PUBLIC REVIEW DRAFT
For discussion purposes only

LOCAL WETLANDS AND RIPARIAN CORRIDOR INVENTORY AND ASSESSMENT FOR THE URBAN GROWTH BOUNDARY EXPANSION AREAS OF THE CITY OF SPRINGFIELD, OREGON

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List of Report Acronyms

DEQ Department of Environmental Quality
DSL Department of State Lands
DLCD Department of Land Conservation and Development
ESH Essential Salmonid Habitat
FEMA Federal Emergency Management Agency
HGM Hydrogeomorphic Method of Wetland Assessment
HUC Hydrologic Unit Code
LCDC Land Conservation and Development Commission
LCOG Lane Council of Governments
LWI Local Wetlands Inventory
LSW Locally Significant Wetland
MFWR Middle Fork Willamette River
NRCS Natural Resources Conservation Service
NWI National Wetlands Inventory
OAR Oregon Administrative Rule
OFWAM Oregon Freshwater Wetland Assessment Methodology
UGB Urban Growth Boundary
URIAG Urban Riparian Inventory & Assessment Guide
USFWS United States Fish and Wildlife Service
WETS Precipitation and Temperature Station Data, short for wetlands climate analysis
WMVC Western Mountains, Valleys, and Coast Region

1.0 Introduction

SummitWest Environmental, Inc. (SummitWest) and their partner, Terra Science, Inc. (TSI), contracted with the City of Springfield (City) to conduct a Local Wetlands Inventory (LWI) and Riparian Corridor Assessment within 792.15 acres of Urban Growth Boundary (UGB) Expansion Areas within the City of Springfield, Lane County, Oregon (Study Area). The Study Area documented herein is comprised of three distinct Study Areas: North Gateway, Willamalane Properties, and the Mill Race.

The goal of the work provided by SummitWest and TSI was to address the wetland and riparian requirements of Oregon Statewide Planning Goal 5 (*Natural Resources, Scenic and Historic Areas, and Open Spaces)* Oregon Administrative Rule (OAR) Section 660, Division 23. Oregon's statewide planning goals provide the land use framework for planning within the state. Statewide Planning Goal 5 requires all Oregon cities and counties "to conserve open space and protect natural and scenic resources." The goal itself, plus OAR 660-23, establish specific procedures and criteria for Goal 5 compliance.

To conduct the LWI, SummitWest and TSI determined the location and size of aquatic features throughout the Study Areas. The quality and condition of identified features was then calculated by applying the Oregon Freshwater Wetland Assessment Methodology (OFWAM) (Roth et al, April 1996). Determinations of whether identified features were locally significant then occurred by applying the requirements in State Administrative Rules (OAR 141-086-300 through 141-086-350). Criteria are in Rule 350 within Chapter 141, Division 86. All aspects of the LWI meet Oregon Department of State Lands (DSL) requirements specified in OAR 141-086-0180 through 141-086-0240.

Riparian Corridor Assessment materials documented herein meet the requirements established in Administrative Rule by Department of Land Conservation and Development (DLCD) (Chapter 660, Division 23). Riparian corridor assessments adhere to Goal 5 Safe Harbor and *Urban Riparian Inventory and Assessment Guide* (URIAG) methodology.

Materials herein outline Study Area characteristics, office and field methodologies, and results of the LWI and riparian assessment investigations.

2.0 Inventory and Assessment Methodology

The LWI process included public outreach, field investigations, and functional analyses to document Goal 5 identified aquatic features within the Study Areas. The following narrative describes the process and methodology associated with the LWI process.

2.1 Public Involvement Process

The Lane Council of Governments (LCOG) and the City organized and facilitated public outreach efforts for this project. While 54 distinct tax lots are located throughout the Study Areas, the City and LCOG filtered involved properties to define where physical access was necessary to adequately sample potentially suspect wetland areas. Suspect parcels warranting physical investigation included those areas situated within hydric soil units, National Wetland Inventory (NWI) mapped features, areas exhibiting wetland / water aerial signature patterns, areas previously reviewed by DSL for a jurisdictional

determination, and areas situated within the 100-year floodplain. Of the 54 taxlots contained within the Study Area, 49 warranted physical investigation based on this cursory background analysis.

The City then submitted correspondences explaining the LWI project on April 13, 2020 via postal service to all property owners whose tax lots met the above criteria. Said letters shared information about wetlands and riparian areas, requested site access permission, and invited property owners to attend a public outreach and project kick-off meeting. The initial public kickoff meeting originally planned to provide inventory involved property owners an opportunity to meet in-person with City staff before the start of field work.

With COVID-19 precautions in mind, however, this kick-off meeting format evolved into a virtual teleconference held on May 14, 2020 from 3:30-5:00 PM. Teleconference facilities were made available at City Hall for anyone who could not participate remotely from their homes. During the virtual meeting, City and LCOG representatives described the LWI inventory process, overview of consultant site access processes, and allowed time for property owners to voice questions and concerns. At least five property owners attended the virtual meeting (Monica Sather, City of Springfield, 2020).

As presented in Table 1, of the 49 parcels requiring investigation, thirteen (13) are privately owned by nine (9) distinct landowners. Of the remaining parcels, 33 are owned by public entities (Springfield Utility Board (SUB), Willamalane Park & Recreation District, and City of Springfield), and three (3) are owned by non-Springfield public agencies (Eugene Water and Electric Board (EWEB)) and Oregon Department of Transportation (ODOT). Access onto EWEB and ODOT properties required entry permits. Access information was collected into a database which was referenced by the field teams to avoid encroachment into non-participating properties. As access permission was obtained to all but one private property, LWI field teams physically investigated 98% of parcels (equating to 99.9% participating acres) contained within the LWI Study Areas.

Table 1. Access Granted to LWI Field Teams

Landowner	Total # of Tax Lots	Total # of Owners	Access Granted (per owner)	Access Not Granted (per owner)
Private	13	9	8	1
Non-Springfield Public Entities (Entry Permit Required)	3	3	3	-
City of Springfield Public Entities	33	3	3	-
Total	49	15	14	1

2.2 Local Wetland Inventory Methodology

The LWI investigation involved cursory background research, published data analysis, and preliminary desktop boundary approximations of suspect aquatic features followed by onsite field investigations to verify, document, and map aquatic features within the Study Areas. The following sections detail each step of the LWI investigation.

2.2.1 Preliminary Off-site Determination Protocol

Prior to conducting the field investigations, the LWI team attained, analyzed, and generated detailed georeferenced base maps using a variety of published environmental data. Cursory materials analysis included review of:

*U.S. Geological Survey (USGS) 7.5-minute topographic maps and more contemporarily generated U.S. Topo maps. Contemporary Topo maps outline approximate locations and layouts of potential aquatic features such as rivers, streams, and ponds using orthorectified aerial images and shaded relief. When assessed with historically produced topographic quadrant maps, US Topo maps are valuable to understand evolving hydrologic conditions (especially river and stream features).

*Federal Emergency Management Agency (FEMA) flood maps, which delineate topographically low, flood prone areas adjacent rivers and streams.

*Watershed Sciences, Inc. LiDAR derived topographic contours collected for Oregon Department of Geological and Mineral Industries (DOGAMI). Aerially surveyed and rectified cloud point data acquired in 2013 was utilized to generate two-foot (2') topographic contours through the National Oceanic and Atmospheric Administration (NOAA) Data Access Viewer (DAV) application.

* DOGAMI generated bare earth raster datasets derived from LiDAR point cloud data. The bare earth raster provides detailed shaded relief allowing the LWI teams to identify subtle swales and topographically low areas.

* LCOG provided 2019 infrared aerial photograph. This orthorectified aerial image depicts contemporary aerial conditions for each Study Area and surrounding vicinity. As the most recently acquired aerial photograph conforming to the Federal Geographic Data Committee (FGDC) Wetlands Mapping Standard, this aerial photograph was heavily relied upon to identify and assess suspect aerial signatures patterns.

*U.S. Department of Agriculture (USDA) National Aerial Imagery Program (NAIP) aerial photographs ranging from 1995 to 2016. Aerial datasets guided the LWI teams understanding of regional development, potential shifts in site use, and aided in identification of areas exhibiting suspect hydrological aerial signatures.

*Georeferenced City of Springfield shapefile inventories for streams, stormwater infrastructure, and waterways. Databases and associated shapefiles maintain up-to-date inventories of existing aquatic features as part of City's GIS program. City inventoried aquatic features were included as suspect features warranting field investigation.

*City digitized aquatic feature boundaries associated with previously issued DSL jurisdictional determinations. Previous agency review and approved boundaries were incorporated into cursory base maps for field documentation and confirmation.

* U.S. Fish and Wildlife Service (USFWS) NWI maps and shapefile data. Historic and more contemporarily inventoried NWI features available through the USFWS Wetlands Mapper service were automatically included as potential aquatic feature warranting field investigation. Field sampling of NWI polygons result in omission of features which do not qualify as wetland / waters or the refinement and / or reclassification of verified onsite features.

* USDA Natural Resource Conservation Service (NRCS) soil survey inventories and shapefiles attained through the Web Soil Survey program. Identification of hydric (wetlands) soil polygons was crucial to define suspect areas which may support contemporary (existing) aquatic features.

Identified reference materials were utilized to create base field and geodatabase background maps. Upon completion of base map generation, preliminary feature boundaries were approximated using AutoCAD and ArcGIS software. Preliminary boundaries were based on suspect areas typically situated in hydric soil units, NWI polygons, and topographically low geomorphic positions exhibiting suspect aerial signature patterns. City provided waterway and stormwater shapefile polygons were also relied upon to define suspect aquatic features.

Upon desktop identification of suspect features, cursory boundaries and pertinent reference data were loaded onto GPS instrumentation to guide the field investigation(s). The LWI field teams were granted access to all but one[1] LWI involved parcel; this parcel, however, does not exhibit suspect aquatic characteristics (such as inventoried hydric soils, NWI polygon, or aerial signature). During the field investigation(s), all but one[2] suspect aquatic feature was physically investigated. During the on-site field exercises, desktop-determined boundaries were examined to: 1) ground-truth and refine preliminary boundaries to reflect existing field conditions or 2) omitted from final mapping (as they did not satisfy necessary wetland criteria). The field team investigated suspected wetland features as represented by the sample plot numbers on the wetlands maps. Suspect wetland sites that did not satisfy wetland criteria due to indicators such as soil type or vegetation were omitted from further analysis.

2.2.2 On-site Determination Protocol

Upon digestion of background materials, SummitWest and TSI field teams conducted the LWI investigations between June 22 and July 13, 2020.

Table 2. Dates of Field Investigations

Site Name	Field Investigation Dates
North Gateway	June 22-23, 2020
Willamalane Properties (Oxbow)	June 22, 2020
Willamalane Properties (Lively & Ruff Parks)	June 24-25, 2020

[1] Access was not granted within privately owned Parcel 1803010002100 within the Mill Race Study Area.
[2] Wetland WPW-8 within the Willamalane Oxbow Natural Area was not field documented as fording the McKenzie River was not safe for the LWI field teams. Wetland boundaries for the feature were assessed using offsite analysis of background information and review of similarly situated Wetlands (WPW-7A-WPW-7E).

Mill Race	June 24-26, July 13, 2020

Field teams located desktop defined suspect features using background shapefiles and reference materials loaded onto GPS instrumentation. Each suspect feature was investigated to determine whether it exhibited wetland indicators, including hydric soils, elevated water tables and/or saturation, and wetland vegetation. To document the condition of aquatic features, sample plots were established within representative polygons in accordance with delineation methodology outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0) (WMVC). Existing vegetation was visually estimated using a thirty-foot (30') radius for trees and shrubs and a five-foot (5') radius for herbaceous species. Indicator statuses outlined in the *2018 Oregon Wetland Plant List* were then utilized to evaluate communities for hydrophytic determinations.

Soils were evaluated at each sample plot using a tape measure and tile spade to examine the upper portion of the soil profile. Exposed profiles were moist (or moistened) during color analysis using Munsell color charts. When possible; profiles were excavated to a depth of twenty inches (20"); gravel and rock refusal was often experienced at shallower depths. Profiles were then evaluated for hydric soil characteristics using the NRCS *Field Indicators of Hydric Soils in the United States* (Version 8.0).

Excavated soils pit locations were then utilized to observe and record elevated water tables and/or saturation (if present) during the site visit. Due to the summer timing of the investigation, the field teams did not consider the lack of elevated water tables alone as sufficient information to disqualify an area as supporting potential wetland hydrology. In lieu of direct hydrology observations and in accordance with WMVC methodology, the field team relied upon observations of other primary and secondary indicators to assess the hydrology parameter.

All sample plot locations were recorded using GPS instrumentation. WMVC delineation field sheets were transcribed onto digital data sheets and are included as report Appendix D.

When applicable, field teams refined (or omitted) preliminary aquatic feature boundaries using field observations of existing vegetation, soils, and geomorphic positioning. Confirmed feature boundaries were then recorded using GPS instrumentation; secondary boundary linework was processed for generation of the LWI graphics and geodatabase using AutoCAD and ArcGIS software. Field teams mapped boundaries for all but eight small aquatic feature boundaries; these small features (less than 0.1-acre) are mapped using the Probable Wetland (PW) nomenclature (in accordance with contemporary LWI mapping regulations).

While mapped with GPS instrumentation, no aquatic feature boundaries were flagged or otherwise demarcated in the field. Sample plot locations, however, were field defined using colored ribbon flagging.

2.3 Functional Assessment Protocol

2.3.1 The Oregon Freshwater Wetland Assessment Methodology (OFWAM)

The quality of LWI identified wetlands in the Study Area was assessed using the *Oregon Freshwater Wetland Assessment Methodology* (OFWAM) (Roth et al. 1996). OFWAM is used to evaluate the relative quality of wetlands primarily for planning and educational purposes. OFWAM does not assign a numeric ranking to the wetlands, but it does determine the relative quality of six functions for each of the wetlands: Wildlife Habitat, Fish Habitat, Water Quality, Hydrologic, Education, and Recreation. Each function is then assessed using three conditions: Sensitivity to Impact, Enhancement Potential, and Aesthetic Quality; while not required as part of the LWI inventory process for DSL, condition results are outlined within the OFWAM data sheets (Appendix E).

To conduct the OFWAM, identified LWI wetlands are grouped into assessment units based on proximity, similar vegetation characteristics, similar soil characteristics, and similar hydrologic characteristics. When bisected by a road, wetlands are considered as one assessment area when infrastructure (culverts, for example) allow for the free flow of surface water and the drainage is unidirectional. For example, several wetlands in the Mill Race Study Area are defined as separate LWI wetland polygons but are hydrologically connected by culverts beneath bike paths or gravel lanes; these similarly situated wetlands are, therefore, assessed as one unit.

When wetlands are situated on opposing sides of a river they are considered to be within the same assessment unit. For example, Weyerhaeuser McKenzie Natural Area (hereafter Oxbow Natural Area) has an assessment unit dissected by the McKenzie River. As these wetlands share similar plant communities, soil characteristics, and hydrologic influences one OFWAM is representative and adequately describes the condition of the river-separated wetland.

As wetlands of less than one-half (0.5) acre in size can be designated as a probable wetland (PW), only those wetlands greater than or equal to one-half acre in size were assessed using OFWAM.

All assessment areas identified in this LWI adhered to this guidance, and assessment unit boundaries are described in the Results section of this report.

2.3.2 OFWAM Functions and Values

Wetlands vary greatly by type, size, and condition, and therefore not all perform the same functions and not all are equally valued. The OFWAM uses indicators that allow for the evaluation of various functions, as well as provides a framework for comparing value (relative importance) for each wetland.

Functions are defined as the ecological processes in the wetland, such as flood control or nutrient cycling. Values are the societal importance of a wetland attached to those functions, such as preventing urban flooding during large precipitation events. The condition of the wetland is the degree in which it has been altered or degraded. Education and recreation are also considered to be functions of a wetland in terms of what they can provide to the public. Wetland functions evaluated by OFWAM include:

Wildlife habitat: Wetlands can provide diverse habitat for numerous species. OFWAM evaluates the habitat diversity for species usually associated with wetlands, without emphasizing one particular species.

Fish habitat: OFWAM evaluates how a wetland contributes to fish habitat in streams, ponds or lakes associated with a wetland. The questions are suitable for both warm-water and cold-water fish, and no particular species is emphasized. Only wetlands with water bodies with the potential for fish habitat were assessed for this function; those not connected to a river or pond by unimpeded surface flow were not considered.

Water Quality: OFWAM evaluates the potential of a wetland to reduce the impacts of excess nutrients in stormwater runoff on downstream waters.

Hydrologic control: Wetlands can hold and retain water during large precipitation events, thereby reducing flooding impacts. OFWAM evaluates the effectiveness of a wetland to reduce downstream flood peaks and store floodwaters.

Education: OFWAM evaluates the suitability of the wetland as a site for an "outdoor classroom" in a location that is publicly accessible where someone can learn about plants, birds, hydrology, etc. Some wetlands provide better opportunities than others depending on access, ownership, and the results of the other functions.

Recreation: OFWAM evaluates the suitability of the wetland and associated watercourses for non-powered boating, fishing and similar recreational activities. A wetland is a valuable asset, and therefore functional, when it is publicly accessible.

While OFWAM provides qualitative information on the relative value of wetland functions, the methodology does not provide a numerical ranking. Rather, categories of High (H), Medium (M), and Low (L) are assigned to the assessment criteria to easily compare the results. High designations were assigned to wetlands receiving the highest function or condition result (e.g., intact, diverse) while Low was assigned to the wetlands receiving the lowest result (lost or not present); Medium rating is assigned to results which do not fit the other criteria (impacted or degraded, potential). This system is summarized in Table 3 and was used to display the results of the six OFWAM functions for each assessment area.

Table 3. Key to OFWAM Ranking

Wildlife Habitat	H. *Wetland provides diverse wildlife habitat* M. *Wetland provides habitat for some wildlife species* L. *Wetland does not provide wildlife habitat*
Fish Habitat	H. *Wetland's fish habitat function is intact* M. *Wetland's fish habitat function is impacted or degraded* L. *Wetland's fish habitat function is lost or not present*
Water Quality	H. *Wetland's water-quality function is intact* M. *Wetland's water-quality function is impacted or degraded* L. *Wetland's water quality function is lost or not present*
Hydrologic Control	H. *Wetland's hydrologic control function is intact* M. *Wetland's hydrologic control function is impacted or degraded* L. *Wetland's hydrologic control function is lost or not present*
Education	H. *Wetland has educational uses* M. *Wetland has potential for educational uses* L. *Wetland is not appropriate for educational uses*
Recreation	H. *Wetland provides recreational opportunities* M. *Wetland has the potential to provide recreational opportunities* L. *Wetland is not appropriate for or does not provide recreational opportunities*

Modified from Pacific Habitat Services, Inc. 2010

2.3.3 Wetlands of Special Interest Protection

OFWAM also evaluates each wetland using a series of ten questions to determine if a feature qualifies as a "Wetland of Special Interest for Protection". These questions assess features: capability to support Federal or State listed threatened, endangered, or sensitive species; designation as critical habitat; inclusion within existing management / conservation plans; significance for migratory birds; designation as a State Outstanding Resource Water; identification as a compensatory mitigation area; inclusion in the NRCS wetland reserve program, and / or; documented presence of uncommon wetland plant communities in Oregon. These factors can determine if the wetland is protected by regulatory rules or statutes. A "yes" answer to any of the ten OFWAM questions qualifies the wetland as a wetland of "Special Interest for Protection." Resources referenced during assessment of this parameter include:

* Oregon Natural Heritage Program (ONHP) databases which document sensitive species potentially occurring in the proximity of the Study Area(s);

*USFWS Critical Habitat for Threatened & Endangered Species maps;

*ODFW interviews;

*Metro / City conservation plans, including Willamalane Park and Recreation Comprehensive Plan – 2012 and Mckenzie River Oxbow Natural Area Master Plan - 2001;

*Oregon Explorer Map Viewer;

*OR DEQ 303(d) 2018/2020 water resources list;

*DSL Essential Salmonid Habitat (ESH) Maps, and;

*DSL records of permit actions for identification of potential compensatory mitigation areas.

As a majority of wetlands are on publicly owned land managed as Open Space it is anticipated they may satisfy "inclusion within existing management / conservation plans."

2.4 Riparian Inventory Protocol

A "Riparian area" is defined as the area adjacent to a river, lake, or stream, consisting of the area of transition from an aquatic ecosystem to a terrestrial ecosystem. The "Riparian corridor" is a Goal 5 resource that includes the water feature, fish habitat, adjacent riparian areas, and wetlands within the riparian area boundary (Administrative Rule by DLCD; Chapter 660, Division 23). Goal 5 requires that fish-bearing rivers, lakes, and stream habitats be included in the riparian inventory, including waterbodies with both native and introduced fish species. As such, the determination of riparian corridors was based on all fish-bearing waterbodies within the Study Area.

Resources referenced to identify aquatic features which support potential fish populations include:

- StreamNet, a multi-agency collaborative effort to obtain georeferenced and standardized fish distribution data;
- DSL's Essential Salmonid Habitat (ESH) mapping;
- Oregon Department of Fish and Wildlife (ODFW) interview;
- Field observations;
- McKenzie River Oxbow Natural Area Master Plan, 2001.

Within the Study Area nine (9) stream features satisfy defined Goal 5 criteria and the riparian condition assessed: McKenzie River, Middle Fork Willamette River, Keizer Slough, Cedar Creek, South Fork Cedar Creek, Mill Race, Gorrie Creek, Quarry Creek, and SUB Drainage. For several stream features, only one riparian corridor is situated within the LWI Study Area. Refer to *Figure 1. Project Overview Map*. For example, the McKenzie River skirts the north-east edge of the North Gateway Study Area; in this instance, an assessment is only conducted for the south riparian area extending into Study Area boundary.

The Study Area also contains four (4) waterbody features likely to contain potential (non-native) fish species. In accordance with protocol, Wetlands MRW-9A, MRW-14D, MRW-17 and MRW-18 waterbodies are also assessed for riparian condition.

2.4.1 Safe Harbor Assessment Protocol

Goal 5 contains a "safe harbor" option for local jurisdictions which allows them to replace portions of the standard Goal 5 process with a simplified, uniform approach as described in the specific Rules for each Goal 5 resource (e.g., the Rules for Riparian Corridors are in OAR 660-023-0090). The safe harbor process for riparian corridors allows jurisdictions to impose a fifty (50) foot setback from all fish-bearing lakes and streams and a seventy-five (75) foot setback from all streams with average annual stream flow greater than 1,000 cubic feet per second (cfs) [OAR 660-023- 0090(5)]. Setbacks are applied to the top of bank of the waterway resource or, when locally significant wetlands are within 50 or 75 feet from the top of bank of the riparian resource, or are hydrologically connected by surface flow to these wetlands, the setback is to begin at the upland edge of the wetland. Setbacks are determined using inventoried LWI aquatic feature boundaries documented herein.

2.4.2 Urban Riparian Inventory and Assessment Guide (URIAG) Protocol

The *Urban Riparian Inventory and Assessment Guide* (URIAG) methodology is comprised of a riparian inventory and a riparian assessment. The riparian inventory involves gathering and assimilating information pertinent to the project site, developing a base map, and completing the riparian characterization form. Goal 5 does not establish specific criteria for determining significant riparian areas. Instead, local jurisdictions establish their own criteria based on the quantity and quality of the riparian resource.

Riparian corridors are broken into "reaches" with similar characteristics, such as vegetation patterns or land use for assessment. Reaches are assigned based on a combination of available knowledge, field observations, and best professional judgment (DSL, 1998). To assign quality to a riparian reach, the URIAG methodology assesses functions, including water quality, flood management, thermal regulation, and wildlife habitat. These functions are then assigned a value of low, medium, or high through answering a series of questions about each function.

The URIAG methodology was used to determine the riparian width on all fish-bearing streams and waterways. The riparian width is measured from the edge of the water resource, typically either the top of a streambank or the outer edge of the LWI defined feature. Riparian areas on both sides of a stream channel are assigned separate widths. The *potential* width of the riparian area is based on the dominant riparian tree species within one-hundred (100) feet of the water resource. The height of the dominant tree species at maturity is used as a distance to define the outer riparian boundary. The height of the tree species at maturity is called the Site Potential Tree Height (SPTH). Setback distances are determined using the upland edge of inventoried LWI aquatic feature boundaries documented herein.

3.0 Project Study Area Characteristics

Located at the southern extent of the Willamette Valley, the Study Area is positioned on alluvial terrace landforms associated with the McKenzie River (North Gateway and Willamalane Properties Study Areas) or Middle Fork Willamette River (Mill Race Study Area). The Study Areas are situated in the Marine West

Coast climate zone which has a Mediterranean climate with cool, wet winters, and warm, dry summers. According to National Oceanic and Atmospheric Administration (NOAA), average rainfall is 36.38 inches and typically ranges between 32.23 and 39.83 inches in most years (DSL, 1998). Using the topographically similar Eugene-Mahlon Sweet Field WETS Station, the growing season for the Study Area is defined as occurring between March 7 through November 13 (NOAA, 2020).

The 792.15-acre Study Area is dissected into three distinct Study Areas: North Gateway, Willamalane Properties, and Mill Race. Approximately two-thirds (66%) of the Study Areas are publicly-owned, 33% are owned by private entities, and 1% consists of road right-of-ways, as represented in Appendix H.

Table 4. Study Areas Acreage Analysis

Study Area	Public Parcels	Private Parcels	Right-of-Way	Total Acres
North Gateway	9.84	190.30	12.15	212.3
Willamalane Properties	75.02	-	-	75.02
Mill Race	433.60	72.71	1.59	507.9
Total Project Study Area:				792.2

3.1 North Gateway Study Area

The North Gateway Study Area totals 212.3 acres, of which 190.30 acres are privately owned and 9.84 acres are owned by public entities. This Study Area contains six individual parcels and portions of two road right-of-way parcels within Township 17 South, Range 03 West, Sections 10 and 15, Willamette Meridian. The City of Springfield's Zoning Map identifies a majority of the Study Area as Agriculture-Urban Holding Area with smaller areas designated as Public Land and Open Space.

The North Gateway Study Area is bordered by the McKenzie River to the north-northeast, by Interstate I-5 to the west, and by campus-style industrial development to the south. While the site contains three rural residences, the majority of this Study Area remains undeveloped and in agricultural production. Approximately 75% of the Study Area is actively utilized for agricultural crop production and/or residential use, approximately 5% is developed as an EWEB power facility, and approximately 20% remains in relatively undisturbed forest and/or shrubland. This is represented in Figure 3 (Appendix B.1).

3.1.1 Topography

The North Gateway Study Area is situated on a relatively flat to slightly undulating alluvial terrace situated along the (offsite) McKenzie River. Generally, the terrace slopes gently from south to north and east to west. Elevations within the North Gateway Study Area range from approximately 400 feet above mean sea level (msl) along the McKenzie River to 440 feet msl along Interstate 5. A remnant (no longer active)

side channel of the river, locally known as Maple Island Slough[3], skirts the southern site boundary before dissecting the north-central portion of the Study Area; the bottom of this feature is approximately six (6) to ten (10)-feet lower than the surrounding terrace landform. The north edge of the of Study Area follows the top of an abrupt escarpment approximately twelve (12) to sixteen (16) feet above river level; a lengthy portion of this escarpment has rip-rap bank protection. This is represented in Figure 2 (Appendix B.1).

3.1.2 Vegetation Communities

The majority of the existing land in the North Gateway Study Area is utilized for agricultural purposes with large portions in ryegrass (*Lolium spp*.) production. Some of these areas are fallow or are resting between crops whereas an area in the north is used for vegetable crops. Some forested areas and low scrub areas exist along the McKenzie River as well as within and along the former Maple Island Slough. Other land use includes an industrial parcel for the EWEB Substation in the southwest corner of Study Area. Finally, there are several rural residential lands in the southeast and northwest parts of the Study Area.

Local Vegetation Communities

Generalized plant communities encountered within the North Gateway Study Area include: mixed upland coniferous/deciduous forest; deciduous forest, agricultural fields / developed; wetlands; and riparian forest and scrubland. Each of these communities is described below. Wetland communities are further distinguished as palustrine emergent, or palustrine scrub-shrub following the Cowardin classification system developed for the US Fish and Wildlife Service (Cowardin, et. al., 1979).

Mixed Upland Coniferous-Deciduous Forest: This community occurs in topographically high areas that are well drained, such as the top of the escarpment along the McKenzie River, along the outside edge of the remnant Maple Island Slough, and in the relatively undisturbed southeast corner of the Study Area. This community is dominated by a mix of Douglas fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*). Scattered black cottonwood (*Populus trichocarpa*) and Oregon ash (*Fraxinus latifolia*) may occur in this community but are more prevalent in the topographically lower Wetlands and Riparian communities (described below). The understory is often dominated by Himalayan blackberry but may include saplings and/or younger overstory species, such as scattered Scouler's willow (*Salix scouleriana*), hawthorn (*Crataegus spp.*), and common snowberry *(Symphoricarpos albus)*. Herbaceous species include sword fern (*Polystichum munitum*) and various upland grasses including blue wild-rye (*Elymus glaucus*), soft brome (*Bromus hordeaceus*), rip-gut brome (*Bromus rigidus*), velvet grass (*Holcus lanatus*), rat-tail brome (*Vulpia bromoides*), annual and perennial ryegrass (*Lolium spp.*), and tall fescue (*Schedonorus arundinaceus*).

[3] *Conclusions pending. A feature called Maple Island Slough has been represented on a number of other maps and in other inventories, but our field investigations made it clear that hydrology monitoring is needed. Areas associated with Maple Island Slough pending hydrology analysis in winter 2020/21 for feature confirmation and classification. This analysis could result in an additional resource site described herein and shown on the maps.*

Agricultural Fields / Developed: This community occurs on the broad, flat alluvial terraces between the McKenzie River, Interstate 5, and the former Maple Island Slough. At the time of report publication, most of these areas were in agricultural perennial ryegrass (*Lolium spp.*) production. Some vegetable crops are grown in the northwest portion of the Study Area; these fields were mostly fallow / resting at the time of the field study.

Those areas not in agricultural production but considered developed include areas around the EWEB Substation in the southwest and around the rural residences within the Study Area. These areas were dominated by a mix of non-native turfgrasses that were frequently kept mowed. All other developed areas include parking areas and unpaved and paved roadways which were generally unvegetated. Around residences, vegetation that is not turfgrass is often of horticultural origin or comprised of weedy species. The fringes of these developed areas often include areas of Himalayan blackberry.

Wetlands: Two (2) wetland vegetation communities occur within the north-central portion of the Study Area. These communities are:

> *Palustrine scrub/shrub wetlands (PSS)* dominated by widely scattered Oregon ash (*Fraxinus latifolia*) in the overstory, a slightly greater cover of Oregon ash saplings and small trees in the understory, and reed canarygrass (*Phalaris arundinacea*) in the herbaceous stratum. Wetland NGW-2 is an example of this community.
>
> *Palustrine emergent wetlands (PEM)* dominated by widely scattered black cottonwood (*Populus trichocarpa)* in the overstory, scattered Oregon ash saplings, small trees, and Himalayan blackberry in the understory, and reed canarygrass in the herbaceous stratum. Wetland NGW-1 is an example of this community.

Riparian Forest and Scrubland: Riparian communities occur along the banks of the McKenzie River as well as within the bottom of the remnant Maple Island Slough as it dissects the Study Area. The latter consists of mature black cottonwood and Oregon ash in the overstory which established when Maple Island Slough exhibited wetter hydrologic conditions; the area now supports thickets of Himalayan blackberry in the understory and a mix of mostly non-native forbs and grasses. Forested riparian communities adjacent the McKenzie River support black cottonwood, Oregon ash, and scattered bigleaf maple in the overstory, Himalayan blackberry, willow, and hawthorn in the understory, and a mix of native and non-native grasses and forbs. Riparian areas between the active agricultural fields and McKenzie River contain Himalayan blackberry.

3.1.3 Soils

As outlined on Table 5 and depicted on Figure 5 (Appendix B.1), NRCS inventories six (6) distinct soil mapping units within the North Gateway Study Area.

Table 5. Inventoried Soils within the North Gateway Study Area

Mapping Unit	Soil Name	Slopes	Classification	Drainage Class	Hydric?
48	Fluvents	-		Poorly drained	Yes

96	Newberg loam	-	Fluventic Haploxerolls	Well drained	No
26	Chehalis silty clay loam	-	Ultic Haploxerolls	Well drained	No
95	Newberg fine sandy loam	-	Fluventic Haploxerolls	Somewhat excessively drained	No
22	Camas gravelly sandy loam	-	Fluventic Haploxerolls	Excessively drained	Yes
113G	Ritner cobbly silty clay loam	30% - 60%	Typic Haploxerepts	Well drained	No

3.1.4 Watershed and Hydrology

The North Gateway Study Area is located in the Walterville Canal-McKenzie River 6th level watershed (hydrologic unit code (HUC) 170900040706). This watershed is approximately 57 square miles in size and, using OFWAM protocol, is calculated to have an average slope of 3.5%. The Study Area is situated within the topographically lower third of this watershed.

Hydrology for this North Gateway Study Area is primarily supported by precipitation save for those areas immediately adjacent to the McKenzie River. As the site is generally underlain by gravel substrates, precipitation is quickly infiltrated and surface retention appears to be minimal. For those areas immediately adjacent the river, as well as the topographically lowest (northern) extent of the Maple Island Slough, hyporheic flow from the river provides more sustained hydrology. While located within FEMA defined flood hazards zones, flooding from the McKenzie River is infrequent and only during high flow events.

The remnant Maple Island Slough[4] landform occasionally receives stormwater discharge from an adjacent (offsite) stormwater management features associated with development to the south (City, September 24, 2020). Similar to the infrequent McKenzie River floodwaters, this discharge appears to occur only during high precipitation events and is not a long term or sustained hydrologic source to the remnant slough feature.

3.1.5 Sensitive Species and Water Quality Data

Potential sensitive species information was assessed using the Oregon Explorer interactive map view and reports. During the August 2020 review, Oregon Explorer's list of sensitive species occurring within the Walterville Canal-McKenzie River 6th level watershed (HUC 170900040706) includes:

- Western pond turtle (*Actinemys marmorata*)
- Bradshaw's lomatium (*Lomatium bradshawii*)
- Northern spotted owl (*Strix occidentalis caurina*)

[4] *Conclusions pending. A feature called Maple Island Slough has been represented on a number of other maps and in other inventories, but our field investigations made it clear that hydrology monitoring is needed. Areas associated with Maple Island Slough pending hydrology analysis in winter 2020/21 for feature confirmation and classification. This analysis could result in an additional resource site described herein and shown on the maps.*

- Bull trout (Coastal Recovery Unit) (*Salvelinus confluentus*)
- Oregon chub (*Oregonichthys crameri*)
- Chinook salmon (Upper Willamette River ESU, spring run) (*Oncorhynchus tshawytscha*)
- Pacific lamprey (*Entosphenus tridentatus*)
- Winged floater mussel (*Anodonta nuttalliana*)

DSL's 2015 Essential Salmonid Habitat (ESH) mapping inventories the (offsite) McKenzie River as ESH for Spring Chinook. No portion of the North Gateway Study Area, however, is mapped by DSL as having ESH.

DEQ's 2018/2020 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution and contemporary DEQ interactive mapping programs indicate that the McKenzie River is a Category 5 Water Quality Limited Waterway for temperature and other impairments. DEQ also identifies the majority of the North Gateway Study Area as being situated atop the Rainbow Water District Groundwater Public Water System Protection Zone. Lastly, the City's adopted inventory of local water quality waters identifies Maple Island Slough[5] as a local Water Quality Limited Waterway.

3.1.6 Previous Inventories and Assessment Information

USFWS NWI inventories a small, Palustrine, Emergent, Persistent, Seasonally Flooded (PEM1C) wetland polygon in the northwest portion of the North Gateway Study Area. NWI mapping also identifies a Palustrine, Forested, Seasonally Flooded (PFOC) / feature extending through the site; said feature reflects a remnant scour channel of the McKenzie River, locally known as Maple Island Slough.

FEMA mapping inventories Floodways of the McKenzie River skirting the north-east site boundary, generally reflecting the offsite orientation of the river. The remainder of the site is inventoried as being in the FEMA Floodplain Zone A.

The City's adopted inventory of local water quality limited waters also identifies a Water Quality Limited Waterway reflective of the remnant Maple Island Slough.

NWI Figure 4 provided within Appendix B.1 documents referenced inventories and assessments.

3.2 Willamalane Properties Study Area

The Willamalane Properties Study Area consists of three (3), publicly-owned properties totaling 75.02 acres: the Weyerhaeuser-McKenzie Natural Area (herein Oxbow Natural Area), Jack B. Lively Memorial Park (herein Lively Park), and Wallace M. Ruff Jr. Memorial (herein Ruff Park). These parcels are located in Sections 26, 27, 29, and 30 of Township 17 South, Range 2 West, Lane County, Willamette Meridian, Oregon. The City's Zoning Map designates each area as Public Land and Open Space. This is represented in Figures 10 and 11 (Appendix B.2).

[5] *Conclusions pending. A feature called Maple Island Slough has been represented on a number of other maps and in other inventories, but our field investigations made it clear that hydrology monitoring is needed. Areas associated with Maple Island Slough pending hydrology analysis in winter 2020/21 for feature confirmation and classification. This analysis could result in an additional resource site described herein and shown on the maps.*

All three properties are managed for varying levels of recreational use, ranging from the more natural Oxbow Natural Area to highly managed and manicured Ruff Park. Each of these properties contains pedestrian paths, bike trails, and designated parking areas.

3.2.1 Topography

Topography within the Oxbow Natural Area consists of a low, undulating floodplain terrace adjacent an oxbow of the McKenzie river. The north portion of the park slopes steeply east and toward the river, whereas the southeast is gentler undulating. Several side channels and alcoves occur along the river. Elevations range from 467 feet along the lowest part of the river to 485 feet along Marcola Road in the northwest. This is represented in Figure 8 (Appendix B.2).

Topography within Lively and Ruff Parks is mostly flat to gently sloping north where parklands transition steeply to Cedar Creek along their north Study Area boundaries. Elevations at Lively Park range from 510 feet in the south to 498 feet along Cedar Creek. Elevations at Ruff Park range from 515 feet in the southeast to 504 feet along Cedar Creek. This is represented in Figure 9 (Appendix B.2).

3.2.2 Vegetation Communities

The majority of the existing land in the Willamalane Properties Study Areas is utilized for parks and open space. Oxbow Natural Area is the least developed with the majority of vegetation occurring as forested and scrub-shrub areas along the McKenzie River with some open grassy areas. The grassy areas are managed by EWEB in the southeast part. Lively and Ruff Parks, in contrast, are developed and managed as traditional city parks with mowed turfgrass and horticultural plantings. Portions of Lively and Ruff Parks bordering Cedar Creek have forested vegetation along the creek and on the adjacent alluvial terrace. Within Ruff Park, areas adjacent South Cedar Creek has riparian forest established along the drainage with the remaining areas managed for grass and horticultural plantings. Areas around the developed parking lots within the parks are generally maintained as turfgrass with horticultural plantings.

Local Vegetation Communities

Generalized plant communities encountered within the Willamalane Properties Study Areas include: mixed upland coniferous/deciduous forest; upland deciduous forest, park grassland / developed; wetlands; and riparian forest and scrubland. Each of these communities is described below. Wetland communities are further distinguished as palustrine emergent, or palustrine scrub-shrub following the Cowardin classification system developed for the USFWS.

Mixed Upland Coniferous-Deciduous Forest: This community occurs in areas that are topographically higher and/or well drained such as the on the forested terrace south of Cedar Creek at Lively and Ruff Parks. This community is primarily dominated by a mix of bigleaf maple (*Acer macrophyllum*) and Douglas fir (*Pseudotsuga menziesii*). Black cottonwood (*Populus trichocarpa*) and Oregon ash (*Fraxinus latifolia*) occur occasionally in this community but are more prevalent in the Wetlands and Riparian communities (described below). The understory contains California hazelnut (*Corylus cornuta*), Himalayan blackberry (*Rubus bifrons*), and osoberry (*Oemleria cerasiformis*). It includes saplings and/or younger overstory

species, as well as hawthorn (*Crataegus spp.*) and common snowberry *(Symphoricarpos albus)*. Herbaceous species include sword fern (*Polystichum munitum*), trailing blackberry (*Rubus ursinus*), and several upland grasses including blue wild-rye (*Elymus glaucus*), oniongrass (*Melica spp.*), and tall fescue (*Schedonorus arundinaceus*).

Upland Deciduous Forest: This community occurs within the upland (non-wetland, non-riparian) areas of the Oxbow Natural Area. It is dominated by bigleaf maple and black cottonwood in the overstory with scattered Oregon ash, Scouler's willow (*Salix scouleriana*), and osoberry with occasional to frequent thickets of Himalayan blackberry in the understory. The herbaceous stratum is a mix of native and non-native grasses and forbs including reed canarygrass (*Phalaris arundinacea*), tall fescue, blue wild-rye, and trailing blackberry.

Park Grassland / Developed All three properties support this community around parking areas as well as in the broader, well-managed, "city park"-like settings. This community is dominated by a mix of non-native turfgrasses that are frequently kept mowed. Horticultural trees and shrubs are often present, particularly in Ruff and Lively Parks. All other developed areas include parking lots and unpaved and paved roadways which are generally unvegetated. Around structures, vegetation that is not turfgrass is often of horticultural origin or weedy. The fringes of some of these developed areas sometimes include Himalayan blackberry.

Wetlands: Three (3) wetland vegetation communities occur within the topographically low areas along the McKenzie River bottomlands, Cedar Creek, and South Cedar Creek. These are:

> *Palustrine forested wetlands (PFO)* dominated by bottomland gallery forest species including mature specimens of black cottonwood, Oregon ash, and red alder (*Alnus rubra*) in the overstory, younger Oregon ash, red alder, willow (*Salix* sp.), and red-osier dogwood (*Cornus alba*) in the understory, and slough sedge (*Carex obnupta*) and reed canarygrass dominating the herbaceous layer. Wetlands WPW-4A and WPW-7A within the Oxbow Natural Area are examples of this community.
>
> *Palustrine scrub/shrub wetlands (PSS)* dominated by scattered Oregon ash in the overstory, red-osier dogwood and Pacific ninebark (*Physocarpos capitatus*) in the understory, and slough sedge and reed canarygrass in the herbaceous stratum. Wetlands WPW-1 and WPW-3 are examples of this community.
>
> *Palustrine emergent wetlands (PEM)* generally lack tree and shrub species but include marshpepper smartweed (*Polygonum hydropiper*) and reed canarygrass in the herbaceous stratum. Wetland WPW-4B is an example of this community.

Riparian Forest and Scrubland: Riparian forest and scrubland communities occur along the steeper non-wetland banks of the McKenzie River as well as along the upper banks of Cedar Creek and South Cedar Creek. The riparian community along the McKenzie River is dominated by black cottonwood, red alder, and scattered bigleaf maple in the overstory, Himalayan blackberry, snowberry (*Symphoricarpos albus*) and hawthorn in the understory, and a mix of native and non-native grasses and forbs. Several areas along the banks of the river are dominated by Himalayan blackberry with very little overstory. As for Cedar Creek and South Cedar Creek, these riparian communities generally lack black cottonwood but are

otherwise similar to those found along the McKenzie River. Some areas are also dominated by Himalayan blackberry.

3.2.3 Soils

As outlined on Table 6 and depicted on Figures 14 and 15 (Appendix B.2), NRCS inventories ten (10) distinct soil mapping units within the Willamalane Properties Study Areas.

Table 6. Mapped Soils within the Willamalane Properties Study Area

Soil Series	Soil Name	Slopes	Classification	Drainage Class	Hydric?
48	Fluvents	-	-	Poorly drained	Yes
22	Camas gravelly sandy loam	-	Fluventic Haploxerolls	Excessively drained	No
29	Cloquato silt loam	-	Cumulic Ultic Haploxerolls	Well drained	No
97	Newberg-Urban land complex	-	Fluventic Haploxerolls	Well drained	No
95	Newberg fine sandy loam	-	Fluventic Haploxerolls	Well drained	No
96	Newberg loam	-	Fluventic Haploxerolls	Well drained	No
113E	Ritner cobbly silty clay loam	12-30% slopes	Typic Haploxerepts	Well drained	No
75	Malabon silty clay loam	-	Pachic Ultic Argixerolls	Well drained	No
89C	Nekia silty clay loam	2 to 12% slopes	Xeric Haplohumults	Well drained	No
114	Riverwash	-	-	Poorly drained	Yes

3.2.4 Watershed and Hydrology

The Willamalane Properties Study Area are located in the Walterville Canal-McKenzie River 6th level watershed (hydrologic unit code (HUC) 170900040706). This watershed is approximately 57 square miles in size and, using OFWAM protocol, is calculated to have an average slope of 3.5%. The Study Area is situated within the topographically middle third of this watershed.

For the Oxbow Natural Area area, hydrology is primarily supported by hyporheic and overland flow from the McKenzie River with direct precipitation contributing only a minor component. Due to underlying gravel substrates, precipitation is quickly infiltrated. Winter and spring overland flow from high water and flood events is retained in the lowest (wetland) areas and sustained by hyporheic flow from the McKenzie River during summer. Keizer Slough, conveying runoff from adjacent industrial lands to the south, flows northerly to McKenzie River through the eastern portion of the site.

For the majority of the Ruff and Lively Parks, hydrology is primarily supported by direct precipitation with only the areas immediately adjacent Cedar Creek and South Cedar Creek being influenced significantly from surface and/or hyporheic flows associated with these waterways. These areas also lack sustained surface retention due to underlying gravel substrates which quickly infiltrate precipitation.

3.2.5 Sensitive Species and Water Quality Data

Potential sensitive species information was assessed using the Oregon Explorer interactive map view and reports. During the August 2020 review, Oregon Explorers list of sensitive species occurring within the Walterville Canal-McKenzie River 6th level watershed (HUC 170900040706) includes:

- Western pond turtle (*Actinemys marmorata*)
- Bradshaw's lomatium (*Lomatium bradshawii*)
- Northern spotted owl (*Strix occidentalis caurina*)
- Bull trout (Coastal Recovery Unit) (*Salvelinus confluentus*)
- Oregon chub (*Oregonichthys crameri*)
- Chinook salmon (Upper Willamette River ESU, spring run) (*Oncorhynchus tshawytscha*)
- Pacific lamprey (*Entosphenus tridentatus*)
- Winged floater mussel (*Anodonta nuttalliana*)

DSL's Essential Salmonid Habitat (ESH) mapping inventories the McKenzie River (and side channels locally inventoried as Keizer Slough) and Cedar Creek as ESH.

Within the Oxbow Natural Area, DEQ's 2018/2020 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution and contemporary DEQ interactive mapping programs indicate that the McKenzie River as a Category 5 Water Quality Limited Waterway for temperature and other impairments. The City's Water Quality Limited Waterway inventory identifies Keizer Slough as a Water Quality Limited Waterway. Lively and Ruff Parks skirt the DEQ inventoried Cedar Creek which is listed as Category 5 water quality Limited Waterway for temperature and other impairments. The City's local Water Quality Limited Waterways inventory identifies Cedar Creek and South Cedar Creek as Water Quality Limited Waterways.

3.2.6 Previous Inventories and Determinations

Oxbow Natural Area is inventoried by USFWS NWI as containing Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded (R2UBH) features associated with the McKenzie River and Keizer Slough. Bottomland wetlands adjacent the river are inventoried as Palustrine, Forested, Seasonally Flooded (PFOC), respectively.

Ruff and Lively Parks are inventoried by the NWI as containing Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded (R2UBH) Cedar Creek along their northern site boundaries. USFWS also inventories a Riverine, Intermittent, Streambed, Seasonally Flooded (R4SBC) feature associated with a biofiltration swale within Lively Park; sampling within the topographically low portion of this feature documents this is an upland feature (see Section 5.1 for discussion). South Cedar Creek within Ruff Park is also inventoried by USFWS as R2UBH.

FEMA mapping inventories a majority of the Oxbow Natural Area as being contained within the Floodway elevation of the McKenzie River. While Floodway of Cedar Creek is defined along the northern edge of Lively Park, a majority of this site is located in an area of Minimal Flood Hazard. Ruff Park is inventoried as having Floodways associated with Cedar Creek and South Cedar Creek; the remainder of this park is contained within Flood Zone AE.

The City's Water Quality Limited Waterways inventory also identifies the McKenzie River as a Water Quality Limited Waterway and Keizer Slough as a Water Quality Limited Waterway within Oxbow Natural Area. Further, the City identifies Cedar Creek and South Cedar Creek as Water Quality Limited Waterways.

Lastly, a wetland delineation was conducted within the Oxbow Natural Area site circa 2000. Delineation linework was reviewed and approved via issuance of DSL's jurisdictional determination WD#2001-0056.

NWI Figures 12 and 13 provided within Appendix B.2 document referenced inventories and assessments.

3.3 Mill Race Study Area

The Mill Race Study Area totals 507.86 acres, of which 72.71 acres are privately owned, 227.76 acres are exclusively owned by the Springfield Utility Board (SUB), 70.66 acres are exclusively owned by Willamalane, 15.12 acres are exclusively owned by the City, and 120.06 acres are co-owned by SUB, Willamalane, and the City. The Mill Race Study Area comprises 30 tax lots within Section 1 in Township 18 South, Range 3 West, and 18 tax lots in Sections 4, 6, 7, and 8 in Township 18 South, Range 2 West, Lane County, Willamette Meridian. The City's Zoning Map inventories a majority of the Study Area as Public Land and Open Space with small areas in the northwest designated as Agriculture -Urban Holding Area. This is represented in Figure 21 (Appendix B.3).

The Mill Race Study Area is bordered by the Middle Fork Willamette River to the south and Springfield Butte to the west. The Mill Race drainage generally flows along the north Study Area boundary. The eastern portion of the Study Area contains Clearwater Park, the central portion contains the Georgia Pacific Natural Area, and the western portion contains SUB water treatment facilities. Only the

northwestern portion of this Study Area is privately owned. Privately owned lands range from areas of active agricultural pasture use to abandoned orchards to rural residential lands.

3.3.1 Topography

Topography in the Mill Race Study Area generally consists of undulating alluvial terraces dissected by creeks and drainages. Overall, the Study Area slopes very gently to the south and west toward the Middle Fork Willamette River. Mill Race, Gorrie Creek, Quarry Creek, and SUB Drainage dissect the alluvial terrace landform within defined channels. Several remnant scour channels are also incised within the larger terrace landform. Historical industrial use of this vicinity results in several abandoned borrow pits, aggregate quarries, and or log ponds which are scattered throughout; these depressional features consist of excavated areas surrounded by berms. Topography ranges from 496 feet at the upper east end to 452 feet at the lower west end of the Study Area. This is represented in Figure 20 (Appendix B.3).

3.3.2 Vegetation Communities

Generalized plant communities encountered within the Mill Race Study Area include: mixed upland coniferous/deciduous forest; upland deciduous forest; grassland meadows; fallow nut tree farm / scrubland; park grassland / developed; wetlands; and riparian forest and scrubland. Each of these communities is described below. Wetland communities are further distinguished as palustrine emergent, palustrine scrub-shrub, and palustrine forested following the Cowardin classification system developed for the USFWS.

Mixed Upland Coniferous-Deciduous Forest: This community occurs in the areas that are topographically higher and/or well drained such as on the higher forested terraces just north of the Middle Fork Willamette River and upland areas along Mill Race. This community is generally dominated by a mix of Douglas fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*), however, black cottonwood (*Populus trichocarpa*), Oregon ash (*Fraxinus latifolia*), western red cedar (*Thuja plicata*), and incense cedar (*Calocedrus decurrens*) occasionally co-dominate in this community. The understory is broadly variable depending on location but may include younger saplings and trees that occur in the overstory as well as California hazelnut (*Corylus cornuta*), Himalayan blackberry (*Rubus bifrons*), osoberrry (*Oemleria cerasiformis*), hawthorn (*Crataegus spp.*) and common snowberry *(Symphoricarpos albus)*. Herbaceous species include sword fern (*Polystichum munitum*), trailing blackberry (*Rubus ursinus*), and several upland grasses including blue wild-rye (*Elymus glaucus*), oniongrass (*Melica spp.*), and tall fescue (*Schedonorus arundinaceus*).

Upland Deciduous Forest: This community occurs on upland terraces throughout the central portion of the Study Area along the Middle Fork Willamette River; several scattered patches of this community are also established elsewhere in the Study Area. It is dominated by bigleaf maple and black cottonwood in the overstory with scattered Oregon ash, California hazelnut, hawthorn, snowberry, Scouler's willow (*Salix scouleriana*), and osoberry in the understory. Occasional to frequent thickets of Himalayan blackberry sometimes dominate the understory. The herbaceous stratum is a variable mix of grasses and forbs that generally includes reed canarygrass (*Phalaris arundinacea*), tall fescue, blue wild-rye, and trailing blackberry.

Grasslands: This community occurs through much of the upland areas within the SUB properties and those properties managed for agricultural grass (hay) production. Generally, tree and shrub species are lacking however scattered patches of Himalayan blackberry may be present. The herbaceous stratum is dominated by a broad mix of native and non-native pasture grasses and weedy forbs including tall fescue, meadow foxtail (*Alopecurus pratensis*), velvetgrass (*Holcus lanatus*), ryegrass (*Lolium spp.*), annual bromes (*Bromus spp.*), dandelion (*Taraxacum officinale*), cat's ear (*Hypochaeris spp.*), ox-eye daisy (*Leucanthemum vulgare*), tansy ragwort (*Senecio vulgaris*), and clovers (*Trifolium spp.*).

Fallow Nut Tree Farms / Scrubland: This community occurs in the northwest part of the Study Area where a former hazelnut and walnut farm have been left fallow. Besides the nut trees, understory vegetation is dominated by Himalayan blackberry, California hazelnut, and European filbert (*Corylus avellana*). Herbaceous vegetation is mostly non-native grass and forb species including tall fescue, velvetgrass, ryegrass, annual bromes, dandelion, cat's ear, ox-eye daisy, and tansy ragwort.

Park Grassland / Developed: Primarily situated in the eastern portion (Clearwater Park), this community is established adjacent parking lots, roads, and areas managed for turfgrass (a disc golf course). This vegetation community generally reflects a "city park"-like setting dominated by a mix of non-native turfgrasses that are frequently kept mowed. Horticultural trees and shrubs are sometimes present. All other developed areas include parking lots and unpaved and paved roadways which were generally unvegetated. Around structures, vegetation that is not turfgrass is often of horticultural origin or weedy. The fringes of some of these developed areas sometimes include Himalayan blackberry.

Wetlands: Three (3) different hydrophytic dominated vegetation communities occur throughout the Mill Race Study Area. Communities include:

Palustrine forested wetlands (PFO) dominated by bottomland forest species including large specimens of black cottonwood, Oregon ash and/or red alder (*Alnus rubra*) in the overstory. Younger Oregon ash, willow (*Salix spp.*), Pacific ninebark (*Physocarpus capitatus*), and/or red-osier dogwood (*Cornus alba*) may often be dominant in the understory, with slough sedge (*Carex obnupta*), reed canarygrass, and trailing blackberry as dominants in the herbaceous layer. Wetland MRW-1 provides one example of this community.

Palustrine scrub/shrub wetlands (PSS) are quite variable and may be dominated by willow, red-osier dogwood, Himalayan blackberry, and/or Pacific ninebark in the understory, and slough sedge, small-fruited bulrush (*Scirpus microcarpus*), reed canarygrass, and trailing blackberry in the herbaceous stratum. Scattered Oregon ash and/or red alder may occasionally occur in the overstory. Wetlands MRW-4, MRW-5, and MRW-8 provide examples of this community.

Palustrine emergent wetlands (PEM) are also quite variable and may be dominated by monocultures of reed canary grass to areas supporting slough sedge, soft rush (*Juncus effusus*), stinging nettle (*Urtica dioica*), yellow-flag iris (*Iris pseudacoris*), common spikerush (*Eleocharis palustris*), and/or panicled bulrush (*Scirpus microcarpus*). Wetland WPW-4B is an example of this community.

Palustrine aquatic bed wetlands (PAB) are dominated by pondweed (*Potamogeton* sp.), and common spikerush (*Eleocharis palustris).* WPW-4B (Appendix B.1, Map 1) is an example of this community.

Riparian Forest and Scrubland: Riparian forest and scrubland communities within Mill Race occur along the steeper non-wetland banks of the Middle Fork Willamette River as well as along the upper banks of Mill Race. Said community is dominated by black cottonwood, red alder, and scattered bigleaf maple in the overstory, Himalayan blackberry, trailing blackberry, and snowberry in the understory, and a mix of native and non-native grasses and forbs. Several areas along the banks of the river are dominated by Himalayan blackberry with very little overstory.

3.3.3 Soils

As outlined on Table 7 and depicted on Figure 23 (Appendix B.3), NRCS inventories 11 distinct soil mapping units within the Mill Race Study Area.

Table 7. Mapped Soils within the Mill Race Study Area

Soil Series	Soil Name	Slopes	Classification	Drainage Class	Hydric?
26	Chehalis silty clay loam	-	Cumulic Ultic Haploxerolls	Well drained	No
79	McBee silty clay loam	-	Cumulic Ultic Haploxerolls	Moderately well drained	No
95	Newberg fine sandy loam	-	Fluventic Haploxerolls	Well drained	No
96	Newberg loam	-	Fluventic Haploxerolls	Well drained	No
29	Cloquato silt loam	-	Cumulic Ultic Haploxerolls	Well drained	No
22	Camas gravelly sandy loam	-	Fluventic Haploxerolls	Excessively drained	No
114	Riverwash	-	-	Poorly drained	Yes
48	Fluvents	Nearly level	Fluventic Haploxerolls	Excessively drained	Yes
110	Pits	-	-	-	No
24	Chapman loam	-	Cumulic Ultic Haploxerolls	Well drained	No
25	Chapman-Urban land complex	-	Cumulic Ultic Haploxerolls	Well drained	No

3.3.4 Watershed and Hydrology

The Mill Race is located in the Mill Race-Middle Fork Willamette 6th level watershed (hydrologic unit code (HUC) 170900011003). The watershed is 38 square miles in size and, using OFWAM protocol, has an average slope of 2.9%. This watershed ultimately drains to the Willamette River to the northwest.

Hydrology for this Study Area is highly variable. Low areas adjacent the Middle Fork Willamette River and identified stream features (including Mill Race, Gorrie Creek, Quarry Creek, and SUB Drainage) are primarily supported by hyporheic and overland flow from these waterways. The Mill Race receives surface flow diversion from Middle Fork Willamette River in the eastern portion of the site; this feature flows northwesterly along the northern Study Area. Ultimately, the Mill Race feature is further diverted to Gorrie and Quarry Creeks in the western portion of the site. Winter and spring overland flow from high water and flood events is retained in the lowest (wetland) areas and sustained by hyporheic flow from these waterways during summer. Topographically low areas, including remnant borrow pits / ponds, likely intercept ground water elevations. These depressional areas also collect precipitation and overland flow.

Areas within the SUB properties (in the western portion of the Study Area) are intensively managed to maintain groundwater at target elevations. Management includes pumping water from the Middle Fork Willamette River into drainages to impoundment of Gorrie Creek. Overall, precipitation and runoff from upgradient lands appear to be only minor components of site hydrology as much of the Study Area is relatively flat and generally underlain by gravel substrates.

3.3.5 Sensitive Species and Water Quality Data

Potential sensitive species information was assessed using the Oregon Explorer interactive map view and reports. During the August 2020 review, Oregon Explorer's list of sensitive species occurring within the Mill Race-Middle Fork Willamette River 6th level watershed (HUC 170900011003) watershed includes:

- Western pond turtle (*Actinemys marmorata*)
- Bradshaw's lomatium (*Lomatium bradshawii*)
- Oregon chub (*Oregonichthys crameri*)
- Chinook salmon (Upper Willamette River ESU, spring run) (*Oncorhynchus tshawytscha*)
- Pacific lamprey (*Entosphenus tridentatus*)

DSL's Essential Salmonid Habitat (ESH) mapping inventories the Middle Fork Willamette River, Mill Race, Gorrie Creek, and low reaches of Quarry Creek as ESH.

DEQ's 2018/2020 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution and contemporary DEQ interactive mapping programs identify the Middle Fork Willamette River and Mill Race as Category 5 Water Quality Limited Waterway for multiple parameters. DEQ also identifies the majority of the Mill Race Area as being situated atop the SUB Public Water System Protection Zone. Lastly, the City's local Water Quality Limited Waterways inventory identifies Mill Race, Gorrie Creek, and Quarry Creek as Water Quality Limited Waterways.

3.3.6 Previous Inventories and Determinations

USFWS NWI inventories multiple aquatic features throughout the Mill Race Study Area. Inventoried features include drainages Middle Fork Willamette River, Mill Race, Gorrie Creek, and Quarry Creek which are inventoried as Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded (R2UBH). Remnant excavated features (borrow pits and log ponds) range from Palustrine, Aquatic Bed, Semipermanently Flooded (PABF) to Palustrine, Unconsolidated Bottom, Permanently Flooded, excavated (PUBHx). Several Palustrine, Forested, Temporarily Flooded (PFOA) and Palustrine, Emergent, Seasonally Flooded (PEMC) features are also scattered throughout the Mill Race.

FEMA mapping inventories the Floodway elevation of the Middle Fork Willamette River along topographically low areas along the southern portion of the Mill Race. Areas adjacent drainages (Mill Race, Gorrie Creek, Quarry Creek) are inventoried as being situated within the Flood Zone AE with topographically higher areas throughout the Mill Race as being in areas of low flood percentages (Zone X).

City shapefiles define approximate centerlines for drainages Mill Race, Gorrie Creek, and Quarry Creek. Middle Fork Willamette River Water Quality Limited polygon is defined along the south Mill Race Study Area.

Mill Race contains several previously approved delineation boundaries reviewed for DSL jurisdictional determinations. Previously issued DSL determination include:

* DSL determination WD#2008-0483 (associated with Wetlands MRW-3B, (portion of) MRW-3A, MRW-14A, MRW-26A, and MRW-26B);
* DSL determination WD#2009-0023 (associated with Wetland MRW-7A);
* DSL determination WD#2000-0467 (associated with Wetlands MRW-13A and MRW-13B);
* DSL determination WD#2007-0325 (associated with Wetlands MRW-19, MRW-20, MRW-21, MRW-22, MRW-24B, MRW-25B, MRW-25C, and MRW-27), and;
* DSL determination WD#2005-0204 (associated with Wetlands MRW-23, MRW-24A, MRW-25A, MRW-28, and MRW-29).

NWI Figure 21 provided within Appendix B.3 documents referenced inventories and assessments.

4.0 Cartography

Base maps analyzed for generation of preliminary boundaries are outlined in report Section 2.2.1. Said reference maps, preliminary desktop boundaries, and pertinent City provided background shapefile information (Lane County tax lots and City stormwater infrastructure, for example) were uploaded to GPS instrumentation to guide the field investigation. Field teams were outfitted with a series of field maps depicting preliminary boundaries superimposed atop: 2016 NAIP aerial photography, DOGAMI bare earth, 2-foot LiDAR contours, NRCS hydric soil units, and NWI polygons for supplemental data collection and site feature sketching.

As indicated, the field team was granted access to all but one parcel contained within the LWI Study Area. During the field investigation process, all but one aquatic feature (WPW-8) was physically documented / investigated during the LWI investigation. Field confirmed aquatic feature boundaries and sample plot locations were mapped using GPS instrumentation. Field shapefiles were then processed for point and polygon creation using AutoCAD and ArcGIS software.

Sample plot nomenclature reflects the designated Study Area name and sequential plot number as follows:

*NG: North Gateway Study Area (Sample Plots NG-1 to NG-7);
*WP: Willamalane Properties Study Area (Sample Plots WP-1 to WP-7), and;
*MR: Mill Race Study Area (Sample Plots MR-1 to MR-24).

Riparian sample plot locations reflect similar nomenclature with a Riparian (R) classifier signifying the plot documents a riparian condition. For example, R-WP-1 designates the location within the Willamalane Properties Study Area where the riparian condition was assessed.

Wetland and Waterbody nomenclature adheres to designated Study Area names and sequential numbering system:

*NGW: North Gateway Wetlands (Features NGW-1 to NGW-2);
*WPW: Willamalane Properties Wetlands / Waterbodies (Features WPW-1 to WPW-8), and;
*MRW: Mill Race Wetlands / Waterbodies (Features MRW-1 to MRW-29)

Safe Harbor Riparian Corridor nomenclature includes the "R" classifier followed by the aquatic feature name and specific polygon (if applicable). For example, R-CC-1 defines the Safe Harbor fifty-foot (50') riparian setback from the Cedar Creek feature boundary.

When applicable, Wetland / Waterbody features are dissected into subunits when a hydrologically connected feature is observed to exhibit changes in vegetation and / or hydrological characteristics. For example, WPW-4A and WPW-4B are contained within the same wetland feature but exhibit significantly different vegetation and hydrological conditions, warranting separate representative data sheets and functional assessments. Similarly, subunits are defined when a feature extends from a newly identified LWI polygon (MRW-25D) to digitized DSL feature boundaries (MRW-25C).

In addition to minimum DSL database / map layer requirements, the LWI maps and associated geodatabase contain distinct layers to reflect the McKenzie River and Middle Fork Willamette River (inventoried as MKR-# and MFWR-#, respectively). As documented on these layers, only those areas which extend into the LWI Study Area(s) are mapped. To show regional connectivity and provide a larger sense of these rivers, however, the geodatabase includes reference to USFWS NWI polygons.

To document hydrological connectivity of Wetland / Waterbody features, the maps and geodatabase include City derived LWI Streams linework (City, 2020). The LWI Streams layer depicts approximate stream centerlines and depicts field confirmed connectivity to Wetland / Waterbody polygons which may be separated by a culvert or other infrastructure. This layer is most beneficial to more fully understand separate aquatic feature connectivity within the Mill Race Study Area (Mill Race drainage, for example).

Lastly, Artificial Features polygon nomenclature stems from the created purpose of each feature. This layer includes stormwater biofiltration swales and constructed treatment facilities. For example, several Springfield Utility Board (SUB) water treatment ponds are situated within the western portion of the Mill Race Study Area. These human-made and managed features are respectively identified as SUB-1 to SUB-4.

Eight small areas (less than 0.1-acre) anticipated to satisfy wetland / water parameters are labeled on the maps and geodatabase as Probable Wetlands (PW). Due to the small size of these features, LWI standards do not require boundary determinations or site-specific data (DSL, 1996).

In addition to representing sample plots and aquatic features, final report maps include: tax lots, road centerlines, legend, north arrow, scale bar, and DSL required disclaimer. The corresponding LWI geodatabase includes Wetland attribute data such as: nomenclature, mapping methodology, Cowardin / HGM classifications, hydrologic information, vegetation condition, Locally Significant determinations, DSL action number (if applicable), acreage, and individualized comment.

5.0 LWI Results and Conclusions

Features documented and defined within this LWI have been exhaustively researched, specifically documented, and field mapped. Use of contemporary aerial photography, best available scientific information (including LiDAR derived products), and routinely maintained City infrastructure inventories allows the LWI team to provide highly detailed and accurate feature information.

The following Table 8 represents the wetland assessment units.

Table 8. Representative Assessment Units for the City of Springfield UGB Project Study Area

Study Area	Representative Sample Plot	LWI Wetland Code
North Gateway	NG-7	NGW-2
North Gateway	NG-8	NGW-1
Willamalane	WP-1	WPW-1
Willamalane	WP-2	WPW-2, WPW-3
Willamalane	WP-4	WPW-4B
Willamalane	WP-5	WPW-4A
Willamalane	WP-6	WPW-7A
Willamalane	WP-7	WPW-7A, WPW-7C, WPW-7D, WPW-7E, WPW-7F
Willamalane	WP-8	WPW-8

Mill Race	MR-2	MRW-2
Mill Race	MR-3	MRW-1
Mill Race	MR-4	MRW-3A, MRW-3B
Mill Race	MR-5	MRW-4
Mill Race	MR-6	MFWR-2
Mill Race	MR-7	MFWR-3
Mill Race	MR-8	MRW-7B, MRW-7C, MRW-7D
Mill Race	MR-9	MRW-5, MRW-6, MRW-11
Mill Race	MR-10	MRW-8
Mill Race	MR-11	MRW-9
Mill Race	MR-12	MRW-10
Mill Race	MR-13	MRW-12
Mill Race	MR-14	MRW-13A, MRW-13B
Mill Race	MR-15	MRW-15A, MRW-15B, MRW-15C, MRW-15D
Study Area	**Representative Sample Plot**	**LWI Wetland Code**
Mill Race	MR-16	MRW-18
Mill Race	MR-17	MRW-14A, MRW-14B, MRW-14C
Mill Race	MR-18	MRW-14D
Mill Race	MR-19	MRW-17
Mill Race	MR-20	MRW-26A, MRW-26B, MRW-27
Mill Race	MR-21	MRW-16, MRW-25B, MRW-25C, MRW-25D
Mill Race	MR-22	MRW-23
Mill Race	MR-23	MRW-19, MRW-20, MRW-21, MRW-22
Mill Race	MR-24	MRW-24A, MRW-24B, MRW-25A, MRW-28, MRW-29

5.1 North Gateway LWI Results

The North Gateway Study Area encompasses 212.3 acres and existing conditions are documented by eight (8) representative sample plots. Two wetland polygons and one Probable Wetland (PW) is documented within this Study Area. While skirting the northern Study Area boundary, the McKenzie River is not observed to extend into the Study Area footprint. Wetlands NGW-1 and NGW-2 total 1.49 acres.

Wetland NGW-1 is hydrologically connected to the McKenzie River. While historically connected to NGW-2, an earthen farm road now dissects and separates these features. Due to the lack of connectivity, these polygons are assessed separately. Wetland Summary Sheets for each wetland are found in Appendix B.1.

NWI inventories a small, Palustrine, Emergent, Persistent, Seasonally Flooded (PEM1C) wetland polygon in the northwest portion (Tax lot 1703100002500) of the North Gateway Study Area. As documented by Sample Plot NG-9, this NWI polygon lacks hydric soils and evidence of wetland hydrology. As such, it has been omitted as an aquatic feature for this LWI.

NWI mapping also identifies a Palustrine, Forested, Seasonally Flooded (PFOC) / feature extending through North Gateway. NWI mapping reflects a remnant scour channel of the McKenzie River, locally known as Maple Island Slough. Sample Plots NG-3 and NG-5 are positioned in the topographically low portion of this remnant slough; these plots, however, document upland conditions. Although this area is contained within the 100-year floodplain and has been documented to receive floodwaters (City, 2020), this feature no longer retains sufficient hydrology to sustain hydrophytic vegetation communities. Landowner interviews suggest development and impervious surface created a situation that now does not allow for ground water recharge (Larry Wicklund, 2020).

One Probable Wetland (PW-1) is mapped in the extreme southeast corner of North Gateway. This feature is a small, excavated depression that has hydrologic connectivity to the (offsite) McKenzie River. As this feature is less than 0.1-acre, and in accordance with LWI mapping protocol, this feature was not specifically sampled or boundaries defined.

No other wetland or water features are documented within the North Gateway Study Area.
Results of the LWI investigation are depicted in Figure 6 (Appendix B.1) while WMVC Data Sheets are included as Appendix D.1. The LWI team documented North Gateway wetlands classifications in terms of Cowardin and OHGM classifications; Table 9 summarizes the LWI findings.

Table 9. North Gateway Study Area LWI Aquatic Feature Results

LWI Wetland Code	Representative Sample Plot	Cowardin Classification	OHGM Classification	Acreage
NGW-1	NG-8	PEM	S/F	1.26
NGW-2	NG-7	PSS	S/F	0.23
PW	N/A	PUB	S/F	<0.1
TOTAL				1.46

Cowardin qualifiers:
PEM: Palustrine, Emergent
PSS: Palustrine, Scrub-Shrub
PUB: Palustrine, Unconsolidated Bottom

OHGM classification:
S/F: Slope / Flats

5.2 Willamalane Properties LWI Results

The Willamalane Properties Study Areas consist of three distinct areas encompassing 75.02 acres.

1. Wetlands within the 9.98 acre Ruff Park are documented by one sample plot (WP-1) representative of the meandering South Cedar Creek feature WPW-1; this feature originates to the east and flows westerly towards its ultimate confluence with Cedar Creek approximately 2,900 linear channel feet west of the park. The park also contains a section of

the westerly flowing Cedar Creek (WPW-2) which skirts the northern site boundary. This site contains a total of 0.69-acres of aquatic features[6].

2. Wetlands within the 6.44 acre Lively Park are documented by two sample plots (WP-2 and WP-3) and contain 0.45-acre of Cedar Creek (WPW-3). Due to proximity and similar condition of Cedar Creek within both the Lively and Ruff Parks, one representative sample plot (WP-2) adequately documents the condition of the feature. This Study Area also contains a Riverine NWI polygon. As documented by Sample Plot WP-3, this feature consists of an upland biofiltration swale constructed to treat water from the adjacent park complex. This site contains a total of 0.45-acres of aquatic features.

3. The 55.58 acre Oxbow Natural Area is documented by four representative sample plots. The McKenzie River (MKR-1) skirts the eastern edge of the site before flowing into and through the northern portion. Keizer Slough (WPW-6) enters the site in the southern portion. This site contains a riparian bottomland complex consisting of variable types of aquatic features ranging from side channels of the McKenzie River (WPW-5 and WPW-7B) to backwater sloughs (WPW-4B) to low riparian forest (WPW-4A, WPW-7A, 7B, 7C, 7D, 7E, and WPW-8). While previously documented by DSL determination WD#2001-0056, the site has drastically evolved since it was originally documented and the previous delineation is considered obsolete. The site contains a total of 20.77 acres of aquatic features.

No other wetland or water features are documented within the Willamalane Properties Study Areas.

Results of the LWI investigation are depicted in Figures 16 and 17 (Appendix B.2) while WMVC Data Sheets are included as Appendix D.2. The LWI team documented Willamalane Properties Study Area aquatic feature classifications in terms of Cowardin and OHGM classifications; Table 10 summarizes the LWI findings.

Table 10. Willamalane Properties Study Area LWI Aquatic Feature Results

LWI Wetland Code	Representative Sample Plot	Cowardin Classification	OHGM Classification	Acreage
Ruff Park Study Area				
WPW-1 (South Cedar Creek)	WP-1	R4SB	RFT	0.54-acre[3]
WPW-2 (Cedar Creek)	WP-2	R2UB	RFT	0.15-acre
Ruff Park Subtotal				**0.69-acre**
Lively Park Study Area				
WPW-3 (Cedar Creek)	WP-2	R2UB	RFT	0.45-acre
Lively Park Subtotal				**0.45-acre**
Oxbow Natural Area Study Area				
WPW-4A	WP-5	PFO	S/F	1.53 acre
WPW-4B	WP-4	PEM	S/F	2.21 acres
WPW-5	N/A	R2UB	RFT	0.99-acre

[6] WPW-1 is observed to straddle the Ruff Park / UGB boundary. Acreage reflects only those areas which extend into the UGB Expansion Study Area.

WPW-6 (Keizer Slough)	N/A	R2UB	RFT	1.7 acre
WPW-7A	WP-6, WP-7	PFO	S/F	8.41 acres
WPW-7B	N/A	R2UB	RFT	1.33 acre
WPW-7C	WP-7	PFO	RFT	0.22-acre
WPW-7D	WP-7	PFO	RFT	0.18-acre
WPW-7E	WP-7	PFO	RFT	0.72-acre
WPW-7F	WP-7	PFO	RFT	0.36-acre
WPW-8	WP-7	PFO	RFT	9.35 acres
MKR-1 (McKenzie River)	N/A	R2UB	RFT	6.84 acres
Oxbow Natural Area Subtotal				**33.84 acres**
Total Aquatic Features				**34.98 acres**

Cowardin classifiers:

R4SB: Riverine, Intermittent, Streambed
R2UB: Riverine, Lower Perennial, Unconsolidated Bottom
PFO: Palustrine, Forested
PEM: Palustrine, Emergent
PSS: Palustrine, Scrub-Shrub

OHGM classifiers:

RFT: Riverine Flow Through
S/F: Slope Flats

5.3 Mill Race LWI Results

The largest of the LWI Study Areas, Mill Race totals 507.86 acres and is documented by twenty-five (25) representative sample plots. This site contains 51 distinct aquatic polygons and contains portions of the Middle Fork Willamette River, Mill Race, Gorrie Creek, and Quarry Creek systems. Seven (7) Probable Wetland points are also inventoried within the Mill Race footprint. Aquatic features defined with this Study Area total 44.42 acres.

Middle Fork Willamette River (MFWR) is observed to flow into the Mill Race Study Area in the southeastern portion of the site (within Clearwater Park and Georgia Pacific Natural Area). Polygon MFWR-1 is the active Mill Race diversion channel which was partially restored between 2009 and 2012 by USACE and City of Springfield (City, 2020). Other sections of the MFWR consist of a backwater slough (MFWR-2) and side channel (MFWR-3) which are hydrologically influenced by MFWR surface flows. Feature MFWR-3 historically served as the main diversion channel for the Mill Race system. While abandoned as the main diversion during the 2009-2012 restoration actions, this feature continues to receive some overflow from the Mill Race and main stem MFWR.

Several remnant scour channels of the MFWR are scattered throughout the Mill Race Study Area. Remnant scour channels include Wetlands MRW-6, MRW-11, and MRW-12 and are documented by representative Sample Plot MR-9. These linear features are generally two to ten feet deeper than the surrounding alluvial terrace landforms. While historically created by the MFWR, they are not actively hydrologically connected to the river.

As indicated, MFWR-1 diversion channel now diverts waters to the Mill Race system (documented as Wetlands MRW-7A to MRW-7D). The Mill Race channel was historically excavated to serve as a hydrology source to former logging mill operations (City, 2020). The feature has evolved to a variable width riverine channel surrounded by emergent and scrub-shrub benches; the drainage and associated wetlands are contained within a larger, excavated trapezoidal landform. This system flows north-northwesterly along

the northern Mill Race Study Area (and ultimately beyond this LWI study footprint). The Mill Race system is documented by Sample Plot MR-8.

The western portion of the Mill Race Study Area contains Gorrie and Quarry Creeks. Gorrie Creek, documented by Sample Plot MR-15, originates offsite (of this LWI Study Area) and is partially supported by controlled diversions within the Mill Race drainage (City, September 24, 2020). From the diversion point, Gorrie Creek flows south and is primarily contained within SUB owned properties. SUB actively manages flows within Gorrie Creek (City, September 24, 2020). Ultimately, this system flows west to its confluence with Quarry Creek along the western Mill Race Study Area boundary.

Quarry Creek is also supported by controlled diversion flows from the Mill Race (City, December 8, 2020) and flows south along the western edge of the Mill Race Study Area towards its confluence with the MFWR. The creek ranges from an excavated ditch within a broad swale in the northern portion to a more defined creek channel in the lower reach. This system contains large sections of PEM wetland which transitions to PSS and PFO areas. Quarry Creek is documented by Sample Plot MR-20.

Reflective of the historic industrial nature of this area, several remnant log ponds and borrow pits are located throughout the Mill Race Study Area. Wetland MRW-1, MRW-4, MRW-9, MRW-14D, and MRW-17 consist of historically excavated and impounded aquatic features. Features range from relatively shallow borrow material areas (such as MRW-4) to features reflective of extensive excavation and fill placement (such as MRW-9). As these features have not been utilized for industrial purposes for greater than fifty years, they have (typically) evolved to a central open water area surrounded by variable wetland complexes. Remnant pond features are documented by Sample Plots MR-3, MR-5, MR-11, MR-18, and MR-19.

Two wetlands, MRW-8 and MRW-10, also exhibit historical fill and excavation disturbances associated with the former industrial use of the vicinity. Likely remnant scour channels of the MFWR, these features were historically manipulated and contain areas of fill material placement and excavation. Similar to the above, periods of disturbance occurred over such long periods of time that these areas have evolved into wetland complexes ranging from PEM to PFO communities. These features are documented by Sample Plots MR-10 and MR-12.

Wetland MRW-18 consists of a historically excavated farm stock pond. This small feature is not directly connected to other hydrological systems and does not appear to receive irrigation / introduced water from Gorrie Creek. This small feature is documented by Sample Plot MR-16.

In addition to managed Gorrie Creek, the SUB operations parcel contains additional aquatic features under varying levels of hydrological management. Four artificially created water treatment ponds (SUB-1 through SUB-4) have been constructed for the purposes of drinking water treatment. These lined ponds received pumped water for water treatment; treated water is then piped into infrastructure for regional distribution.

SUB also manages a small drainage (features MRW-14A through MRW-14D) along the south portion of their property. Water from MFWR is pumped to an outlet at the east end of MRW-14A. This water then flows westerly through manipulated drainages to a (historically excavated) holding pond (MRW-14D). Water levels of the pond are dictated by a weir structure in the southwestern corner; this structure

overflows to Quarry Creek. Manipulation of this (and Gorrie Creek) allows SUB to maintain a regional water table elevation to ensure proper function and health of their wellfield. This drainage is documented by Sample Plot MR-14C. While not directly receiving SUB managed water flows, Wetland MRW-16 likely benefits from the regionally elevated water tables.

Multiple wetland delineations have previously been conducted on parcels contained within the Mill Race Study Area. Many of these delineations have been submitted to, reviewed by, and received DSL jurisdictional determinations. When DSL boundary determination linework was available, the LWI field teams utilized digitized boundaries to guide the field investigation. Previously approved delineation boundaries were generally confirmed and DSL jurisdictional determination boundaries utilized for the LWI. The following provides an overview of previously reviewed delineation boundaries and associated DSL determinations:

*Wetlands MRW-3B, (portion of) MRW-3A, MRW-14A, MRW-26A, and MRW-26B boundaries were reviewed and approved for DSL determination WD#2008-0483;
*Wetland MRW-7A boundaries were reviewed and approved for DSL determination WD#2009-0023;
*Wetlands MRW-13A and MRW-13B boundaries were reviewed and approved for DSL determination WD#2000-0467;
*Wetlands MRW-19, MRW-20, MRW-21, MRW-22, MRW-24B, MRW-25B, MRW-25C, and MRW-27, and boundaries were reviewed and approved for DSL determination WD#2007-0325; and
*Wetlands MRW-23, MRW-24A, MRW-25A, MRW-28, and MRW-29 delineated boundaries reflect those boundaries approved by DSL determination WD#2005-0204.

Results of the LWI investigation are depicted on Figures 23 and 24 (Appendix B.3) while WMVC Data Sheets are included as Appendix D.3. The LWI team documented Mill Race Study Area aquatic feature classifications in terms of Cowardin and OHGM classifications; Table 11 summarizes the LWI findings.

Table 11. Mill Race Study Area LWI Aquatic Feature Results

LWI Wetland Code	Representative Sample Plot	Cowardin Classification	OHGM Classification	Acreage
MRW-1	MR-3	PFO	S/F	3.65 acres
MRW-1A	N/A	PEM	S/F	0.45-acre
MRW-2	MR-2	PSS	S/F	0.45-acre
MRW-3A	MR-4	PFO	S/F	0.24-acre
MRW-3B[1]	MR-4	PFO	S/F	0.02-acre
MRW-4	MR-5	PFO	S/F	0.77-acre
MRW-5	MR-9	PSS	RFT	0.37-acre
MRW-6	MR-9	PSS	S/F	0.47-acre
MRW-7A (Mill Race) [2]	N/A	R2UB	RFT	2.5 acres
MRW-7B (Mill Race)	MR-8	PEM	RFT	0.3-acre
MRW-7C (Mill Race)	MR-8	PEM	RFT	7.47 acres
MRW-7D (Mill Race)	MR-8	PEM	RFT	0.07-acre
MRW-8	MR-10	PSS	S/F	0.99-acre
MRW-9	MR-11	PSS	S/F	1.23 acre

MRW-9A	N/A	PAB	S/F	3.09 acres
MRW-10	MR-12	PSS	S/F	1.94 acre
MRW-11	MR-9	PSS	S/F	0.33-acre
MRW-12	MR-13	PSS	S/F	0.22-acre
MRW-13A[3]	MR-14	PEM	S/F	0.82-acre
MRW-13B[3]	MR-14	PEM	S/F	0.14-acre
MRW-14A[1] (SUB Drainage)	MR-17	PEM	RFT	0.08-acre
MRW-14B (SUB Drainage)	MR-17	PEM	RFT	0.61-acre
MRW-14C (SUB Drainage)	MR-17	PEM	RFT	0.73-acre
MRW-14D (SUB Drainage)	MR-18	PUB	S/F	2.26 acres
MRW-15A (Gorrie Creek)	MR-15	PEM	RFT	0.92-acre
MRW-15B (Gorrie Creek)	MR-15	PEM	RFT	1.67-acre
MRW-15C (Gorrie Creek)	MR-15	PEM	RFT	0.78-acre
MRW-15D (Gorrie Creek)	MR-15	PSS	RFT	0.51-acre
MRW-16	MR-21	PSS	S/F	1.12-acre
MRW-17	MR-19	PUB	S/F	2.1 acres
LWI Wetland Code	**Representative Sample Plot**	**Cowardin Classification**	**OHGM Classification**	**Acreage**
MRW-18	MR-16	PAB	S/F	0.24-acre
MRW-19[4]	MR-23	PEM	S/F	0.07-acre
MRW-20[4]	MR-23	PEM	S/F	0.36-acre
MRW-21[4]	MR-23	PFO	S/F	0.33-acre
MRW-22	MR-23	PEM	S/F	0.03-acre
MRW-23[5]	MR-22	PEM	S/F	0.13-acre
MRW-24A[5]	MR-24	PSS	S/F	0.04-acre
MRW-24B[4]	MR-24	PSS	S/F	0.18-acre
MRW-25A[5]	MR-24	PFO	S/F	1.27-acre
MRW-25B[4]	MR-21	PEM	S/F	0.63-acre
MRW-25C[4]	MR-21	PEM	S/F	0.1-acre
MRW-25D	MR-21	PEM	S/F	1.11-acre
MRW-26A[1]	MR-21	R2UB	RFT	0.91-acre
MRW-26B[1]	MR-21	PSS	RFT	1.77-acre
MRW-27[4]	MR-21	PSS	S/F	0.83-acre
MRW-28[5]	MR-24	PSS	S/F	0.09-acre
MRW-29[4]	MR-24	PEM	S/F	0.03-acre
MFWR-2	MR-6	R2UB	RFT	1.29-acre
MFWR-3	MR-7	R2UB	S/F	1.41-acre
Total Aquatic Features				**44.42 acres**

[1]: Reflects feature reviewed for DSL determination WD#2008-0483
[2]: Reflects feature reviewed for DSL determination WD#2009-0023
[3]: Reflects feature reviewed for DSL determination WD#2000-0467
[4]: Reflects feature reviewed for DSL determination WD#2007-0325
[5]: Reflects feature reviewed for DSL determination WD#2005-0204

Cowardin classifiers:
PEM: Palustrine, Emergent
PSS: Palustrine, Scrub-Shrub
PFO: Palustrine, Forested
PAB: Palustrine, Aquatic Bed

OHGM classifiers:
S/F: Slope / Flats
RFT: Riverine Flow Through

PUB: Palustrine, Unconsolidated Bottom
R3SB: Riverine, Upper Perennial, Streambed
R4UB: Riverine, Intermittent, Unconsolidated Bottom

6.0 Oregon Freshwater Wetland Assessment Methodology Results

Representative wetland polygons identified during the LWI investigation were assessed using OFWAM protocol. Grouped wetlands were assessed for six functions which were then ranked based on associated values. Assessed OFWAM functions include: Wildlife Habitat, Fish Habitat, Water Quality and Hydrologic Control. When situated on publicly owned lands, OFWAM functions associated with Education and Recreation were also assessed.

6.1 North Gateway OFWAM Results

North Gateway identified wetlands are determined to provide habitat for some wildlife species (Medium value), likely due to their proximity to the McKenzie River, diverse / structural vegetation community, and hydrologic diversity.

Fish habitat was assessed for NG-8 only, due to its connection to the McKenzie River, as NG-7 does not have a direct surface connection and therefore was not assessed. NG-8 scored as impacted or degraded (Medium value) for fish habitat. While the McKenzie River is mostly a natural channel and that salmon, trout and other sensitive fish species could be present, it contains less than 10% instream structures, which are preferred by fish as the cover provides essential habitat as well as refugia for insect larvae – a good food source for fish.

Both wetlands also have water quality function that is impacted or degraded (Medium value) due to their proximity to DEQ 303(d) listed McKenzie River, despite their ability to filter potential agricultural runoff and their vegetation diversity.

The wetlands' Hydrologic Control function scores as intact (High value) for both wetlands, due to their being situated within the 100-year floodplain, showing evidence of flooding or ponding, and dominance of woody vegetation, which has a better capacity to control flood flow than wetlands dominated by open water or low-growing vegetation.

Educational and recreational opportunity scores are included but not discussed due to these wetlands being on private property and not accessible to the public at this time.

Table 12 documents OFWAM results for wetlands defined within the North Gateway Study Area while OFWAM data sheets are included as Appendix F.1.

Table 12. OFWAM Ranking Results for the North Gateway Study Area LWI

Representative Sample Plot	LWI Wetland Code	Wildlife Habitat	Fish Habitat	Water Quality	Hydrologic Control	Education	Recreation	Size (acres)
NG-7	NGW-2	Medium	N/A	Medium	High	Low	High	0.23
NG-8	NGW-1	Medium	Medium	Medium	High	Low	High	1.26

6.2 Willamalane Properties OFWAM Results

All seven assessed wetlands in the Willamalane Study Area ranked as providing habitat for some wildlife species (Medium value), due to their proximity to a river system, multiple Cowardin classes, connectivity to other bodies of water, and mostly open-space/forested land use within 500-feet of the wetland. Similarly, all seven wetlands scored as impacted or degraded (Medium value) for fish habitat, because while the McKenzie River is mostly a natural channel and that salmon, trout and other sensitive fish species could be present, it contains less than 10% instream structures, which are preferred by fish as the cover provides essential habitat as well as refugia for insect larvae – a good food source for fish.

The water quality function for all wetlands scored as impacted or degraded (Medium value) due to their proximity to DEQ 303(d) listed McKenzie River, despite their ability to filter potential agricultural runoff and their vegetation diversity.

Hydrologic control was assessed as impacted or degraded (Medium value) for three of the seven wetlands, while four scored as intact (High value). Those that scored High had larger overall acreage and woody vegetation, or, in the case of WP-1, which is less than 5 acres, is dominated by developed or agricultural use downstream, which makes its ability to control flooding more important than when a wetland is upstream from an undeveloped or forested area.

Two of the wetlands scored as having educational uses (High value), while four scored as having educational use potential (Medium value), and one scored as not appropriate (Low value). The factors that affect this score include accessibility, visibility, and the presence of hazards such as steep slopes or dense vegetation.

Five wetlands scored as providing recreational opportunities (High value), one scored as having potential to provide recreational opportunities (Medium value) and one scored as not providing recreational opportunities (Low value). Factors that affect this score include public access, including by boat, trails and viewing areas, and scores for wildlife habitat.

Table 13 documents OFWAM results for seven representative wetland features documented within the Willamalane Properties Study Areas while OFWAM data sheets are included as Appendix F.2.

Table 13. OFWAM Ranking Results for the Willamalane Properties Study Area LWI

Representative Sample Plot	LWI Wetland Code	Wildlife Habitat	Fish Habitat	Water Quality	Hydrologic Control	Education	Recreation	Size (acres)
WP-1	WPW-1	Medium	Medium	Medium	High	High	High	1.45
WP-2	WPW-2, WPW-3	Medium	Medium	Medium	Medium	High	High	0.6
WP-4	WPW-4B	Medium	Medium	Medium	Medium	Medium	Medium	2.21
WP-5	WPW-4A	Medium	Medium	Medium	Medium	Medium	High	1.53
WP-6	WPW-7A	Medium	Medium	Medium	High	Medium	High	8.41
WP-7	WPW-7C, WPW-7D, WPW-7E, WPW-7F	Medium	Medium	Medium	Medium	Medium	High	1.48
WP-8	WPW-8	Medium	Medium	Medium	High	Low	Low	9.35

6.3 Mill Race OFWAM Results

Three assessed wetlands, MR-3, MR-11 and MR-19, in the Mill Race Study Area ranked as providing diverse wildlife habitat (High value), while the other 20 wetlands ranked as providing habitat for some wildlife species (Medium value). Factors that affect wildlife habitat include proximity and connectivity to a river system or other wetlands, number of Cowardin classes and their level of interspersion, and land use within 500 feet of the wetland.

Fish habitat was assessed for 14 wetlands. Of those, two, MR-20, and MR-21, ranked as having intact (High value) fish habitat, while 12 scored as impacted or degraded (Medium value) for fish habitat. Factors affecting fish habitat include how natural the connected stream or river channel is, if salmon, trout and other sensitive fish species could be present, the percentage of instream structures, and water quality.

The water quality function is lost or not present (Low value) for two wetlands, MR-2 and MR-13, is impacted or degraded (Medium value) for 20 wetlands, and is intact (High value) for one wetland, MR-24. Factors affecting water quality include proximity to DEQ 303(d) listed waterbodies, their ability to filter potential urban or agricultural runoff and their vegetation diversity.

Hydrologic control was assessed as lost or not present (Low value) in four wetlands, as impacted or degraded (Medium value) for seven wetlands, and 12 scored as intact (High value). Those that scored High had larger overall acreage and woody vegetation, or, in several cases, the downstream land use is dominated by developed or agricultural use downstream, which makes its ability to control flooding more important than when a wetland is upstream from an undeveloped or forested area.

Eight of the wetlands scored as having educational uses (High value), while four scored as having educational use potential (Medium value), and 11 scored as not appropriate (Low value). The factors that

affect this score include accessibility, visibility, and the presence of hazards such as steep slopes or dense vegetation. Those that scored as not appropriate for educational uses were mostly not accessible to the public.

Twelve wetlands scored as providing recreational opportunities (High value), four scored as having potential to provide recreational opportunities (Medium value) and seven scored as not providing recreational opportunities (Low value). Factors that affect this score include public access, including by boat, trails and viewing areas, and scores for wildlife habitat.

Table 14 documents OFWAM results for 23 representative wetland features documented within the Mill Race Study Area while OFWS data sheets are included as Appendix F.3.

Table 14. OFWAM Ranking Results for the Mill Race Study Area LWI

Representative Sample Plot	LWI Wetland Code	Wildlife Habitat	Fish Habitat	Water Quality	Hydrologic Control	Education	Recreation	Size (acres)
MR-2	MRW-2	Medium	N/A	Low	Low	Medium	High	0.45
MR-3	MRW-1	High	Medium	Medium	High	High	High	3.65
MR-4	MRW-3A, MRW-3B	Medium	N/A	Medium	High	High	High	0.26
MR-5	MRW-4	Medium	N/A	Medium	High	High	Medium	0.77
MR-6	MFWR-2	Medium	Medium	Medium	Medium	High	High	1.29
MR-7	MFWR-3	Medium	Medium	Medium	High	Medium	High	1.41
MR-8	MRW-7B, MRW-7C, MRW-7D	Medium	Medium	Medium	High	Medium	High	7.84
MR-9	MRW-5, MRW-6, MRW-11	Medium	N/A	Medium	High	Medium	High	1.17
MR-10	MRW-8	Medium	Medium	Medium	High	High	High	0.99
MR-11	MRW-9	High	Medium	Medium	High	High	High	1.23
MR-12	MRW-10	Medium	Medium	Medium	Medium	High	High	1.94
MR-13	MRW-12	Medium	N/A	Low	Low	Low	Medium	0.22

MR-14	MRW-13A, MRW-13B	Medium	N/A	Medium	Low	Low	Low	0.96
MR-15	MRW-15A, MRW-15B, MRW-15C, MRW-15D	Medium	Medium	Medium	High	Low	Medium	3.88
MR-16	MRW-18	Medium	N/A	Medium	High	Low	Low	1.12
MR-17	MRW-14A, MRW-14B, MRW-14C	Medium	Medium	Medium	Medium	Low	High	1.42
MR-18	MRW-14D	Medium	Medium	Medium	Medium	Low	Medium	2.26
MR-19	MRW-17	High	Medium	Medium	Medium	High	High	2.1
MR-20	MRW-26A, MRW-26B, MRW-27	Medium	High	Medium	High	Low	Low	3.51
MR-21	MRW-16, MRW-25B, MRW-25C, MRW-25D	Medium	High	Medium	Medium	Low	Low	2.96
MR-22	MRW-23	Medium	N/A	Medium	Low	Low	Low	0.13
Representative Sample Plot	**LWI Wetland Code**	**Wildlife Habitat**	**Fish Habitat**	**Water Quality**	**Hydrologic Control**	**Education**	**Recreation**	**Size (acres)**
MR-23	MRW-20, MRW-19, MRW-21, MRW-22	Medium	N/A	Medium	Medium	Low	Low	0.79
MR-24	MRW-24A, MRW-24B, MRW-25A, MRW-28, MRW-29	Medium	Medium	High	High	Low	Low	1.61

6.4 Wetlands of Special Interest for Protection

Using a series of ten OFWAM questions, each representative wetland was assessed as a potential Wetland of Special Interest for Protection (WSIP). Responses reflect the features: capability to support Federal or State listed threatened, endangered or sensitive species; inclusion within existing management / conservation plans; identification as a compensatory mitigation area; critical habitat designation; being inventoried as wetland reserve areas, and / or; documented presence of uncommon wetland plant communities in Oregon.

Several features throughout the Study Areas are documented by DSL as Essential Salmonid Habitat (ESH). Specifically, McKenzie River, Middle Fork Willamette River, Cedar Creek, Mill Race, Gorrie Creek, and low reaches of Quarry Creek are inventoried as ESH, and any wetlands with a direct surface connection to these systems could be considered to have ESH. This ESH designation infers the feature supports Federal / State listed fish species, qualifying each associated feature as a WSIP.

Reference review and field verification suggests that no other aquatic features within the Study Areas are documented to support Federally or State list threatened, endangered, or sensitive species. Similarly, records review does not document any of the LWI identified features as compensatory mitigation areas, wetland reserve areas, or being situated within an existing management / conservation plan. Lastly, field observations confirm that none of the identified LWI wetlands contain rare wetland plant communities.

The full table for WSIP results can be found in Appendices E.1 (North Gateway), E.2 (Willamalane) and E.3 (Mill Race).

A list of all species known to occur in the watershed can be found in Appendix H.

Table 15. Wetlands of Special Interest for Protection

Study Area / Feature		Wetland of Special Interest for Protection?	Qualifier
North Gateway		None	N/A
Willamalane Properties			
WP-1	WPW-1	Yes	T/E species
WP-2	WPW-2 and WPW-3	Yes	T/E species
WP-4	WPW-4B	Yes	T/E species
WP-5	WPW-4A	Yes	T/E species
WP-6	WPW-7A	Yes	T/E species
WP-7	WPW-7A, WPW-7C, WPW-7D, WPW-7E, WPW-7F	Yes	T/E species
WP-8	WPW-8	Yes	T/E species
Mill Race			
MR-6	MFWR-2	Yes	T/E species
MR-7	MFWR-3	Yes	T/E species
MR-8	MRW-7B, MRW-7C, MRW-7D	Yes	T/E species
MR-10	MRW-8	Yes	T/E species
MR-11	MRW-9	Yes	Critical Habitat
MR-12	MR-10	Yes	T/E species
MR-15	MRW-15A, MRW-15B, MRW-15C, MRW-15D	Yes	T/E species
MR-17	MRW-14A, MRW-14B, MRW-14C	Yes	T/E species

MR-18	MRW-14D	Yes	Critical Habitat
MR-19	MRW-17	Yes	T/E species
MR-20	MRW-26A, MRW-26B, MRW-27	Yes	T/E species
MR-21	MRW-16, MRW-25B, MRW-25C, MRW-25D	Yes	T/E species

*T/E = Threatened or Endangered wildlife or plant species.

7.0 Oregon Goal 5 Significant Wetlands Determination

7.1 Locally Significant Wetlands Criteria

On September 1, 1996, the LCDC adopted a revised Statewide Planning Goal 5 which requires local jurisdictions to inventory the natural resources covered under the goal, determine the significance of said resources, and develop plans to achieve the goals. In other words, local jurisdictions must adopt land use ordinances regulating development in and around significant areas. The committee that created the Goal 5 significance criteria determined that even relatively small wetlands might provide an important (or major) function in their particular landscape position.

Local jurisdictions determining significant wetlands must use criteria as required by ORS 197.279(3)(b). These criteria are specified in the OARs in 141-086-030, which identify qualifiers for Locally Significant Wetlands. The significance criteria are divided into three sections, as shown in Table 16.

Table 16. Criteria for Determining Goal 5 Locally Significant Wetlands

(1) **Exclusions:** Regardless of their standing in relation to the criteria in OAR 141-086-0350 (Locally Significant Wetland Criteria)(2) or (3) of these rules, wetlands shall not be designated as locally significant if they fall within any one of the following categories:
a. Wetlands artificially created entirely from upland that are: A. Created for the purpose of controlling, storing, or maintaining storm water; or B. Active surface mining or as a log pond; or C. Ditches without a free and open connection to natural waters of the state (as defined in OAR 141-085-0010(9)) and which do not contain food or game fish (as defined in ORS 496.009 (“Game fish” defined)); or D. Less than one acre and created unintentionally as the result of: I. Irrigation water overflow or leakage; or II. Construction activity not related to compensatory mitigation for permitted wetland impacts; or

E. Of any size and created for the purpose of wastewater treatment, cranberry production, farm or stock watering, settling of sediment, cooling industrial water, or as a golf course hazard.

b. Wetlands or portions of wetlands that are contaminated by hazardous substances, materials or wastes as per the following conditions:

A. The wetland is documented as contaminated on either the U.S. Environmental Protection Agency's (EPA) National Priority List (NPL, also known as the "superfund list"), or the Department of Environmental Quality's (DEQ) Inventory of Hazardous Substance Sites.

B. Only the portion of the wetland affected by such hazardous substances or wastes shall be excluded from the LSW analysis. Affected portions shall be delineated in consultation with EPA and DEQ, and shall include areas potentially disturbed by clean-up activities.

C. Contaminated wetlands that have subsequently been removed from the NPL or DEQ Inventory following clean-up shall be re-evaluated under the LSW criteria at the next periodic review.

(2) ***Mandatory LSW Criteria.*** A local government shall identify a wetland as locally significant if it meets one or more of the following criteria:

(a) The wetland performs any of the following functions at the levels indicated below using the Oregon Freshwater Wetland Assessment Methodology:

A. "Diverse" wildlife habitat; or

B. "Intact" fish habitat; or

C. "Intact" water quality function; or

D. "Intact" hydrologic control function.

(b) The wetland or a portion of the wetland occurs within a horizontal distance less than one-fourth mile from a water body listed by the Department of Environmental Quality as a water quality limited water body (303(d) list), and the wetland's water quality function is described as "intact" or "impacted or degraded" using OFWAM. The 303(d) list specifies which parameters (e.g., temperature, pH) do not meet state water quality standards for each water body. A local government may determine that a wetland is not significant under this subsection upon documentation that the wetland does not provide water quality improvements for the specified parameter(s).

(c) The wetland contains one or more rare plant communities, as defined in this rule.

(d) The wetland is inhabited by any species listed by the federal government as threatened or endangered, or listed by the state as sensitive, threatened or endangered, unless the appropriate state or federal agency indicates that the wetland is not important for the maintenance of the species.

A. The use of the site by listed species must be documented, not anecdotal. Acceptable sources of documentation may include but are

not limited to: field observations at the wetland sites during the local wetlands inventory and functional assessments, and existing information on rare species occurrences at agencies such as the Oregon Natural Heritage Program, Oregon Department of Fish and Wildlife, Oregon Department of Agriculture and the U.S. Fish and Wildlife Service.

B. Input originating from other locally knowledgeable sources constitutes "documentation" if verified by one of the above agencies or a university or college reference collection.

(e) The wetland has a direct surface water connection to a stream segment mapped by the Oregon Department of Fish and Wildlife as habitat for indigenous anadromous salmonids, and the wetland is determined to have "intact" or "impacted or degraded" fish habitat function using OFWAM.

(3) **Optional LSW Criteria.** At the discretion of the local government, wetlands that meet one or more of the following criteria may be identified as locally significant wetlands:

(a) The wetland represents a locally unique native plant community: wetland is or contains the only representative of a particular native wetland plant community in the UGB/UUC, which is only applicable if the entire UGB/UUC is inventoried. To be identified as a LSW, such a wetland must also have been assessed to perform at least one of the following functions at the levels indicated below using OFWAM:

A. Its wildlife habitat descriptor is either "provides diverse habitat," or "provides habitat for some wildlife species"; or

B. Its fish habitat descriptor is either "intact," or "impacted or degraded"; or

C. Its water quality function descriptor is either "intact," or "impacted or degraded"; or

D. Its hydrologic control function descriptor is either "intact," or "impacted or degraded."

(b) The wetland is publicly owned and determined to "have educational uses" using OFWAM, and such use by a school or organization is documented for that site.

Rule 141-086-0350, OAR, Locally Significant Wetland Criteria

7.2 Goal 5 Locally Significant Wetland Results

Identified aquatic features were assessed using Goal 5 Locally Significant Wetlands (LSW) criteria. Wetlands are determined to be Locally Significant should they meet the criteria such as providing some wildlife habitat and having intact water quality function.

7.2.1 North Gateway LSW Results

All documented wetlands within the North Gateway Study Area were determined to be locally significant. As outlined in Table 17, these wetlands meet one or more criteria to qualify as significant. LSW worksheets are provided in Appendix F.1.

Table 17. Locally Significant Wetland Designations for the North Gateway Study Area

Representative Sample Plot	LWI Wetland Code	Locally Significant Wetland?	LSW Criteria Met
NG-7	NGW-1	Yes; Locally Significant	Hydrologic Control
NG-8	NGW-1	Yes; Locally Significant	Hydrologic Control

7.2.2 Willamalane Properties LSW Results

All documented wetlands within the Willamalane Properties Study Area were determined to be locally significant. As outlined in Table 18, these wetlands meet one or more criteria to qualify as significant. LSW worksheets are provided in Appendix F.2.

Table 18. Locally Significant Wetland Designations for the Willamalane Properties Study Area

Representative Sample Plot	LWI Wetland Code	Locally Significant Wetland?	LSW Criteria Met
WP-1	WPW-1	Yes; Locally Significant	Hydrologic Control
WP-2	WPW-2, WPW-3	Yes; Locally Significant	Education
WP-4	WPW-4B	Yes; Locally Significant	Water Quality Limited
WP-5	WPW-4A	Yes; Locally Significant	Water Quality Limited
WP-6	WPW-7A	Yes; Locally Significant	Hydrologic Control
WP-7	WPW-7C, WPW-7D, WPW-7E, WPW-7F	Yes; Locally Significant	Water Quality Limited
WP-8	WPW-8	Yes; Locally Significant	Hydrologic Control

7.2.3 Mill Race LSW Results

All but one, MR-16, of the documented aquatic features within the Mill Race Study Area were determined to be locally significant. As outlined in Table 19, these wetlands meet one or more criteria to qualify as significant. LSW worksheets are provided in Appendix F.2.

Table 19. Locally Significant Wetland Designations for the Mill Race Study Area

Representative Sample Plot	LWI Wetland Code	Locally Significant Wetland?	LSW Criteria Met
MR-2	MRW-2	Yes; Locally Significant	Water Quality Limited
MR-3	MRW-1	Yes; Locally Significant	Wildlife Habitat, Hydrologic Control
MR-4	MRW-3A, MRW-3B	Yes; Locally Significant	Hydrologic Control
MR-5	MRW-4	Yes; Locally Significant	Hydrologic Control
MR-6	MFWR-2	Yes; Locally Significant	Education
MR-7	MFWR-3	Yes; Locally Significant	Hydrologic Control
MR-8	MRW-7B, MRW-7C, MRW-7D	Yes; Locally Significant	Hydrologic Control
MR-9	MRW-5, MRW-6, MRW-11	Yes; Locally Significant	Hydrologic Control
MR-10	MRW-8	Yes; Locally Significant	Hydrologic Control
MR-11	MRW-9	Yes; Locally Significant	Wildlife Habitat, Hydrologic Control
Representative Sample Plot	**LWI Wetland Code**	**Locally Significant Wetland?**	**LSW Criteria Met**
MR-12	MRW-10	Yes; Locally Significant	Education
MR-13	MRW-12	Yes; Locally Significant	Water Quality Limited
MR-14	MRW-13A, MRW-13B	Yes; Locally Significant	Water Quality Limited
MR-15	MRW-15A, MRW-15B, MRW-15C, MRW-15D	Yes; Locally Significant	Hydrologic Control
MR-16	MRW-18	Not Locally Significant	-
MR-17	MRW-14A, MRW-14B, MRW-14C	Yes; Locally Significant	Water Quality Limited
MR-18	MRW-14D	Yes; Locally Significant	Water Quality Limited
MR-19	MRW-17	Yes; Locally Significant	Wildlife Habitat

MR-20	MRW-26A, MRW-26B, MRW-27	Yes; Locally Significant	Fish Habitat, Hydrologic Control
MR-21	MRW-16, MRW-25B, MRW-25C, MRW-25D	Yes; Locally Significant	Fish Habitat
MR-22	MRW-23	Yes; Locally Significant	Water Quality Limited
MR-23	MRW-20, MRW-19, MRW-21, MRW-22	Yes; Locally Significant	Water Quality Limited
MR-24	MRW-24A, MRW-24B, MRW-25A, MRW-28, MRW-29	Yes; Locally Significant	Water Quality, Hydrologic Control

8.0 Riparian Corridor Assessment Results

Upon identification of aquatic features which meet the qualifications for riparian assessment, the LWI teams assessed riparian setbacks using Safe Harbor and standard URIAG riparian setback and analysis to document extent and condition of riparian zones.

8.1 North Gateway Riparian Corridors

The LWI team did not identify a river or waterbody within the North Gateway Study Area. The McKenzie River, however, is situated immediately north of the site with the riparian corridor extending into the Study Area. In accordance with Goal 5 protocol, the McKenzie River riparian area extending into North Gateway is assessed.

NOTE: Conclusions pending. A feature called Maple Island Slough has been represented on a number of other maps and in other inventories, but our field investigations made it clear that hydrology monitoring is needed. Areas associated with Maple Island Slough pending hydrology analysis in winter 2020/21 for feature confirmation and classification. This analysis could result in an additional resource site described herein and shown on the maps.

8.1.1 Safe Harbor Riparian Analysis

As the McKenzie River exhibits flows greater than 1000 cfs and the river is designated as ESH, the 75-foot Safe Harbor setback is applied (DSL, 1998). This setback extends from the top of bank (corresponding to the Ordinary High Water elevation) of the river (as documented by the City's Water Quality Limited Waterways inventory). Table 20 outlines Safe Harbor setbacks while defined riparian zones are depicted in Figure 13 (Appendix B.1).

Table 20. North Gateway Study Area Safe Harbor Riparian Widths

Feature	Safe Harbor Qualification	Riparian corridor widths
McKenzie River	Flows >1000 cfs, presence of fish (ESH)	75 feet

8.1.2 URIAG Riparian Analysis

Using URIAG, one tree species was determined to be the dominant native tree within the McKenzie River riparian areas extending into North Gateway Study Area. The dominant tree species is documented to be black cottonwood (*Populus trichocarpa*) with Oregon ash (*Fraxinus latifolia*) and bigleaf maple (*Acer macrophyllum*) in smaller quantities. URIAG buffers associated with Black cottonwood are 120-feet. This setback extends from the top of bank (corresponding to the Ordinary High Water elevation) of the river (as documented by City's Water Quality Limited Waterways inventory). Table 21 outlines URIAG setbacks while defined riparian zones are depicted in Figure 13 (Appendix B.1).

Table 21. URIAG Riparian Widths for the North Gateway Study Area

Feature	Dominant Tree Species		Potential Tree Height/ Riparian Corridor Widths
	Common Name	Botanical Name	
McKenzie River	Black cottonwood	*Populus trichocarpa*	120 Feet

URIAG analysis rates the McKenzie River riparian corridor within the North Gateway Study Area as High for water quality function, with the exception of a small stretch that is adjacent to the agricultural field, represented by sample plot R-NG-3 (L), which ranked as Medium. The high ranking is likely due to the riparian area's ability to filter runoff from nearby land, but adjacent to the agricultural field, at R-NG-3 (L), this function is lost, thus the score is lower.

In the flood management category, the riparian area rates as High to Medium, most likely due to the fact that the entire area contains a flood prone area above the top of bank, and for R-NG-1 (L) and R-NG-2 (L), woody vegetation is dominant, which slows the flow of water in a flood event. R-NG-3 (L) does not have much woody vegetation and therefore ranks lower. The riparian area near R-NG-1 (L) scored higher than that near R-NG-2 (L) because the McKenzie River is constricted by human-made features near R-NG-2 (L), but not at R-NG-1 (L).

The riparian zone also ranges from Low to High for thermal regulation due to diverse vegetation cover adjacent the river. R-NG-2 (L) ranks highest because the aspect / orientation of the riparian area allows for shading at midday in the summer, whereas the other two do not. R-NG-3 (L) also has patches of bare ground present, which further lowered its score.

Wildlife use ranked high for R-NG-1 (L) and R-NG-2 (L), due to diverse vegetation cover adjacent the river, and Low for R-NG-3 L due to lack of vegetation cover and diversity.

Table 22 summarizes the results of the riparian functional assessment while the riparian datasheets can be found in Appendix G.1.

Table 22. Summary of the North Gateway Study Area Riparian Functional Assessments

Riparian Sample Plot ID	Riparian Reach Code	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
R-NG-1 (L)	R-MKR-1	High	High	Medium	High
R-NG-2 (L)	R-MKR-1	High	Medium	High	High
R-NG-3 (L)	R-MKR-1	Medium	Medium	Low	Low

8.2 Willamalane Properties Riparian Corridors

The LWI team identified multiple stream features within the Willamalane Properties Study Areas warranting Goal 5 riparian assessments. Said features include McKenzie River, Keizer Slough, Cedar Creek, and South Cedar Creek.

8.2.1 Safe Harbor Riparian Analysis

As McKenzie River exhibits flows greater than 1000 cfs and the river is designated as ESH, the 75-foot Safe Harbor setback is applied (DSL, 1998). This setback extends from the top of the river bank (as documented by City's Water Quality Limited Waterways inventory and LWI boundary determinations).

Keizer Slough, Cedar Creek, and South Cedar Creek each exhibit flows with less than 1000 cfs (City, 2020). As Keizer Slough and Cedar Creek are designated as ESH (fish bearing streams), these features qualify for a 50-foot Safe Harbor setback. While not qualifying as ESH, StreamNet inventories South Cedar Creek as providing migratory use for Chinook salmon; said inventory documents the feature as a fish bearing stream, qualifying South Cedar Creek for the 50-foot Safe Harbor setback. Identified setbacks extend from the top upland edge associated with each LWI identified feature. Table 23 outlines Safe Harbor setbacks while defined riparian zones are depicted in Figures 28 and 29 (Appendix B.2).

Table 23. Willamalane Properties Study Area Safe Harbor Riparian Widths

Feature	Safe Harbor Qualification	Riparian corridor widths
McKenzie River	Flows >1000 cfs, presence of fish (ESH)	75 Feet
Keizer Slough	Flows <1000 cfs, presence of fish (ESH)	50 Feet
Cedar Creek	Flows <1000 cfs, presence of fish (ESH)	50 Feet
South Cedar Creek	Flows <1000 cfs, presence of fish	50 Feet

8.2.2 URIAG Riparian Analysis

Using URIAG, the Oxbow Natural Area corridors are documented to have black cottonwood as the dominant species within the McKenzie River corridor, including Keizer Slough. Cedar Creek (within Ruff and Lively Parks) riparian zones support dominant species bigleaf maple (*Acer macrophyllum*). South Cedar Creek within Ruff Park also supports bigleaf maple as the dominant tree species. URIAG buffers associated with black cottonwood are 120-feet, bigleaf maple requires a 90-foot setback. Identified setbacks extend from the upland edge associated with LWI identified features. Table 24 outlines URIAG setbacks while defined riparian zones are depicted in Figures 28 and 29 (Appendix B.2).

Table 24. URIAG Riparian Widths for the Willamalane Properties Study Area

Feature	Dominant Tree Species		Potential Tree Height/ Riparian Corridor Widths (feet)
	Common Name	Botanical Name	
McKenzie River	Black cottonwood	*Populus trichocarpa*	120 Feet
Keizer Slough	Bigleaf Maple	*Acer macrophyllum*	90 Feet
Cedar Creek	Bigleaf Maple	*Acer macrophyllum*	90 Feet
South Cedar Creek	Bigleaf Maple	*Acer macrophyllum*	90 Feet

URIAG analysis rates the McKenzie River and Keizer Slough riparian corridors, represented by sample plots R-KS-1 (L) and (R), R-WP-3 (L), R-WP-4 (L) and R-WP-5 (R, L), within the Willamalane Study Area as High for water quality function and wildlife habitat. The high ranking for water quality is attributed to the riparian area's ability to filter runoff from nearby land due to woody vegetation, low to moderate soil erosion rankings, less than 10% slopes, and less than 10% of impervious surfaces. The wildlife ranking is attributed to the presence of woody debris and more than one type of water resource, and the dominance of woody vegetation. In the flood management category, these riparian areas rate as Medium, most likely due to the fact that the entire area contains a flood prone area above the top of bank, which can slow flood waters, but less desirable is the constriction of the stream by human-made features. Thermal regulation also ranked as High for all riparian areas due to the dominance of woody vegetation and woody vegetation hanging over the edge of the water providing shade and buffering temperature gradients.

All assessed riparian corridors found at Cedar Creek and South Cedar Creek, represented by sample plots R-WP-1 (L)and R-WP-2 (L), ranked High for water quality function and wildlife habitat. South Cedar Creek ranked High for flood management, while Cedar Creek ranked as Medium. This difference is attributed to the fact that Cedar Creek is constricted by human-made features. Thermal regulation ranked as High at Cedar Creek and Medium at South Cedar Creek due to the fact that South Cedar Creek does not have shading during midday in the summer.

Table 25 summarizes the results of the riparian functional assessment while the riparian datasheets can be found in Appendix G.2.

Table 25. Summary of the Willamalane Properties Study Area Riparian Functional Assessments

Riparian Sample Plot ID	Riparian Reach Code	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
R-KS-1 (L)	R-KS-1 (L)	High	Medium	High	High
R-KS-1 (R)	R-KS-1 (R)	High	Medium	High	High
R-WP-1 (L)	R-SCC-1	High	High	Medium	High
R-WP-2 (L)	R-CC-2, R-CC-1	High	Medium	High	High
R-WP-3 (L)	R-MKR-2	High	Medium	High	High
R-WP-4 (L)	R-MKR-2, R-MKR-4	High	Medium	High	High
R-WP-5 (R, L)	R-MKR-3	High	Medium	High	High

8.3 Mill Race Riparian Corridors

The LWI team identified multiple stream features within the Mill Race Study Area warranting Goal 5 riparian assessments. Said features include Middle Fork Willamette River, Mill Race, Gorrie Creek, and Quarry Creek systems.

8.3.1 Safe Harbor Riparian Analysis

As Middle Fork Willamette River exhibits flows greater than 1000 cfs, the 75-foot Safe Harbor setback is applied (DSL, 2020). This setback extends from the top of the river bank (as documented by City's Water

Quality Limited Waterways inventory and LWI boundary determinations). Mill Race, Gorrie Creek, and Quarry Creeks each exhibit flows of less than 1000 cfs and are documented to contain fish populations; as such, the 50-foot riparian corridor setback is applied. Identified setbacks extend from the upland edge associated with each LWI identified feature. Table 26 outlines Safe Harbor setbacks while defined riparian zones are depicted on Figures 49 and 50 (Appendix B.3).

Table 26. Mill Race Study Area Safe Harbor Riparian Widths

Feature	Safe Harbor Qualification	Riparian corridor widths
Middle Fork Willamette River	Flows >1000 cfs, presence of fish (ESH)	75-Feet
Mill Race	Flows <1000, presence of fish (ESH)	50-Feet
Gorrie Creek	Flows <1000, presence of fish (ESH)	50Feet
Quarry Creek	Flows <1000, presence of fish (ESH)	50-Feet

8.3.2 URIAG Riparian Analysis

Using URIAG, the Middle Fork Willamette River riparian corridors are documented to have black cottonwood as the dominant species with Oregon ash, black cottonwood, and red alder also present. Mill Race, Gorrie Creek, and Quarry Creek are documented to have similar riparian species. URIAG buffers associated with black cottonwood are 120-feet. Identified setbacks extend from the upland edge associated with LWI identified features. Table 27 outlines URIAG setbacks while defined riparian zones are depicted on Figures 49 and 50 (Appendix B.3).

Table 27. URIAG Riparian Widths for the Mill Race Study Area

Feature	Dominant Tree Species		.Potential Tree Height/ Riparian Corridor Widths
	Common Name	Botanical Name	
Middle Fork Willamette River	Black cottonwood	*Populus trichocarpa*	120 Feet
Mill Race	Black cottonwood	*Populus trichocarpa*	120 Feet
Gorrie Creek	Black cottonwood	*Populus trichocarpa*	120 Feet
Quarry Creek	Black cottonwood	*Populus trichocarpa*	120 Feet
MRW-9A	Pacific Willow	*Salix lasiandra*	35 Feet
MRW-17	Red alder	*Alnus rubra*	65 Feet
MRW-18	Pacific Willow	*Salix lasiandra*	35 Feet
MRW-1A	Black cottonwood	*Populus trichocarpa*	120 Feet

URIAG analysis rates the Mill Race riparian corridor, represented by sample plot M-MR-1 (R, L), as High for water quality, thermal regulation, and wildlife habitat. The high ranking for water quality is attributed to the riparian area's ability to filter runoff from nearby land due to woody vegetation, low to moderate

soil erosion rankings, less than 10% slopes, and less than 10% of impervious surfaces. The wildlife ranking is attributed to the presence of woody debris and more than one type of water resource, and the dominance of woody vegetation. Thermal regulation also ranked as High for all riparian areas due to the dominance of woody vegetation and woody vegetation hanging over the edge of the water providing shade and buffering temperature gradients. Flood management ranked as Medium. Factors contributing to this category include the presence or absence of flood prone areas above the top of the water system's bank, dominance of woody vegetation in the flood prone area, and constriction of the water body by human-made features.

The Middle Fork Willamette River URIAG analysis, represented by sample plots R-MR-2 (R) and R-MR-3 (R), rates water quality and wildlife as High. The high ranking for water quality is attributed to the riparian area's ability to filter runoff from nearby land due to woody vegetation, low to moderate soil erosion rankings, less than 10% slopes, and less than 10% of impervious surfaces. The wildlife ranking is attributed to the presence of woody debris and more than one type of water resource, and the dominance of woody vegetation. Flood management ranks as high for R-MR-2 (R) and Medium for R-MR-3 (R). These differences are attributed to the presence of human-made constrictive features along the river near R-MR-3 (R), which lowers the ability of the riparian area to control floods. Thermal regulation rated as Medium for R-MR-2 (R) and high for R-MR-3 (R). Factors that affect this category include whether woody vegetation hangs over the edge of the water, providing shade, and if woody vegetation is the dominant layer to help buffer temperature gradients.

Gorrie Creek riparian corridor, represented by sample plot R-MR-4 (R, L), ranked as High for water quality and thermal regulation, and Medium for both flood management and wildlife habitat. Some factors that contributed to these scores include shading at midday in the summer, adjacent floodplain, degree of woody vegetation present, and if human-made features constrict the waterway.

The riparian corridor associated with the water system from the SUB facility, represented by R-MR-5 (R, L), ranked as High for water quality, thermal regulation and wildlife, due to shading, woody vegetation layers, and low erosion-ranked soils. The area ranked as Medium for flood management due to the constriction of the stream by human-made features.

The Quarry Creek riparian corridor, represented by sample plot R-MR-6 (R), ranked as High for water quality, thermal regulation, and wildlife. Some factors that contributed to these scores include shading at midday in the summer, adjacent floodplain, degree of woody vegetation present, and if human-made features constrict the waterway. The area rated as Medium for flood management due to the constriction of the stream by human-made features.

Several riparian areas associated with ponds were also assessed using the URIAG methodology, represented by sample plots R-MRW-17, R-MRW-18, R-MRW-1A and R-MRW-9A. R-MRW-17 and MRW-1A ranked the highest, most likely as they are a natural system and in the case of R-MRW-17, is connected to the McKenzie River, providing diverse, natural habitat and high value for flood reduction. R-MRW-18 is a small feature that does not provide much shade or diversity of vegetation layers, and it has steep slopes, reducing its overall riparian score. Features R-MRW-9A and R-MRW-1A represent ponded areas surrounded by natural forested corridors. R-MRW-9A is a larger feature that provides High wildlife and flood management values, but scores lower for water quality and thermal regulation due to the lack of woody vegetation immediately on the fringe of the waterbody and thus lack of shading. R-MRW-1A is a

smaller feature, surrounded by tall trees and dense forest, increasing its ability to thermal regulate and providing High value in all categories.

Table 28 summarizes the results of the riparian functional assessment while the riparian datasheets can be found in Appendix G.3.

Table 28. Summary of the Mill Race Study Area Riparian Functional Assessments

Riparian Sample Plot ID	Riparian Reach Code	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
R-MR-1 (R, L)	R-MR-1	High	Medium	High	High
R-MR-2 (R)	R-MFWR-1	High	High	Medium	High
R-MR-3 (R)	R-MFWR-2	High	Medium	High	High
R-MR-4 (R, L)	R-GC-1	High	Medium	High	Medium
R-MR-5 (R, L)	R-SUB-1	High	Medium	High	High
R-MR-6 (R)	R-QC-1	High	Medium	High	High
R-MRW-17	R-MRW-17	High	High	High	High
R-MRW-18	R-MRW-18	Medium	Medium	Low	Medium
R-MRW-1A	R-MRW-1A	High	High	High	High
R-MRW-9A	R-MRW-9A	High	High	Medium	High