City of Rainier
West Rainier Urban Growth Management Committee
August 1, 2023
10 a.m.
Rainier City Hall

City Administrator W. Scott Jorgensen called the meeting to order at 10:06 a.m.

Committee Members Present: Connie Budge, Chris Hathaway, John Hamlik, Paul Langner and John Slape

Committee Members Absent: Terry Deaton and Margaret Magruder

City Staff Present: W. Scott Jorgensen, City Administrator

Visitor Comments: There were no visitor comments at this time.

Consider Approval of the Consent Agenda

Consider Approval of the June 8, 2023 West Rainier Urban Growth Management Committee Meeting Minutes—Paul Langner moved to approve the minutes. That motion was seconded by John Slape and adopted unanimously.

New Business

a. Presentation by Chris Hathaway of Lower Columbia Estuary Partnership—Hathaway said the organization covers the area between the Bonneville Dam and the Pacific Ocean and has a staff of around 30 people. The organization helps with salmon recovery, habitat restoration and water quality monitoring and has worked with the City of Rainier on planting along Fox Creek. It is currently working with the City on a retrofit project that will capture stormwater and pull out pollutants before they reach larger bodies of water. Jorgensen explained that there's a lack of separation between the city's stormwater and sewer systems. That has resulted in fines from the Department of Environmental Quality. The City agreed to do mitigation projects with the estuary partnership, including one currently underway near its boat launch facility. Hathaway pointed out that the City of Portland used to have the same issue. John Hamlik said that there are around 30 culverts along Highway 30 that send water to the area covered by the Rainier Drainage Improvement Company (RDIC). The RDIC incurs the energy costs associated with pumping that water. Hathaway observed that if less water was flowing to that area, there would be less pumping required.

b. Existing Zoning and Infrastructure—Jorgensen explained that the area involved is zoned for light and heavy industrial. But it's not shovel ready because it is not hooked up to City water or sewer. There wouldn't be much involved with getting those properties hooked up to water but extending the sewer line out that way would be very expensive. Langner said there would have to be a pump station installed in the area.

c. Future Growth and Development Opportunities

d. Future Recreational Opportunities—Jorgensen explained that one of the maps he included in the packet delineates the public ownership of different properties around the Dibblee beach area. The City recently had a property donated to it, Columbia County owns some property around there and so does the Department of State Lands. His thought was that all of those properties combined could maybe become a larger park, but he isn't having much luck getting the state on board with it. State officials have told him to get it figured out at

the local level first, but he doesn't think the county would have much interest in taking on the maintenance of another park facility.

Old Business

a. Urban Growth Management Agreement—Connie Budge said that much of the responsibility for the urban growth area still resides with the county. She feels that the City and county should review and revisit the agreement to update it. Langner said he sees there being three main issues. The first is the need to update that agreement. The second is the costs incurred by the RDIC and the third is maintenance of the culverts along Highway 30.
b. Definitions

Jorgensen adjourned the meeting at 11:38 a.m.

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W. Scott Jorgensen, City Administrator

URBAN GROWTH MANAGEMENT AGREEMENT

The parties to this Management Agreement shall be the City of Rainier, Oregon, and Columbia County, Oregon.

This Management Agreement is intended to facilitate the orderly and efficient transition from urbanizable to urban land uses within the City of Rainier Urban Growth Area, and is entered into pursuant to Chapters 190, 197 and 203 of the Oregon Revised Statutes and pursuant to the Oregon Statewide Planning Goals.

The purposes of this agreement are: to preserve land around the City of Rainier for economical and efficient development and public services so that the costs of future development will be placed more directly on those who benefit; and to differentiate land inside the Urban Growth Area from that outside the area so that future growth will be concentrated in and around the city.

The City of Rainier and Columbia County will manage the Urban Growth Area according to the terms contained in this agreement. Their mutual expectations and decisions regarding land use shall promote the above-stated purposes. The City and the County will coordinate with all local service districts and service associations in providing public facilities. The City and the County shall cooperate in the development of a Comprehensive Plan and in the zoning of the Urban Growth Area.

The terms of this Management Agreement shall be applicable to the City of Rainier Urban Growth Area. For the purposes of this Agreement, the Urban Growth Area shall be defined as that area of land extending from the City of Rainier's corporate limits to the City of Rainier's Urban Growth Boundary as defined in the Comprehensive Plan adopted February 18, 1981 and as amended to date.

Words and phrases used in this Joint Management Agreement, the Comprehensive Plan and implementing ordinances of the City of Rainier and the Comprehensive Plan and implementing ordinance of Columbia County shall be construed in accordance with ORS Chapters 92, 197, 215, 227 and applicable Oregon Statewide Planning Goals unless otherwise specified. In the event two or more definitions are provided for a single word or phrase, the most restrictive definition shall be utilized in construing this Agreement.

I. COMPREHENSIVE PLAN PROVISIONS.

A. In order to promote an orderly and efficient transition from urbanizable to urban land within the Urban Growth Boundary and retention of land for non-urban uses outside of the Urban Growth Boundary, the comprehensive plans of the City of Rainier and Columbia County shall not conflict.

B. Columbia County and the City of Rainier recognize the need to coordinate their plans and ordinances.

C. Furthermore, it is a policy of the City of Rainier and Columbia County to maintain ongoing planning processes that will facilitate the development of mutually compatible plans and implementing ordinances.

D. Columbia County and the City of Rainier will share the responsibility of land use planning and regulation for the land within the Urban Growth Area. County responsibility for enforcement of any land use ordinance or prosecution thereof will be relinquished over any land within this area upon its annexation to the City.

E. The City of Rainier Comprehensive Plan Map shall be the controlling plan for land use designations within the UGA. Columbia County shall have the lead role for zoning of land within the UGA, but such zoning shall be consistent with the land use designations of the City of Rainier Comprehensive Plan Map.

II. ZONING ORDINANCE PROVISIONS.

A. Zone amendments. The Columbia County Board of Commissioners shall retain the decision making responsibility on all zoning amendments for all land in the Urban Growth Area.

B. Other land use actions as defined by the Zoning Ordinance. The Columbia County Planning Commission shall retain the decision making responsibility, subject to appeal to the County Board of Commissioners, for all variances, conditional use permits and exceptions as described in the County Zoning Ordinance. However, such decisions shall be made only after the receipt of a recommendation, in accordance with Section II (C and D) of the Agreement, by the City Council of Rainier.

C. The County Planning Department shall refer each of the above requests within the Rainier Urban Growth Area to the City Council of Rainier for the City's review and comment within five (5) days of the date the application was accepted as complete by the County Planning Department.

D. The City Council of Rainier shall review the request and submit its recommendation to the County Planning Commission within twenty (20) days of the date the request was received by the City of Rainier. Should no recommendations be forthcoming within 20 days of its receipt, absent request for extension, the City of Rainier shall be presumed to have no comment regarding the application.

III. SUBDIVISION ORDINANCE PROVISIONS.

A. The decision-making responsibility for all subdivisions and partitions of all land within the Rainier Urban Growth Area will remain with Columbia County. However, subdivision and partition approval shall be made only after receipt of a recommendation, in accordance with Section II (C and D) of this Agreement, by the City Council of Rainier.

B. All subdivisions in the Rainier Urban Growth Area shall meet or exceed the design standards for roads and provisions for sewer and storm drainage as stated in the City of Rainier Land Division Ordinance. Likewise all major partitions will meet or exceed the standards of the City of Rainier Land Division Ordinance.

C. It is agreed that Columbia County will not waive conditions imposed by the City of Rainier Land Division Ordinance unless prior written approval has been obtained from the City Council of Rainier.

D. In order to preserve efficient subdivision opportunities consistent with the City of Rainier Comprehensive Plan, no subdivision will be approved without an agreement to annex to the City as outlined in Section IV A below. Partitions will be allowed without City services.

E. Within Urban Growth Boundary areas, major and minor partitions shall be accompanied by a redivision plan. This redivision plan shall show the proposed location of future streets, lot lines and any proposed structures.

IV. CITY SERVICES.

A. The City of Rainier will have sewer and water capacity to serve all planned growth in the Urban Growth Area. The City of Rainier may extend City sewer and water service to any site located within the City of Rainier's Urban Growth Area but not contiguous to the City Limits at the affected property owner's request and expense, subject to an unlimited agreement signed by the affected property owner that the site be annexed at such time the site is contiguous to the City Limits.

B. For the purposes of this Management Agreement, expenses to be incurred by the property owner shall include the extension of service mains or lines from the City mains or lines, including tap-in costs, to the properties to be served.

C. Services and hook-on charges shall be established by the Rainier City Council.

D. Columbia County shall not approve any subdivision that is within the Urban Growth Area that is to be annexed within the foreseeable future unless such subdivision is connected to public water and sewer service, or unless prior written approval for such service waiver has been obtained from the City Council of Rainier.

E. The City of Rainier shall develop a timetable and capitol improvement program for the construction of sewer mains into the Urban Growth area.

V. ANNEXATION.

Annexation of sites within the Rainier Urban Growth Area shall be in accordance with relevant annexation procedures contained in the Oregon Revised Statutes, Oregon Case Law and Rainier City Ordinances.

VI. ROADS.

Prior to annexation Columbia County and the City of Rainier shall cooperatively develop an implementation policy regarding streets and roads within the Urban Growth Area and the city limits which is consistent with the comprehensive plans of each jurisdiction. Such policy shall include, but not be limited to the following:

A. The circumstances under which the City of Rainier will assume control of and maintain responsibility for county roads within the City limits.

B. The conditions under which existing roads designated as future arterials in the Comprehensive Plan will be developed.

VII. APPEALS.

Except for the waiver of Subdivision design standards, Columbia County retains responsibility for land use decisions and actions affecting the Urban Growth Area. Appeals from such decisions and actions shall be in accordance with the appeals procedure specified in the Columbia County Zoning and Subdivision Ordinances and State Law. In cases of waiver of Subdivision design standards, the applicant must appeal to the City of Rainier Planning Commission, which shall be responsible for conducting a joint City Council/City Planning Commission public hearing.

VIII. AMENDMENTS TO THE COLUMBIA COUNTY COMPREHENSIVE PLAN AND IMPLEMENTING MEASURES

If sections of the Columbia County Comprehensive Plan or implementing ordinances that affect the Urban Growth Area are in need of revision, for whatever reason, the document shall be amended according to the procedures described in the Comprehensive Plan. Such amendments shall be adopted by the Columbia County Board of Commissioners after recommendations have been received from the City Council of Rainier, and the Planning Commissions of the City of Rainier and Columbia County, and its Citizen Planning Advisory Committee (CPAC).

IN WITNESS WHEREOF, this Urban Growth Management Agreement is signed and executed this 17th day of April, 1996.

BOARD OF COMMISSIONERS FOR COLUMBIA COUNTY

Chairman

Commissioner

Commissioner

CITY COUNCIL FOR THE CITY OF RAINIER

Mayor

Attest:

City Recorder

Rainier Drainage Improvement Company
Interior Drainage Analysis

Prepared for:

Ms. Terry Deaton
Rainier Drainage Improvement Company
P.O. Box 521
Rainier, OR 97048

Prepared by:

2601 25th St. SE, Suite 450
Salem, OR 97302
(503) 485-5490

December 23, 2020

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1 INTRODUCTION

The Rainier Water Improvement District (RWID) Flood Damage Reduction (FDR) system is operated by the Rainier Drainage Improvement Company (RDIC or the District). The District is in the process of acquiring levee accreditation from the Department of Homeland Security, Federal Emergency Management Agency (FEMA). According to regulations described in Title 44 of the Code of Federal Regulations, Section 65.10 (44 CFR 65.10), levee accreditation requires analyses of freeboard, closures, embankment protection, embankment and foundation stability, settlement, and interior drainage. Since March 2016, RDIC has been working together with the Portland District of the U.S. Army Corps of Engineers (USACE) to complete these analyses, with the exception of the interior drainage analysis.

RDIC contracted with WEST Consultants, Inc. (WEST) to conduct an interior drainage analysis of their FDR system. The purpose of the analysis is to evaluate the system within the levee protected area for the 1% annual chance exceedance flood (base flood). The analysis identified the base flood water surface elevations in areas with flood depths greater than one foot. Those areas were then mapped in accordance with guidelines published by the Federal Emergency Management Agency (FEMA).

STUDY AREA

RDIC is located in northwest Oregon along the left (south) bank of the Columbia River. The District lies entirely within Columbia County, and encompasses approximately 1,352 acres (2.11 square miles). It is bounded by the levee along the river and high ground to the interior. A location map for the project is provided in Figure 1. All figures are located in Appendix A.

SITE RECONNAISSANCE

On May 4, 2018, James Heyen, P.E., WEST Consultants, Inc, conducted site reconnaissance of the RDIC FDR system. While on site, Mr. Heyen met with representatives from the District and toured the study area. Observations were made of key system features, including: the pump station,

Rinearson Slough, smaller drainage ditches, bridges, culverts, and land use. Select photographs from the site reconnaissance are provided in Appendix B.

COMPUTER MODELING

A series of hydrologic and hydraulic models were developed for the study area and were used to evaluate the flood risk for the base flood event. All modeling was carried out using software developed by the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center (HEC); HEC-HMS for hydrologic calculations and HEC-RAS for hydraulic calculations. Specifics regarding model development are provided in Sections 2 (hydrology) and 3 (hydraulics).

PREVIOUS STUDIES

The Portland District of the USACE delivered a Phase 1 National Flood Insurance Program Levee System Evaluation Report on February 15, 2018. This report summarizes the USACE's Phase 1 findings regarding the levee system's ability to provide flood relief during a base flood event. The effective FEMA Flood Insurance Study (FIS) for Columbia County, OR indicates that RDIC is mapped as an Area of Reduced Flood Risk Due to Levee (Zone X). Rinearson Slough, which flows through the center of the District, is mapped as Zone A (Approximate).

TOPOGRAPHIC SURVEY

WEST conducted a detailed topographic survey in May of 2019 to characterize geometry for Rinearson Slough. Survey data were also collected for bridge and culvert crossings along the slough. A total of 21 channel cross sections, 2 bridge structures, and 5 culverts were surveyed. Additional detail regarding the survey data is discussed in Sections 3.2 and 3.4. All survey data are provided in Appendix C.

REPORT ORGANIZATION

This report is organized into five sections. Section 1 provides introductory and background information. Sections 2 and 3 explain the development of the hydrologic and hydraulic models, respectively. Section 4 describes the development of revised floodplain mapping based on the

analysis results. Section 5 summarizes the results and conclusions of the analysis. As stated previously, all figures referenced in the report are provided in Appendix A. Appendix B provides select photographs collected during site reconnaissance and during the survey. Survey data are provided in tabular format in Appendix C. Appendix D contains the revised floodplain mapping in a detailed topographic work map. Electronic copies of all data are provided on a USB drive.

DATUMS

Unless otherwise indicated, all geographic and spatial data used in this study referenced to the horizontal datum of North American Datum (NAD) 1983 Oregon State Plane North, international feet (FIPS 3601) and the vertical datum of NAVD 1988, feet.

2 HYDROLOGIC MODELING

Hydrologic modeling for the project was carried out in two steps, each utilizing HEC-HMS. The first step computed inflow hydrographs for the 11 small subbasins located along the steep slopes southwest of the District. Each of these subbasins lie outside the levee protected area and were accounted for in the analysis as lateral inflows to the hydraulic model domain. The second step utilized HEC-HMS to determine the excess runoff depth from the design storm for the levee protected area. This was applied as uniform rainfall on the 2D model domain and routed through the system using 2D hydraulics. Figure 2 shows a map of the modeled subbasins.

PRECIPITATION

Two storm events were considered for the study. The first event is based on observed precipitation that occurred in February 1996, which was used for hydraulic model calibration. The second event considered is the 1% annual chance storm, which is a synthetic event used to model levee system performance and develop the resulting flood inundation extents.

FEBRUARY 1996 STORM EVENT

Precipitation data were obtained from the rainfall gage 454769 located in Longview, Washington, which is located across the Columbia River approximately five miles to the north-east. Due to its

close proximity, this gage has similar hydrologic characteristics, which allows for use of the data without adjustment. The precipitation data were available in 1-hour increments. Information for the February 1996 event is summarized in Table 1.

Table 1 – February 1996 Precipitation Event

Event Start Date/Time	Event End Date/Time	Storm Duration (hours)	Maximum 24-hr Precipitation (inches)	Total Precipitation (inches)
02/05/1996 00:00	02/09/1996 00:00	96	2.6	6.6

The precipitation hyetograph for the February 1996 event is provided in Figure 3.

1% Annual Chance Precipitation Events

Four 1% annual chance synthetic storm events were evaluated to determine the appropriate storm duration, including the 24-, 48-, 72-, and 96-hour events. The precipitation depths for the evaluated storm events are provided in Table 2. For each storm duration considered, the total depth was distributed using an SCS Type 1A (SCS, 1982) distribution. The temporal precipitation distributions for these storm events are shown in Figure 4.

Table 2 – Summary of 1% Annual Chance Precipitation Events

Storm Duration (hours)	Total Precipitation (inches)	Data Source
24	5.1	Oregon Department of Transportation (2008)
48	9.4	Soil Conservation Service (1964)
72	11.4	Soil Conservation Service (1964)
96	12.5	Soil Conservation Service (1964)

Precipitation Losses

Infiltration, interception, and storage are collectively referred to as precipitation losses. The SCS Curve Number method (SCS, 1985) was used to determine precipitation losses for this study. Spatially-variable Curve Numbers (CNs), were determined using ArcGIS geospatial analysis of shapefiles representing land cover and hydrologic soil groups. The existing land cover for the modeled area was defined based on inspection of aerial photography and notes taken during site

reconnaissance. The land cover classes identified within the study area are summarized in Table 3. A spatial representation of the land cover classes is shown in Figure 5.

Table 3 – Land Cover and SCS Runoff Curve Numbers

Land Cover Description	Curve Number Based on Hydrologic Soil Group			
	A	B	C	D
Residential, 1-acre lots (20% impervious)	51	68	79	84
Evergreen Forest	30	55	70	77
Impervious (road/pavement/ditch)	83	89	92	93
Cultivated Row Crops	60	72	80	84
Industrial (72% impervious)	81	88	91	93

The Hydrologic Soil Groups (HSGs) help determine the runoff potential of soil. The four HSGs are classified as A, B, C, and D, where HSG A has the smallest runoff potential (high infiltration rates) and HSG D has the largest runoff potential (low infiltration rates). The spatial extents of each HSG within the study area were obtained from the NRCS (2014). A map of the HSGs is provided in Figure 6. HSG C/D (indicating relatively high runoff potential) is found in the majority of the low-lying areas within the District, while HSG C is more common for the small steep drainages located along the southwest edge of the District.

CNs were determined for the study area using guidance from Urban Hydrology for Small Watersheds TR-55 (NRCS, 1985). Each subbasin's composite CN was determined using area-weighted averaging of land use and HSG. The composite CNs are summarized in Table 4. Figure 7 shows the spatial distribution of the CNs in the study area.

Table 4 – Subbasin Composite Curve Numbers

Subbasin Number	Subbasin Area (square miles)	Composite CN
1	1.66	82
2	0.30	83
3	0.13	80
4	0.28	65
5	0.29	72
6	0.10	69
7	0.16	69
8	0.12	71
9	0.21	72
10	0.15	70
11	0.14	70
12	0.15	70
13	0.12	70
14	0.15	70

TRANSFORMATION METHOD

Excess precipitation was transformed into surface runoff using the SCS Standard Unit Hydrograph method. This transformation approach requires the computation of subbasin lag time. The standard method for determining a subbasin's lag time is to first compute a time of concentration, then convert that to a lag time by multiplying by 0.6. Time of concentration for a subbasin is the summation of time necessary for runoff to travel from the hydraulically most distant point of a subbasin to its outlet. Typically, water moves through each subbasin as sheet flow, shallow concentrated flow, and channel flow, or some combination of these. Time of concentration was calculated for each of these elements for all subbasins. A summary of computed lag times is provided in Table 5. Lag time was not computed for subbasins 1, 2, and 3 because excess precipitation on the 2D domain was handled differently, which is explained in Section 3.

Table 5 – Subbasin Lag Time

Subbasin Number	Lag Time (min)
1	N/A
2	N/A
3	N/A
4	13.6
5	7.2
6	16.4
7	25.2
8	10.7
9	10.4
10	21.6
11	28.4
12	28.8
13	27.2
14	14.1

HYDRAULIC MODEL INFLOWS

LATERAL INFLOWS

Runoff hydrographs from the 11 small subbasins (numbered 4 through 14) located along the southwest edge of the District were defined in the 2D hydraulic model domain as inflow boundary conditions.

DIRECT PRECIPITATION

Subbasins 1, 2, and 3 represent the total area of the 2D hydraulic model domain. The hydrology for these subbasins was determined using HEC-HMS to compute precipitation losses due to interception and infiltration. The excess precipitation computed by HEC-HMS was then used to define the uniform precipitation input data for the 2D hydraulic model domain.

3 HYDRAULIC MODELING

HEC-RAS version 5.0.7 was used to develop a fully 2D hydraulic model of the District. The hydraulic model was used to determine the extents of flooding within the District that are greater

than 1 foot in depth for the 1% annual chance storm event. Each of the differing duration synthetic storms and the 1996 storm event were analyzed. Model results indicate that the 96-hour rainfall event produces the greatest flooding extents and was therefore selected as the base flood event for the District.

TERRAIN DATA

Terrain data encompassing the study area were obtained from the Oregon Department of Geology and Mineral Industries LiDAR Data Quadrangle Series. Data from three quadrangles were required to cover the entire study area: 46122-A8, 46123-A1, and 46123-B1. The LiDAR data were collected by Watershed Sciences between April and September of 2010 for the U.S. Army Corps of Engineers, Portland District and were then published by DOGAMI in 2012 (DOGAMI, 2012). The data are in grid format with a horizontal resolution of one meter.

CHANNELS

Rinearson Slough is the primary drainage channel located inside the District. The slough meanders through the study area from southeast to northwest, terminating at the single pump station located at the northwest corner of the District. Multiple smaller channels and ditches have been engineered over time to facilitate drainage of the levee protected area. Whereas Rinearson Slough averages six to eight feet of depth and follows a meandering path, most of the smaller ditches are only two to three feet deep and tend to align with other features such as roadways or property lines.

Surveyed cross section data were collected at 21 locations along Rinearson Slough in order to accurately characterize its geometry. The survey data indicate that the slough is generally uniform in cross section shape and depth. As such, the collected survey data were used to develop an interpolated channel shape along the entire length of the slough. This was accomplished in RAS Mapper utilizing carefully placed breaklines and bank stations. The interpolated channel surface was then combined with the LiDAR data to create a terrain surface that represents the study area.

Hydraulic roughness characteristics for Rinearson Slough and the contributing ditches and channels were estimated from observations made during site reconnaissance. The lower slough, between Highway 433 and the pump station, generally contained low to moderately dense vegetation (typically blackberry and grass) along the channel banks. Upstream of Highway 433, the slough is smaller, shallower, and contained a higher density of vegetation along the channel banks. Table 6 summarizes the Manning's *n* roughness values assigned to Rinearson Slough.

Table 6 – Manning's n Roughness Values - Rinearson Slough

Land Cover / Feature	Manning's *n*
Lower Slough – 6' to 8' depth, low to moderately dense vegetation	0.055
Upper Slough – 2' to 3' depth, moderate to high density vegetation	0.06

OVERLAND FLOW

As with the flow in the channels, hydraulics of the overbank flows was computed in the 2D domain. Roughness characteristics for the overbank areas were estimated from observations made during the site reconnaissance and with the assistance of available aerial photography. Table 7 summarizes the Manning's *n* roughness values assigned for the various land cover types contained in the overbank flow areas. A map of the Manning's roughness values for the entire study area is provided in Figure 8.

Table 7 – Manning's n Roughness Values - Overland Flow

Land Cover / Feature	Manning's *n*
Brush	0.06
Forested	0.08
Levee/Pavement	0.03
Open Field - Grass/Crops	0.035

STRUCTURES

A total of five structures were defined in the model geometry for Rinearson Slough; two bridges, and five culverts. The two bridges area located in the lower reach of the slough, one located immediately upstream from the pump station, and a second located at Amundson Road, approximately 1.5 miles upstream. Both bridges are reinforced concrete slab construction, supported by two interior bents with circular piers. The piers are aligned with the direction of flow. For both bridges, the crossings were modeled using the SA/2D Connection option in HEC-RAS. The bridge openings were simulated with multiple large box culverts with sizes and dimensions which closely mimicked the surveyed openings beneath each bridge structure. This approach was selected because HEC-RAS is currently not capable of modeling bridges in 2D under high flow conditions where the low chord of the bridge deck is partially or fully submerged. At both bridge crossings, water does not overtop the bridge deck during the 1% annual chance flood.

The five culverts located along Rinearson Slough were similarly modeled using SA/2D Connections. Most of these structures are overtopped during the base flood event. The overtopping was modeled using the normal 2D equations. The culverts were of a variety of shapes and sizes, ranging from large double box culverts (Lowe Road) to much smaller corrugated metal pipe culverts (Rock Crest and Mill Streets).

There are also additional culverts located along the smaller drainage ditches and channels, primarily carrying private driveways or connecting adjoining ditches through local high ground. These culverts were not surveyed as part of this evaluation. For each of the locations where a culvert was identified, primarily through aerial photography and examination of the terrain and drainage paths, a suitable sized culvert was added to the model geometry. All of these culverts were modeled as concrete pipes not more than two feet in diameter. The addition of these culverts improved the hydraulic behavior of the smaller drainage paths.

PUMP STATION

The single pump station for the drainage system is located at the northwest corner of the District. It discharges into a remnant of Rinearson Slough that connects directly to the Columbia River.

The pump station contains two mixed-flow, single-stage pumps. The first is powered by a 100-hp electric motor; the second by a 200-hp electric motor. Pump characteristics were provided by RDIC, however detailed performance data for the older, 200-hp pump was not available. WEST contacted the pump supply company that installed the pumps in RDIC, Triangle Pump and Equipment, Inc. located in Battleground Washington, to see if they had records for the larger pump. Although they had no records, they were able to provide specifications for a similar pump of the same size and vintage that were used for the 200-hp pump. Figure 9 provides the performance curves used for the two pumps.

The RDIC pumps are controlled by a series of floats located under the pump station. These floats activate switches that turn the pumps turn on and off depending on the water surface elevation in the pump station forebay. The control settings are summarized in Table 8.

Table 8 – Pump Control Settings

Pump	Pump On Water Surface Elevation (ft)	Pump Off Water Surface Elevation (ft)
100-hp	3.21	2.71
200-hp	3.41	2.91

INITIAL CONDITIONS AND BOUNDARY CONDITIONS

Hydraulic model simulations require establishing appropriate initial conditions and boundary conditions. For the two hydrologic events simulated in this analysis, the 1996 flood and the 1% annual chance flood event, it was necessary to set the tailwater condition for the pump station. During the 1996 flood event, stage data were recorded at the USGS gaging station located in Vancouver, WA. These data were adjusted for RDIC according to its relative location along the Columbia River using the FEMA flood profile pulished in the effective Columbia County Flood Insurance Study. The peak Columbia River stage of the 1996 flood event at RDIC was estimated to be approximately 19.4 feet. The daily stage hydrograph is provided in Table 9. For the 1% annual chance flood event, the base flood elevation published in the effective Flood Insurance Study was used to set the tailwater elevation at 18.8 feet.

Table 9 – 1996 Columbia River Stages at RDIC

Date/Time	Simulation Time (hr)	Water Surface Elevation (ft)
04 February 1996 2300	0	9.5
05 February 1996 2300	24	10.0
06 February 1996 2300	48	11.0
07 February 1996 2300	72	13.0
08 February 1996 2300	96	18.2
09 February 1996 2300	120	19.4
10 February 1996 2300	144	19.1
11 February 1996 2300	168	18.2

Initial conditions within RDIC assumed a static water surface elevation within Rinearson Slough of 3.2 feet. As there are no recording stage gages within RDIC, this elevation corresponds with the water surface depicted in the most recent LiDAR terrain data.

SIMULATION PARAMETERS

Simulation parameters for model computations were set as shown in Table 10.

Table 10 – Simulation Parameters

Parameter	1996 Flood Event	1% Annual Chance Flood Event
Simulation Duration	168 hours	108 hours
Computation Interval	Courant Controlled	Courant Controlled
Minimum Timestep	15 seconds	15 seconds
Maximum Timestep	2 minutes	2 minutes
2D Solution Equation	Diffusion Wave	Diffusion Wave

MODEL CALIBRATION

Calibration of the hydraulic model was not possible due to the lack of recorded stage measurements or aerial photography of historic events such as the 1996 flood. Alternatively, model results for the 1996 flood simulation were provided to RDIC for dissemination to residents that were present during that event. Anecdotal responses from the residents indicated that the model was predicting flood extents that were similar to their observations. Therefore, it was concluded that the hydraulic model would produce reasonable results for the 1996 and base flood events.

4 MODEL RESULTS AND FLOOD HAZARD MAPPING

The modeled simulations produced gridded output of water surface elevations witin the 2D domain. The water surface elevations were used to map the inundation extents for the 1% annual chance flood event.

Flood hazard modeling conducted with 2D hydraulic analyses are not readily compatible with traditional FEMA flood hazard mapping methodologies, which were developed for 1D hydraulic analyses. WEST developed a methodology for adapting the high-resolution 2D inundation data into a final flood hazard mapping product that conforms to FEMA specifications. GIS analysis tools were used to resample the model output using an inverse distance-weighted interpolation method. The output was a continuous water surface elevation grid at the same resolution as the underlying 1-meter terrain grid. The terrain grid was then subtracted from the water surface grid to generate a depth grid and inundation extent. The depth grid was then filtered to remove areas with depths less than one foot.

The initial mapping results contained numerous small ponds due to water collecting in localized terrain depressions. The abundance of these small ponds and their large variation in water surface elevations would make producing flood hazard maps that conform with FEMA standards nearly impossible due to the density of elevation and zone labels which would result in nearly illegible maps. In the absence of published guidance from FEMA, inquiries regarding appropriate mapping resolution were made to staff at FEMA headquarters and at Region 10. FEMA staff responded that there was no formal guidance regarding mapping resolution and that it was a matter to be decided by the mapping partner. Subsequent dialogue with Columbia County indicated that they would defer to WEST, so long as the resulting produce was accurate and acceptable to FEMA. WEST selected a mapping resolution of 10,000 square feet (a value equivalent to an area measuring 100 feet by 100 feet). This conclusion was based primarily on the limited resolution and accuracy of rainfall data and the approximated performance specifications for the 200-hp pump.

The mapped flood extents for the 1% annual chance flood event are shown in Figure 10. A detailed topographic workmap, which includes additional detail and static water surface

elevations, is provided in Appendix D. All areas inundated by the 1% annual chance flood event are mapped as "Zone AE" with static base flood elevations. Areas not inundated by the 1% annual chance flood, but which are still within the levee protected area, retained their mapping limits and designation as "Zone X, Area with Reduced Flood Risk Due to Levee".

5 SUMMARY

A study was conducted to evaluate the interior drainage conditions within the RDIC levee-protected area and produce flood hazard mapping in accordance with FEMA guidelines. To accomplish this goal, hydrologic and hydraulic modeling were used to analyze the drainage system. Hydrologic and hydraulic models were created to represent current conditions based on the most recently available topographic and land cover information. Survey data of the channels and hydraulic structures were also collected and used to develop the hydraulic model. The hydraulic model was then used to analyze the synthetic 1% annual chance flood event based on a 96-hour SCS Type 1A storm distribution. The simulation results were used to identify and map areas inundated by flood water depths greater than or equal to one foot and to identify the base flood elevations for the inundated areas.

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APPENDIX A

FIGURES

Figure 1 - Project Location Map

Figure 2 – Map of Hydrologic Subbasins

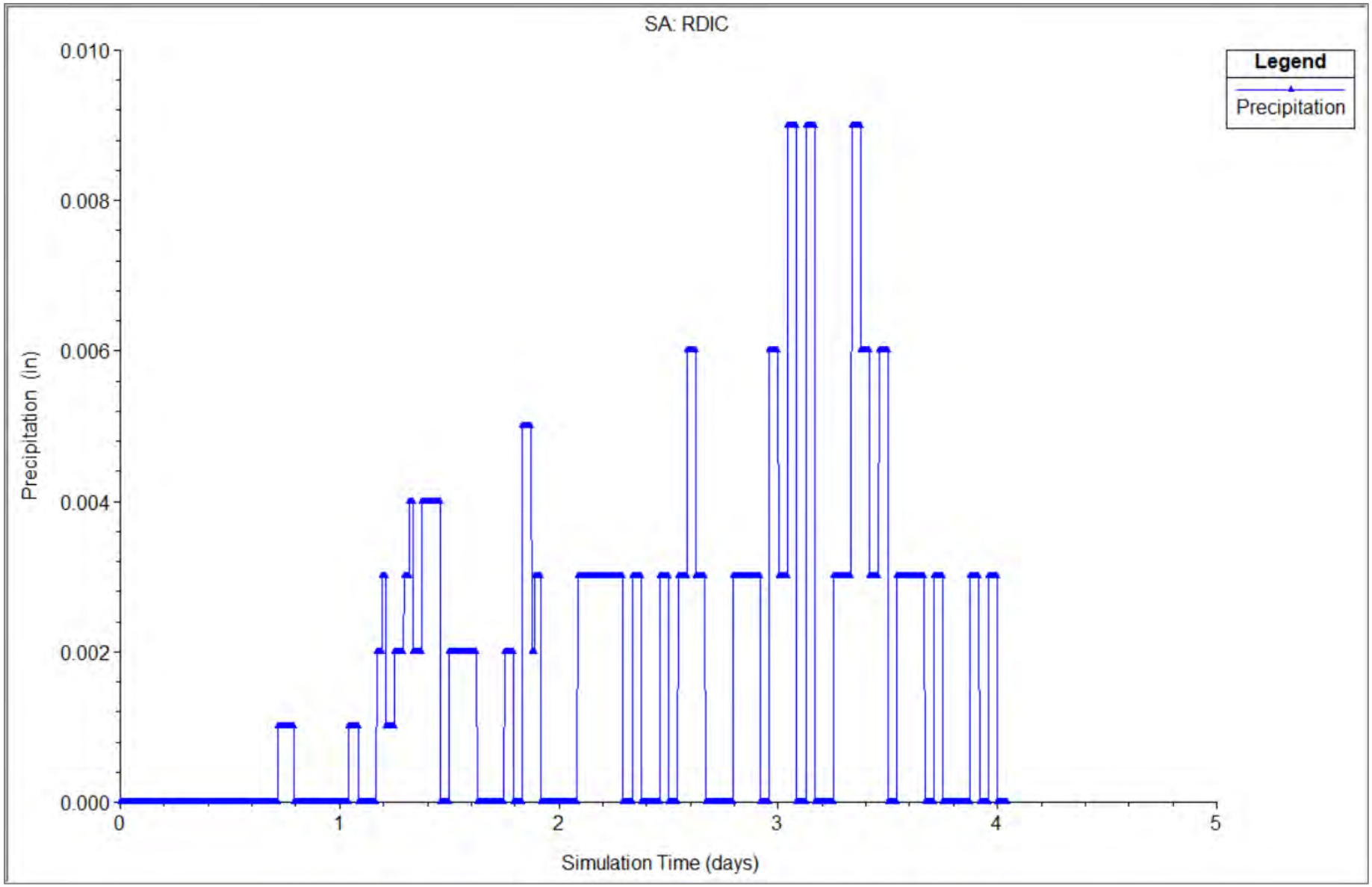


Figure 3 – Precipitation Hyetograph for 1996 Flood

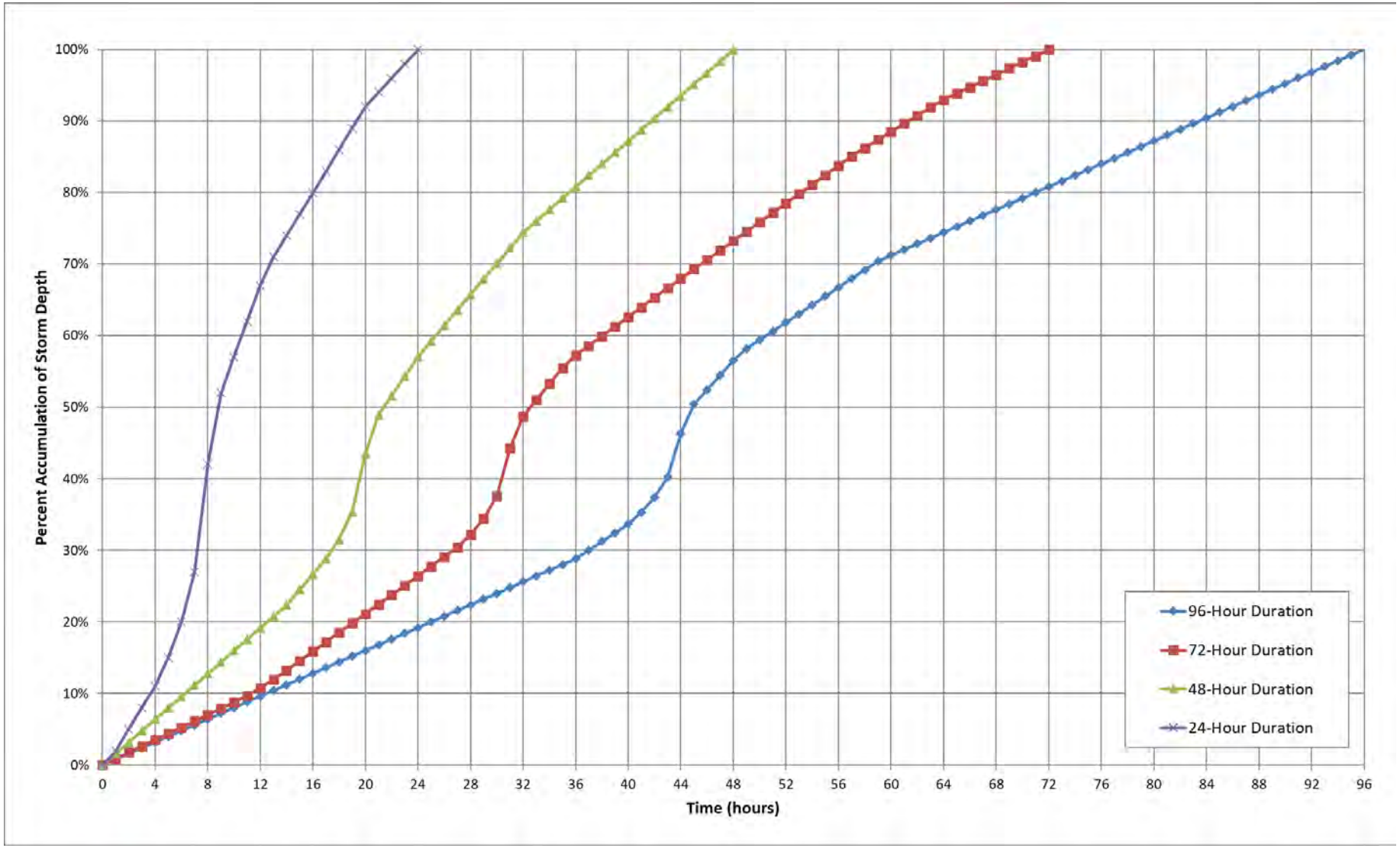


Figure 4 – Temporal Precipitation Distributions for Synthetic 1% Annual Chance Flood Durations

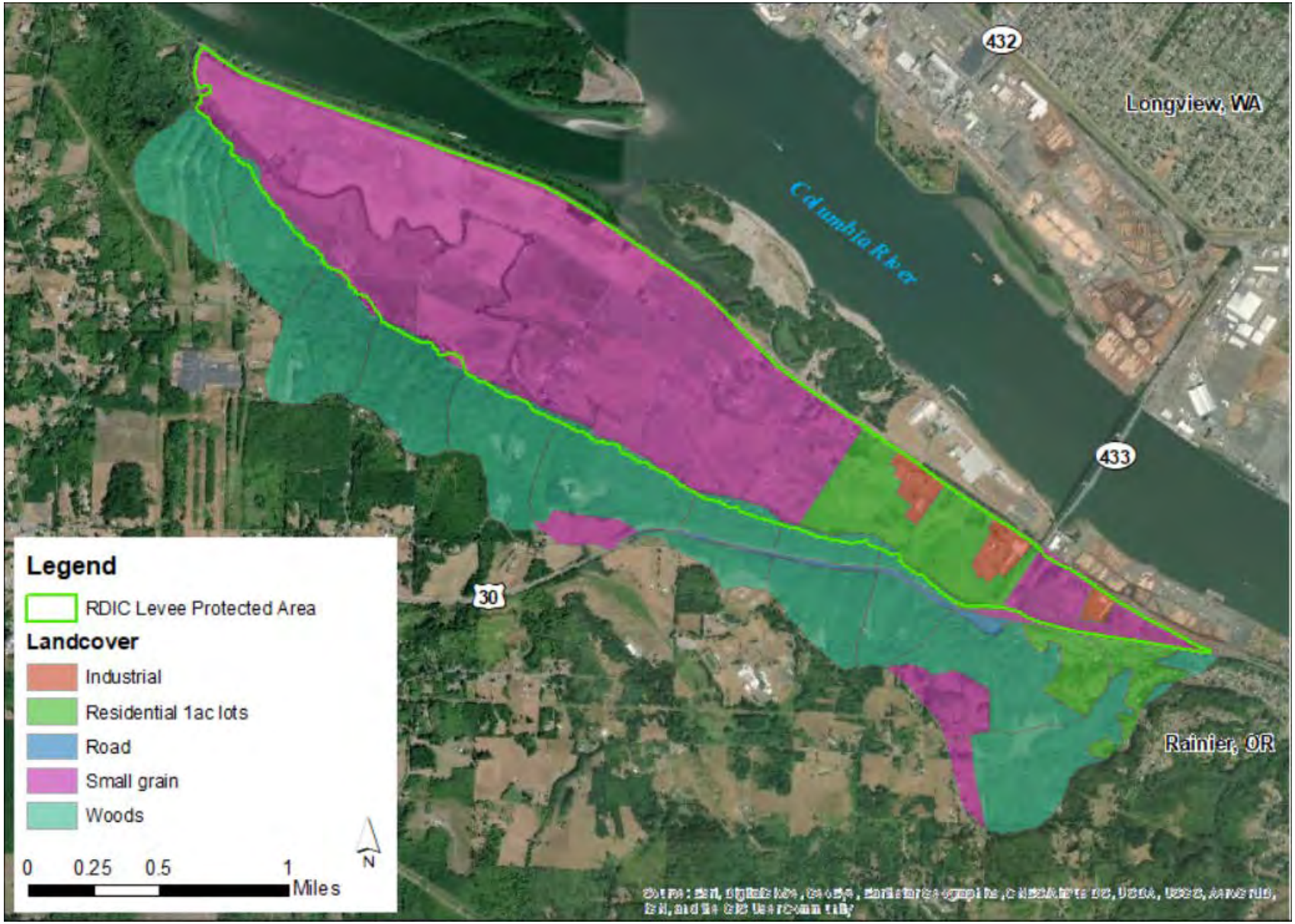


Figure 5 – Map of Land Cover Classes

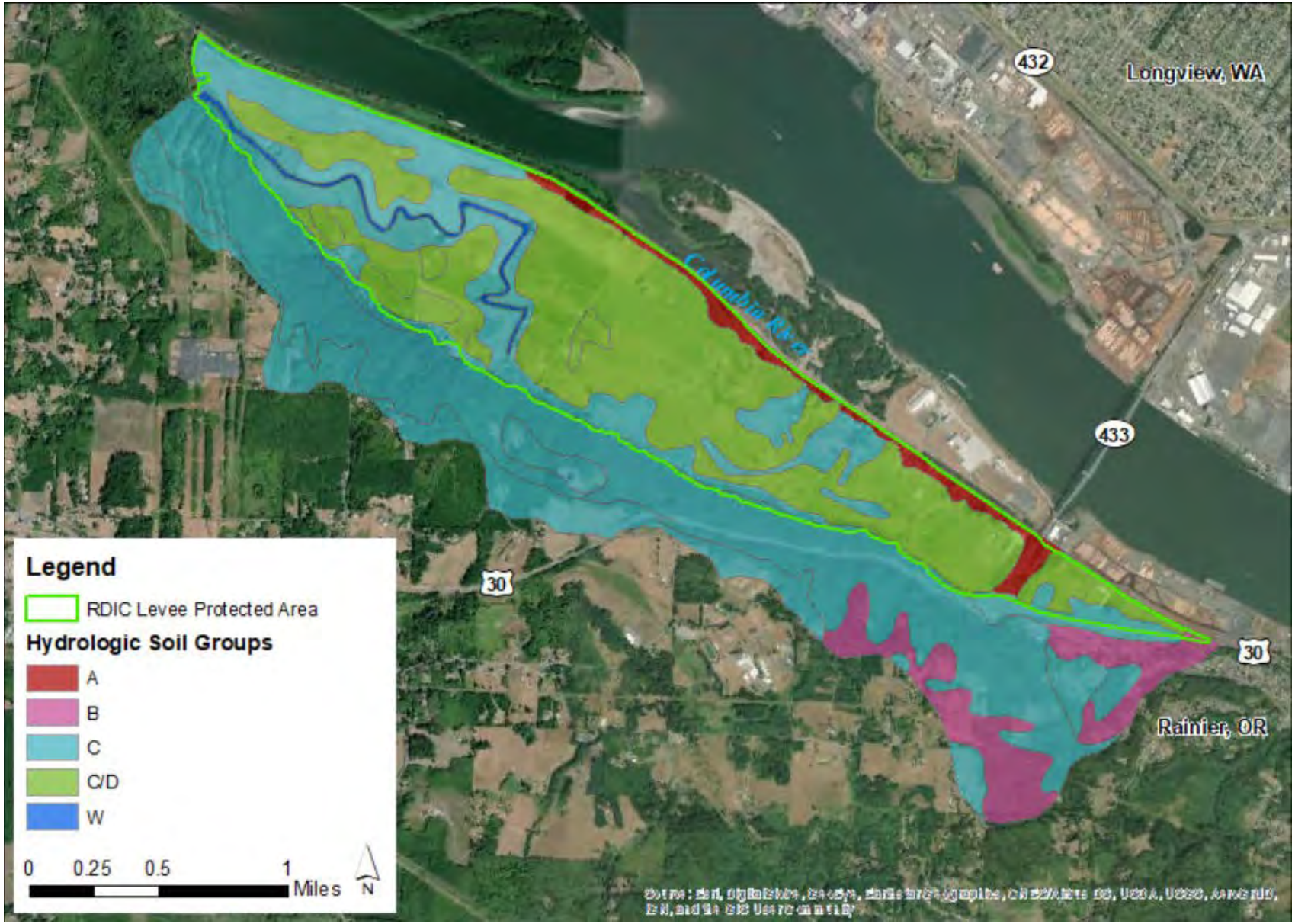


Figure 6 – Map of Hydrologic Soil Groups

Figure 7 – Map of Composite Curve Numbers

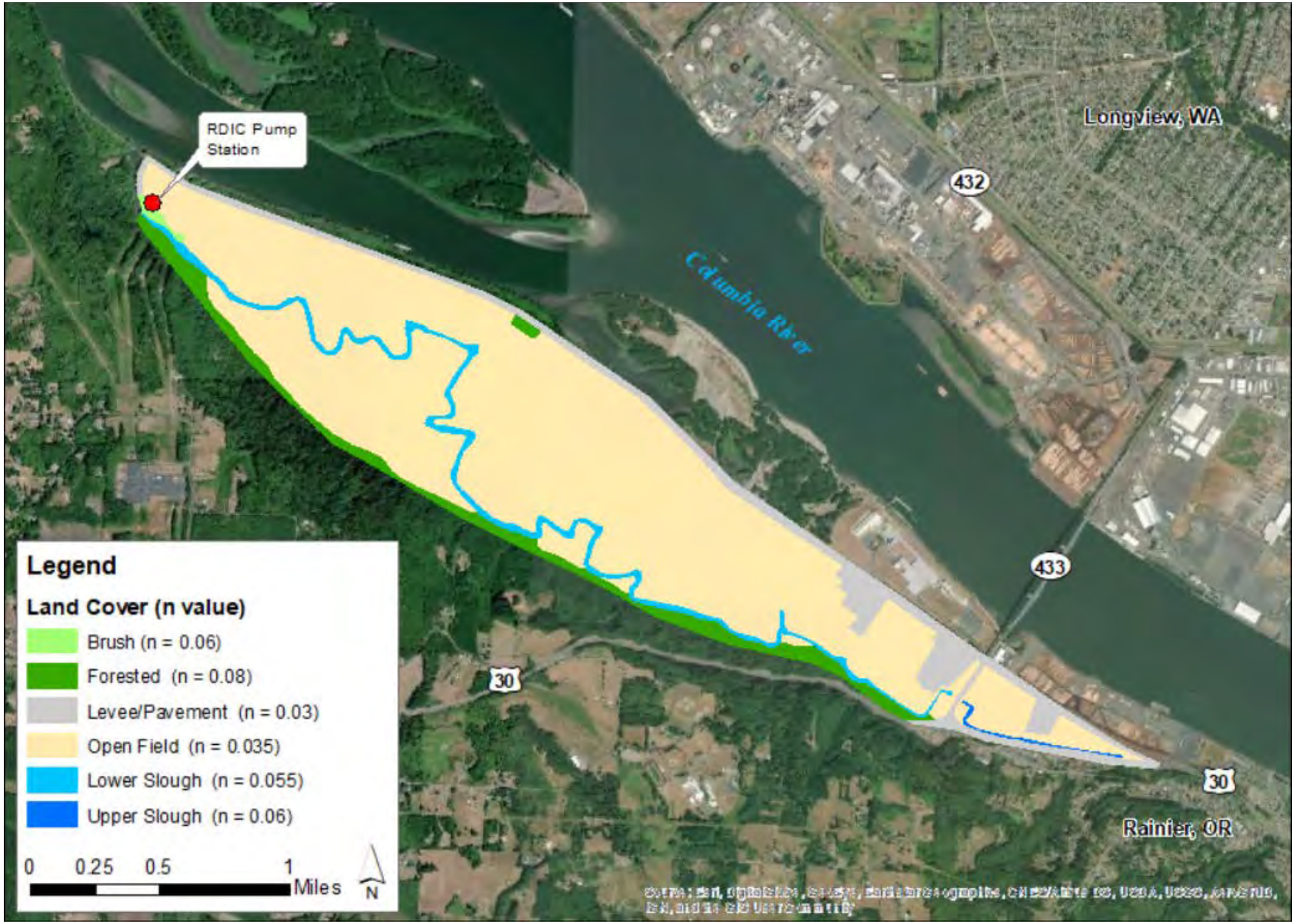
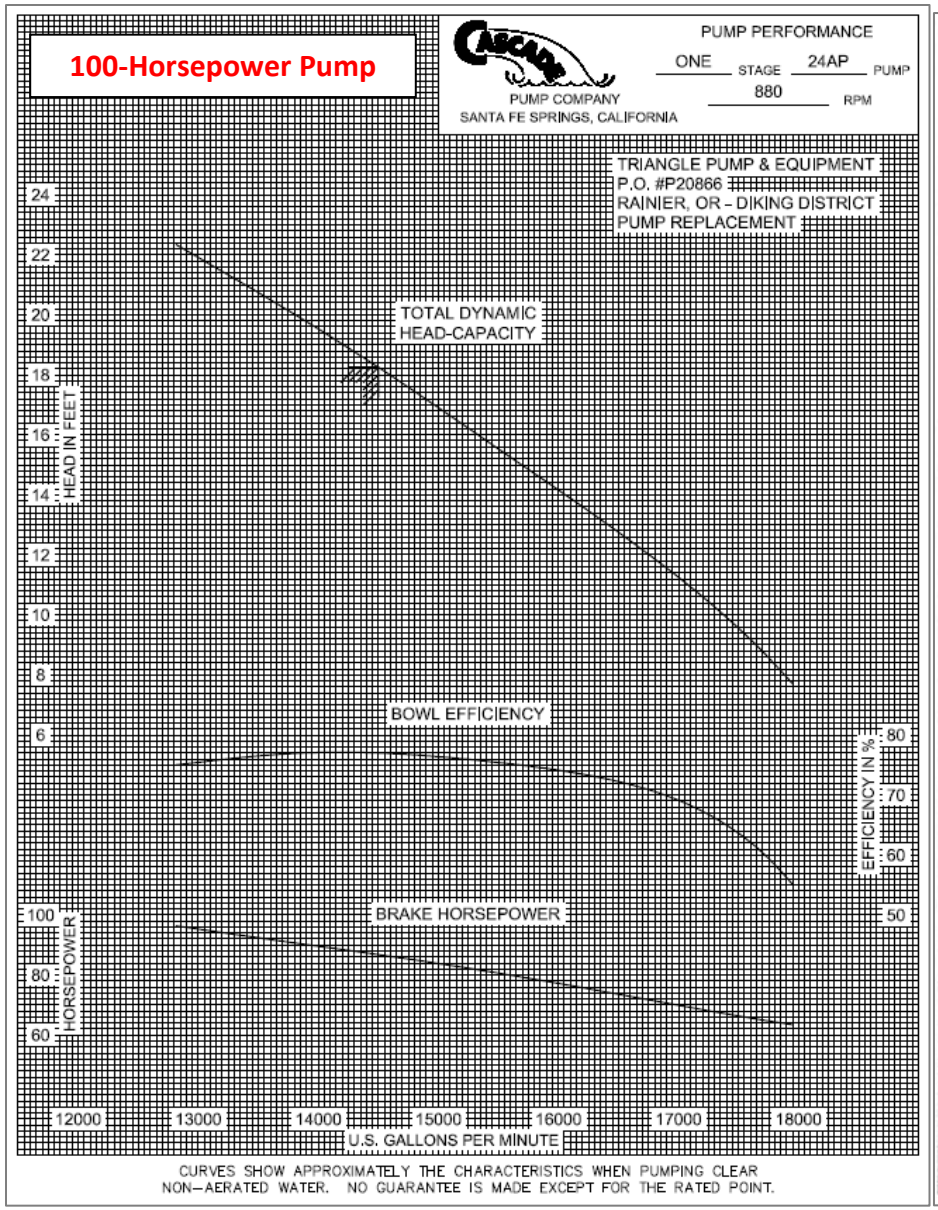


Figure 8 – Map of Manning's n Roughness



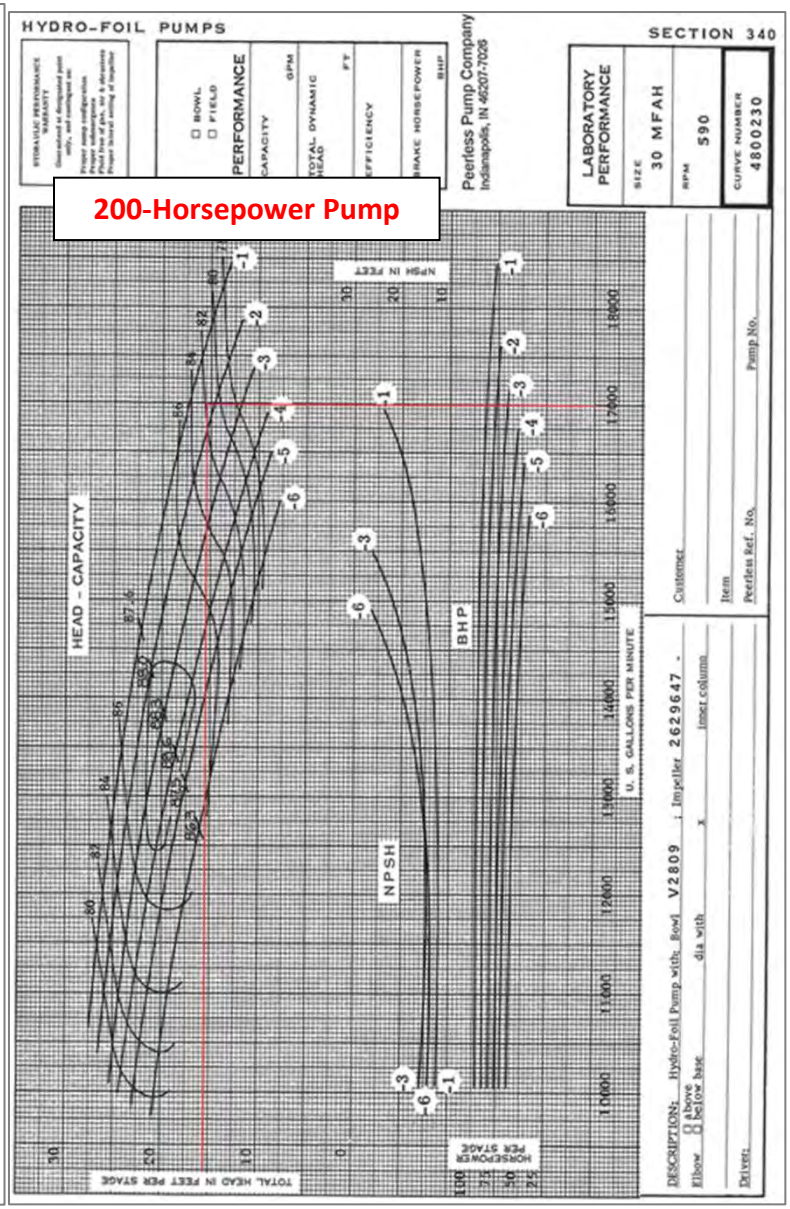


Figure 9 – Performance Curves for RDIC Pumps

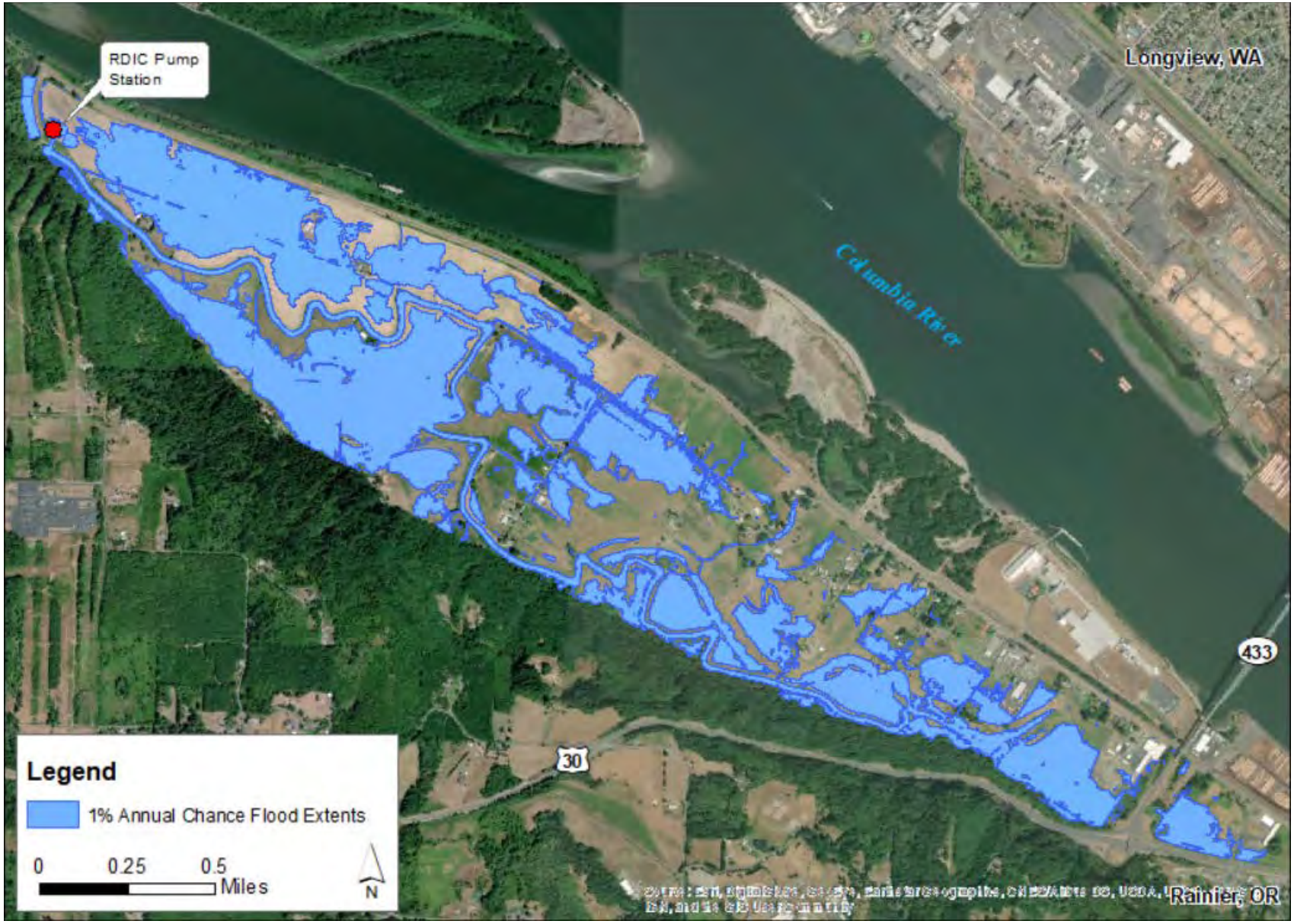


Figure 10 – Map of 1% Annual Chance Flood Extents

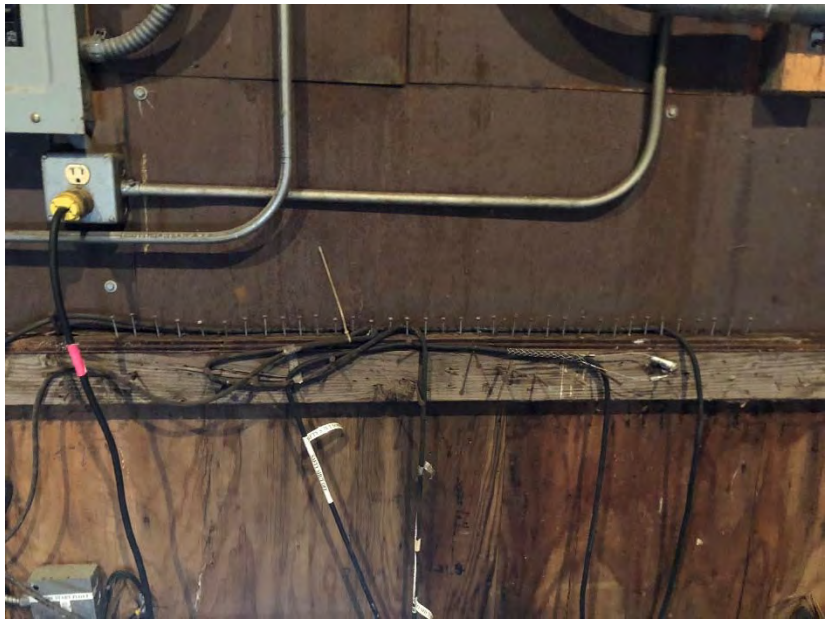
APPENDIX B

PHOTOGRAPHIC LOG

RDIC Pump Station – 100-hp Pump

RDIC Pump Station – 200-hp Pump

RDIC pump station – electrical panels



RDIC pump station – float controls for on/off

Facing upstream from RDIC pump station; levee access bridge visible in the distance

Pump station forebay

Staff Gage in pump station forebay

Facing upstream from levee access bridge

Facing downstream from levee access bridge

View of RDIC interior from levee, typical in lower portion of District

Facing upstream from Amundson Road bridge

Upstream face of Amundson Road bridge from right bank

Facing downstream along Amundson Road

Double arch culvert at Lowe Road crossing

Abandoned crossing at end of Barton Road, from downstream

Abandoned crossing at end of Barton Road, from upstream

Culvert at Young Road, from upstream right bank

Lewis & Clark Bridge approach road, culvert outlet from left bank

Lewis & Clark Bridge approach road, culvert inlet from left bank

Facing upstram from Lewis & Clark Bridge approach road culvert inlet

Rock Crest Street culvert, facing upstream from culvert inlet

Rock Crest Street culvert inlet detail

Mill Street culvert, upstream face from channel

Mill Street culvert, inlet detail

APPENDIX C

SURVEY DATA

Survey Data for RDIC – Collected on 5/15/19 and 5/16/19

All data is in NAVD88 and State Plane Oregon North

ID	Northing	Easting	Elevation	Descr		ID	Northing	Easting	Elevation	Descr
1000	894673.94	7578518.424	24.88	ac		1060	894929.903	7577101.19	20.408	gr
1001	894688.499	7578521.476	23.086	gr		1061	894937.774	7577103.55	16.525	gr
1002	894702.925	7578523.63	20.493	gr		1062	894947.504	7577105.2	11.993	gr
1003	894712.946	7578525.054	18.925	gr		1063	894953.87	7577105.11	10.371	gr
1004	894716.367	7578524.916	16.814	gr		1064	894957.47	7577106.46	9.608	gr
1005	894718.906	7578524.846	15.931	gr		1065	894963.714	7577108.1	8.799	gr
1006	894719.838	7578524.858	14.982	gr		1066	894967.908	7577110.49	8.806	gr
1007	894721.345	7578525.62	14.851	gr		1067	894968.532	7577110.31	8.663	gr
1008	894721.533	7578525.781	13.946	lew		1068	894969.374	7577110.18	7.714	lew
1009	894721.745	7578525.785	13.507	ch		1069	894969.024	7577110.36	6.664	ch
1010	894722.821	7578525.905	13.09	ch		1070	894969.731	7577110.15	6.901	ch
1011	894724.757	7578526.211	12.559	ch		1071	894971.603	7577110.25	6.927	ch
1012	894727.289	7578525.909	12.921	ch		1072	894971.774	7577110.41	7.782	rew
1013	894729.273	7578525.336	13.947	rew		1073	894971.846	7577110.49	8.694	gr
1014	894731.55	7578526.156	14.599	gr		1074	894976.457	7577112.18	8.856	gr
1015	894737.153	7578526.974	14.621	gr		1075	894984.819	7577113.96	9.119	gr
1016	894750.405	7578530.526	14.917	gr		1076	894990.612	7577115.75	9.538	gr
1017	894774.357	7578536.357	15.261	gr		1077	894992.899	7577117.45	9.601	gr
1018	894728.22	7578502.659	15.192	cultop		1078	894998.093	7577116.79	10.266	gr
1019	894727.95	7578502.373	13.68	culinv		1079	895008.874	7577119.5	10.361	gr
1020	894759.479	7578422.694	15.503	gr		1080	895014.889	7577119.32	9.233	gr
1021	894749.722	7578422.557	15.23	gr		1081	895022.065	7577121.05	9.051	gr
1022	894745.524	7578422.054	15.109	gr		1082	894962.53	7577154.98	6.766	culinv
1023	894743.746	7578420.918	13.749	gr		1083	894983.087	7577217.76	20.306	rd
1024	894741.336	7578420.641	12.92	rew		1084	894949.388	7577205.69	22.387	rd
1025	894740.161	7578419.861	12.577	ch		1085	894917.204	7577193.66	24.03	rd
1026	894737.204	7578419.373	12.326	ch		1086	895675.744	7576037.2	2.964	culinv
1027	894734.918	7578418.512	12.544	ch		1087	895673.922	7576038.67	6.691	cultop
1028	894734.298	7578418.492	12.929	lew		1088	895711.893	7576107.65	13.253	gr
1029	894732.69	7578417.963	13.954	gr		1089	895704.514	7576100.45	12.895	gr
1030	894728.21	7578418.051	15.719	gr		1090	895694.945	7576091.69	11.378	gr
1031	894724.319	7578417.064	16.577	gr		1091	895686.45	7576086.56	10.687	gr
1032	894735.938	7578431.551	12.743	culinv		1092	895679.416	7576082.69	9.419	gr
1033	894736.375	7578431.12	14.259	cultop		1093	895672.926	7576078.52	7.708	gr
1034	894712.267	7578414.301	18.898	gr		1094	895669.078	7576075.69	6.626	gr
1035	894707.276	7578413.23	21.097	gr		1095	895669.288	7576075.38	6.338	rew
1036	894701.406	7578411.791	24.149	gr		1096	895668.645	7576075.92	4.224	ch
1037	894686.202	7578408.985	25.151	ac		1097	895663.64	7576073.16	3.908	ch
1039	894888.563	7577255.747	24.83	ac		1098	895660.349	7576070.96	4.152	ch
1040	894900.611	7577258.058	22.845	gr		1099	895657.295	7576070.73	4.177	ch
1041	894910.576	7577259.154	20.161	gr		1100	895654.514	7576067.34	4.365	ch
1042	894917.674	7577261.413	17.48	gr		1101	895654.738	7576068.93	6.325	lew
1043	894923.005	7577264.111	15.633	gr		1102	895651.465	7576068.57	7.053	gr
1044	894925.966	7577265.184	14.338	gr		1103	895646.588	7576066.43	11.351	gr
1045	894933.06	7577266.374	11.979	gr		1104	895641.4	7576067.26	14.312	gr
1046	894936.368	7577267.654	10.693	gr		1105	895635.891	7576059.22	16.219	gr
1047	894937.825	7577268.767	9.698	gr		1106	895613.275	7576057.55	17.711	gr
1048	894940.214	7577269.641	8.313	gr		1107	895616.146	7576061.35	17.178	gr
1049	894943.329	7577270.718	8.292	gr		1108	895609.11	7576049.98	18.745	gr
1050	894943.405	7577270.612	8.178	lew		1109	895603.205	7576039.49	19.15	gr
1051	894943.966	7577271.194	7.925	ch		1110	895577.017	7576030.39	21.237	gr
1052	894945.916	7577270.658	8.196	rew		1111	895552.307	7576017.11	23.008	gr
1053	894946.418	7577271.89	8.362	gr		1112	895532.575	7575996.42	24.842	gr
1054	894950.219	7577272.826	10.039	gr		1113	895524.377	7575984.94	29.242	gr
1055	894954.52	7577274.652	10.554	gr		1114	895880.396	7575726.31	3.013	culinv
1056	894968.808	7577282.028	10.659	gr		1115	895880.276	7575726.79	6.855	cultop
1057	894947.986	7577242.464	7.635	culinv		1116	895961.289	7575731.46	7.631	gr
1058	894910.339	7577098.557	25.008	gr		1117	895949.14	7575726.86	8.206	gr
1059	894923.482	7577100.182	22.548	gr		1118	895939.48	7575719.81	6.753	gr
ID	**Northing**	**Easting**	**Elevation**	**Descr**		**ID**	**Northing**	**Easting**	**Elevation**	**Descr**
1119	895932.536	7575717.268	6.525	gr		1183	896945.913	7572975.81	7.089	gr
1120	895922.278	7575708.917	7.572	gr		1184	899350.655	7568431.37	2.732	culinv

1121	895912.15	7575700.669	7.935	gr		1185	899350.593	7568431.51	6.705	cultop
1122	895906.703	7575697.295	6.583	gr		1186	899355.082	7568434.48	2.742	culinv
1123	895905.572	7575696.952	6.335	rew		1187	899355.343	7568434.71	6.673	cultop
1124	895905.43	7575696.908	3.41	ch		1188	899375.157	7568481.64	10.103	gr
1125	895903.935	7575695.731	3.792	ch		1189	899363.279	7568476.48	10.125	gr
1126	895901.704	7575695.086	4.303	ch		1190	899356.408	7568473.94	9.644	gr
1127	895897.653	7575691.333	3.644	ch		1191	899354.39	7568472.66	8.165	gr
1128	895896.396	7575691.148	3.124	ch		1192	899351.537	7568473.96	4.582	gr
1129	895895.374	7575690.636	6.314	lew		1193	899350.657	7568473.65	3.747	rew
1130	895894.949	7575690.455	7.072	gr		1194	899348.939	7568473.65	2.42	ch
1131	895891.644	7575688.272	8.683	gr		1195	899347.027	7568473.4	1.868	ch
1132	895886.23	7575682.878	9.363	gr		1196	899342.924	7568471.57	0.895	ch
1133	895879.512	7575677.508	9.461	gr		1197	899338.982	7568470.2	0.177	ch
1134	896948.25	7573022.423	7.058	gr		1198	899335.314	7568469.03	-0.25	ch
1135	896931.343	7573009.58	6.95	gr		1199	899331.78	7568467.05	-0.82	ch
1136	896918.658	7573001.434	5.898	gr		1200	899326.456	7568465	-1.056	ch
1137	896913.953	7572998.793	5.479	gr		1201	899319.582	7568461.62	-0.36	ch
1138	896912.247	7572996.772	4.425	gr		1202	899315.615	7568459.26	1.15	ch
1139	896911.499	7572996.978	3.901	rew		1203	899310.239	7568457.59	2.653	ch
1140	896910.919	7572996.074	2.64	ch		1204	899307.707	7568455.66	3.537	ch
1141	896908.795	7572994.678	2.098	ch		1205	899304.254	7568453.21	3.677	lew
1142	896905.651	7572993.342	0.16	ch		1206	899298.018	7568449.51	4.749	gr
1143	896902.935	7572990.58	-0.339	ch		1207	899290.149	7568443.83	6.357	gr
1144	896898.407	7572988.147	0.686	ch		1208	899284.062	7568440.25	8.087	gr
1145	896896.888	7572987.069	2.245	ch		1209	899271.945	7568432.53	8.49	gr
1146	896896.902	7572987.011	2.781	ch		1210	899258.648	7568424.65	7.866	gr
1147	896897.221	7572987.32	3.911	lew		1211	899360.501	7568415.15	2.517	culinv
1148	896895.618	7572986.166	5.372	gr		1212	899360.466	7568415.22	6.46	cultop
1149	896893.464	7572985.233	6.546	gr		1213	899364.777	7568417.96	2.75	culinv
1150	896888.165	7572981.284	7.638	gr		1214	899364.673	7568417.98	6.775	cultop
1151	896881.778	7572978.15	7.736	gr		1215	899315.172	7568345.94	7.911	gr
1152	896877.999	7572973.505	7.413	gr		1216	899324.559	7568352.31	7.919	gr
1153	896916.384	7572968.737	3.606	culinv		1217	899332.579	7568356.27	7.6	gr
1154	896916.494	7572968.755	7.593	cultop		1218	899339.503	7568360.25	5.668	gr
1155	896927.591	7572950.948	6.931	cultop		1219	899344.46	7568363.19	4.221	gr
1156	896927.736	7572950.929	2.819	culinv		1220	899348.336	7568365.95	3.995	gr
1157	896916.721	7572902.859	7.73	gr		1221	899348.858	7568366.17	3.665	lew
1158	896925.868	7572907.794	7.903	gr		1222	899352.027	7568367.32	3.48	ch
1159	896934.592	7572911.487	7.14	gr		1223	899354.519	7568369.46	3.073	ch
1160	896935.879	7572911.549	5.904	gr		1224	899355.409	7568370.03	1.633	ch
1161	896936.324	7572912.194	5.034	gr		1225	899362.905	7568371.6	0.43	ch
1162	896936.8	7572912.213	3.727	lew		1226	899366.053	7568373.13	-0.491	ch
1163	896937.715	7572912.649	3.153	ch		1227	899369.461	7568374.94	-0.613	ch
1164	896940.312	7572913.876	2.748	ch		1228	899376.574	7568379.87	1.047	ch
1165	896941.612	7572914.511	2.31	ch		1229	899380.157	7568382.56	0.498	ch
1166	896943.454	7572915.651	2.623	ch		1230	899385.001	7568386.74	0.717	ch
1167	896945.22	7572916.551	2.413	ch		1231	899387.28	7568387.35	1.55	ch
1168	896948.246	7572917.843	2.506	ch		1232	899389.888	7568390.1	2.744	ch
1169	896951.132	7572918.885	2.572	ch		1233	899390.588	7568390.79	3.669	rew
1170	896952.063	7572919.429	2.611	ch		1234	899391.654	7568391.98	4.729	gr
1171	896954.627	7572920.128	2.019	ch		1235	899394.297	7568394.4	6.697	gr
1172	896957.04	7572922.568	3.08	ch		1236	899396.258	7568396.01	8.058	gr
1173	896957.612	7572922.324	3.728	rew		1237	899399.836	7568399.43	9.039	gr
1174	896958.073	7572922.933	4.755	gr		1238	899407.287	7568402.28	9.824	gr
1175	896959.662	7572923.437	5.842	gr		1239	899385.368	7568442.28	9.845	gr
1176	896962.173	7572923.766	7.204	gr		1240	899366.53	7568430.31	10.151	gr
1177	896964.581	7572925.214	7.86	gr		1241	899356.669	7568424.49	9.631	gr
1178	896973.365	7572928.931	8.195	gr		1242	899340.446	7568413.72	8.657	gr
1179	896900.547	7572945.129	7.477	gr		1243	899323.443	7568402.52	7.942	gr
1180	896915.534	7572955.029	7.854	gr		1244	899312.093	7568395.75	7.959	gr
1181	896922.84	7572960.138	8.146	gr		1245	897594.51	7570465.41	7.974	gr
1182	896937.776	7572970.235	7.395	gr		1246	897575.099	7570459.15	8.646	gr

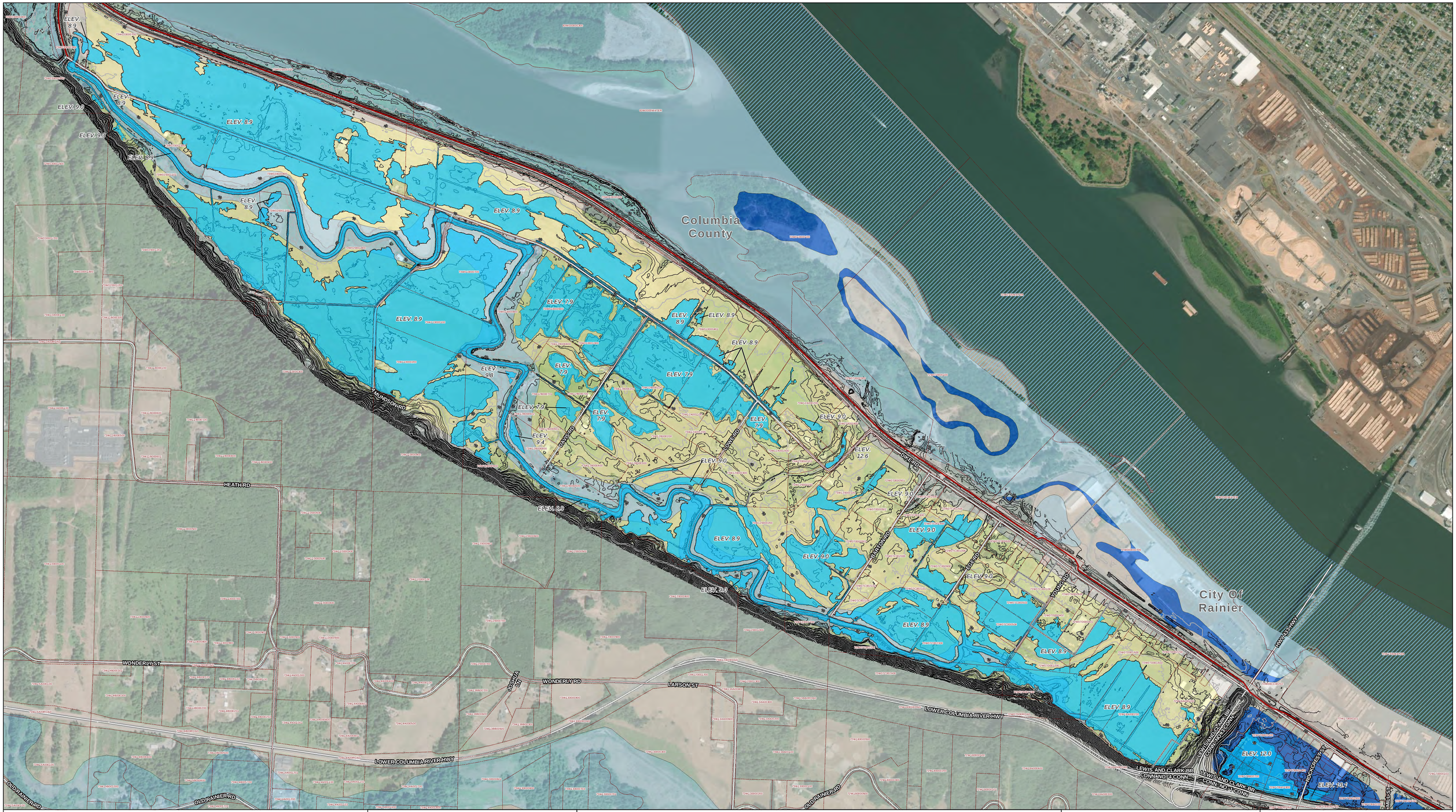
ID	Northing	Easting	Elevation	Descr		ID	Northing	Easting	Elevation	Descr
1247	897564.125	7570455.184	8.297	gr		1311	897608.354	7570258.96	0.579	ch
1248	897558.959	7570453.137	6.472	gr		1312	897605.233	7570257.89	1.09	ch
1249	897556.095	7570452.184	4.726	gr		1313	897600.794	7570256.19	1.275	ch
1250	897555.078	7570452.253	3.829	rew		1314	897595.816	7570255	1.598	ch
1251	897555.028	7570452.265	3.047	ch		1315	897590.186	7570253.33	2.284	ch
1252	897553.94	7570451.557	2.381	ch		1316	897586.888	7570251.97	2.646	ch
1253	897551.107	7570451.376	1.551	ch		1317	897582.395	7570251.15	3.043	ch
1254	897548.965	7570450.93	0.138	ch		1318	897576.621	7570248.88	3.438	ch
1255	897544.721	7570449.212	-0.582	ch		1319	897572.59	7570247.42	3.798	lew
1256	897539.827	7570447.303	-0.936	ch		1320	897569.27	7570246.81	4.024	gr
1257	897535.719	7570445.888	-0.563	ch		1321	897562.717	7570243.98	4.38	gr
1258	897531.261	7570444.073	0.495	ch		1322	897557.219	7570240.27	5.762	gr
1259	897526.455	7570442.211	0.691	ch		1323	897551.221	7570233.83	7.317	gr
1260	897519.663	7570440.103	1.361	ch		1324	897538.593	7570222.55	7.695	gr
1261	897515.315	7570439.406	2.079	ch		1325	897519.191	7570214.03	9.087	gr
1262	897510.941	7570438.425	2.812	ch		1326	900894.119	7565931.16	10.121	gr
1263	897506.292	7570436.803	3.025	ch		1327	900907.021	7565915.5	10.167	gr
1264	897501.92	7570436.287	3.45	ch		1328	900919.292	7565904.59	10.215	gr
1265	897500.681	7570436.005	3.771	lew		1329	900924.515	7565898.1	10.219	gr
1266	897498.014	7570435.585	4.541	gr		1330	900926.575	7565894.97	7.676	gr
1267	897494.305	7570433.567	5.252	gr		1331	900928.227	7565891.34	6.268	gr
1268	897490.81	7570431.593	6.827	gr		1332	900929.948	7565888.79	4.694	gr
1269	897484.355	7570428.007	8.056	gr		1333	900932.727	7565883.67	3.801	gr
1270	897479.027	7570424.136	7.974	gr		1334	900935.338	7565879.95	3.438	rew
1271	897472.651	7570419.42	7.742	gr		1335	900939.411	7565874.42	2.732	ch
1272	897477.461	7570343.458	11.086	gr		1336	900939.532	7565874.42	2.728	ch
1273	897486.483	7570348.78	10.542	gr		1337	900941.24	7565871.61	1.983	ch
1274	897502.309	7570360.924	9.949	gr		1338	900944.097	7565869.8	1.319	ch
1275	897513.305	7570363.133	9.712	gr		1339	900946.385	7565865.65	-0.272	ch
1276	897529.486	7570367.908	9.104	gr		1340	900948.195	7565862.94	-1.051	ch
1277	897547.311	7570377.021	9.265	gr		1341	900951.312	7565859.27	-1.512	ch
1278	897552.857	7570378.84	10.678	gr		1342	900955.431	7565854.15	-1.604	ch
1279	897558.163	7570385.857	9.514	gr		1343	900958.749	7565851.03	-1.401	ch
1280	897562.44	7570388.39	6.971	gr		1344	900963.974	7565845.51	-0.649	ch
1281	897566.866	7570372.022	1.751	culsed		1345	900967.043	7565841.47	0.876	ch
1282	897567.042	7570371.662	3.033	cultop		1346	900968.673	7565839.53	1.714	ch
1283	897562.775	7570369.676	2.997	cultop		1347	900969.912	7565838.21	2.307	ch
1284	897563.472	7570369.569	2.028	culsed		1348	900971.033	7565838.97	3.423	lew
1285	897562.378	7570402.522	2.465	culsed		1349	900970.588	7565836.32	4.213	gr
1286	897562.562	7570402.506	4.189	cultop		1350	900972.208	7565834.38	5.35	gr
1287	897551.154	7570398.419	2.649	culsed		1351	900977.398	7565830.85	8.944	gr
1288	897550.95	7570399.002	5.266	cultop		1352	900980.218	7565829.5	10.436	gr
1289	897566.294	7570390.662	3.818	lew		1353	900984.024	7565828.63	10.911	gr
1290	897566.929	7570390.993	3.426	ch		1354	903260.041	7564904.62	8.351	gr
1291	897568.644	7570391.454	2.044	ch		1355	903282.778	7564914.65	8.141	gr
1292	897570.452	7570393.723	1.337	ch		1356	903292.416	7564920.32	7.356	gr
1293	897572.842	7570395.402	-0.068	ch		1357	903296.922	7564922.61	6.269	gr
1294	897575.695	7570397.074	1.657	ch		1358	903301.41	7564925.66	4.477	gr
1295	897577.377	7570398.715	2.269	ch		1359	903306.697	7564929.11	3.424	lew
1296	897576.176	7570397.939	3.777	rew		1360	903307.441	7564929.89	2.898	ch
1297	897578.134	7570398.831	5.057	gr		1361	903309.113	7564930.66	2.123	ch
1298	897581.979	7570400.107	8.52	gr		1362	903313.672	7564931.88	1.399	ch
1299	897583.467	7570400.781	9.186	gr		1363	903316.673	7564933.39	0.702	ch
1300	897593.571	7570406.703	8.774	gr		1364	903321.935	7564935.45	0.536	ch
1301	897612.693	7570420.198	8.207	gr		1365	903327.366	7564938.05	0.656	ch
1302	897668.174	7570279.893	10.604	gr		1366	903332.534	7564940.64	0.269	ch
1303	897650.453	7570273.965	10.992	gr		1367	903337.142	7564942.55	-0.086	ch
1304	897634.653	7570268.836	9.676	gr		1368	903341.639	7564944.97	0.795	ch
1305	897627.239	7570266.752	5.693	gr		1369	903347.07	7564947.23	1.879	ch
1306	897625.08	7570265.806	3.808	rew		1370	903348.607	7564948.35	3.402	rew
1307	897622.797	7570265.042	2.455	ch		1371	903351.546	7564949.84	4.076	gr
1308	897621.478	7570263.506	1.982	ch		1372	903356.394	7564951.62	5.424	gr
1309	897618.396	7570262.005	1.516	ch		1373	903361.417	7564955.15	6.436	gr
1310	897614.123	7570260.267	1.581	ch		1374	903367.058	7564958.8	8.505	gr

ID	Northing	Easting	Elevation	Descr		ID	Northing	Easting	Elevation	Descr
1375	903372.861	7564961.544	9.432	gr		1440	903321.653	7564866.97	7.902	lc
1376	903384.98	7564968.95	9.85	gr		1441	903326.969	7564869.38	7.945	lc
1377	903397.472	7564973.433	10.291	ac		1442	903338.016	7564874.59	8.024	lc
1378	903294.832	7564878.394	7.603	lcabt		1443	903349.187	7564879.96	8.041	lc
1379	903294.821	7564878.38	7.111	grabt		1444	903361.014	7564885.26	7.97	lc
1380	903309.689	7564885.26	7.87	lc		1445	903378.966	7564893.49	7.821	lc
1381	903320.451	7564890.251	7.988	lc		1446	903388.887	7564898.17	7.677	lcabt
1382	903331.982	7564895.606	8.045	lc		1447	903389.078	7564898.28	6.283	grabt
1383	903346.844	7564902.54	8.016	lc		1448	903427.077	7564897.66	10.882	ac
1384	903365.394	7564911.202	7.827	lc		1449	903417.705	7564894.27	10.145	gr
1385	903378.621	7564918.084	7.587	lcabt		1450	903404.493	7564888.31	10.313	gr
1386	903378.627	7564918.019	6.354	grabt		1451	903398.405	7564887.05	9.741	gr
1387	903260.002	7564863.394	12.762	brr		1452	903394.494	7564887.03	8.43	gr
1388	903260.321	7564863.118	10.509	ac		1453	903390.03	7564884.61	5.097	gr
1389	903280.961	7564873.087	11.18	ac		1454	903386.184	7564883.48	4.134	gr
1390	903281.227	7564873.312	11.517	toc		1455	903384.226	7564882.32	3.469	rew
1391	903281.254	7564873.076	13.71	brr		1456	903373.132	7564875.74	1.462	ch
1392	903292.056	7564878.126	14.02	brr		1457	903370.157	7564874.12	0.866	ch
1393	903293.157	7564878.938	14.226	brr		1458	903365.15	7564872.35	1.115	ch
1394	903292.749	7564878.851	12.1	toc		1459	903360.478	7564870.01	0.641	ch
1395	903293.343	7564878.125	11.581	tod		1460	903355.034	7564867.64	0.399	ch
1396	903312.83	7564887.693	11.918	tod		1461	903348.138	7564864.98	0.501	ch
1397	903312.457	7564887.803	14.529	brr		1462	903340.557	7564862.01	0.887	ch
1398	903313.149	7564888.773	12.41	toc		1463	903333.752	7564857.29	1.349	ch
1399	903340.45	7564901.311	12.534	toc		1464	903328.908	7564853.81	2.419	ch
1400	903340.61	7564901.071	14.654	brr		1465	903325.382	7564852.32	2.91	ch
1401	903340.914	7564900.642	12.027	tod		1466	903320.513	7564852.37	3.413	ch
1402	903360.459	7564909.901	11.827	tod		1467	903317.995	7564850.72	3.408	lew
1403	903360.505	7564910.202	14.471	brr		1468	903313.871	7564849.23	5.564	gr
1404	903360.73	7564911.01	12.347	toc		1469	903306.657	7564849.07	8.846	gr
1405	903379.831	7564919.668	12.102	toc		1470	903299.648	7564847.24	10.364	gr
1406	903379.513	7564919.284	14.222	brr		1471	903289.22	7564843.57	10.333	gr
1407	903380.14	7564918.752	11.584	tod		1472	903275.102	7564838.15	10.266	gr
1408	903400.054	7564929.105	13.381	brr		1473	905689.985	7559397.81	14.948	gr
1409	903399.964	7564928.974	11.076	ac		1474	905681.616	7559408.54	14.876	gr
1410	903279.433	7564845.907	13.104	brr		1475	905679.301	7559411.81	14.131	gr
1411	903279.452	7564846.294	10.967	ac		1476	905675.851	7559410.96	13.442	lcabt
1412	903302.327	7564857.261	11.598	tod		1477	905675.542	7559410.78	12.835	grabt
1413	903302.222	7564856.426	11.806	toc		1478	905672.751	7559419.1	10.533	gr
1414	903286.487	7564848.84	11.473	toc		1479	905670.021	7559422.26	8.662	gr
1415	903302.444	7564856.656	12.067	toc		1480	905665.044	7559429.03	5.712	gr
1416	903303.1	7564857.367	14.209	brr		1481	905662.592	7559431.06	4.186	gr
1417	903327.357	7564868.139	14.53	brr		1482	905662.172	7559431.97	3.557	lew
1418	903327.511	7564867.803	12.408	toc		1483	905660.876	7559433.49	2.586	ch
1419	903327.279	7564868.455	11.902	tod		1484	905659.551	7559436.48	0.518	ch
1420	903356.543	7564882.014	11.964	tod		1485	905656.338	7559441.23	0.194	ch
1421	903356.742	7564881.828	14.586	brr		1486	905653.255	7559444.28	-1.226	chclpier
1422	903356.909	7564881.546	12.427	toc		1487	905650.883	7559448.43	-1.4	ch
1423	903390.921	7564897.477	12.17	toc		1488	905647.977	7559453.43	-1.795	ch
1424	903390.057	7564897.093	14.28	brr		1489	905643.743	7559459.1	-0.082	ch
1425	903390.577	7564898.319	11.603	tod		1490	905641.73	7559462.04	2.083	ch
1426	903391.401	7564897.837	11.915	toc		1491	905641.124	7559463.17	3.551	rew
1427	903402.017	7564902.657	11.607	toc		1492	905639.412	7559466.45	5.158	gr
1428	903401.836	7564902.746	13.832	brr		1493	905636.39	7559471.48	8.035	gr
1429	903413.479	7564906.669	13.38	brr		1494	905633.657	7559476.21	10.652	gr
1430	903413.517	7564906.961	11.167	ac		1495	905632.434	7559480.69	11.526	gr
1431	903232.098	7564837.507	9.499	rd		1496	905625.903	7559493.29	11.691	gr
1432	903271.789	7564855.393	10.901	rd		1497	905619.65	7559505.65	11.456	gr
1433	903297.279	7564867.482	11.664	rd		1498	905670.269	7559418.31	13.193	lc
1434	903336.641	7564885.627	12.071	rd		1499	905662.435	7559429.51	12.602	lc
1435	903371.308	7564901.927	11.874	rd		1500	905652.984	7559443.94	11.613	lcclpier
1436	903419.012	7564923.419	11.027	rd		1501	905644.044	7559456.38	11.07	lc
1438	903304.194	7564858.51	7.62	lcabt		1502	905634.886	7559470.11	10.19	lc
1439	903304.445	7564858.381	7.023	grabt		1503	905630.718	7559476.24	9.718	lcabt

ID	Northing	Easting	Elevation	Descr		ID	Northing	Easting	Elevation	Descr
1504	905630.761	7559476.176	9.121	grabt		1562	905620.386	7559459.03	7.407	gr
1505	905675.417	7559408.846	15.561	gr		1563	905616.082	7559465.1	10.202	gr
1506	905675.404	7559409.129	16.339	toc		1564	905614.027	7559468.33	11.667	gr
1507	905674.18	7559408.607	15.536	tod		1567	905605.609	7559479.27	11.892	gr
1508	905662.471	7559425.734	14.574	tod		1568	905588.958	7559384.38	1.652	ch
1509	905663.577	7559426.397	15.502	toc		1569	905588.833	7559379.73	3.203	ch
1510	905649.888	7559446.277	14.3	toc		1570	905587.14	7559372.8	3.343	ch
1511	905649.056	7559445.969	13.433	tod		1571	905584.228	7559368.66	3.508	lew
1512	905636.855	7559464.474	13.295	toc		1572	905577.9	7559361.55	4.503	gr
1513	905628.698	7559477.435	12.309	toc		1573	905567.546	7559350.66	5.148	gr
1514	905628.472	7559477.633	12.196	gr		1574	905555.165	7559337.7	5.493	gr
1515	905664.019	7559400.712	15.577	gr		1575	905543.998	7559329.09	7.526	gr
1516	905663.531	7559400.894	16.307	toc		1576	905521.162	7559313.15	12.236	gr
1517	905654.145	7559414.764	15.66	toc		1577	905513.553	7559306.69	13.623	gr
1518	905655.24	7559415.414	14.74	tod		1578	905860.093	7559521.92	9.828	gr
1519	905646.614	7559427.736	14.047	tod		1579	905857.774	7559516.58	8.469	gr
1520	905645.732	7559426.98	14.968	toc		1580	905856.519	7559507.59	7.151	gr
1521	905634.508	7559444.143	14.026	toc		1581	905856.014	7559501.62	6.638	gr
1522	905635.824	7559443.511	13.145	tod		1582	905854.462	7559497.02	4.194	gr
1523	905627.863	7559454.648	13.49	toc		1583	905854.382	7559495.74	3.555	rew
1524	905627.831	7559454.58	12.589	tod		1584	905853.855	7559493.52	2.59	ch
1525	905616.624	7559469.323	11.473	toc		1585	905853.072	7559491.19	0.988	ch
1526	905616.578	7559469.455	11.388	gr		1586	905852.876	7559487.72	-1.201	ch
1527	905662.579	7559400.567	13.484	lcabt		1587	905851.148	7559483.86	-2.682	ch
1528	905662.534	7559400.625	12.985	grabt		1588	905850.064	7559479.24	-2.472	ch
1529	905653.359	7559414.542	12.915	lc		1589	905848.14	7559473.82	-1.881	ch
1530	905645.524	7559426.256	12.215	lc		1590	905846.172	7559468.51	-1.23	ch
1531	905639.738	7559434.539	11.723	lcclpier		1591	905842.875	7559462.23	-0.435	ch
1532	905627.611	7559452.474	10.796	lc		1592	905841.06	7559458.64	1.944	ch
1533	905617.293	7559467.239	9.77	lcabt		1593	905841.884	7559456.55	3.029	ch
1534	905617.264	7559467.289	9.21	grabt		1594	905842.321	7559456.53	3.548	lew
1535	905604.063	7559502.713	12.128	gr		1595	905842.411	7559454.56	4.675	gr
1536	905623.463	7559474.263	12.148	gr		1596	905841.436	7559452.85	6.113	gr
1537	905635.561	7559455.991	12.647	tod		1597	905839.421	7559448.46	8.409	gr
1538	905650.459	7559432.337	13.947	tod		1598	905836.859	7559437.83	8.365	gr
1539	905669.212	7559405.036	15.419	tod		1599	905835.262	7559422.33	9.068	gr
1540	905669.175	7559404.873	15.425	tod		1600	905832.731	7559404.25	9.804	gr
1541	905669.427	7559404.593	15.418	gr		1601	905910.952	7559465.36	8.102	staff
1542	905685.243	7559378.525	17.581	gr		1602	903908.05	7562180.97	9.121	gr
1543	905706.391	7559345.641	22.523	gr		1603	903890.682	7562189.9	8.885	gr
1544	905714.854	7559331.414	23.087	gr		1604	903885.536	7562191.95	5.806	gr
1545	905666.256	7559392.918	15.342	gr		1605	903882.398	7562193.41	3.966	gr
1546	905661.992	7559398.311	14.001	gr		1606	903882.046	7562193.75	3.587	rew
1547	905655.037	7559408.627	10.364	gr		1607	903879.057	7562195.63	2.376	ch
1548	905651.206	7559415.287	7.724	gr		1608	903873.075	7562198.48	0.991	ch
1549	905647.108	7559420.184	5.228	gr		1609	903868.235	7562200.88	0.354	ch
1550	905645.123	7559423.615	3.713	gr		1610	903863.767	7562203.42	0.028	ch
1551	905645.495	7559424.511	3.514	lew		1611	903856.579	7562206.68	-0.354	ch
1552	905643.935	7559426.3	2.148	ch		1612	903852.867	7562209.47	-0.328	ch
1553	905641.163	7559430.006	0.539	ch		1613	903846.636	7562211.42	-0.256	ch
1554	905639.231	7559434.143	-1.022	chclpier		1614	903841.216	7562213.94	-0.114	ch
1555	905633.164	7559441.722	-1.556	ch		1615	903834.634	7562216.89	0.337	ch
1556	905629.153	7559446.69	-1.208	ch		1616	903829.749	7562219.54	0.523	ch
1557	905626.418	7559450.862	1.496	ch		1617	903824.676	7562222.16	1.057	ch
1558	905625.246	7559453.158	2.578	ch		1618	903820.048	7562224.75	2.005	ch
1559	905625.002	7559453.703	3.646	gr		1619	903817.537	7562225.84	3.569	lew
1560	905625.834	7559453.353	3.587	rew		1620	903816.645	7562226.69	4.275	gr
1561	905623.135	7559455.609	4.826	gr		1621	903814.552	7562225.41	7.683	gr

APPENDIX D

DETAILED FLOODPLAIN MAPPING



Legend

- Levee
- Street
- Taxlot
- Proposed Zone AE
  Static BFE (Feet)

Effective FEMA Floodplain

- Zone A/AE
- Floodway
- 0.2% Annual Chance Flood Hazard
- Zone X, Area of Minimal Flood Hazard
- Zone X, Area with Reduced Flood Risk Due to Levee

REGISTERED PROFESSIONAL ENGINEER
58051PE
OREGON
JULY 12, 2005
JAMES ERIC HEYEN
EXPIRATION DATE: 06/30/2021

Columbia County & RDIC Flood Inundation Map

Topographic Data Source: Watershed Sciences (2010)
Project Projection: Oregon State Plane North FIPS 3601
Horizontal and Vertical Datums: NAD83/NAVD88
Units: International Feet
Contour Interval: 2 Feet

N

500 250 0 500 1,000 Feet

1 inch = 600 feet

WEST Consultants, Inc.
2601 25th Street SE
Suite 450
Salem, OR 97302

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

IN THE MATTER OF:	)	MUTUAL AGREEMENT
	)	AND ORDER
CITY OF RAINIER	)	NO. WQ-M-NWR-2022-044
Permittee.	)	COLUMBIA COUNTY
	)	

WHEREAS:

1. On August 1, 2012, the Department of Environmental Quality (DEQ) issued National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Number 102571 (the Permit) to the City of Rainier (Permittee). The Permit authorizes the Permittee to construct, install, modify or operate a wastewater treatment control and disposal facility (Facility or Facilities) and discharge adequately treated wastewaters into the Columbia River, a water of the state, in conformance with the requirements, limitations and conditions set forth in the Permit. The Permit expired on July 31, 2017, but has been administratively extended because Permittee made a timely application for renewal.

2. Condition 1 of Schedule A of the Permit requires Permittee to meet the following waste discharge limitations:

a. Outfall Number 001 (May 1 – October 31):

	AVERAGE EFFLUENT CONCENTRATIONS		EFFLUENT LOADINGS		
Parameter	Monthly	Weekly	Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
BOD	10 mg/L	15 mg/L	83	130	170
TSS	10 mg/L	15 mg/L	83	130	170

b. Outfall Number 001 (November 1 – April 30):

	AVERAGE EFFLUENT CONCENTRATIONS		EFFLUENT LOADINGS		
Parameter	Monthly	Weekly	Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
BOD	10 mg/L	15 mg/L	130	190	250
TSS	10 mg/L	15 mg/L	130	190	250

3. Permittee has violated the Permit as follows:

October 28, 2021	The reported daily maximum BOD loading of 260 lb/d exceeds the permit limit by 53%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
October 2021	The reported weekly average BOD loading of 149 lbs/d exceeds the permit limit by 14%	This is a Class III violation pursuant to OAR 340-012-0055(3)(b)
October 2021	The reported weekly average BOD concentration of 19 mg/L exceeds the permit limit by 26%.	This is Class II violation pursuant to OAR 340-012-0055(2)(a)
October 2021	The reported monthly average TSS loading of 866 lbs/d exceeds the permit limit by 904%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
October 28, 2021	The reported daily maximum TSS of 6256 lbs/d exceeds the permit limit by 357%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
October 2021	The reported monthly average TSS concentration of 113 mg/L exceeds the permit limit by 1030%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)

October 2021	The reported weekly average TSS loading of 3281 lbs/d exceeds the permit limit by 2423%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
October 2021	The reported weekly average TSS concentration of 388 mg/L exceeds the permit limit by 2486%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
October 2021	The reported monthly average TSS removal efficiency of 84% was below the permit limit by 1%	This is a Class III violation pursuant to OAR 340-012-0055(3)(c)
November 2021	The reported monthly average TSS concentration of 15 mg/L exceeds the permit limit by 50%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
November 2021	The reported weekly average TSS concentration of 23 mg/L exceeds the permit limit by 53%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
December 20, 2021	The reported daily maximum TSS loading of 250 lbs/d exceeds the permit limit by <1%	This is a Class III violation pursuant to OAR 340-012-0055(3)(b)
December 2021	The reported monthly average TSS concentration of 13 mg/L exceeds the permit limit by 30%	This is a Class II violation pursuant to OAR 340-012-0055(2)(a)
December 2021	The reported weekly average TSS loading of 203 lbs/d exceeds the permit limit by 6%	This is a Class III violation pursuant to OAR 340-012-0055(3)(b)
December 2021	The reported weekly average TSS	This is a Class I violation pursuant to

	concentration of 27 mg/L exceeds the permit limit by 80%	OAR 340-012-0055(1)(k)
January 2022	The reported monthly average TSS loading of 158 lbs/d exceeds the permit limit by 21%	This is a Class II violation pursuant to OAR 340-012-0055(2)(a)
January 4, 2022	The reported daily maximum TSS loading of 554 lbs/d exceeds the permit limit by 121%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
January 2022	The reported monthly average TSS concentration of 16 mg/L exceeds the permit limit by 50%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
January 2022	The reported weekly average TSS loading of 546 lbs/d exceeds the permit limit by 187%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
January 2022	The reported weekly average TSS concentration of 46 mg/L exceeds the permit limit by 206%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
March 2022	The reported monthly average TSS loading of 146 lbs/d exceeds the permit limit by 12%	This is a Class III violation pursuant to OAR 340-012-0055(3)(b)
March 2022	The reported monthly average TSS concentration of 29 mg/L exceeds the permit limit by 190%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
March 2, 2022	The reported daily maximum TSS loading of 377 lbs/d exceeds the permit limit by	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)

	50%	
March 2022	The reported weekly average TSS loading of 261 lbs/d exceeds the permit limit by 37%	This is a Class II violation pursuant to OAR 340-012-0055(2)(a)
March 2022	The reported weekly average TSS concentration of 42 mg/L exceeds the permit limit by 180%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
April 2022	The reported daily maximum TSS loading of 616 lbs/d exceeds the permit limit by 146%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
April 2022	The reported monthly average TSS concentration of 34 mg/L exceeds the permit limit by 240%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
April 2022	The reported monthly average TSS loading of 190 lbs/d exceeds the permit limit by 46%	This is Class II violation pursuant to OAR 340-012-0055(2)(a)
April 2022	The reported weekly average TSS concentration of 59.0 mg/L exceeds the permit limit by 293%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
April 2022	The reported weekly average TSS loading of 435.0 lbs/d exceeds the permit limit by 129%	This is a Class I violation pursuant to OAR 340-012-0055(1)(k)
November 3, 2022	The reported daily maximum TSS loading of 2351 lbs/d exceeds the permit limit by 840%	This is a Class 1 violation pursuant to OAR 340-012-0055(1)(k). However, the cause of the violation was determined to

		be beyond the permittee's reasonable control, so this violation was not included in the civil penalty calculation.
November 2022	The reported weekly average TSS loading of 949 lbs/d exceeds the permit limit by 399%	This is a Class 1 violation pursuant to OAR 340-012-0055(1)(k). However, the cause of the violation was determined to be beyond the permittee's reasonable control, so this violation was not included in the civil penalty calculation.
November 2022	The reported monthly average TSS concentration of 300.9 lbs/d exceeds the permit limit by 131%	This is a Class 1 violation pursuant to OAR 340-012-0055(1)(k). However, the cause of the violation was determined to be beyond the permittee's reasonable control, so this violation was not included in the civil penalty calculation.
November 2022	The reported weekly average TSS concentration of 202 mg/L exceeds the permit limit by 1247%	This is a Class 1 violation pursuant to OAR 340-012-0055(1)(k). However, the cause of the violation was determined to be beyond the permittee's reasonable control, so this violation was not included in the civil penalty calculation.
November 2022	The reported monthly average TSS concentration of 68 mg/L exceeds the permit limit by 580%	This is a Class 1 violation pursuant to OAR 340-012-0055(1)(k). However, the cause of the violation was determined to be beyond the permittee's reasonable

		control, so this violation was not included in the civil penalty calculation.

4. On April 11, 2022, a sanitary sewer overflow (SSO) event occurred at a manhole located at West 3rd and A Street. During the event, approximately 121,900 gallons of untreated wastewater mixed with stormwater was discharged to the Columbia River. OAR 340-041-0009(3) prohibits the discharge of untreated sewage into the waters of the State. This is a Class I violation of ORS 468B.025(1)(b) which prohibits any person from discharging any wastes into the waters of the State if the discharge reduces the quality of such waters below established water quality standards.

5. From November 4, 2022, through November 6, 2022, an SSO event occurred at a manhole located at East 3rd and A Street. During the event, approximately 715,219 gallons of untreated wastewater mixed with stormwater was discharged to the Columbia River. OAR 340-041-0009(3) prohibits the discharge of untreated sewage into the waters of the State. This is a Class I violation of ORS 468B.025(1)(b) which prohibits any person from discharging any wastes into the waters of the State if the discharge reduces the quality of such waters below established water quality standards.

6. On November 30, 2022, an SSO event occurred at a Constructed Overflow on East 3rd and A Street. During the event, approximately 270,719 gallons untreated wastewater mixed with stormwater was discharged to the Columbia River. OAR 340-041-0009(3) prohibits the discharge of untreated sewage into the waters of the State. This is a Class I violation of ORS 468B.025(1)(b) which prohibits any person from discharging any wastes into the waters of the State if the discharge reduces the quality of such waters below established water quality standards.

7. DEQ and Permittee recognize that until new or modified Facilities are constructed and put into full operation, Permittee may continue to violate the permit effluent limitations listed in Paragraphs 2a. and 2b. at times and may discharge raw sewage to waters of the state

from a sanitary sewer overflow caused by the system being overwhelmed by stormwater.

8. DEQ and Permittee recognize that the Environmental Quality Commission has the authority to impose a civil penalty and to issue an abatement order for violations of the Permit. Therefore, pursuant to ORS 183.417(3), DEQ and Permittee settle the past violations referred to in Paragraphs 3–6 by this Mutual Agreement and Order (MAO).

9. The U.S. Environmental Protection Agency appropriately delegated the federal NPDES permitting program to DEQ, making DEQ the primary administrator and enforcer of NPDES permits. This MAO furthers the goals of the NPDES permitting program by ensuring progress towards compliance and is consistent with DEQ's goal of protecting human health and the environment. However, DEQ and Permittee recognize that this MAO does not eliminate the possibility of additional enforcement of Permit requirements by the U.S. Environmental Protection Agency or citizens under the federal citizen suit provisions.

10. This MAO is not intended to limit, in any way, DEQ's right to proceed against Permittee in any forum for any past or future violations not expressly settled herein.

II. FINAL ORDER

11. The Environmental Quality Commission hereby enters a final order:

A. Requiring Permittee to comply with the following conditions and corrective action schedule:

Task	**Due Date**
1. <u>Wastewater System Planning, Permitting and Funding:</u>	
a. Complete and submit to DEQ for review an evaluation of the storm water impacts from Conrad Forest Products.	January 31, 2023
2. <u>Collection System:</u>	
a. Complete additional field investigations and submit to DEQ a report with maps showing the investigation	September 30, 2023

findings and proposed initial peak flow reduction projects.	
3. <u>Wastewater Treatment System:</u>	
a. Complete Initial Wastewater Treatment Plant Flow and Load Capacity Evaluations and submit preliminary findings to DEQ for review.	April 30, 2023
b. Interim Treatment Plant Improvements:	
i. Submit a proposed interim improvements plan and schedule to DEQ for review and comment.	September 30, 2023
ii. Revise the interim improvements plan and schedule consistent with DEQ's comments.	Within 30 days of the completion of DEQ's review
iii. Complete interim improvements	September 30, 2024
4. <u>Wastewater Master Plan (Combined Collection and Treatment)</u>	
a. Complete and submit to DEQ for review and comment a Wastewater Master Plan.	March 31, 2024
b. Revise the Wastewater Master Plan consistent with DEQ's comments.	Within 30 days of the completion of DEQ's review.
c. Obtain all necessary project approvals and funding	June 30, 2024
5. <u>Wastewater System Design and Construction</u>	
a. Complete design and obtain DEQ approval for Collection System and WWTP projects.	June 30, 2025
b. Complete construction of collection system and WWTP upgrades.	June 30, 2027

B. Requiring Permittee to continue to meet the effluent limitations set forth in the Permit; except at any point prior to June 30, 2027, when influent flow exceeds the Peak Instantaneous Flow design capacity of the Facility (2.77 MGD) for a 1-hour period on any day, Permittee must not exceed:

a. 45 mg/L TSS Daily Maximum when the 24-hour composite tests end within 48 hours after a flow event of 2.77 MGD average for a 1-hour period.

b. 30mg/L TSS Weekly Average for those weeks when one or more tests ended within 48 hours after a flow event of 2.77 MGD average for a 1-hour period.

c. 580 lb TSS/day when the 24-hour composite tests end during the next 48 hours.

d. 490 lb TSS/day Weekly Average for weeks when one or more tests ended within 48 hours after a flow event of 2.77 MGD average for a 1-hour period.

C. Requiring Permittee, upon receipt of a written Penalty Demand Notice from DEQ, to pay the following civil penalties:

a. $600 per day, per violation of the corrective action schedule set forth in Paragraph 11.A.

b. For exceedance of the interim effluent limits in Paragraph 11.B.:

1. $300 for any exceedance of 50% or more of the limit,
2. $150 for any exceedance of 20% or more, but less than 50% of the limit, and
3. $50 for any exceedance of less than 20% of the limit.

c. $2,400 per SSO event caused by the system being overwhelmed by stormwater.

D. Requiring Permittee to pay a civil penalty of $52,650 for the violations listed in Paragraphs 3–6 above. The determination of the civil penalty is attached as Attachments A and B.

a. In accordance with DEQ's Internal Management Directive on Supplemental Environmental Projects (SEPs), DEQ agrees to mitigate the $52,650 civil penalty to $10,530 and Respondent agrees to satisfactorily complete the approved SEP proposal as set forth in Attachment C and incorporated by reference. Respondent agrees to refrain from using the value of the SEP as a tax deduction or as part of a tax credit application; and, whenever Respondent publicizes the SEP or the results of the SEP, Respondent will state in a prominent manner that the project was undertaken as settlement of a DEQ enforcement action. Respondent will be deemed to have completed the SEP when DEQ receives a Final SEP Report verifying that the project, as described in the approved SEP, has been completed. The Final SEP Report must include a detailed description of the project's expenses, copies of relevant receipts, an explanation of measurable results, and a certification that the SEP is complete as described in the report.

F. Requiring Respondent to submit the Final SEP Report by December 31, 2023, otherwise the remaining civil penalty ($42,120) is due and owing to DEQ on December 31, 2023.

G. Requiring Respondent to pay the civil penalty set forth in Paragraph 11.D above via check or money order payable to "Department of Environmental Quality" and sent to the DEQ, Revenue Section, 700 NE Multnomah Street, Suite 600, Portland, Oregon 97232.

12. If any event occurs that is beyond Permittee's reasonable control and that causes or may cause a delay or deviation in performance of the requirements of this MAO, Permittee shall immediately notify DEQ verbally of the cause of delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Permittee proposes to carry out such measures. Permittee shall confirm

in writing this information within five (5) working days of the onset of the event. It is Permittee's responsibility in the written notification to demonstrate to DEQ's satisfaction that the delay or deviation has been or will be caused by circumstances beyond the control of and despite the due diligence of Permittee. If Permittee so demonstrates, DEQ shall extend times of performance of related activities under this MAO as appropriate. Circumstances or events beyond Permittee's control include, but are not limited to, acts of nature, unforeseen strikes, work stoppages, fires, explosion, riot, sabotage, or war. Increased cost of performance or a consultant's failure to provide timely reports are not considered circumstances beyond Permittee's control.

13. Any violation of the Permit effluent limits referenced in Paragraph 2 above that do not exceed the interim limits established in Paragraph 11.B will be addressed per DEQ's Enforcement Guidance Internal Management Directive in effect at the time of the violation.

14. Pursuant to OAR 340-012-0030(19) and OAR 340-012-0145(2), the violations cited in Paragraphs 3–6 of this MAO, will be treated as prior significant actions in the event a future violation occurs.

15. Permittee and DEQ hereby waive any and all of their rights to any and all notices, hearing, judicial review, and to service of a copy of the final order herein. DEQ reserves the right to enforce this order through appropriate administrative and judicial proceedings.

16. Regarding the schedule set forth in Paragraph 11.A., Permittee acknowledges that Permittee is responsible for complying with that order regardless of the availability of any federal or state grant monies.

17. The terms of this MAO may be amended by mutual agreement of DEQ and Permittee.

18. DEQ may amend or terminate this MAO upon finding that such modification or termination is necessary because of changed circumstances or to protect public health and the environment. DEQ shall provide Permittee a minimum of thirty (30) days written notice prior to issuing an order amending or terminating the MAO. If Permittee contests the order, the

applicable procedures for conduct of contested cases in such matters shall apply.

19. This MAO shall be binding on the parties and their respective successors, agents, and assigns. The undersigned representative of each party certifies that he or she is fully authorized to execute and bind such party to this MAO. No change in ownership or corporate or partnership status relating to the facility shall in any way alter Permittee's obligations under this MAO, unless otherwise approved in writing by DEQ.

20. All reports, notices and other communications required under or relating to this MAO to Randall Bailey, DEQ Northwest Regional Office, 700 NE Multnomah Street, Suite 600, Portland, Oregon 97232, phone number 503-229-5019, unless otherwise notified by DEQ. The contact person for Permittee shall be Sue Lawrence, Public Works Director, City of Rainier, 106 West "B" Street, P.O. Box 100, Rainier, Oregon, 97048, phone number 503-556-7301.

21. Permittee acknowledges that it has actual notice of the contents and requirements of this MAO and that failure to fulfill any of the requirements hereof will constitute a violation of this MAO and subject Permittee to the payment of civil penalties pursuant to Paragraph 11.C. above.

22. Any stipulated civil penalty imposed pursuant to Paragraph 11.C. shall be due upon written demand. Stipulated civil penalties shall be paid by check or money order made payable to the "Department of Environmental Quality" and sent to: Business Office, Department of Environmental Quality, 700 NE Multnomah Street, Suite 600, Portland, Oregon 97232. Within 20 days of receipt of a "Demand for Payment of Stipulated Civil Penalty" Notice from DEQ, Permittee may request a hearing to contest the Demand Notice. At any such hearing, the issue shall be limited to Permittee's compliance or non-compliance with this MAO. The amount of each stipulated civil penalty for each violation and/or day of violation is established in advance by this MAO and shall not be a contestable issue.

23. This MAO shall terminate at the end of the day on the date the final compliance task in Paragraph 11.A. above is to be completed. However, Permittee remains liable for stipulated

penalties for any violations of the MAO occurring during the period the MAO was in effect and demanded pursuant to Paragraph 11.C.

CITY OF RAINIER

1/9/23
Date

Jerry Cole, Mayor
City of Rainier

DEPARTMENT OF ENVIRONMENTAL QUALITY and ENVIRONMENTAL QUALITY COMMISSION

1/9/2023
Date

Kieran O'Donnell, Manager
Office of Compliance and Enforcement
on behalf of DEQ pursuant to OAR 340-012-0170
on behalf of the EQC pursuant to OAR 340-011-0505

ATTACHMENT A

FINDINGS AND DETERMINATION OF RESPONDENT'S CIVIL PENALTY PURSUANT TO OREGON ADMINISTRATIVE RULE (OAR) 340-012-0045

VIOLATIONS: Respondent violated ORS 468B.025(2) by the exceeding the TSS and BOD technology based effluent limits (TBELs) in its wastewater permit by 50% or more.

CLASSIFICATION: These are Class I violations pursuant to OAR 340-012-0055(1)(k)(A).

MAGNITUDE: The magnitude of the violation is minor pursuant to OAR 340-012-0135(2)(a)(C)(i) because Respondent's effluent was diluted by a factor of 10 or more by the receiving stream.

CIVIL PENALTY FORMULA: The formula for determining the amount of penalty of each violation is: $BP + [(0.1 \times BP) \times (P + H + O + M + C)] + EB$

"BP" is the base penalty, which is $750 for a Class I, minor magnitude violation in the matrix listed in OAR 340-012-0140(4)(b)(A)(iii) and applicable pursuant to OAR 340-012-0140(4)(a)(F)(i) because Respondent's facility has a permitted flow of less than two million gallons per day.

"P" is whether Respondent has any prior significant actions (PSAs), as defined in OAR 340-012-0030(19), in the same media as the violation at issue that occurred at a facility owned or operated by the same Respondent, and receives a value of 10 according to OAR 340-012-0145(2)(b) because Respondent has more than nine Class I equivalent violations stemming from Case Nos. WQ/M-NWR-2017-228 and WQ/M-NWR-2020-179.

"H" is Respondent's history of correcting prior significant actions and receives a value of 0 according to OAR 340-012-0145(3)(c) because there is insufficient information on which to base a finding under paragraphs (3)(a) or (b).

"O" is whether the violation was repeated or ongoing, and receives a value of 2 according to OAR 340-012-0145(4)(b) based on the following:

- On the following dates, Respondent's discharge exceeded the applicable TBEL:
  - October 28, 2021: daily maximum BOD loading (Class I violation)
  - October 2021: weekly average BOD loading (Class III violation)
  - October 2021: weekly average BOD concentration (Class II violation)
  - October 2021: monthly average TSS loading (Class I violation)
  - October 28, 2021: daily maximum TSS loading (Class I violation)
  - October 2021: monthly average TSS concentration (Class I violation)
  - October 2021: weekly average TSS loading (Class I violation)

- October 2021: weekly average TSS concentration (Class I violation)
- October 2021: monthly average TSS removal (Class III violation)
- November 2021: monthly average TSS concentration (Class II violation)
- November 2021: weekly average TSS concentration (Class I violation)
- December 20, 2021: daily maximum TSS loading (Class III violation)
- December 2021: monthly average TSS concentration (Class II violation)
- December 2021: weekly average TSS loading (Class III violation)
- December 2021: weekly average TSS concentration (Class I violation)
- January 2022: monthly average TSS loading (Class II violation)
- January 4, 2022: daily maximum TSS loading (Class I violation)
- January 2022: monthly average TSS concentration (Class I violation)
- January 2022: monthly average TSS loading (Class I violation)
- January 2022: weekly average TSS concentration (Class I violation)
- March 2022: monthly average TSS loading (Class III violation)
- March 2022: monthly average TSS concentration (Class I violation)
- March 2, 2022: daily maximum TSS loading (Class I violation)
- March 2022: weekly average TSS loading (Class II violation)
- March 2022: weekly average TS concentration (Class I violation)
- April 2022: daily maximum TSS loading (Class I violation)
- April 2022: monthly average TSS concentration (Class I violation)
- April 2022: monthly average TSS loading (Class II violation)
- April 2022: weekly average TSS concentration (Class I violation)
- April 2022: weekly average TSS loading (Class I violation)

- As set detailed above, Respondent experienced 30 total violations. DEQ is assessing a separate penalty only for the 19 Class I violations.

- To arrive at "O", DEQ divides the total number of violations by the number of violations penalized. Therefore, each assessed penalty represents 1.6 occurrences for an "O" factor value of 2.

"M" is the mental state of the Respondent and receives a value of 4 according to OAR 340-012-0145(5)(c) because Respondent's conduct was negligent. The TSS and BOD limits are express conditions of Respondent's permit. By failing to take necessary actions to comply with the limits, Respondent failed to exercise reasonable care to avoid the foreseeable risk a permit violation would occur.

"C" is Respondent's efforts to correct or mitigate the violation and receives a value of 0 according to OAR 340-012-0145(6)(f) because the violation or the effects of the violation could not be corrected or minimized.

"EB" is the approximate dollar value of the benefit gained and the costs avoided or delayed as a result of the Respondent's noncompliance. It is designed to "level the playing field" by taking away any economic advantage the entity gained and to deter potential violators from deciding it is cheaper to violate and pay the penalty than to pay the costs of compliance. In

this case, "EB" receives a value of 0 according to OAR 340-012-0150(4) because there is insufficient information on which to make an estimate under the rule.

PENALTY CALCULATION: Penalty = BP + [(0.1 x BP) x (P + H + O + M + C)] + EB
= $750 + [(0.1 x $750) x (10+0+2+4+0)] + $0
= $750 + [$75 x 16] + $0
= $750 + $1,200 +$0
= $1,950

ORS 468.140(2) states that each day of violation constitutes a separate occurrence of the offense. DEQ is assessing penalties only for the 19 Class I violations. The single occurrence violation penalty is therefore multiplied by 19 for a final civil penalty of $37,050.

ATTACHMENT B

FINDINGS AND DETERMINATION OF RESPONDENT'S CIVIL PENALTY PURSUANT TO OREGON ADMINISTRATIVE RULE (OAR) 340-012-0045

VIOLATIONS: Respondent violated OAR 340-041-0009(3) and ORS 468B.025(1)(b) by discharging untreated sewage into the Columbia River.

CLASSIFICATION: This is a Class I violation pursuant to OAR 340-012-0055(1)(b).

MAGNITUDE: The magnitude of the violation is moderate pursuant to OAR 340-012-0130(1), as there is no selected magnitude specified in OAR 340-012-0135 applicable to this violation, and the information reasonably available to DEQ does not indicate a minor or major magnitude.

CIVIL PENALTY FORMULA: The formula for determining the amount of penalty of each violation is: $BP + [(0.1 \times BP) \times (P + H + O + M + C)] + EB$

"BP" is the base penalty, which is $6,000 for a Class I, moderate magnitude violation in the matrix listed in OAR 340-012-0140(2)(b)(A)(ii) and applicable pursuant to OAR 340-012-0140(2)(a)(D).

"P" is whether Respondent has any prior significant actions (PSAs), as defined in OAR 340-012-0030(19), in the same media as the violation at issue that occurred at a facility owned or operated by the same Respondent, and receives a value of 10 according to OAR 340-012-0145(2)(b) because Respondent has more than nine Class I equivalent violations stemming from Case Nos. WQ/M-NWR-2017-228 and WQ/M-NWR-2020-179.

"H" is Respondent's history of correcting prior significant actions and receives a value of 0 according to OAR 340-012-0145(3)(c) because there is insufficient information on which to base a finding under paragraphs (3)(a) or (b).

"O" is whether the violation was repeated or ongoing, and receives a value of 2 according to OAR 340-012-0145(4)(b) because there were more than one but less than seven occurrences of the violation. Respondent experienced three SSO events.

"M" is the mental state of the Respondent and receives a value of 4 according to OAR 340-012-0145(5)(c) because Respondent's conduct was negligent. Respondent's permit expressly prohibits uncontrolled overflows where wastewater is likely to escape into a water of the state. By failing to take necessary actions to prevent the SSOs from occurring, Respondent failed to exercise reasonable care to avoid the foreseeable risk a violation would occur.

"C" is Respondent's efforts to correct or mitigate the violation and receives a value of 0 according to OAR 340-012-0145(6)(f) because the violation or the effects of the violation could not be corrected or minimized.

"EB" is the approximate dollar value of the benefit gained and the costs avoided or delayed as a result of the Respondent's noncompliance. It is designed to "level the playing field" by taking away any economic advantage the entity gained and to deter potential violators from deciding it is cheaper to violate and pay the penalty than to pay the costs of compliance. In this case, "EB" receives a value of 0 according to OAR 340-012-0150(4) because there is insufficient information on which to make an estimate under the rule.

PENALTY CALCULATION: Penalty = BP + [(0.1 x BP) x (P + H + O + M + C)] + EB
= $6,000 + [(0.1 x $6,000) x (10+0+2+4+0)] + $0
= $6,000 + [$600 x 16] + $0
= $6,000 + $9,600 +$0
= $15,600

LEEWAY

Technical Memorandum

Prepared for:	Sue Lawrence, Public Works Director City of Rainier, Oregon
Project:	Supplemental Environmental Project West C Street Stormwater
Author:	Rob Lee, PE, PMP Leeway Engineering Solutions
Date:	November 9, 2022
Subject:	Budgetary Estimate

1 Introduction

The City of Rainier (City) has identified a potential project that could provide environmental and social benefits. Stormwater conveyance in the vicinity of W. C Street and Maple Drive has been an issue in the past, and this identified project could provide relief while also improving stormwater quality and beautification of the area.

The project would involve the design and construction of approximately 550' of new stormwater conveyance, a new green stormwater infrastructure (GSI) rain garden or bioswale, and stabilized outfall to Nice Creek. Figure 1 below shows the approximate project location.

LEEWAY

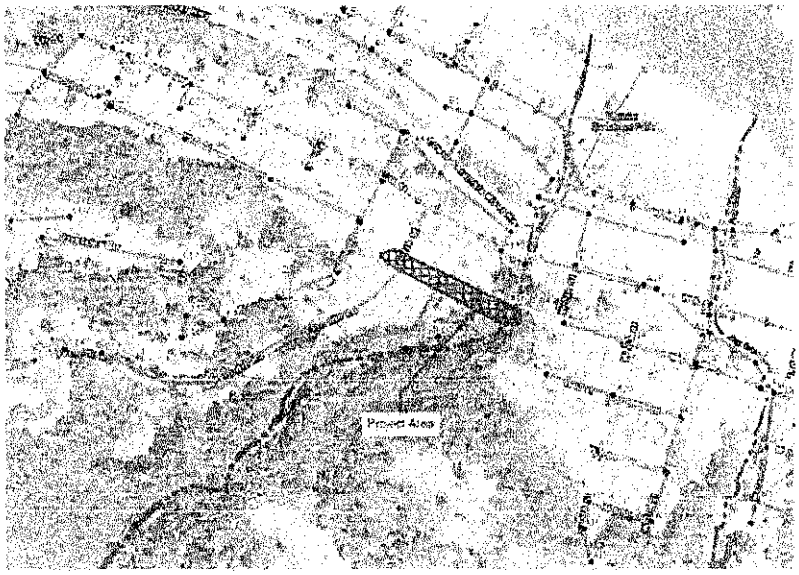


Figure 1. Project Location

2 Project Budgetary Estimate

Leeway Engineering (Leeway) has developed the following budgetary estimate the following for the project.

Table 1. Project Estimated Cost

600 lineal feet of new 12-inch storm sewer	$82,500
Bioswale	$20,000
Construction Subtotal	**$102,500**
Design and Administration (30%)	$30,750
Contingency (20%)	$20,500
Project Budgetary Estimate	**$153,750**

Leeway estimates approximately one year is required from start of design to completion of construction.

Supplemental Environmental Project Application
Oregon Department of Compliance and Enforcement
700 NE Multnomah St., Suite 600
Portland, OR 97232

Case Name and No.: WQ-M-NWR-2022-044

Project Contact: Sue Lawrence
Public Works Director
City of Rainier
PO Box 100
Rainier, OR 97048
slawrence@cityofrainier.com

Type of Project: Separation of Storm and Sanitary Sewer with storm water – Reducing the amount and/or danger presented by some form of pollution, often by providing better treatment and disposal of the pollutant.
Type of Project Rationale: The project proposes to separate storm water from the sanitary sewer and install a green-streets type of stormwater facility that will reduce pollutants inherent to roadway generated runoff.

Who is conducting the project: The City of Rainier will be the project manager and will be hiring the design and construction.

Location where the project will take place:

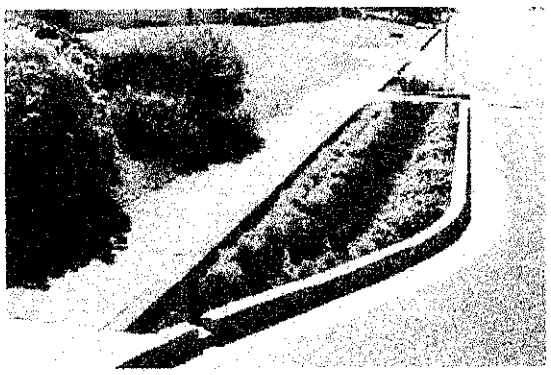
The project will take place along West C Street within the City of Rainier, in this general area that could capture roadway runoff generated along W C St and Fern Hill and that would provide significant water quality treatment prior to discharge into Nice Creek. Currently, no water quality treatment exists for the roadway drainage. The proposed project location is advantageous in that it has the potential to utilize the City's existing stormwater infrastructure, utilizes downslope areas adjacent to the Creek that are within the City's Right-of-Way (ROW), and is public facing to provide additional community benefits and education.

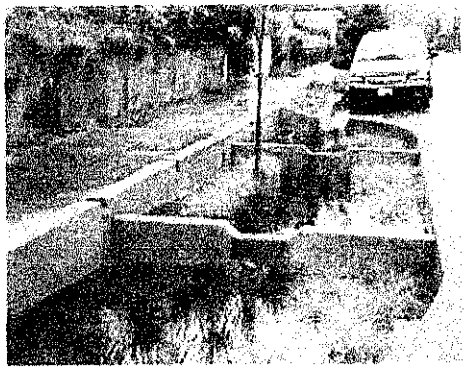
General Project Location

Project description:

The project proposes to install a green-streets type stormwater facility along West C Street within the City's ROW. The facility would capture and treat roadway generated runoff from along West C Street that currently flows into the sanitary sewer and the drainage ditch into Nice Creek. Given supportive geotechnical findings, the facility will be a non-lined bioretention planter ("green street planter") which would also provide the benefits of infiltration in addition to water quality treatment (peak flow attenuation and volume reduction benefits). A non-lined facility would also minimize the complexities/costs associated with tie-in to existing stormwater infrastructure. Other similar design options are available if geotechnical findings do not support infiltrating practices. Optimizing the design

of the facility would utilize the knowledge/guidance from similar successful green-streets projects that have been constructed in the City of Portland; examples below from the City of Portland website.





Green Street Planter Examples
(images from City of Portland website; https://www.portlandoregon.gov/bes/article/414873)

What environmental benefits are expected?

The proposed project will provide multiple environmental benefits:

- Removal of stormwater from the sanitary sewer system
- Reduction of pollutants inherent to roadway generated stormwater runoff (engine oils, grease, rubber/tire wear, heavy metals, debris/garbage, etc.).
- Reduction of Total Suspended Solids (TSS) in stormwater discharged to Nice Creek.
- Reduction of runoff temperatures to Nice Creek.
- Habitat creation (through facility plantings and soil strata).
- Reduction of peak discharge flowrates and peak runoff volumes generated from the drainage area; reduction of erosive forces in Fox Creek during wet-weather.
- Potential for groundwater recharge (given approved infiltration facility).

Additionally, the project will also include such benefits as:

- Provide a public facing stormwater management/treatment facility; public engagement.
- Provide the community with a template and example for future stormwater retrofit projects.
- Continue to build upon previous community restoration efforts nearby and along Fox Creek.
- Increased roadway aesthetics with stormwater plantings.

How will you measure/assess the benefits?

The City will measure/assess the benefits of the project in multiple ways:

- Quantify the amount of impervious surface area that is provided treatment by the new facility.
- Provide estimates of the reduction of peak runoff flows and volumes.
- Document the condition and health of the stormwater plantings.

What is the total project cost?

The total project cost is $150000

Project costs include: Estuary Partnership staff time (project coordination, stormwater facility design, construction inspections, facility as-built documentation, reimbursement for travel to/from site, etc.), permits, potential geotechnical services, potential surveying services, stormwater facility construction services, and construction materials and plantings.

What is the timeframe for the project (most projects are completed within one year)? Include milestones and final completion date:

The project is anticipated to be completed within one-year of the final approval of the SEP. We anticipate that the stormwater facility construction will occur in the spring/summer of 2022 when weather is conducive, while any applicable geotechnical/surveying/permitting and facility design to begin upon stakeholder consensus on specific project location. Assuming an award in AUG 2021, project milestones/schedule include:

- Design of storm system – March 2023
- Permitting (as applicable) – March 2023
- Site surveying (as applicable) – February 2023
- Geotechnical investigations and reporting (as applicable) – March 2023
- Preliminary stormwater facility design development – May 2023
- Facility construction – July/August 2023
- As-built facility documentation and final reporting – December 2023

Date: 11/16 2002 Signature: Public Works Director