hundreds to thousands of gallons of fuel and oil, and almost any kind of hazardous waste or material. An accident involving a fully loaded tanker truck could result in a substantial spill of fuel or other hazardous substance. Accidents involving smaller vehicles could result in smaller spills of fuel or oil. Spills onto roadways could cause fuel, oil, or other hazardous substances to flow directly into the river or streams, or into ditches or stormwater systems that ultimately lead to the Clackamas or its tributaries.

The Clackamas River watershed contains 110 bridges. In 2013, 11 of those bridges were listed by ODOT as functionally obsolete (ODOT 2013). A functionally obsolete bridge is one that cannot safely service the volume or type of traffic using it. Although such bridges are not unsafe for all vehicles, they have older design features that prevent them from accommodating current traffic volumes and modern vehicle sizes and weights. Also, many older bridges do not have stormwater facilities and allow runoff to flow directly to the stream. Each year, about 15 bridges in Oregon become classified as structurally deficient (ODOT 2013). Functionally obsolete bridges cross the Clackamas River at McLoughlin Boulevard near the bottom of the watershed and at Highway 211 near Estacada. Bridge failure or a hazardous spill on a bridge could have significant impacts on the Clackamas River. Bridge locations are shown on Figure 2.

2.4.2 Rail Transportation

A major north-south Union Pacific railroad line crosses the Clackamas River at a bridge near the bottom of the watershed near the I-205 bridge. The rail line runs parallel to Cow Creek (a tributary to the Clackamas River) through several miles of the lower watershed. Mixed-cargo trains on the rail line can carry an assortment of hazardous materials on a regular basis. Train locomotives typically hold several thousand gallons of diesel fuel plus large quantities of lube and motor oils. A train derailment could spill diesel fuel or hazardous cargo into the nearby stream or river.



Legend

- Facilities storing hazardous materials
- Dam

Bridges (2014)

- Not deficient
- Functionally obsolete
- Structurally deficient

- Clackamas River Industrial Area
- Railroad
- Road
- Highway
- River
- City limits
- Clackamas River watershed boundary

Figure 2.
Overview of Potential Risk Sources in the Lower Clackamas River Geographic Response Plan Area.

N

0 6,000 12,000 24,000 Feet

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2.4.3 Clackamas Industrial Area

The Clackamas Industrial Area is the commercial and industrial region at the bottom of the watershed bounded by I-205 to the west, Highway 212/224 to the east, and the Clackamas River to the south. Many of the businesses in the industrial area are less than a quarter of a mile away from the Clackamas River and a spill at (or transporting materials to or from) these facilities could end up draining to stormwater infrastructure that ultimately discharge directly to the Clackamas River or four of its small tributary creeks (Rock, Sieben, Carli, and Cow Creeks). More than 500 facilities using, storing, manufacturing, and disposing reportable quantities of 3,500 different hazardous substances have been identified in the Clackamas River watershed; the largest concentration of those facilities is in the Clackamas Industrial Area (Herrera 2015). The results of GIS hazardous materials risk analyses conducted in the watershed showed a high spill risk hotspot in in this area, due both to historic repeated spills and the presence of a high concentration of hazardous substance storage facilities in close proximity to the river.

2.4.4 Other Spill Risks

Other potential oil spill risks in the planning area include dam turbine mechanical failures at the three hydroelectric dams (Faraday, just east of Estacada, River Mill, west of Estacada and North Fork, upstream from Faraday) and construction activities using heavy equipment on or near stream banks.

CHAPTER 3

Lower Clackamas River

Spill Response Options and Considerations

		Location									
		Lake Oswego Municipal Surface Water Intake (RM 0.8)	South Fork Water Board Surface Water Intake (RM 1.6)	Cow Creek Confluence (RM 2.4)	Cow Creek Outfall (RM 2.4)	North Clackamas County Water Commission Surface Water Intake (RM 2.7)	Stormwater Outfall CD16A-73 at Riverside Park (RM 3.1)	Clackamas River Water Surface Water Intake at Riverside Park (RM 3.3)	Carli Creek Confluence (RM 3.7)	Carli Creek Outfall (RM 3.7)	Carver Park (RM 7.9)
Waterbody	Rivers	●	●	●		●	●	●	●		●
	Tributaries			●	●				●	●	
	Outfalls			●	●		●	●	●	●	
	Pool Area formed by Dam										
	Confluence			●					●		
	Wetland Area (s)	●	●	●		●	●	●	●		●
Considerations	Water Provider Notification	●	●	●	●	●	●	●	●	●	●
	Surface Water Intake	●	●			●		●			
	Shoreside Access can be Limited by Private Property			●	●				●	●	●
	Park or Recreation Area						●	●			●
	Boat Ramp in Area						●	●			●
	Recreational Boat Traffic	●	●	●		●	●	●	●		●
	Tribal Lands/ UandA Interests[1]	●	●	●	●	●	●	●	●	●	●
	In or Adjacent to Industrial Area			●	●		●	●	●	●	
	Dam(s) in Area										●
	Interstate Highway Corridor (I-205)	●	●		●	●					
	Oil Movement by Rail in Area	●	●	●	●	●	●	●	●	●	
	Threatened/Endangered Terrestrial Species[2]	●	●	●	●	●	●	●	●	●	●
Potential Response Options	Intake Monitoring/Shut Off	●	●			●		●			
	Source Control and Containment Activities	●	●	●	●	●	●	●	●	●	●
	Aerial/Vessel Surveillance Activities	●	●	●	●	●	●	●	●	●	●
	Collection for Skimming Operations[3]			●		●	●	●	●		●
	Vessel Based Skimming Operations[4]	●		●		●	●	●	●		●
	Shore Based Skimming Operations[5]			●		●	●	●	●		●
	Shoreside Protection Booming[6]	●		●		●	●	●	●		●
	Outfall Booming				●		●	●		●	

See the Northwest Area Contingency Plan (NWACP – Section 1900) for more information on the terminology used on this sheet.

The NWACP is available online at http://www.rrt10nwac.com/NWACP/Default.aspx

Notes:

[1] This sheet doesn't represent all locations where Tribes and Tribal Nations have lands or areas of specific interest (including lands established by treaty or rights to Usual and Accustom areas). Early coordination with tribal governments is highly recommended during a response, regardless of the spill location or potential impact areas.

[2] More information available in Chapter 6. Response and cleanup in these areas may require coordination with Federal or State Fish and Wildlife staff to reduce disturbances to upland species.

[3] Collection for Skimming Operations response options should include use of enhanced skimming using a U-boom, V – boom, or J – boom configuration in waters large enough for boats to maneuver (e.g., lake, large river).

[4] Vessel Based Skimming Operations response options should include use of advancing skimmers: weir, belt, brush, drum, or other skimmer types.

[5] Shore Based Skimming Operations response options should include use of fixed skimmers: weir, belt, brush, drum, or other skimmer types.

[6] Shoreside Cleanup options depend on safe and efficient access to locations and the type of river, creek, or stream bank present. Potential activities could include flooding, flushing, manual removal, vacuum, mechanical removal, sorbents, vegetation cutting, mechanical tilling/aeration, and/or sediment reworking/surf washing.

4. RESPONSE STRATEGIES AND PRIORITIES

This chapter provides information on geographic response strategies. The order in which they should be implemented should be based on the spill location and proximity of sensitive downstream resources. An overview map showing response strategies identified in the Lower Clackamas River watershed and information on boat launch locations are also provided in this chapter. During a spill incident, response strategies described in this plan should be implemented as soon as possible. The downstream movement of oil or other hazardous material and the time it takes to mobilize resources to deploy response strategies must always be considered when setting implementation priorities. Information on resources at risk and sensitive areas is presented in Chapter 6 of this plan.

The response strategies provided in this chapter have been created to reduce a hazardous material spill's impact on sensitive resources. The strategies are not everything that should or could be done during a response to lessen the chance of injury to natural, cultural, and economic resources at risk from spills. Control and containment of an oil spill is always a higher priority than the implementation of GRP response strategies. Although designed to be implemented during the initial phase of a hazardous material spill, geographic response strategies may continue to be used throughout a response at the discretion of the Incident Commander, Unified Command, or the Environmental Unit.

4.1 ONSITE CONSIDERATIONS

Before deploying a response strategy (Questions to Ask):

- Are conditions safe?
  Response managers and responders must first determine if efforts to implement a response strategy would pose an undue risk to worker safety or the public, based on conditions present during the time of the emergency. No strategy should be implemented if doing so would threaten public safety or present an unreasonable risk to the safety of responders.

- Has initial control and containment been sufficiently achieved?
  Source control and containment of the spill at or near the source of a spill are always higher priorities than the deployment of response strategies, especially when concurrent response activities are not possible.

- How far downstream or out into the river environment is the spilled material likely to travel before response personnel will be ready and able to deploy response strategies?

- Will equipment or vehicles need to be staged on or near a roadway?
  If so, traffic control may be required. Contact the Oregon State Police, Clackamas County Department of Transportation and Development for assistance. At minimum, Oregon Department of Transportation (ODOT) guidelines for work zone traffic control should be followed when working on or near a roadway. Oregon State Police Northwest Area Headquarters can be reached at (503) 378-3387.

During Strategy Implementation (Things to Remember):

- On-scene conditions (weather, river speed) may require that strategies be modified to be effective. There is a significant chance that weather and conditions experienced at a particular strategy location during an actual spill event will be different from those present when data was gathered during field visits. Response managers and responders must remain flexible and modify the strategies provided in this chapter, as needed, to meet the challenges experienced during an actual response.

- Certain strategies may call for access points or staging areas that are not easily reached at all times of the year or in all conditions.

After Strategy Implementation (Things to Understand):

- Oil containment boom should be maintained and periodically monitored to ensure its effectiveness. Changes in river or current speed will likely require modifications to boom deflection angles. Depending on conditions, some booming strategies may require around-the-clock tending.

- Although designed for implementation during the initial phase of a hazardous material spill, response strategies may continue to be deployed and implemented throughout the entire lifespan of a response, as determined appropriate and necessary by the Incident Commander or Unified Command.

4.2 Historical River Stream Flow Ranges

US Geological Survey (USGS) gage (stream flow) data were used to determine the mean monthly stream discharge for the Clackamas River. Stream discharge is recorded in cubic feet per second (cfs); information on USGS river gage readings can be found online at http://or.water.usgs.gov/clackamas/monitors/. Detailed flow information and contaminant travel time estimates can be found in Chapter 2.

4.3 Area Overview Maps

The following maps provide a geographic overview of the planning area, including the location of response strategies, notification strategies, boat launch locations, and staging areas. Detailed information for each strategy can be found in the matrices in Section 4.5 or in Appendix A.

The following area maps are provided for reference:

- Response and Notification Strategy Locations
- Boat Launch Locations and Staging Areas

4.4 Strategy and Response Priorities

4.4.1 General Response Priorities

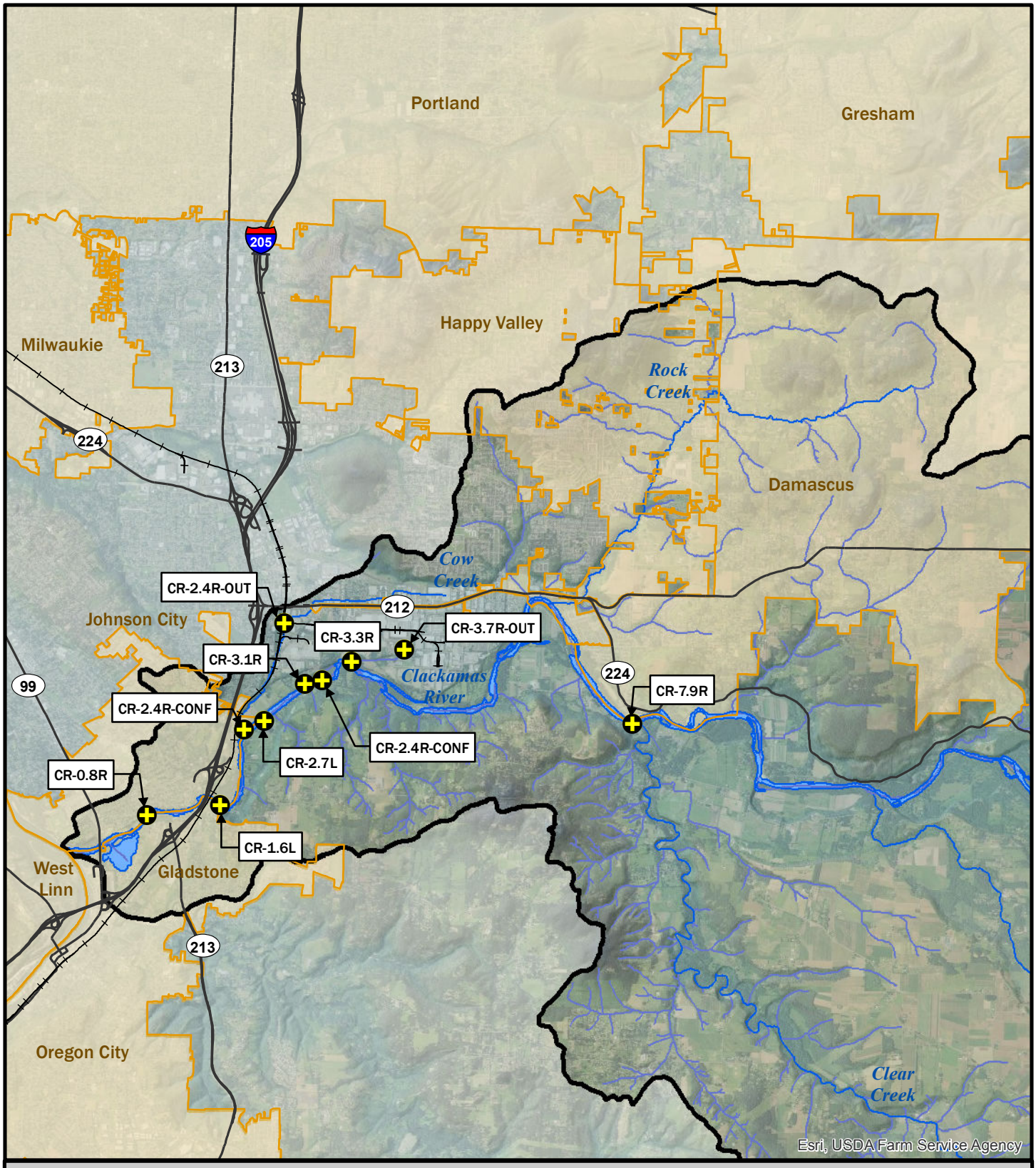
The following list provides the order of response priorities after a hazardous material spill into the Clackamas River.

1. Safety is always the number one priority. Do not implement response strategies or take actions that may unduly jeopardize public, worker, or personal safety.
2. Notify local public health and safety personnel.
3. Control and contain the source of the spill; mobilize resources to the spill location. Source control and containment are always a higher priority than the implementation of GRP strategies.
4. Determine the priority or order response strategies should be implemented based on the location of the spill or affected area and proximity to downstream sensitive resources.
5. As response resources become available, implement the response strategies in order of priority.

4.5 Matrix

4.5.1 Naming Conventions (Short Names)

Each strategy in this document has been given a unique "Short Name" which include a prefix of "CR" denoting the Clackamas River. Following the letters are a river mile designation indicating the distance from the mouth of the river upstream to the site location and the site location ("R" for right bank, "L" for left bank, "OUT" for an off-channel outfall, and "CONF" for a tributary confluence). Staging Areas and Boat Launches are indicated by an "SA-" or "BL-" prefix.



Legend

- Spill Response Strategy
- Railroad
- Clackamas River watershed boundary
- Highway
- River
- City limits

Figure 4-1.
Vicinity Map of the Lower Clackamas River Geographic Response Plan Area.

N

0 3,500 7,000 14,000 Feet

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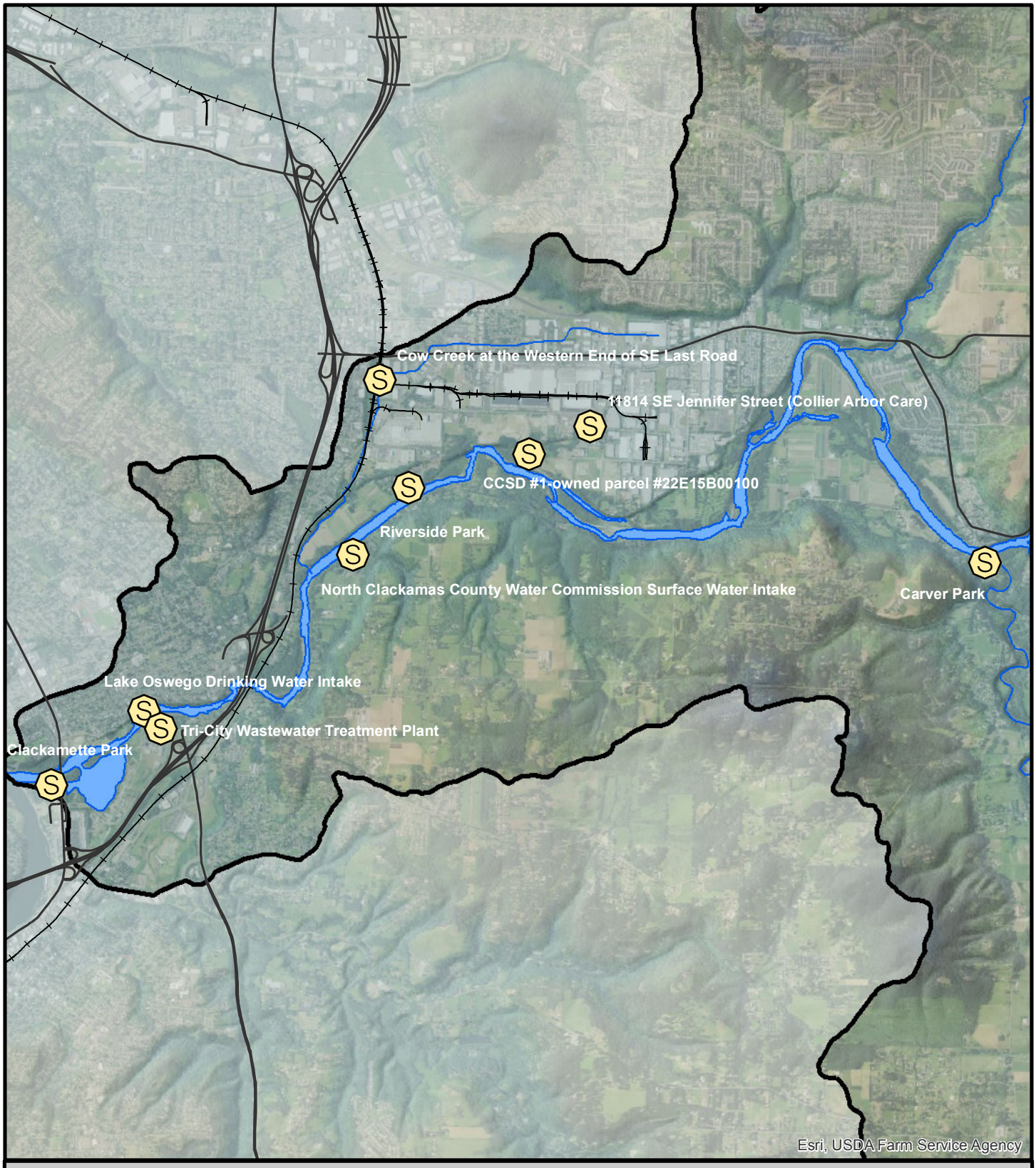

Legend

- Staging Area
- Clackamas River watershed boundary
- Highway
- River
- City limits

Figure 4-2.
Staging Areas in the Lower Clackamas River Geographic Response Plan Area.

N

0 2,000 4,000 8,000 Feet

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Legend

- Boat Launch
- Railroad
- Clackamas River watershed boundary
- Highway
- River
- City limits

Figure 4-3.
Boat Ramps in the Lower Clackamas River Geographic Response Plan Area.

N

0 6,000 12,000 24,000 Feet

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4.5.2 Response Strategy Matrix

Strategy Name	Location	Strategy Type	Latitude	Longitude	Boom Length (feet)	Boat Req?	Resources at Risk	Comments	Staging Area
CR-0.8R	Lake Oswego Municipal Surface Water Intake	Deflection	45.37815	-122.592249	200	Yes	Drinking water intake	Access this site from the Clackamette boat ramp. Onsite access to the river is limited due to high rocks. WES owns the property on the left bank and site access is also possible via a small path as an alternate option.	Clackamette Park is the best option for staging. There is also a small staging area on site on the cliff area or across the river at the Tri-City Wastewater Treatment Plant.
CR-1.6L	South Fork Water Board Surface Water Intake	Notification	45.379414	-122.577858	N/A	No	Drinking water intake	Easy vehicle access via Clackamas River Drive. Very steep foot access near old intake, equipment access not feasible.	South Fork Water Board Surface Water Intake
CR-2.4R-CONF	Cow Creek Confluence	Containment	45.389866	-122.573629	100	Yes	Clackamas River	Access site via boat from Riverside Park	Riverside Park **Note**: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after-hours emergency service.
CR-2.4R-OUT	Cow Creek at the Western End of SE Last Road	Containment	45.40886	-122.563878	100	No	Cow Creek	Easy vehicle access via SE Last Rd. Parking adjacent to the outfall.	Cow Creek Outfall
CR-2.7L	North Clackamas County Water Commission Surface Water Intake	Exclusion	45.391516	-122.569541	200	Yes	Drinking water intake	Easy vehicle access with Clackamas River Drive. A road comes right up to the facility.	North Clackamas County Water Commission Surface Water Intake

Strategy Name	Location	Strategy Type	Latitude	Longitude	Boom Length (feet)	Boat Req?	Resources at Risk	Comments	Staging Area
CR-3.1R	Stormwater Outfall CD16A-73 at Riverside Park	Containment	45.396879	-122.55788	50	No	Drinking water intake	Easy vehicle access via SE Jennifer Street and SE Evelyn Street at Riverside Park. Boat launch onsite.	Riverside Park **Note**: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after-hours emergency service.
CR-3.3R	Clackamas River Water Surface Water Intake at Riverside Park	Deflection	45.396879	-122.55788	600	Yes	Drinking water intake	Easy vehicle access via SE Jennifer Street and SE Evelyn Street at Riverside Park. Boat launch onsite.	Riverside Park **Note**: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 after hours.
CR-3.7R-CONF	Carli Creek Confluence	Containment	45.400004	-122.552351	100	No	Clackamas River	Outfall/lower staging access is via locked gates. 7:30 AM to 5:30 PM Mon-Thurs call WES at (503)742-4567. Otherwise call Clackamas County at (503)655-8211 or 911 (if serious). Ask dispatch to call WES. WES will return your call.	SE Jennifer Road and CCSD #1 parcel 22E15B00100
CR-3.7R-OUT	Carli Creek Outfall	Containment	45.402229	-122.541479	100	No	Clackamas River	Outfall/lower staging access is via locked gates. 7:30 AM to 5:30 PM Mon-Thurs call WES at (503)742-4567. Otherwise call Clackamas County at (503)655-8211 or 911 (if serious). Ask dispatch to call WES. WES will return your call.	SE Jennifer Road and CCSD #1 parcel 22E15B00100
CR-7.9R	Carver Park	Diversion	45.392251	-122.496219	400	Yes	Downstream resources	Good public access via Carver Park.	Carver Park

4.5.3 Staging Area Matrix

Staging Area Name	Location	Latitude	Longitude	Nearest Address	Contact	Comments	Strategies Served
SA-CR-0.2L	Clackamette Park	45.372	-122.60	1955 Clackamette Drive Oregon City, OR 97045	Oregon City Parks and Recreation (503) 496-1201 Hours: M-F 8:00AM to 4:00PM	Oregon City park at the confluence of the Willamette and Clackamas River with easy access from1 I-205 and 99E. Boat launch, public parking, beach access and staging room.	CR-0.8R
SA-CR-3.1R	Riverside Park	45.397	-122.56	7298 SE Water Ave, Clackamas, OR 97015	(503) 722-9220	Large park with boat ramp and ample parking and staging area. **Note**: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 for after-hours emergency service.	CR-2.4R-CONF CR-2.7L CR-3.1R CR-3.3R
SA-CR-2.4R	Cow Creek Outfall	45.405	-122.57	16251 SE 98th Ave Clackamas, OR 97015	Union Pacific Railroad (888) 877-7267	Staging is in an industrial area in a large Union Pacific Railroad parking lot	CR-2.4R-OUT
SA-CR-2.6L	North Clackamas County Water Commission Surface Water Intake	45.391	-122.57	14275 Clackamas River Drive, Oregon City, OR 97045	North Clackamas County Water Commission (503) 722-9220	Some staging area available on site	CR-2.7L
SA-CR-3.7R-CONF	SE Jennifer Road and CCSD #1 parcel 22E15B00100	45.400	-122.55	11340 SE Jennifer Street	Water Environment Services (503) 742-4567	Lower staging area is on CCSD#1-owned land and can be accessed by driving through the CalPortland concrete mix-ready plant facility at 11340 SE Jennifer Street. Large open field.	CR-3.7R-CONF CR-3.7R-OUT

Staging Area Name	Location	Latitude	Longitude	Nearest Address	Contact	Comments	Strategies Served
SA-CR-7.9L	Carver Park	45.392	-122.495	14888 S. Springwater Road Oregon City, OR 97045	Clackamas County Parks: (503) 742-4414	Clackamas County park with a boat ramp, public parking, and room for staging. Detailed park information can be found here: http://www.clackamas.us/parks/carver.html	CR-7.9R
SA-CR-0.9L	Tri-City Wastewater Treatment Plant	45.38	-122.59	15941 Agnes Ave Oregon City, OR 97045	(503) 557-2823	Some staging area available on site	CR-0.8R
SA-CR-0.8R	Lake Oswego Drinking Water Intake	45.38	-122.59	115 W Clackamas Blvd Gladstone, OR 97027	(503) 701-2978	Staging is in an industrial area in a large Union Pacific Railroad parking lot	CR-0.8R
SA-CR-3.7R-OUT	Collier Arbor Care	45.40	-122.54	11814 SE Jennifer Street	Water Environment Services (503) 742-4567	Parking lot area near the Carli Creek outfall	CR-3.7R-OUT

4.5.4 Boat Launch Matrix

Boat Launch Name	Location	Latitude	Longitude	Nearest Address	Contact	Strategies Served
BL-CR-0.2L	Clackamette Park	45.372	-122.60	1955 Clackamette Drive Oregon City, OR 97045	Oregon City Parks and Recreation (503) 496-1201 Hours: M-F 8:00AM to 4:00PM	CR-0.8R
BL-CR-3.1R	Riverside Park	45.397	-122.56	7298 SE Water Ave, 55341 Clackamas, United States	(503) 722-9220 **Note**: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after-hours emergency service.	CR-2.4R-CONF CR-2.7L CR-3.1R CR-3.3R
BL-CR-7.9L	Carver Park	45.392	-122.495	14888 S. Springwater Road Oregon City, OR 97045	Clackamas County Parks: (503) 742-4414	CR-7.9R
BL-CR-13.5R	Barton Park Boat Ramp	45.38	-122.41	19009 SE Barton Park Rd Boring, OR 97009	Clackamas County Parks: (503) 742-4414	All downstream strategies
BL-CR-19L	Feldheimer Boat Launch	45.38	-122.38	19278 S Pioneer Crossing Lane Estacada, OR 97023	Clackamas County (503) 650-3484	All downstream strategies
BL-CR-23.4L	Milo McIver State Park Boat Ramp	45.30	-122.36	24101 S Entrance Rd Estacada, OR 97023	Oregon Parks and Recreation (800) 551-6949	All downstream strategies

5. (RESERVED)

6. RESOURCES AT RISK

This chapter provides a summary of natural and economic resources at risk in the Clackamas River watershed. It provides general information on habitat, fish and wildlife, and locations of sensitive natural resources in the planning area. It offers a summary of cultural resources that include fundamental procedures for the discovery of cultural artifacts and human skeletal remains. General information about flight restrictions, deterrence, and oiled wildlife can be found near the end of this chapter. A list of economic resources in the area is provided in the chapter's appendix.

This chapter is purposely broad in scope and should not be considered comprehensive. Some of the sensitive resources described in this chapter are listed because they could not be addressed in Chapter 4 (Response Strategies and Priorities). Additional information from private organizations or federal, state, tribal, and local government agencies should also be sought during spills and considered.

The information provided in this chapter can be used in:

- Assisting the Environmental Unit (EU) and Operations in developing additional response strategies beyond those found in Chapter 4.
- Providing resource-at-risk "context" to responders, clean-up workers, and others during the initial phase of a spill response in the GRP area.
- Briefing responders and incident command staff that may be unfamiliar with sensitive resource concerns in the GRP area.

6.1 NATURAL RESOURCES AT RISK

Most biological communities are susceptible to the effects of hazardous material spills. Plant communities on land and in water, microscopic plants and animals, fish, amphibians and reptiles, birds, mammals, and invertebrates are all potentially at risk from acute toxicity, smothering, and other effects of being exposed to spilled oil or other hazardous substance. The Clackamas River watershed encompasses a wide variety of aquatic, riparian, and upland habitats that support a complex diversity of flora and fauna. Some fish and wildlife species are resident throughout the year; others seasonally migrate out of the watershed. Many species, both plants and animals, found in the watershed are classified as threatened, endangered, sensitive, or of special concern under the federal and/or Oregon Endangered Species Acts.

Classification types are listed below, with the abbreviation of each type provided in the brackets (to the right of the classification)

- Federal Endangered (FE)
- Federal Threatened (FT)
- Federal Species of Concern (FCo)
- State Endangered (SE)
- State Threatened (ST)
- State Candidate (SC)
- Birds of Conservation Concern (BCC)

Sensitive species that may occur within this area, at some time of year, include the following federal and state listed species.

Birds

- Northern Spotted Owl (FT, ST)
- Streaked Horned Lark (FT)
- Yellow-billed Cuckoo (FT)
- Clark's Grebe (BCC)
- Great Blue Heron (BCC)
- Lesser Yellowlegs (BCC)
- Olive-sided Flycatcher (FCo, BCC)
- Red-throated Loon (BCC)
- Rufous Hummingbird (BCC)
- Semipalmated Sandpiper (BCC)
- Western Screen-owl (BCC)
- Whimbrel (BCC)

Listed Fish and Critical Habitat

- Bull Trout (FT)
- Upper Willamette River Chinook salmon (FT)
- Upper Columbia River spring-run Chinook Salmon (FE)
- Lower Columbia River Chinook salmon (FT)
- Lower Columbia River Coho Salmon (FT, SE)
- Upper Willamette River steelhead (FT)
- Upper Columbia River steelhead (FT)
- Mid-Columbia River steelhead (FT)
- Lower Columbia River steelhead (FT)
- Snake River steelhead (FT)

Flowering Plants

- Bradshaw's Desert-parsley (FE, SE)
- Kincaid's Lupine (FT, ST)
- Nelson's Checker-mallow (FT, ST)
- Water Howellia (FT, ST)
- Willamette Daisy (FE, SE)

6.2 General Resource Concerns

6.2.1 Habitats

- Wetlands support a diverse array of bird, insect and fish and wildlife species.
- Side channels provide feeding and resting areas for a variety of birds, including waterfowl and herons and are rearing areas for juvenile fish.
- Riparian vegetation is heavily used by a variety of wildlife; it also helps cool river water by providing shade and provides habitat for fish near stream banks.

- Habitat has been restored at numerous sites along the Clackamas River and its tributaries; often, significant resources have been invested in those areas to improve stream conditions specific to salmon recovery.

6.2.2 Fish

- Numerous aquatic species of special interest use habitat within the Clackamas River, such as salmon, steelhead, bull trout, and lamprey.
- The watershed is home to the last significant run of wild late winter Coho in the Columbia Basin and one of only two remaining runs of spring Chinook in the Willamette Basin. The watershed also supports a significant population of winter steelhead, cutthroat trout, and native lamprey.
- The Clackamas River is probably the last substantial wild population of Coho salmon remaining in the lower Columbia River (Myers et al. 2003).
- Fish move through the Clackamas River and its tributaries year-round. Spring Chinook salmon are the first migratory fish to arrive each year for spawning, followed by fall Chinook, Coho salmon, and winter steelhead. Migratory runs of lamprey and sea-run cutthroat trout also move between the Pacific Ocean and the Clackamas River.
- Juvenile and/or adult salmonids (salmon and trout) are present in the river throughout the year. Millions of juvenile salmonids use many areas of the river as rearing and foraging habitat. Returning migratory adults support significant tribal, commercial, and recreational fisheries.
- The Eagle Creek National Fish Hatchery and the Oregon Depart of Fish and Wildlife Clackamas Hatchery at McIver State Park are both located within the planning area.

6.2.3 Wildlife

- More than 150 bird species nest in the Willamette Valley.
- The planning area is within the Pacific Flyway, a major bird migration route. Species of waterfowl, shorebirds, songbirds, and birds of prey all migrate through the region.
- The Willamette Valley supports significant waterfowl concentrations from fall through spring. Thousands of geese and ducks may occupy the region during peak periods.
- Resident and migratory waterfowl, herons, and shorebirds rely on waterways, wetlands, and adjacent uplands in the region.

- Resident and migratory songbirds use riparian habitats year-round and are susceptible to injury or death if riparian vegetation and shorelines become contaminated.

- More than 60 mammal species breed in the Willamette Valley. Some mammals common to the Lower Clackamas River watershed include black-tailed deer, skunks, squirrels, bobcat, cougar, black bear, beaver, river otter, mink, and raccoon. Most mammals rely on streams or lakes for fresh water to survive, and many species live their entire lives near waterbodies.

- More than 30 species of amphibians and reptiles live in the region. Amphibians are particularly vulnerable to impacts from spills of hazardous substances.

6.2.4 Specific Geographic Areas of Concern

- This section of the Clackamas River between Clear Creek and the confluence with the Willamette River is critical for protection as it contains four surface water intakes that supply drinking water to 300,000 people, as well as downstream wetlands and critical fish habitat for Chinook and Steelhead salmon.

6.3 Cultural Resources at Risk

Culturally significant resources are present within the Lower Clackamas River watershed. The Lower Clackamas River watershed has been populated by humans for at least 8,000 years (Burtchard et al. 1993). Until the mid-1800s, the primary inhabitants were Native Americans from the Clackamas tribes. In the early 1800s, an estimated 1,800 Native Americans lived in the watershed, and that was after their population had been devastated by diseases introduced by European-Americans. Historically, several larger Native American settlements were near the mouth of the Clackamas River, and a handful of additional communities were scattered along the river upstream as far as the present-day town of Estacada (Woodard 1974).

During a spill response, after the Unified Command is established, information related to specific archeological concerns will be coordinated through the Environmental Unit. To ensure that tactical response strategies do not inadvertently harm culturally sensitive sites, the Oregon State Historic Preservation Office (OR SHPO) should be consulted before disturbing any soil or sediment during a response action. The Tribal Historic Preservation Offices (THPOs) of the Grande Ronde Confederated Tribes and Warm Springs Confederated Tribes may also be able to provide information on cultural resources at risk in the area and should be contacted, through normal trustee notification processes when significant hazardous material spills, or smaller spills above reportable thresholds, occur on the Clackamas River. OR SHPO and/or the Tribes may assign a person, or provide a list of professional archaeologists that can be contracted, to monitor response activities and cleanup operations for the protection of cultural resources at risk. Due to the sensitive nature of such information, details regarding the location and type of cultural resources present are not included in this document.

6.3.1 Discovery of Human Remains

Any human remains, burial sites, or burial-related materials that are discovered during a spill response must be treated with respect at all times. Refer to Section 9403 of the Northwest Area Contingency Plan for National Historic Preservation Act Compliance Guidelines during an emergency response.

6.3.2 Procedures for the Discovery of Cultural Resources

All work must be stopped immediately and the Incident Commander must be notified if any person monitoring work activities or involved in spill response believes that they have encountered cultural resources. The area of work stoppage must be adequate to provide for the security, protection, and integrity of the material or artifact(s) discovered.

Prehistoric Cultural Resources

Prehistoric cultural resources may include, but are not limited to:

- Lithic debitage (stone chips and other tool-making byproducts)
- Flaked or ground stone tools
- Exotic rocks, minerals, or quarries
- Concentrations of organically stained sediments, charcoal, or ash
- Fire-modified rock
- Rock alignments or rock structures
- Bone (burned, modified, or in association with other bone, artifacts, or features)
- Shell or shell fragments
- Petroglyphs and pictographs
- Fish weirs and traps
- Culturally modified trees
- Physical locations or features (traditional cultural properties)

Historic Cultural Material

Historic cultural materials may include any of the following items over 50 years old:

- Bottles, or other glass
- Cans
- Ceramics
- Milled wood, brick, concrete, metal, or other building material
- Trash dumps
- Homesteads, building remains
- Logging, mining, or railroad features
- Piers, wharves, docks, bridge, dams

6.4 Economic Resources at Risk

Some facilities and businesses rely on their location on or near a waterbody to be economically viable—their location is an economic resource that could be negatively affected if a hazardous material spill were to occur. Sensitive economic resources fall into three categories: critical infrastructure (such as water intakes for drinking water or industrial use), water-dependent commercial areas (such as marinas), and water-dependent recreation areas (such as boat ramps and fishing piers). Appendix 6 includes a list of sensitive economic resources in the planning area.

6.5 General Information

6.5.1 Flight Restriction Zones

Flight restriction zones may be recommended by the Environmental Unit (Planning Section) for the purpose of minimizing disturbance that could result in injury to wildlife during an oil spill. By keeping a safe distance or altitude from identified sensitive areas, pilots can minimize the risk of aircraft/ bird collisions, prevent the accidental deterrence of wildlife into oiled areas, and avoid causing abandonment of nests or marine mammal pupping areas. Implementation of Flight Restriction Zones will take place within the Air Operations Branch (Operations Section) after a Unified Command is formed. The Planning Section's Environmental Unit will work with the Air Ops Branch Director to resolve any potential conflicts with flight activities that are essential to the spill response effort. Typically, the area within a 1,500 ft radius and below 1,000 ft in altitude is restricted to flying in areas that have been identified as sensitive. However, some areas have more restrictive zones. In addition to restrictions associated with wildlife, Tribal authorities may also request notification when overflights are likely to affect culturally sensitive areas within

reservations. See Section 9301.3.2 and Section 9301.3.3 of the Northwest Area Contingency Plan for more information on the use of aircraft and helicopters in shoreline responses.

6.5.2 Deterrence

After a Unified Command is formed, the Wildlife Branch (Operations Section) in consultation with the appropriate trustee agencies and the Environmental Unit will evaluate deterrence options for the purpose of keeping un-oiled birds away from oil during a spill. Deterrent options might include the use of acoustic or visual deterrent devices, boats, aircraft or other situation-appropriate tools. For more information see the Northwest Wildlife Response Plan (NWACP Section 9310) and Northwest Area Wildlife Deterrence Resources (NWACP Section 9311).

6.5.3 Oiled Wildlife

Attempting to capture oiled wildlife can be hazardous to both the animal and the person attempting the capture the animal. Response personnel should not approach or attempt to recover oiled wildlife. Responders should report their observations of oiled wildlife to the Wildlife Branch so appropriate action can be taken. Information provided should include the location, date, and time of the sighting, and the estimated number and kind of animals observed. Early on in the response, before a Unified Command is established, oiled wildlife sightings should be reported to Oregon Department of Fish and Wildlife. For more information see the Northwest Wildlife Response Plan (NWACP Section 9310).

7. REFERENCES

Burtchard, G.C., D R. Werth, S.L. Snyder. 1993. Clackamas wild and scenic river cultural resource inventory project. International Archaeological Research Institute.

CRISP. 2015. Clackamas River Invasive Species Management Plan. Clackamas River Invasive Species Partnership. October 1, 2015. Accessed September 21, 2017. https://drive.google.com/file/d/0B-kvFFv8IYynbXU1aUpvYXdUODQ/view

CRWP. 2010. Drinking Water Protection Plan for the Clackamas River. Clackamas River Water Providers.

Herrera. 2015. Updated GIS Hazardous Materials Spill Risk Analyses Results and Recommendations. Online at http://www.clackamasproviders.org/wp-content/uploads/2014/05/CC-10-04900-005-GIS-Hazardous-Materials-Risk-Analysis-Results-06122015.pdf

OCS (Oregon Climate Service) 2005a. General descriptions of Oregon's climatic zones. Oregon Climate Service, Oregon State University, Strand Hall, Corvallis, OR. Online at http://ocs.oregonstate.edu/

ODOT. 2013. May. 2013 Bridge Condition Report. Oregon Department of Transportation. Online at ftp://ftp.odot.state.or.us/bridge/bridge_website_chittirat/2013_Br_Condition_Report_wBookMark_082013.pdf

Taylor, B. 1999. Salmon and steelhead runs and related events of the Clackamas River basin, a historical perspective. Portland General Electric, Portland, Oregon.

USGS. 2017a. USGS Gage 14211010 Clackamas River near Oregon City, Oregon. Accessed September 12, 2017. https://waterdata.usgs.gov/usa/nwis/uv?14211010

USGS. 2017b. USGS Gage 14210000 Clackamas River at Estacada, Oregon. Accessed September 12, 2017. https://waterdata.usgs.gov/usa/nwis/uv?site_no=14210000

Woodward, J.A. 1974. Salmon, Slaves, and Grizzly Bears: The Prehistoric Antecedents and Ethnohistory of Clackamas Indian Culture, Ph.D. Dissertation. University of Oregon, Eugene, Oregon.

APPENDIX 4A

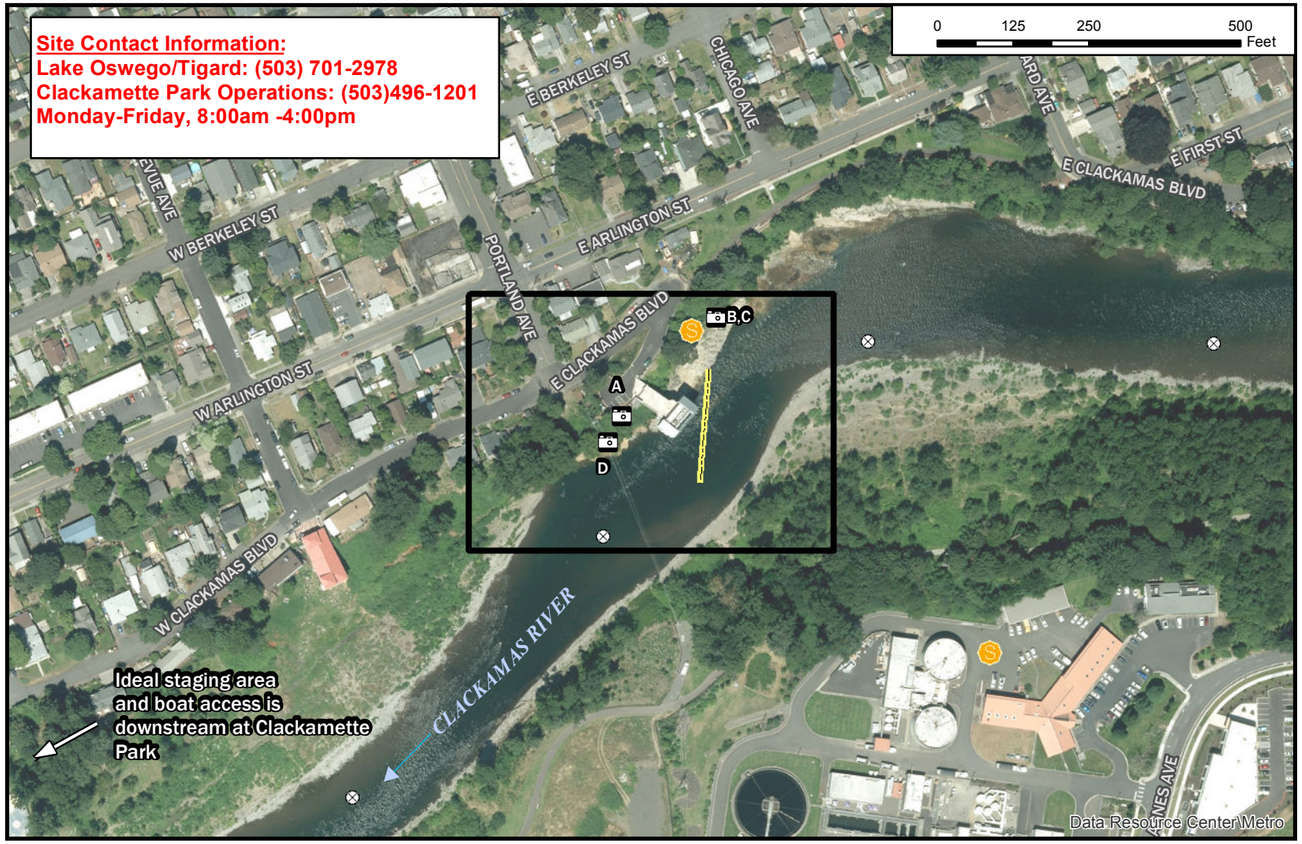
Response Strategies

Photo A. Lake Oswego Municipal Surface Water Intake Facility Entrance.

Photo B. Downstream view towards railroad bridge.

Photo C. Downstream view towards railroad bridge.

Photo D. View of LB access trail.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-0.8R	Lake Oswego Municipal Surface Water Intake	45.377766 -122.592249	Keep oil from entering the drinking water intake.	Drinking water intake	Unknown	Y

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Deflection	Use boat (from d/s Clackamette Park boat ramp) to access site. Angle 200' of deflection boom at a 45 degree angle from the shore to deflect oil floating on the surface. Collection of material could be done at Clackamette Park.	Access this site from the Clackamette boat ramp. Onsite access to the river is limited due to high rocks. WES owns the property on the left bank and site access is also possible via a small path as an alternate option.	Clackamette Park is the best option for staging. There is also a small staging area on site on the cliff area or across the river at the Tri-City Wastewater Treatment Plant.	Boat, Boom (200 feet)	The Coast Guard should be notified of a spill at this site. If there is a large railroad spill u/s, this strategy should be modified to shield the intake with an exclusion boom and shut down the plant. City of Lake Oswego should be notified immediately.

RESPONSE STRATEGY
CR-0.8R
Lake Oswego Municipal Surface Water Intake

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area

N

Date:
FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

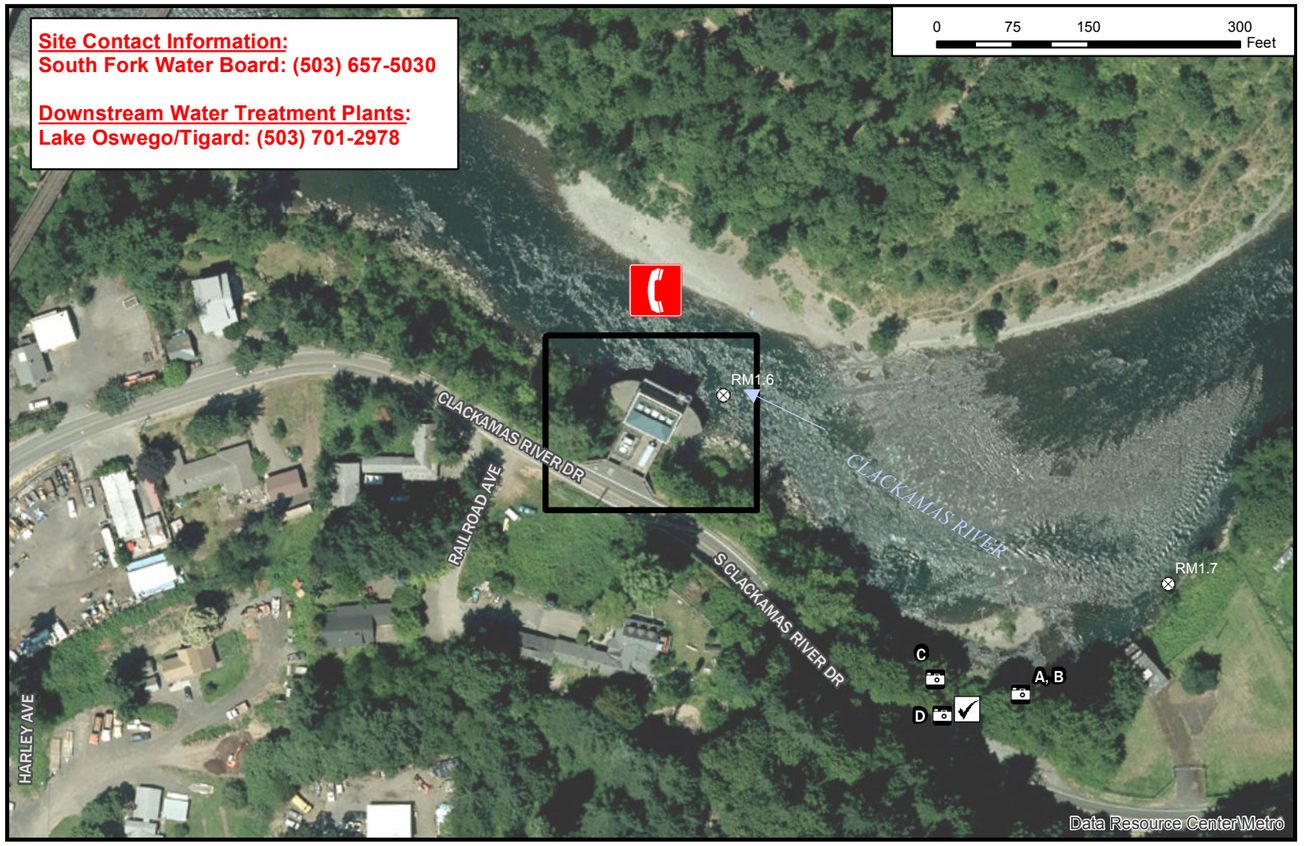
HERRERA

Photo A. Upstream view of choppy, fast-moving water.

Photo B. Upstream view of old intake.

Photo C. Downstream view of surface water intake.

Photo D. Vehicle area near steep access trail.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-1.6L	South Fork Water Board Surface Water Intake	45.379414 -122.577858	Keep oil from entering the drinking water intake.	Drinking water intake	Choppy, fast-moving water. Access is difficult.	N

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Notification	Shut off the drinking water intake and notify City of Oregon City and City of West Linn.	Easy vehicle access via Clackamas River Drive. Very steep foot access near old intake, equipment access not feasible.	South Fork Water Board Surface Water Intake	None	Due to difficult site access (incl. by boat), shut off/notify is the recommended strategy. This site is a candidate for a permanent exclusion shield. The intake takes water from low in the river and in low flows, the water surface is closer to the intake.

RESPONSE STRATEGY CR-1.6L

South Fork Water Board Surface Water Intake

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

Access Points
Photo Points
Boat launch
Staging Area
Response Strategy Area
Notification Strategy

N

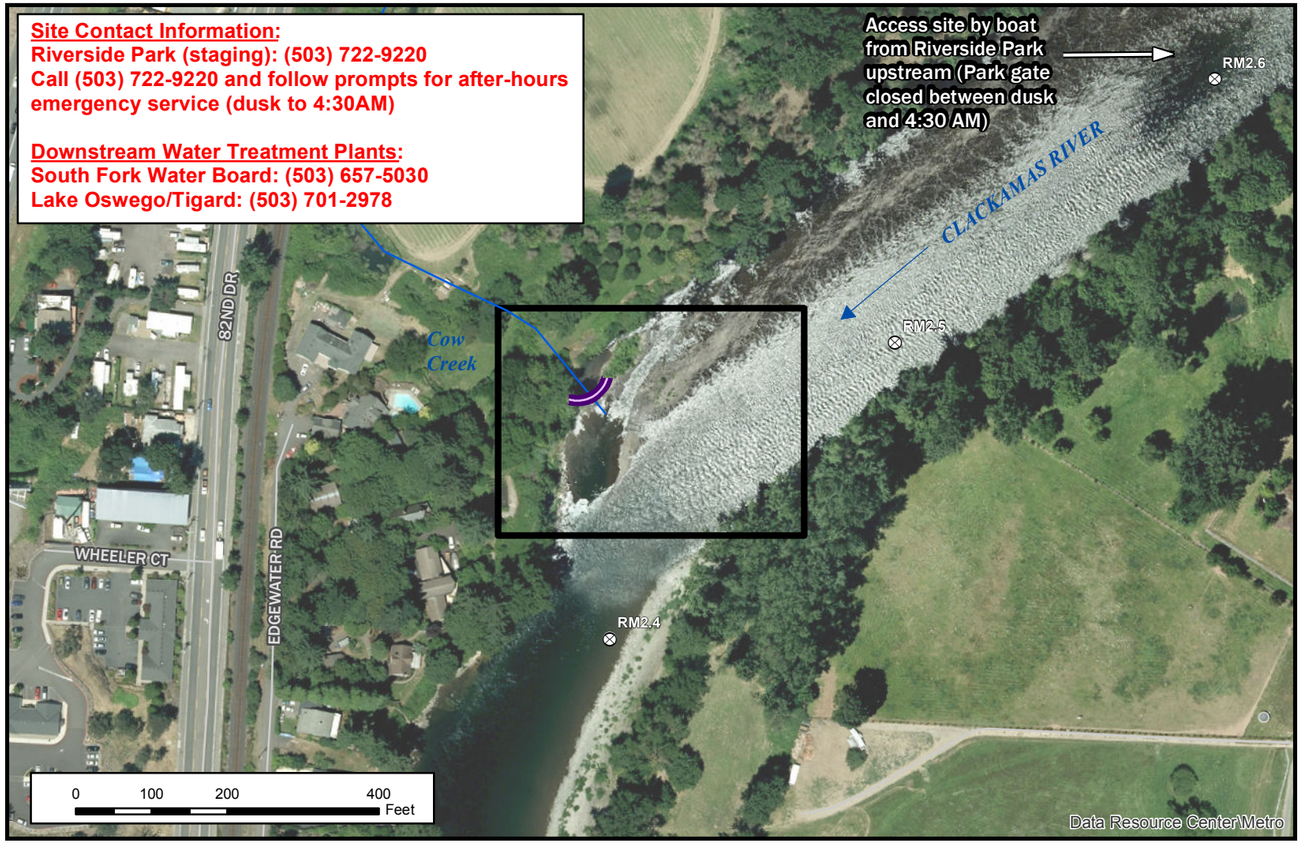
Date:
FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

HERRERA

Photo A. Staging and parking areas at Riverside Park.

Photo B. Boat ramp and downstream view of the Clackamas River.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-2.4R-CONF	Cow Creek Confluence	45.389866 -122.573629	Keep industrial spills from reaching d/s intakes	Clackamas River	Unknown	Y

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Containment	If a spill occurs u/s that can't be contained at the Cow Creek outfall, it may be possible to use solvent boom near the confluence to prevent material from reaching d/s surface water intakes.	Access site via boat from Riverside Park Note: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after hours emergency service.	Riverside Park	Boat, Solvent boom (100 feet)	Adjacent properties are all privately owned. Site access and staging is available u/s at Riverside Park.

RESPONSE STRATEGY
CR-2.4R-CONF
Cow Creek Confluence

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area
- Stormwater structure
- Storm lines

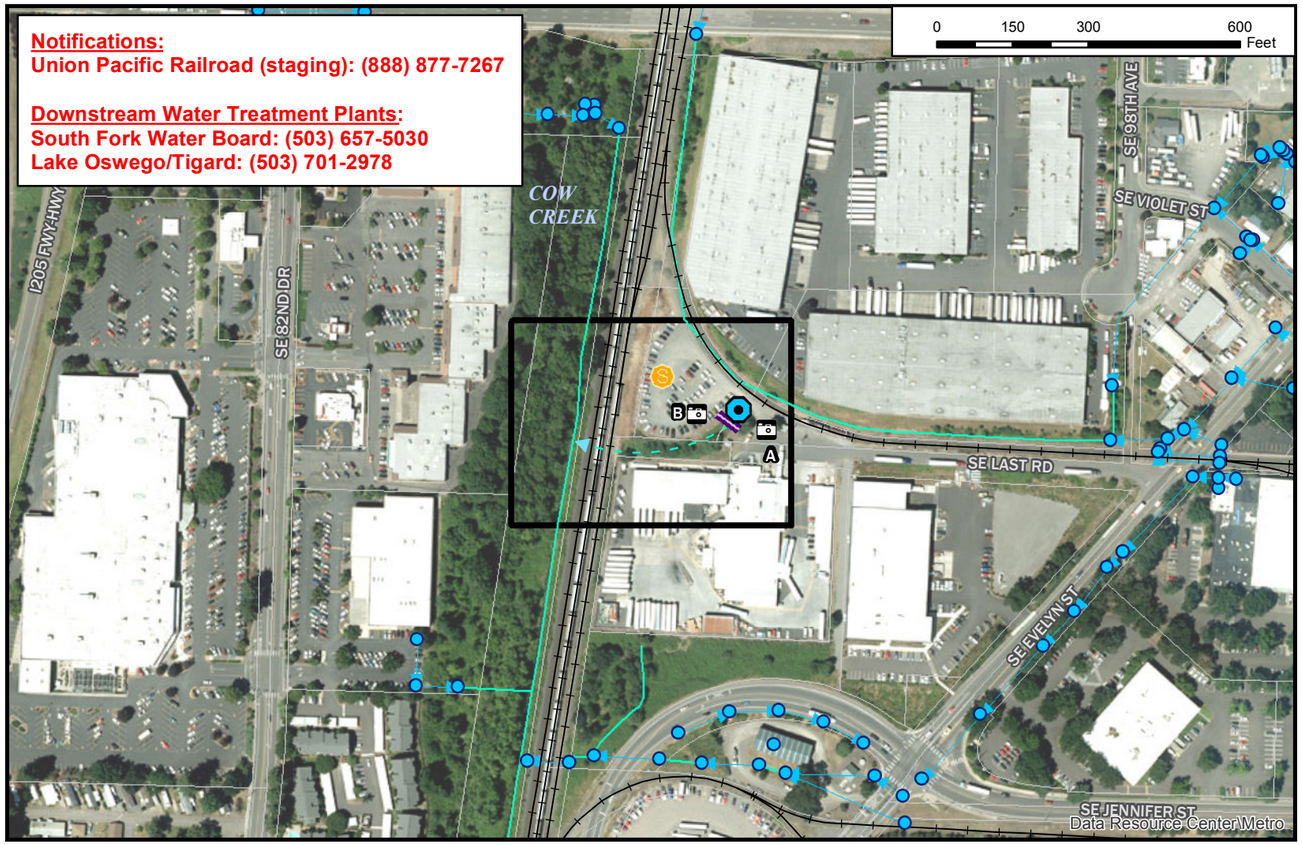
CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

Date: FEBRUARY 2018

HERRERA

Photo A. View of industrial area and parking lot near outfall.

Photo B. Stormwater outfall to Cow Creek.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-2.4R-OUT	Cow Creek at the Western End of SE Last Road	45.40886 -122.563878	Keep industrial spills from reaching d/s intakes	Cow Creek	Stormwater outfall in industrial area	N

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Containment	If a spill occurs upstream of this point, it may be able to be contained using solvent boom at the outfall to keep material from reacing Cow Creek.	Easy vehicle access via SE Last Rd. Parking adjacent to the outfall.	Cow Creek Outfall	Solvent boom (100 feet)	Potential spill sources include the railroad line, the highway corridor, and a large industrial area. Illicit discharges are common here. Spills d/s will need to be shown in a separate response strategy, possibly at the confluence with the Clackamas.

RESPONSE STRATEGY CR-2.4R-OUT

Cow Creek at the Western End of SE Last Road

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area
- Cow Creek Outfall (approximate location)
- Stormwater structure
- Storm lines

N

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

Date:
FEBRUARY 2018

HERRERA

Photo A. Gated access road.

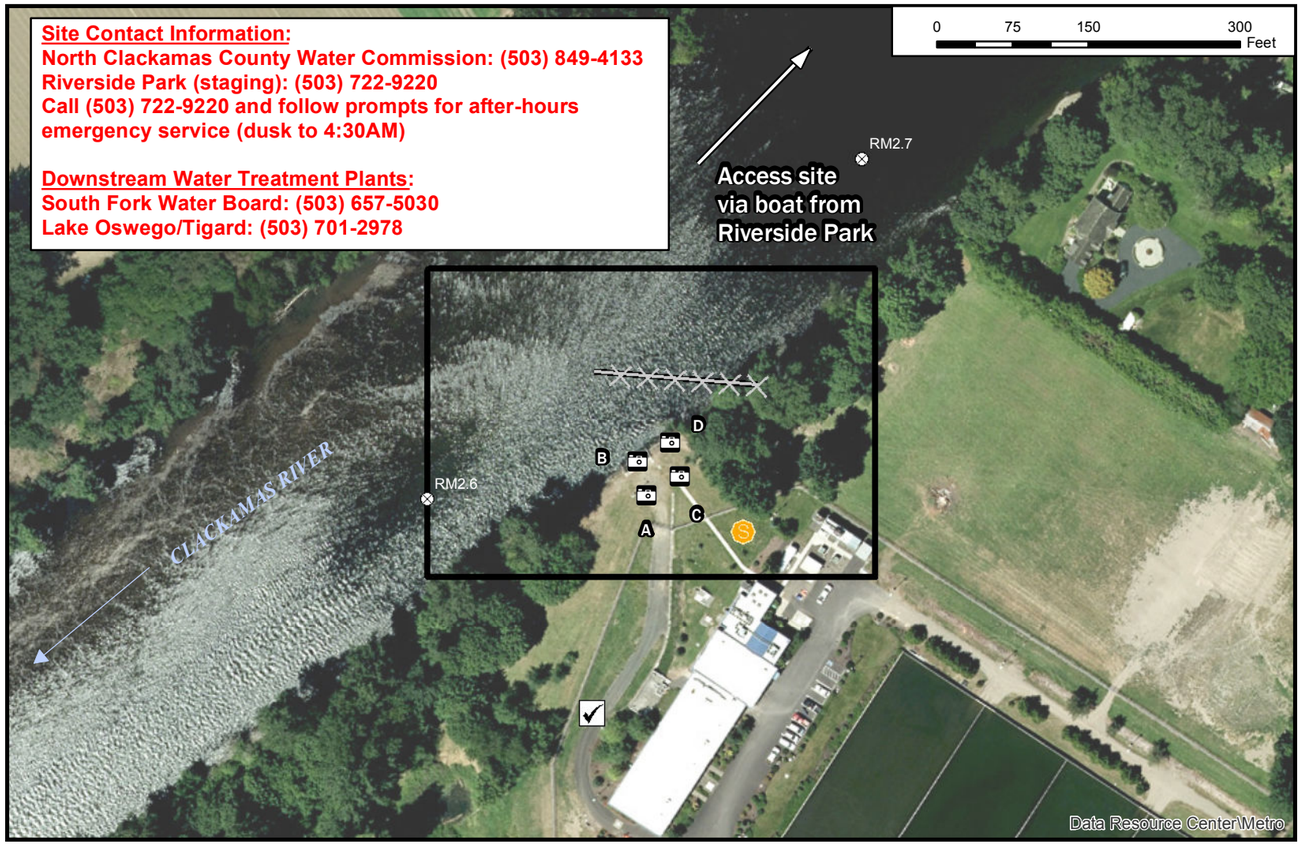
Photo B. Surface water intake.

Photo C. Staging area and foot access to site.

Photo D. View upstream of the surface water intake.

Site Contact Information:
North Clackamas County Water Commission: (503) 849-4133
Riverside Park (staging): (503) 722-9220
Call (503) 722-9220 and follow prompts for after-hours emergency service (dusk to 4:30AM)

Downstream Water Treatment Plants:
South Fork Water Board: (503) 657-5030
Lake Oswego/Tigard: (503) 701-2978



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-2.7L	North Clackamas County Water Commission Surface	45.391516 -122.569541	Keep oil from entering the drinking water intake.	Drinking water intake	Unknown	Y

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Exclusion	Use boat (from u/s Riverside Park) to anchor 200' feet of exclusion boom from the shoreline. This site is also a good candidate for a permanent exclusion shield.	Easy vehicle access with Clackamas River Drive. A road comes right up to the facility. Note: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after hours emergency service.	North Clackamas County Water Commission Surface Water Intake	Boat, Boom (200 feet)	The intake is a side bank screen and structurally a good candidate for having a permanent exclusion shield installed. In the event of a spill requiring shut off, the pumps at this location would be shut off first and then the intake.

RESPONSE STRATEGY CR-2.7L

North Clackamas County Water Commission Surface Water Intake

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

Date:
FEBRUARY 2018

HERRERA

Photo A. Staging and parking areas at Riverside Park.

Photo E. Outfall CD16A-73.

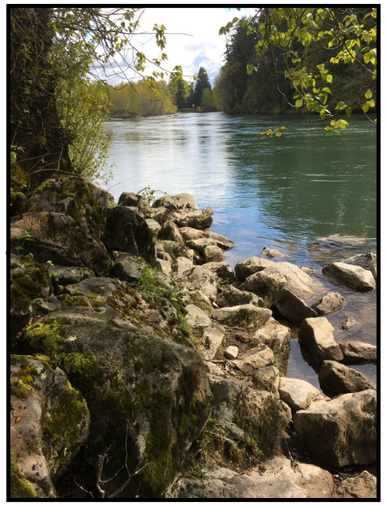


Photo E. Outfall CD16A-73.

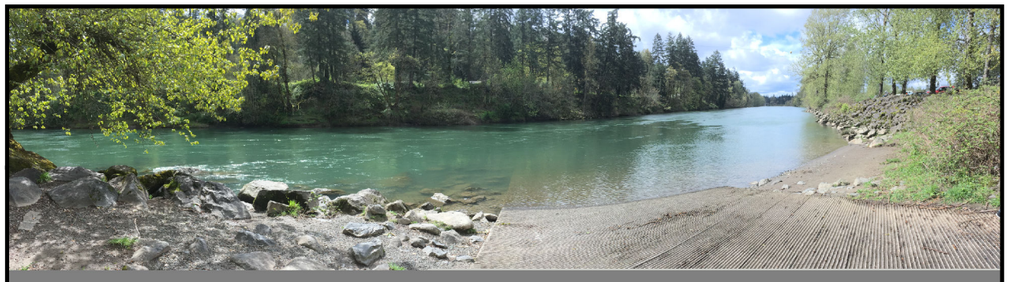
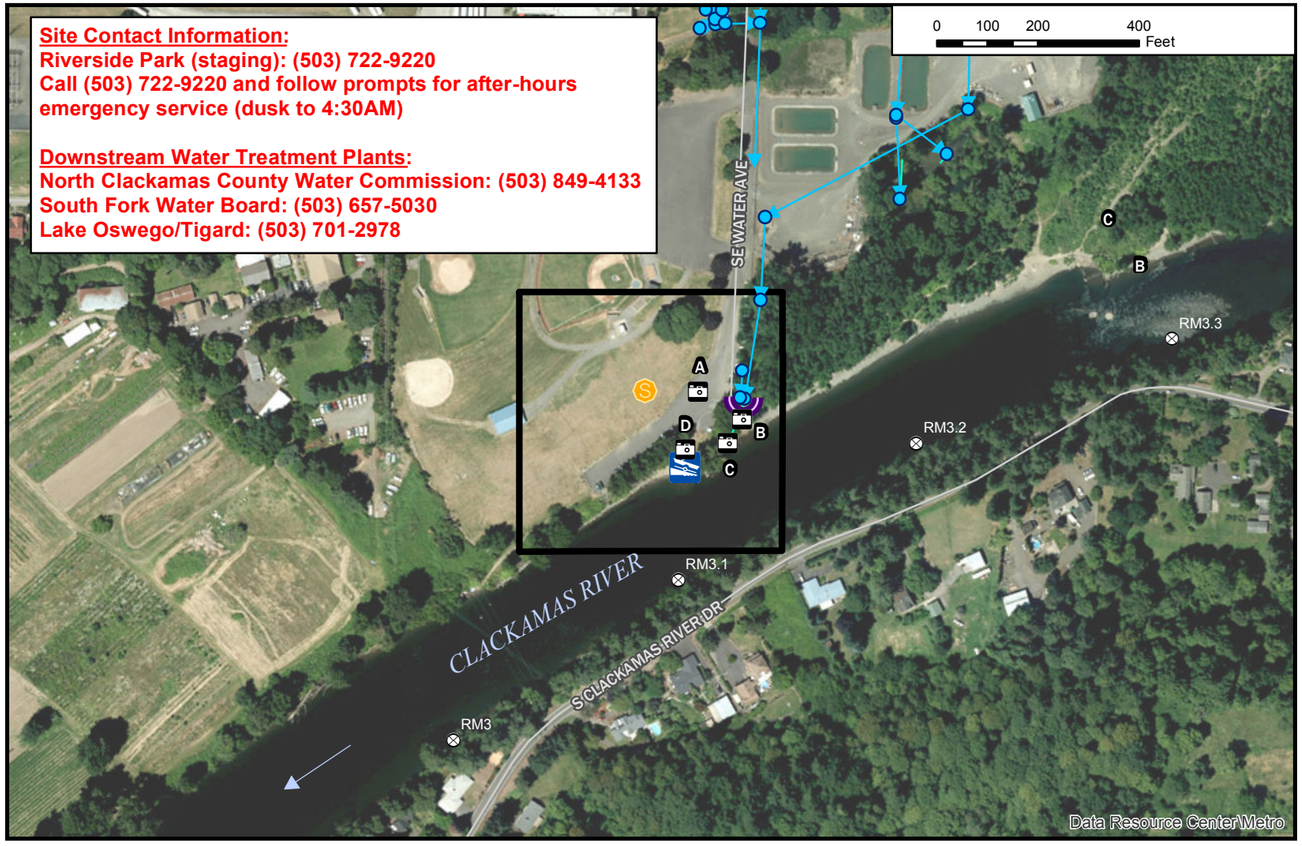


Photo D. Boat ramp and downstream view of the Clackamas River.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-3.1R	Stormwater Outfall CD16A-73 at Riverside Park	45.396879 -122.55788	Keep industrial spills from reaching d/s intakes	Drinking water intake	Unknown	N

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Containment	If a spill occurs upstream of this point, it may be able to be contained using solvent boom at the outfall to keep material from reaching the Clackamas River.	Easy vehicle access via SE Jennifer Street and SE Evelyn Street at Riverside Park. Boat launch onsite. Note: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after hours emergency service.	Riverside Park	Boom (100 feet)	3' outfall that drains Safeway industrial area and highways discharges d/s near boat ramp. Connecting "stranded" section of storm system could allow for future spill containment.

RESPONSE STRATEGY CR-3.1R

Stormwater Outfall CD16A-73 at Riverside Park

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area
- Stormwater structure
- Storm lines

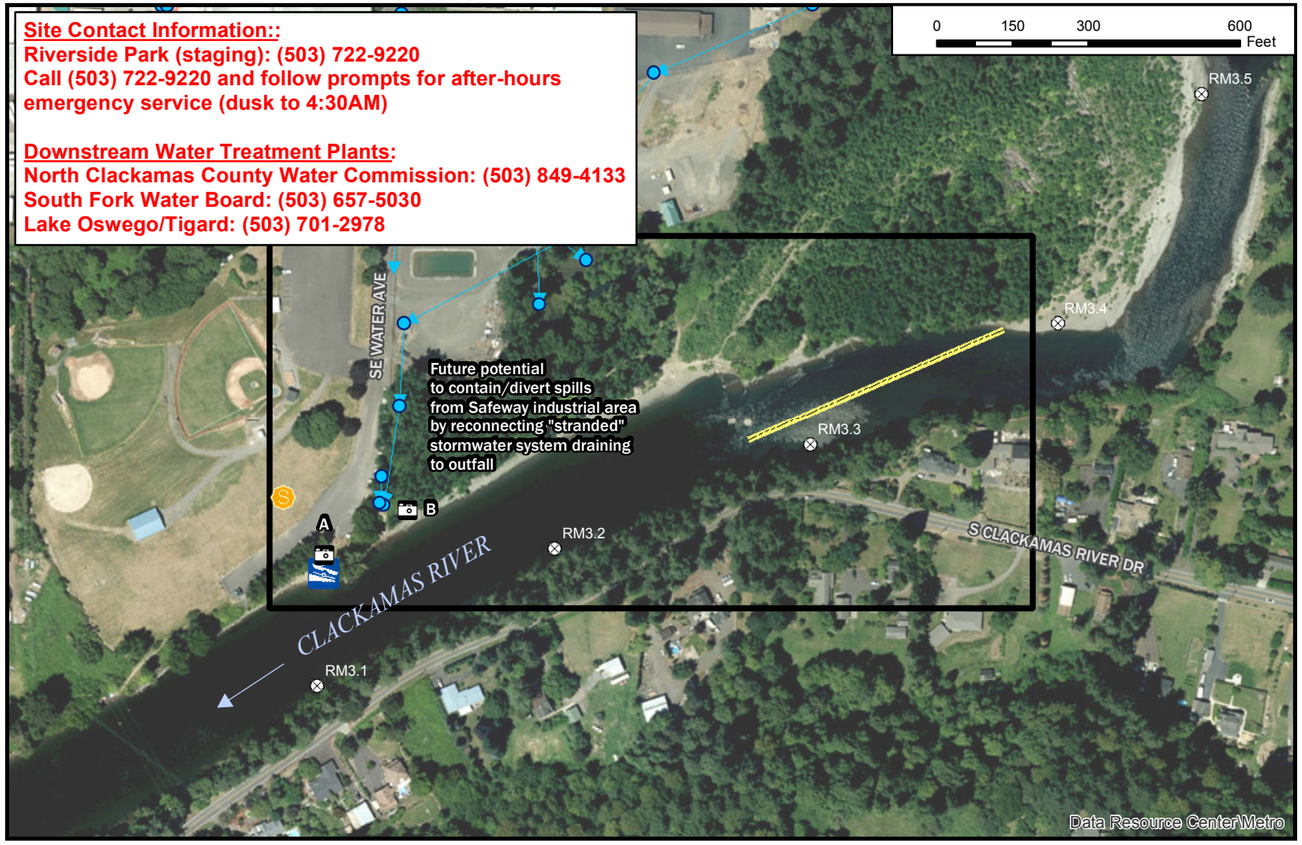
Date: FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

HERRERA

Photo A. Riverside Park boat launch.

Photo B. Upstream view towards the intake.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-3.3R	Clackamas River Water Surface Water Intake (RM 3.3) at Riverside	45.396879 -122.55788	Keep oil from entering the drinking water intake.	Drinking water intake	Unknown	Y

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Deflection	Anchor approximately 600 feet of deflection boom from the shore at a 45 degree angle to deflect current and floating contaminants.	Easy vehicle access via SE Jennifer Street and SE Evelyn Street at Riverside Park. Boat launch onsite. Note: Riverside Park is closed between sunset and sunrise. Call (503) 722-9220 and follow prompts for after hours emergency service.	Riverside Park 17209 SE Water Ave Clackamas, OR 97015	Boat, Boom (600 feet)	Intake is conc. structure that takes in water 8' below surface. 3' outfall that drains Safeway industrial area and highways discharges d/s near boat ramp. Connecting "stranded" section of storm system could allow for future spill containment.

RESPONSE STRATEGY CR-3.3R

Clackamas River Water Surface Water Intake (RM 3.3) at Riverside Park (RM 3.2)

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area

Date: FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

HERRERA

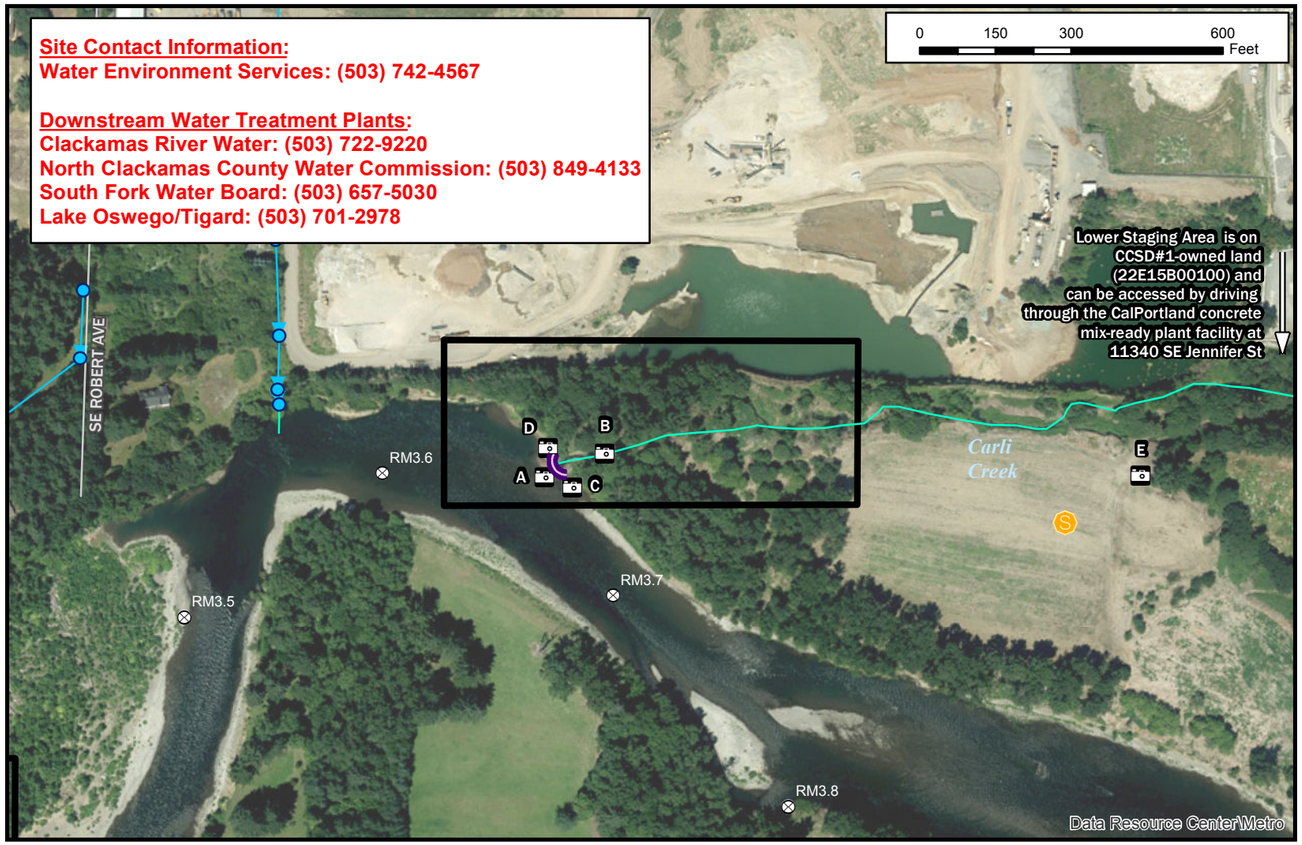
Photo A. Panoramic view u/s and d/s of the Clackamas River at the confluence with Carli Creek.

Photo B. Carli Creek facing downstream.

Photo C. View upstream of the Clackamas River.

Photo D. View downstream of the Clackamas River.

Photo E. Carli Creek near lower staging area.



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-3.7R-CONF	Carli Creek Confluence	45.400004 -122.552351	Keep industrial spills from reaching d/s intakes	Clackamas River	Confined & frequently backwatered. Flashy flows.	N

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Containment	Lower reaches are mod. sloped with coarse substrate. If a spill occurs u/s that can't be contained at the Carli Creek outfall, it may be possible to use solvent boom near the confluence to prevent material from reaching d/s surface water intakes.	Outfall/lower staging access is via locked gates. 7:30 AM – 5:30 PM Mon-Thurs call WES at (503)742-4567. Otherwise call Clackamas County at (503)655-8211 or 911 (if serious). Ask dispatch to call WES. WES will return your call. Please leave phone #.	SE Jennifer Road and CCSD #1 parcel 22E15B00100	Solvent boom (100 feet)	Potential spill sources include the railroad line, the highway corridor, and a large industrial area. Illicit discharges are common here. If possible, these spills should first be responded to at the Carli Creek outfall before they reach Carli Creek.

RESPONSE STRATEGY
CR-3.7R-CONF
Carli Creek Confluence

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area
- Stormwater structure
- Storm lines

Date:
FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

HERRERA

Photo A. Private property outfall access.

Photo B. Outfall view.

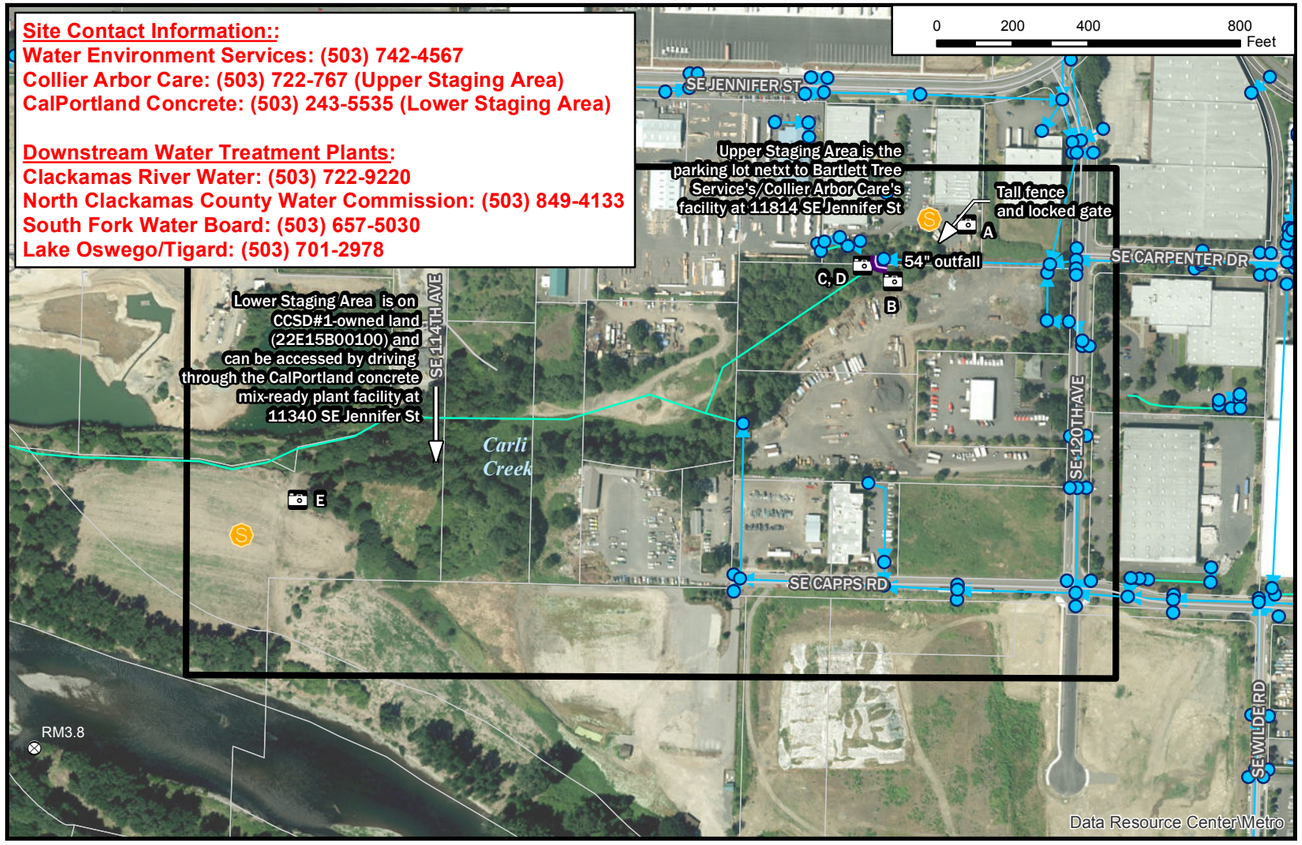
Photo C. Outfall view.

Photo D. Outfall side view.

Photo E. Carli Creek near lower staging area.

Site Contact Information::
Water Environment Services: (503) 742-4567
Collier Arbor Care: (503) 722-767 (Upper Staging Area)
CalPortland Concrete: (503) 243-5535 (Lower Staging Area)

Downstream Water Treatment Plants:
Clackamas River Water: (503) 722-9220
North Clackamas County Water Commission: (503) 849-4133
South Fork Water Board: (503) 657-5030
Lake Oswego/Tigard: (503) 701-2978



Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-3.7R-OUT	Carli Creek Outfall	45.402229 -122.541479	Keep industrial spills from reaching d/s intakes	Clackamas River	Stormwater outfall in industrial area	N

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Containment	If a spill occurs upstream of this point, it may be able to be contained using solvent boom at the outfall to keep material from reaching Carli Creek.	Outfall/lower staging access is via locked gates. 7:30 AM – 5:30 PM Mon-Thurs call WES at (503)742-4567. Otherwise call Clackamas County at (503)655-8211 or 911 (if serious). Ask dispatch to call WES. WES will return your call. Please leave phone #.	SE Jennifer Road and CCSD #1 parcel 22E15B00100	Solvent boom (100 feet)	Potential spills upstream of the outfall may be able to be contained here to keep contaminants from reaching the Clackamas River. CCSD #1 owns the Carli Property which could be used for staging and access.

RESPONSE STRATEGY
CR-3.7R-OUT
Carli Creek Outfall

Legend
Booming Strategy
Containment
Exclusion
Deflection
Access Points
Photo Points
Boat launch
Staging Area
Response Strategy Area
Stormwater structure
Storm lines

Date:
FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

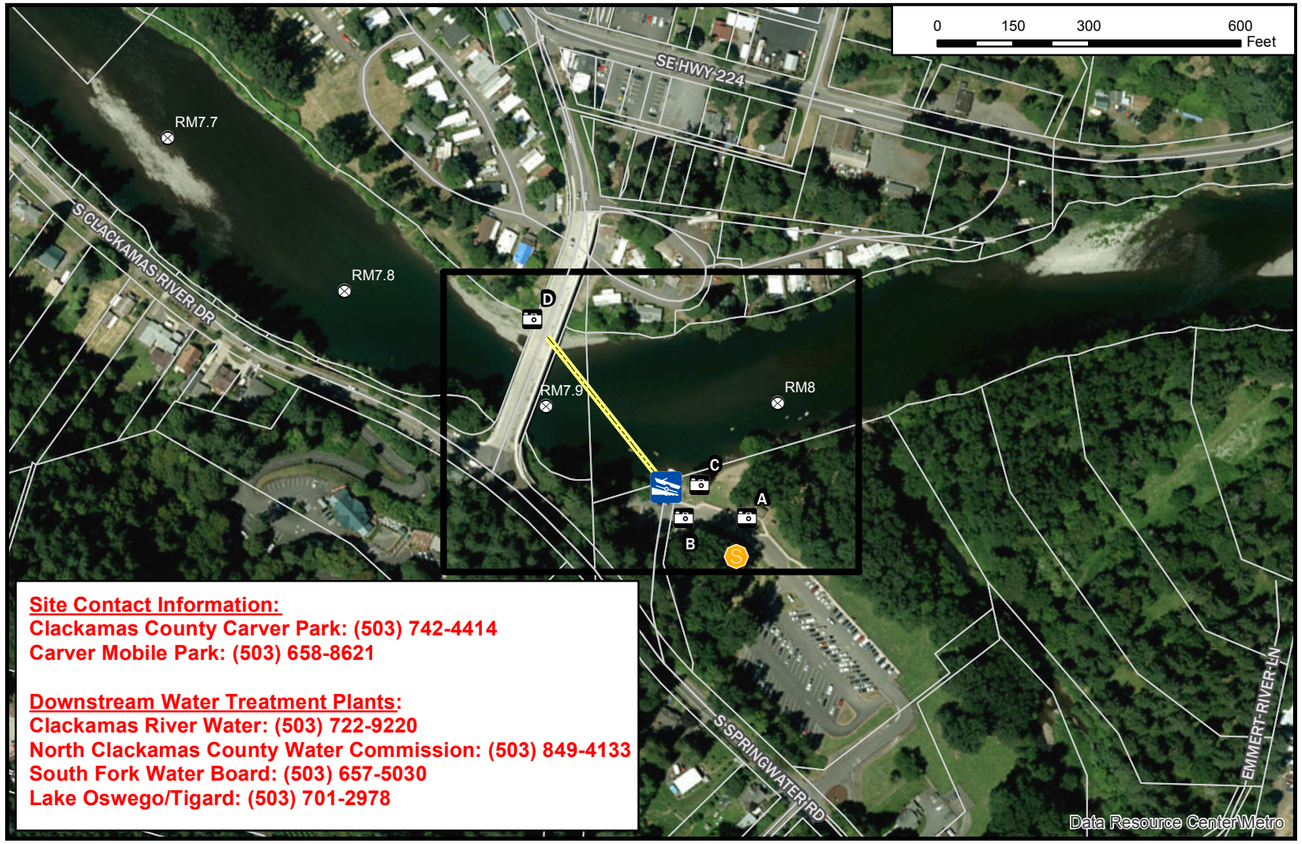
HERRERA

Photo A. Staging and parking areas at Carver Park facing toward boat ramp.

Photo B. Staging and parking areas at Carver Park facing from boat ramp.

Photo C. Downstream view of bridge and gravel bar on opposite right bank.

Photo D. Gravel bar underneath bridge near Carver Mobile Park on the right bank.



Site Contact Information:
Clackamas County Carver Park: (503) 742-4414
Carver Mobile Park: (503) 658-8621

Downstream Water Treatment Plants:
Clackamas River Water: (503) 722-9220
North Clackamas County Water Commission: (503) 849-4133
South Fork Water Board: (503) 657-5030
Lake Oswego/Tigard: (503) 701-2978

Strategy Number	Site Name	Coordinates	Strategy Objective	Resources Protected	Watercourse Description	Boat Required?
CR-7.9R	Carver Park	45.392251 -122.496219	Protect d/s resources and drinking water intakes.	Downstream resources	Unknown	Y

Response Strategy	Strategy Implementation	Site Access	Staging Area	Equipment Needed	Comments
Diversion	Use Carver Park ramp to cascade 400ft of diversion boom to RB.Contain and clean-up material collected at gravel bar near Carver Mobile Ranch.	Good public access via Carver Park.	Carver Park	Boat, Boom (400 feet)	Confirm if public access is available on the right bank for clean-up or if boat deployment is necessary.

RESPONSE STRATEGY CR-7.9R

Carver Park

Legend

Booming Strategy
- Containment
- Exclusion
- Deflection

- Access Points
- Photo Points
- Boat launch
- Staging Area
- Response Strategy Area
- Stormwater structure
- Storm lines

Date: FEBRUARY 2018

CLACKAMAS RIVER GEOGRAPHIC RESPONSE PLAN

HERRERA

APPENDIX 6A

List of Economic Resources

Appendix 6A

List of Economic Resources

* Oregon DEQ staff have access to the OR-IRIS database, which tracks resources such as water intakes, marinas, shellfish harvesting areas, parks and beaches, etc. The OR-IRIS database is updated more frequently than this GRP.

Category	Name	Location/Address	Latitude	Longitude	Contact	Phone
A1 - Drinking Water Intakes	City of Lake Oswego/Tigard	RM 0.8	45.4	-122.6	City of Lake Oswego	(503) 701-2978
A1 - Drinking Water Intakes	South Fork Water Board	RM 1.6	45.4	-122.6	South Fork Water Board	(503) 657-5030
A1 - Drinking Water Intakes	North Clackamas County Water Commission	RM 2.7	45.4	-122.6	North Clackamas County Water Commission	(503) 849-4133
A1 - Drinking Water Intakes	Clackamas River Water	RM 3.3	45.4	-122.6	Clackamas River Water	(503) 722-9220
A2 - Energy/Power Generation	River Mill Hydroelectric Dam	RM 23.5	45.300	-122.350	Portland General Electric	
A2 - Energy/Power Generation	Faraday Diversion Dam	Clackamas River	45.268	-122.320	Portland General Electric	
A2 - Energy/Power Generation	North Fork Dam (Clackamas)	Clackamas River	45.243	-122.280	Portland General Electric	
B2 - Agricultural Irrigation Intakes	Multiple	Clackamas River				
B6 - Fish Hatcheries	Eagle Creek National Fish Hatchery	34288 SE Rainbow Rd Estacada, OR 97023	45.276	-122.206	US Fish & Wildlife Service	(503)630-6270
B6 - Fish Hatcheries	Clackamas Fish Hatchery	24500 S Entrance Rd Estacada, OR 97023	45.296	-122.362	Oregon Department of Fish & Wildlife	(503) 630-7210
C1- Boating Areas	Floating the Clackamas River	Entire study area (particularly in summer)				
C2 - Public Recreation Areas	Dahl Beach	Gladstone, OR 97027	45.373	-122.605	City of Gladstone Parks	(503) 557-2769

C2 - Public Recreation Areas	High Rocks Park	25 82nd Dr Gladstone, OR 97027	45.370	-122.555	City of Gladstone Parks	(503) 557-2769
C2 - Public Recreation Areas	Bonnie Lure State Recreation Area	23689 SE Dowty Rd Eagle Creek, OR 97022	45.352	-122.383	Oregon State Parks	503-630-7150
C2 - Public Recreation Areas	Feldheimer Boat Launch	S Feldheimer Rd Estacada, OR 97023	45.328	-122.382		
C3- Sport Fishing Areas	Mainstem of Lower Clackamas River					
C4 - Parks	Clackamette Park	1955 Clackamettte Dr Oregon City, OR 97045	45.371	-122.603	Oregon City Parks and Recreation	(503) 496-1201
C4 - Parks	Riverside Park	17298 SE Water Ave Clackamas OR 97015	45.397	-122.562	Clackamas County Parks	(503) 722-9220
C4 - Parks	Carver Park	14888 S Springwater Rd, Oregon City, OR 97045	45.392	-122.496	Clackamas County Parks	(503) 742-4414
C4 - Parks	Barton Park	19009 SE Barton Park Rd, Boring, OR 97009	45.382	-122.413	Clackamas County Parks	(503) 742-4414
C4 - Parks	Milo McIver State Park	Estacada, OR 97023	45.298	-122.333	Oregon State Parks	(503) 630-7150