MovingAhead

STREETS AND PLACES REIMAGINED

DRAFT FINAL Water Quality, Floodplain, and Hydrology Technical Report

Lane Transit District
City of Eugene

In cooperation with
Lane Council of Governments
Lane County
Oregon Department of Transportation

July 7, 2017

DRAFT FINAL Water Quality, Floodplain, and Hydrology Technical Report

MovingAhead Project

Prepared in accordance with the
National Environmental Policy Act of 1969, as amended 42 U.S.C. 4322
and the
Federal Transit Act of 1964, as amended 49 U.S.C. 1601 et seq.

July 7, 2017

Prepared for
Federal Transit Administration
Lane Transit District
City of Eugene

Prepared by
CH2M HILL, Inc.

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Acronyms, Abbreviations, and Terms

Acronyms and Abbreviations	Definitions
°C	degree(s) Celsius
>	greater than
<	less than
µg/L	microgram(s) per liter
AA	Alternatives Analysis
ADA	Americans with Disabilities Act
BAT	Business Access and Transit
BFE	Base Flood Elevation
BRT	Bus Rapid Transit
CFU	Colony-Forming Unit
CH2M	CH2M HILL, Inc.
CWA	Clean Water Act
DSL	Oregon Department of State Lands
EmX	Emerald Express
EO	Executive Order
EPA	U. S. Environmental Protection Agency
Draft Eugene 2035 TSP	*DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016)
FEMA	Federal Emergency Management Agency
ft^2	square foot (feet)
FTA	Federal Transit Administration
FTN	Frequent Transit Network
I-5	Interstate 5
I-105	Interstate 105
LCC	Lane Community College
LCOG	Lane Council of Governments
LOS	level of service
LTD	Lane Transit District
mg/L	milligram(s) per liter
mL	milliliter(s)
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
NA	Not applicable; no data available
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System

Acronyms and Abbreviations	Definitions
ODEQ	Oregon Department of Environmental Quality
ODOT	Oregon Department of Transportation
pg/L	picogram(s) per liter
RM	river mile
RTP	Regional Transportation Plan
SDWA	Safe Drinking Water Act
SLOPES	Standard Local Operating Procedures for Endangered Species
TMDL	total maximum daily load
U.S.C.	United States Code
USGS	U.S. Geological Survey
WEEE	West Eugene EmX Extension

Terms	Definitions
Accessibility	The extent to which facilities are barrier free and useable for all persons with or without disabilities.
Alternatives Analysis	The process of evaluating the costs, benefits and impacts of a range of transportation alternatives designed to address mobility problems and other locally-defined objectives in a defined transportation corridor, and for determining which particular investment strategy should be advanced for more focused study and development. The Alternatives Analysis (AA) process provides a foundation for effective decision making.
Business Access and Transit Lane (BAT)	In general, a BAT lane is a concrete lane, separated from general-purpose lanes by a paint stripe and signage. A BAT lane provides BRT priority operations, but general-purpose traffic is allowed to travel within the lane to make a turn into or out of a driveway or at an intersecting street. However, only the BRT vehicle is allowed to use the lane to cross an intersecting street.
Boarding	Boarding is a term used in transit to account for passengers of public transit systems. One person getting on a transit vehicle equals one boarding. In many cases, individuals will have to transfer to an additional transit vehicle to reach their destination and may well use transit for the return trip. Therefore, a single rider may account for several transit boardings in one day.
Bus Rapid Transit (BRT)	A transit mode that combines the quality of rail transit and the flexibility of buses. It can operate on bus lanes, HOV lanes, expressways, or ordinary streets. The vehicles are designed to allow rapid passenger loading and unloading, with more doors than ordinary buses.
Capital Improvements Program	A Capital Improvement Plan or Program (CIP) is a short-range plan, usually 4 to 10 years, which identifies capital projects and equipment purchases, provides a planning schedule and identifies options for funding projects in the program.

Terms	Definitions
Categorical Exclusion	A Categorical Exclusion (CE) means a category of actions which do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required.
Collector Streets	Collector streets provide a balance of both access and circulation within and between residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access and are located in residential neighborhoods, distributing trips from the neighborhood and local street system.
Corridor	A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways and transit route alignments.
Documented Categorical Exclusion (DCE)	A Documented Categorical Exclusion (DCE) means a group of actions that may also qualify as CEs if it can be demonstrated that the context in which the action is taken warrants a CE exclusion; i.e., that no significant environmental impact will occur. Thus, these actions are referred to as Documented Categorical Exclusions. Such actions require some NEPA documentation, but not an Environmental Assessment or a full-scale Environmental Impact Statement. DCEs documentation must demonstrate that in the context(s) in which these actions are to be performed, they will have no significant environmental impact or that such impacts will be mitigated.
Effects	Effects include ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. Effects include: (1) direct effects that are caused by the action and occur at the same time and place, and (2) indirect effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use; population density or growth rate; and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8).
EmX	Lane Transit District's Bus Rapid Transit System, pronounced "MX", short for Emerald Express.
Envision Eugene	The City of Eugene's Comprehensive Plan (latest draft or as adopted). Envision Eugene includes a determination of the best way to accommodate the community's projected needs over the next 20 years.

Terms	Definitions
Environmental Justice	A formal federal policy on environmental justice was established in February 1994, with Executive Order 12898 (EO 12898), "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." There are three fundamental environmental justice principles: • To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations. • To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process. • To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.
Evaluation Criteria	Evaluation criteria are the factors used to determine how well each of the proposed multimodal alternatives would meet the project's Goals and Objectives. The Evaluation Criteria require a mix of quantitative data and qualitative assessment. The resulting data are used to measure the effectiveness of proposed multimodal alternatives and to assist in comparing and contrasting each of the alternatives to select a preferred alternative.
Fatal Flaw Screening	The purpose of a Fatal Flaw Screening is to identify alternatives that will not work for one reason or another (e.g., environmental, economic, community) By using a Fatal Flaw Screening process to eliminate alternatives that are not likely to be viable, a project can avoid wasting time or money studying options that are not viable and focus on alternatives and solutions that have the greatest probably of meeting the community's needs (e.g., environmentally acceptable, economically efficient, implementable).
Fixed Route	Service provided on a repetitive, fixed-schedule basis along a specific route with vehicles stopping to pick up and deliver passengers at set stops and stations; each fixed-route trip serves the same origins and destinations, unlike demand responsive and taxicabs.
Flow Control	Stormwater management practices or facilities used to reduce peak flows.
Geographic Information System (GIS)	Data management software tool that enables data to be displayed geographically (i.e., as maps).
Goals and Objectives	Goals and objectives define the project's desired outcome and reflect community values. Goals and objectives build from the project's Purpose and Need Statement. Goals are overarching principles that guide decision making. Goals are broad statements. Objectives define strategies or implementation steps to attain the goals. Unlike goals, objectives are specific and measurable.
Guideway	A transit right of way separated from general purpose vehicles.
Headway	Time interval between vehicles passing the same point while moving in the same direction on a particular route.
Hydrology	Refers to the flow of water including its volume, where it drains and how quickly it flows.
Impacts	A term to describe the positive or negative effects upon the natural or built environments as a result of an action (i.e., project).

Terms	Definitions
Key Transit Corridors	Key Transit Corridors are mapped in Envision Eugene and are anticipated to be significant transit corridors for the City and the region
Level of Service (LOS)	Level of service (LOS) is a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure. LOS is most commonly used to analyze highways, but the concept has also been applied to intersections, transit, and water supply.
Local Streets	Local streets have the sole function of providing direct access to adjacent land. Local streets are deliberately designed to discourage through traffic movements.
Maintenance facility	A facility along a corridor used to clean, inspect, repair and maintain rail vehicles, as well as to store them when they are not in use.
Metropolitan Planning Organization (MPO)	The organization designated by local elected officials as being responsible for carrying out the urban transportation and other planning processes for an area.
Mitigation	A means to avoid, minimize, rectify, or reduce an impact, and in some cases, to compensate for an impact.
Mode	A particular form or method of travel distinguished by vehicle type, operation technology and right of way separation from other traffic.
MovingAhead Project	The City of Eugene and LTD are working with regional partners and the community to determine which improvements are needed on some of our most important transportation corridors for people using transit, and facilities for people walking and biking. MovingAhead will prioritize transit, walking and biking projects along these corridors so that they can be funded and built in the near-term. The project will focus on creating active, vibrant places that serve the community and accommodate future growth. During Phase 1, currently underway, the community will weigh in on preferred transportation solutions for each corridor and help prioritize corridors for implementation. When thinking about these important streets, LTD and the City of Eugene refer to them as corridors because several streets may work as a system to serve transportation needs.
Multimodal	Multimodal refers to various modes. For the MovingAhead project, multimodal refers to Corridors that support various transportation modes including vehicles, buses, walking and cycling.
National Environmental Policy Act of 1969 (NEPA)	A comprehensive federal law requiring analysis of the environmental impacts of federal actions such as the approval of grants; also requiring preparation of an Environmental Impact Statement (EIS) for every major federal action significantly affecting the quality of the human environment.
No Action or No-Build Alternative	An alternative that is used as the basis to measure the impacts and benefits of the other alternative(s) in an environmental assessment or other National Environmental Policy Act (NEPA) action. The No-Build alternative consists of the existing conditions, plus any improvements which have been identified in the Statewide Transportation Improvement Program (STIP).
Off-Peak Period	Non-rush periods of the day when travel activity is generally lower and less transit service is scheduled. Also called “base period.”
Park and Ride	Designated parking areas for automobile drivers who then board transit vehicles from these locations.

Terms	Definitions
Peak Hour	The hour of the day in which the maximum demand for transportation service is experienced (refers to private automobiles and transit vehicles).
Peak Period	Morning and afternoon time periods when transit riding is heaviest.
Preferred Alternative	An alternative that includes a major capital improvement project to address the problem under investigation. As part of the decision-making process, the Preferred Alternative is compared against the No Action or No-Build Alternative from the standpoints of transportation performance, environmental consequences, cost-effectiveness, and funding considerations.
Purpose and Need	The project Purpose and Need provides a framework for developing and screening alternatives. The purpose is a broad statement of the project's transportation objectives. The need is a detailed explanation of existing conditions that need to be changed or problems that need to be fixed.
Ridership	The number of rides taken by people using a public transportation system in a given time period.
Right of Way	Publicly owned land that can be acquired and used for transportation purposes.
Scoping	A formal coordination process used to determine the scope of the project and the major issues likely to be related to the proposed action (i.e., project).
Screening Criteria	Criteria used to compare alternatives.
Study Area	The area within which evaluation of impacts is conducted. The study area for particular resources will vary based on the decisions being made and the type of resource(s) being evaluated.
Title VI	This title declares it to be the policy of the United States that discrimination on the ground of race, color, or national origin shall not occur in connection with programs and activities receiving Federal financial assistance and authorizes and directs the appropriate Federal departments and agencies to take action to carry out this policy.
Transit System	An organization (public or private) providing local or regional multi-occupancy-vehicle passenger service. Organizations that provide service under contract to another agency are generally not counted as separate systems.
Water Quality	Refers to the characteristics of the water, such as its temperature and oxygen levels, how clear it is, and whether it contains pollutants.

Source: MovingAhead Project Team (2015, March)

Water Quality, Floodplain, and Hydrology Summary

This Water Quality, Floodplain and Hydrology Technical Report presents the results of the water quality, floodplain and hydrology assessment for the Lane Transit District (LTD) and City of Eugene's MovingAhead project in Eugene, Oregon. The purpose of the MovingAhead project is to determine which high-capacity transit corridors identified in the adopted Emerald Express (EmX) System Plan, *Lane Transit District Long-Range Transit Plan* (LTD, 2014) and the Frequent Transit Network are ready to advance to capital improvements programming in the near term. LTD and the City of Eugene (City) initiated the MovingAhead project in 2014 to identify and examine alternatives for improving multimodal safety, mobility, and accessibility in key transit corridors in the City. A main theme of the City's vision is to concentrate new growth along and near the City's key transit corridors and core commercial areas while protecting neighborhoods and increasing access to services for everyone. LTD and the City are jointly conducting the project to facilitate a more streamlined and cost-efficient process through concurrent planning, environmental review, and design and construction of multiple corridors.

LTD and the City of Eugene examined multimodal transit alternatives in five key transit corridors identified in the *Draft Envision Eugene Comprehensive Plan* (Envision Eugene, 2016, July) and the *DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016a; Draft Eugene 2035 TSP), the region's highest growth centers, and Downtown Eugene:

- Highway 99 Corridor
- River Road Corridor
- 30th Avenue to Lane Community College (LCC) Corridor
- Coburg Road Corridor
- Martin Luther King, Jr. Boulevard Corridor

No-Build, Enhanced Corridor, and EmX Alternatives were developed for each corridor, except the Martin Luther King, Jr. Boulevard Corridor, for which only No-Build and Enhanced Corridor Alternatives were developed. The *Level 2 Definition of Alternatives* (CH2M et al., 2016) contains a detailed description of the project alternatives. The following items summarize the project alternatives evaluated.

- The **No-Build Alternatives** serve as a reference point to gauge the benefits, costs, and effects of the Enhanced Corridor and EmX Alternatives in each corridor. Each No-Build Alternative is based on the projected conditions in 2035. Capital projects are derived from the financially constrained project lists in the Draft Eugene 2035 TSP, the *Lane County Transportation System Plan* (Lane County Public Works, Engineering Division Transportation Planning, 2004, update in progress), the *Lane Transit District Capital Improvement Plan* (LTD, 2015), and the *Lane Transit District Long-Range Transit Plan* (LTD, 2014).
- **Enhanced Corridor Alternatives** are intended to address the project's Purpose, Need, Goals, and Objectives without major transit capital investments, instead focusing on lower-cost capital improvements, operational improvements, and transit service refinements, including 15-minute service frequency. Features can include transit queue jumps (lanes for buses that allow the bus to "jump" ahead of other traffic at intersections using a separate signal phase), stop consolidation, and enhanced shelters. These features can improve reliability, reduce transit travel time, and increase passenger comfort, making transit service along the corridor more attractive.
- **EmX Alternatives** are characterized by sections of exclusive guideway, branded multi-door 60-foot-long Bus Rapid Transit (BRT) vehicles, and enhanced stations with level boarding platforms instead of bus stops; off-board fare collection; transit signal priority; wider stop spacing; and 10-minute

service frequencies. In general, EmX is a transit mode positioned between fixed-route bus service operating in mixed traffic and urban rail service operating in a separate right of way. EmX service is intended to improve transit speed, reliability, and ridership.

Figure S.1-1 shows the proposed corridors for the Enhanced Corridor Alternatives and Figure S.1-2 shows the proposed corridors for the EmX Alternatives.

This report, prepared to support the MovingAhead Project Alternatives Analysis (AA), addresses potential adverse and beneficial effects that the project alternatives would have on water quality, floodplains, and hydrology. It describes how the proposed project alternatives would change the water quality, floodplains, and hydrological conditions of the five study corridors. It bases the assessments on how the alternatives would have potential adverse impacts to the amount of impervious surface area and how adverse impacts to the quantity of impervious surface area would impact water quality, floodplains, and hydrology along the corridors; identifies potential mitigation measures to reduce impacts to water quality, floodplains, and hydrology; and describes beneficial effects to the water quality, floodplain, and hydrological conditions found along the corridors.

This report was prepared in compliance with the National Environmental Policy Act (NEPA) and applicable state environmental policy legislation, as well as local and state planning and land use policies and design standards.

S.1. Affected Environment

The project's five corridors are primarily located within the City of Eugene, with a portion of the River Road and 30th Avenue to LCC Corridor located within unincorporated Lane County, and a portion of the Coburg Road Corridor located in the City of Springfield.

The MovingAhead project encompasses five transit corridors in the City of Eugene. The area of potential impact includes the receiving waterways and floodplains of the stormwater runoff from the five corridors. The receiving waterways include the Willamette River, Russel Creek, Q Street Canal, Dodson Slough, Debrick Slough, Spring Creek, and Amazon Creek. Two waterways, the Willamette River and Amazon Creek, are listed as 303(d) water quality limited streams, which indicates they do not meet the water quality standard for certain pollutants. Under the federal Clean Water Act, once it is determined that a water quality standard is not met, a total maximum daily load (TMDL) is established to allocate pollutant load reductions to restore water quality and meet water quality standards. Pollutants for which a TMDL has been established for the Willamette River include dioxin, temperature, and E. coli. Pollutants for which a TMDL has been established for Amazon Creek include dissolved oxygen and E. coli. The Willamette River and Amazon Creek floodplains are crossed by at least one proposed alternative.

S.2. Environmental Consequences

Construction of any MovingAhead corridor build alternative would result in a change of quality and quantity of stormwater runoff resulting from increased impervious area as well as changes in vehicle traffic volumes. In addition, existing vegetation that slows runoff and increases infiltration will likely be removed during the construction of some new impervious surface areas. Without proper mitigation, these consequences could be potentially detrimental to the receiving water. Alternatives resulting in a reduction in vehicle traffic as described in the *MovingAhead Transportation Technical Report* (CH2M and DKS, 2017) would likely have a beneficial impact on water quality. Anticipated impacts are summarized in the following subsections and Table S.3-1.

Figure S.1-1. Enhanced Corridor Alternatives Overview

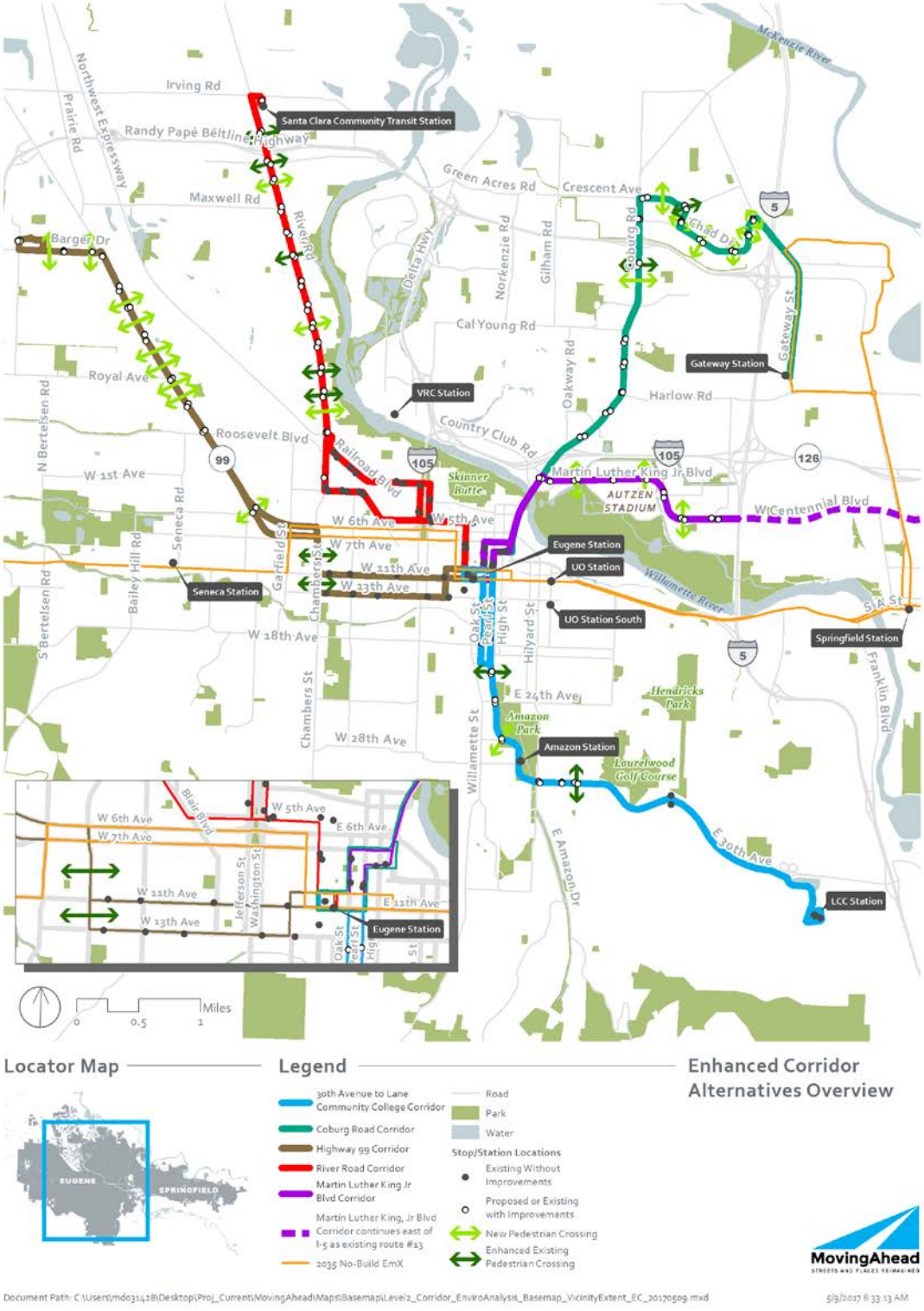

Figure S.1-2. EmX Alternatives Overview

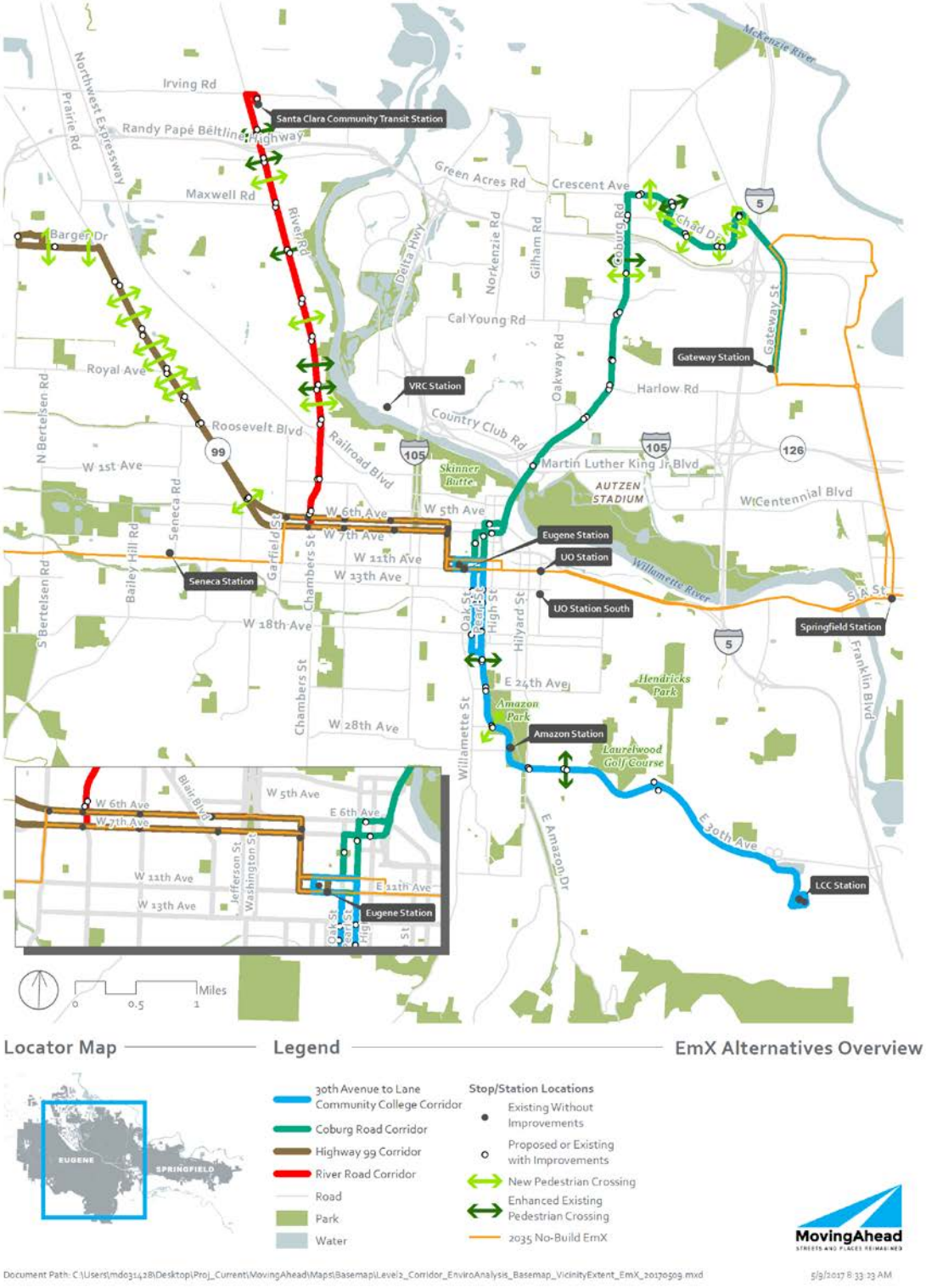

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Highway 99 Corridor			
Temporary / Short-Term Construction Related Impacts / Benefits	Potential for construction-related sediment release related to TSP projects	Potential for construction-related sediment release	Potential for construction-related sediment release
Long-Term Direct Impacts / Benefits	New and reconstructed impervious area per the Draft Eugene 2035 TSP	171,124 ft^2 (0.05%) of new and reconstructed impervious area in Amazon Creek Basin, of which 64,824 ft^2 would be new roadway and sidewalk	215,198 ft^2 (0.06%) of new and reconstructed impervious area in Amazon Creek Basin, of which 92,902 ft^2 would be new roadway and sidewalk
Indirect / Cumulative Effects	Some projects will increase impervious area per he Draft Eugene 2035 TSP	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 269,648 ft^2 (0.08%) of new and reconstructed impervious area in Amazon Creek Basin	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 366,635 ft^2 (0.11%) of new and reconstructed impervious area in Amazon Creek Basin
Mitigation Measures	• Water quality and flow control facilities located near major areas of construction • Erosion control and sediment prevention activities	• Water quality and flow control facilities at the following possible intersections: (1) W. 6th Avenue and W. 7th Avenue (2) Highway 99 and Fairfield Avenue (3) Highway 99 and Barger Drive (4) Ruskin Street and Barger Drive • Erosion and sediment control activities	• Water quality and flow control facilities at the following possible intersections: (1) W. 6th Avenue and W. 7th Avenue (2) Highway 99 and Fairfield Avenue (3) Highway 99 and Barger Drive (4) Ruskin Street and Barger Drive • Erosion and sediment control activities
Unavoidable Adverse Effects	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
River Road Corridor			
Temporary / Short-Term Construction Related Impacts / Benefits	Potential for construction-related sediment release related to TSP projects	Potential for construction-related sediment release	Potential for construction-related sediment release
Long-Term Direct Impacts / Benefits	New and reconstructed impervious area per the Draft Eugene 2035 TSP	• 81,207 ft^2 (0.17%) of new and reconstructed impervious area in Spring Creek Basin, of which 1,956 ft^2 would be new roadway and sidewalk • 28,366 ft^2 (<0.01%) of new and reconstructed impervious area in Willamette River Basin, of which 18,801 ft^2 would be new roadway and sidewalk • 1,123 ft^2 (<0.01%) of reconstructed non-pollutant generating surface area in Amazon Creek Basin	• 188,287 ft^2 (0.39%) of new and reconstructed impervious area in Spring Creek Basin, of which 4,234 ft^2 would be new roadway and sidewalk • 557,646 ft^2 (0.12%) of new and reconstructed impervious area in Willamette River Basin, of which 49,489 ft^2 would be new roadway and sidewalk • 2,917 ft^2 (<0.01%) of reconstructed non-pollutant generating surface area in Amazon Creek Basin
Indirect / Cumulative Effects	Some projects will increase impervious area per the Draft Eugene 2035 TSP	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 207,259 ft^2 (0.05%) of new and reconstructed impervious area in Willamette River Basin	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 716,118 ft^2 (0.16%) of new and reconstructed impervious area in Willamette River Basin

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Mitigation Measures	• Water quality and flow control facilities located near major areas of construction • Erosion and sediment control activities	• Water quality and flow control facilities at the following possible intersections: (1) River Road and Horn Lane (Willamette River) (2) River Road and Maynard Avenue (Willamette River) (3) River Road and Silver Lane (Willamette River) (4) River Road and Hunsaker Lane (Spring Creek) • Erosion and sediment control activities	• Water quality and flow control facilities at the following possible intersections: (1) River Road and Horn Lane (Willamette River) (2) River Road and Maynard Avenue (Willamette River) (3) River Road and Silver Lane (Willamette River) (4) River Road and Hunsaker Lane (Spring Creek) • Erosion and sediment control activities
Unavoidable Adverse Effects	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation
30th Avenue to LCC Corridor			
Temporary / Short-Term Construction Related Impacts / Benefits	Potential for construction-related sediment release related to TSP projects	Increased and change in runoff patterns at locations where construction occurs in or within 20 feet of the Amazon Creek floodplain Construction-related sediment release	Increased and change in runoff patterns at locations where construction occurs in or within 20 feet of the Amazon Creek floodplain Construction-related sediment release

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Long-Term Direct Impacts / Benefits	New and reconstructed non-pollutant generating surface area per the Draft Eugene 2035 TSP	• 98,524 ft^2 (0.03%) new and reconstructed impervious area in Amazon Creek Basin, of which 26,915 ft^2 would be new roadway and sidewalk • 12,277 ft^2 (<0.01%) new and reconstructed impervious area in Willamette River Basin, none of which would be new roadway or sidewalk	• 1,724 ft^2 (0.06%) new and reconstructed impervious area in Russel Creek Basin, of which none would be new roadway or sidewalk • 151,437 ft^2 (0.05%) new and reconstructed impervious area in Amazon Creek Basin, of which 35,749 ft^2 would be new roadway and sidewalk • 56,162 ft^2 (0.01%) new and reconstructed impervious area in Willamette River Basin, of which none would be new roadway or sidewalk
Indirect / Cumulative Effects	Some projects will increase impervious area per the Draft Eugene 2035 TSP	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 269,648 ft^2 (0.03%) of new and reconstructed impervious area in Amazon Creek Basin • Up to 207,259 ft^2 (0.05%) of new and reconstructed impervious area in Willamette River Basin	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 366,635 ft^2 (0.11%) of new and reconstructed impervious area in Amazon Creek Basin • Up to 716,118 ft^2 (0.16%) of new and reconstructed impervious area in Willamette River Basin

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Mitigation Measures	• Water quality and flow control facilities located near major areas of construction • Erosion and sediment control activities	• Water quality and flow control facilities at the following possible intersections: (1) 11th Avenue and Pearl Street (Willamette River) (2) 19th Avenue and Pearl Street (Amazon Creek) (3) Amazon Parkway and Hilyard Street (Amazon Creek) (4) E. 30th Avenue and Spring Boulevard (Russel Creek) • Erosion and sediment control activities	• Water quality and flow control facilities at the following possible intersections: (1) 11th Avenue and Pearl Street (Willamette River) (2) 19th Avenue and Pearl Street (Amazon Creek) (3) Amazon Parkway and Hilyard Street (Amazon Creek) (4) E. 30th Avenue and Spring Boulevard (Russel Creek) • Erosion and sediment control activities
Unavoidable Adverse Effects	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation
Coburg Road Corridor			
Temporary / Short-Term Construction Related Impacts / Benefits	No effect	Increased and change in runoff patterns at locations where construction occurs in or within 20 feet of the Willamette River Construction-related sediment release	Increased and change in runoff patterns at locations where construction occurs in or within 20 feet of the Willamette River Construction-related sediment release

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Long-Term Direct Impacts / Benefits	No effect	• 92,523 ft^2 (0.94%) new and reconstructed impervious area in Debrick Slough Basin, of which 22,525 ft^2 would be new roadway and sidewalk • 170,279 ft^2 (0.14%) new and reconstructed impervious area in Dodson Slough Basin, of which none would be new roadway or sidewalk • 95,774 ft^2 (0.02%) new and reconstructed impervious area in Willamette River Basin, of which 8,215 ft^2 would be new roadway and sidewalk	• 177,597 ft^2 (1.80%) new and reconstructed impervious surface in Debrick Slough Basin • 533,015 ft^2 (0.43%) new and reconstructed impervious surface in Dodson Slough Basin, of which 32,827 ft^2 would be new roadway and sidewalk • 102,310 ft^2 (0.02%) new and reconstructed impervious surface in Willamette River Basin, of which 16,605 ft^2 would be new roadway and sidewalk
Indirect / Cumulative Effects	No effect	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 207,259 ft^2 (0.05%) of new and reconstructed impervious area in Willamette River Basin	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 716,118 ft^2 (0.16%) of new and reconstructed impervious area in Willamette River Basin
Mitigation Measures	No effect	• Water quality and flow control facilities at the following possible intersections: (1) Coburg Road and Cedarwood Drive (Willamette River) (2) Coburg Road and Frontier Road (Debrick Slough) (3) Coburg Road and Crescent Avenue (Dodson Slough) • Erosion and sediment control activities	• Water quality and flow control facilities at the following possible intersections: (1) Coburg Road and Cedarwood Drive (Willamette River) (2) Coburg Road and Frontier Road (Debrick Slough) (3) Coburg Road and Crescent Avenue (Dodson Slough) • Erosion and sediment control activities

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Unavoidable Adverse Effects	No effect	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation
Martin Luther King, Jr. Boulevard Corridor			
Temporary / Short-Term Construction Related Impacts / Benefits	NA	Increased and change in runoff patterns at locations where construction occurs in or within 20 feet of the Willamette River floodplain Construction-related sediment release	
Long-Term Direct Impacts / Benefits	NA	• 254,457 ft^2 (1.34%) new and reconstructed impervious surface in Q Street Canal Basin, of which 2,217 ft^2 would be new roadway and sidewalk • 70,842 ft^2 (0.02%) new and reconstructed impervious surface in Willamette River Basin, of which 8,971 ft^2 would be new roadway and sidewalk	
Indirect / Cumulative Effects	New and reconstructed impervious area per the Draft Eugene 2035 TSP	• Future water quality facility improvements resulting from redevelopment due to increased population and usage • Up to 207,259 ft^2 (0.05%) of new and reconstructed impervious area in Willamette River Basin	

Table S.3-1. Summary of Water Quality, Floodplain, and Hydrology Environmental Consequences by Corridor and Alternative

Alternatives	No-Build Alternative	Enhanced Corridor Alternative[a]	EmX Alternative[a]
Mitigation Measures	• Water quality and flow control facilities located near major areas of construction	• Water quality and flow control facilities at the following possible intersections: (1) Martin Luther King, Jr. Boulevard and Centennial Loop (2) Martin Luther King, Jr. Boulevard and Kinsrow Avenue • Erosion and sediment control activities	
Unavoidable Adverse Effects	Increased impervious area and potential for reduced vegetation	Increased impervious area and potential for reduced vegetation	

NA = not applicable

[a] Percentages defined as New and Reconstructed Impervious Area in Drainage Basin/Total Impervious Area in Drainage Basin

With the development of all enhanced corridors considered in the MovingAhead Project, a total of 207,259 square feet (ft^2) of new or reconstructed impervious surface area would drain to the Willamette River. Up to 716,118 ft^2 would be added to or reconstructed in the Willamette River drainage basin should all EmX Alternatives for all corridors be developed.

The development of any alternative could lead to increases in population and redevelopment along the corridors, which could lead to associated infrastructure improvements. Upgraded stormwater treatment in these redeveloped areas would improve water quality. Currently, the runoff in these areas are not receiving treatment and the new and replaced impervious surface would require treatment, thus providing a net benefit to water quality. Other anticipated impacts specific to each corridor are summarized in the following subsections and Table S.3-1.

S.2.1. Highway 99 Corridor

S.2.1.1. No-Build Alternative

Upgrades to Bethel Drive and Barger Drive are anticipated as part of the No-Build Alternative. The resulting increase in impervious area is currently unknown. Additional non-pollutant generating impervious surfaces (such as bike paths and sidewalks) are also anticipated from No-Build projects. Although surfaces such as sidewalks and bike paths are subject to depositional pollutants, these are systemic pollutants and not associated with specific pollution sources such as vehicles.

S.2.1.2. Enhanced Corridor Alternative

The primary impact of the Highway 99 Corridor Enhanced Corridor Alternative is an increase or reconstruction of 171,124 ft^2 of impervious area in the Amazon Creek drainage basin, of which 64,824 ft^2 would be new roadway and sidewalk. Up to 269,648 ft^2 of impervious area may be added to or reconstructed in the Amazon Creek Basin when the 30th Avenue to LCC Corridor Enhanced Corridor is also developed. Neither the Amazon Creek floodplain nor Willamette River floodplain is directly crossed by the alternative.

S.2.1.3. EmX Alternative

The Highway 99 Corridor EmX Alternative would add or reconstruct 215,198 ft^2 of impervious area in the Amazon Creek Basin, of which 92,902 ft^2 would be new roadway and sidewalk. With the development of the 30th Avenue to LCC Corridor EmX Alternative, up to 366,635 ft^2 of new or reconstructed impervious area will drain to Amazon Creek. Neither the Amazon Creek floodplain nor Willamette River floodplain is directly crossed by the alternative.

S.2.2. River Road Corridor

S.2.2.1. No-Build Alternative

Upgrades to Hunsaker Lane and Beaver Street will likely increase the amount of impervious area that drains to Spring Creek; however, the exact amount is currently unknown. Additional non-pollutant generating impervious surfaces (such as bike paths and sidewalks) are also anticipated from No-Build projects.

S.2.2.2. Enhanced Corridor Alternative

A total of 109,573 ft^2 of pollutant-generating impervious area would be added or reconstructed as the result of the River Road Corridor Enhanced Corridor Alternative. This includes 81,207 ft^2 added to or reconstructed in the Spring Creek drainage basin (of which 1,956 ft^2 would be new roadway and sidewalk) and 28,366 ft^2 added to or reconstructed in the Willamette River drainage basin (of which 18,207 ft^2 would be new roadway and sidewalk). In addition, 1,123 ft^2 of non-pollutant generating surface would be reconstructed in the Amazon Creek drainage basin. Spring Creek, Amazon Creek, and the Willamette River floodplains are not crossed by the Enhanced Corridor Alternative.

S.2.2.3. EmX Alternative

The River Road Corridor EmX Alternative would add or reconstruct 188,287 ft^2 (of which 4,234 ft^2 would be new roadway and sidewalk) and 557,646 ft^2 (of which 49,489 ft^2 would be new roadway and sidewalk) of impervious area) that drains to Spring Creek and the Willamette River, respectively. In addition, 2,917 ft^2 of reconstructed, non-pollutant generating impervious area would drain to Amazon Creek. Spring Creek, Amazon Creek, and the Willamette River floodplains are not crossed by the EmX Alternative.

S.2.3. 30th Avenue to Lane Community College Corridor

S.2.3.1. No-Build Alternative

Only construction of non-pollutant generating impervious area (such as bike paths and sidewalks) is expected from this No-Build Alternative.

S.2.3.2. Enhanced Corridor Alternative

A total of 110, 801 ft^2 of new or reconstructed impervious surface area would drain to Amazon Creek (98,524 ft^2) and Willamette River (12,277 ft^2) under the 30th Avenue to LCC Corridor Enhanced Corridor Alternative. Of the 98,524 ft^2 of impervious surface in the Amazon Creek drainage basin, 26,915 ft^2 would be new roadway and sidewalk.

With the development of the Highway 99 Corridor Enhanced Corridor Alternative, up to 269,648 ft^2 could be added to or reconstructed in the Amazon Creek drainage basin. Construction would occur within the Amazon Creek floodplain near 17th Avenue as bus stations and pedestrian crossings are improved. The existing culverts would not be affected.

S.2.3.3. EmX Alternative

The 30th Avenue to LCC Corridor EmX Alternative would add or reconstruct 56,162 ft^2 of impervious area that drains to the Willamette River. New or reconstructed impervious areas in Amazon Creek and Russel Creek drainage basins would total 151,437 ft^2 (of which 35,749 ft^2 would be new roadway and sidewalk) and 1,724 ft^2, respectively. Similar to the Enhanced Corridor Alternative, bus station and pedestrian crossing construction are expected within the Amazon Creek floodplain at 17th Avenue. Existing culverts would not be affected.

S.2.4. Coburg Road Corridor

S.2.4.1. No-Build Alternative

No substantive impacts are expected to result from the No-Build Alternative.

S.2.4.2. Enhanced Corridor Alternative

The Coburg Road Corridor Enhanced Corridor Alternative would drain to the Willamette River, Debrick Slough, and Dodson Slough. New and reconstructed impervious areas in the drainage basins would total 95,774 ft^2 (of which 8,215 ft^2 would be new roadway and sidewalk), 92,523 ft^2 (of which 22,525 ft^2 would be new roadway and sidewalk), and 170,279 ft^2, respectively. Although the alternative crosses the Willamette River, the Ferry Street Bridge will not be modified. Construction will occur within the Willamette River floodplain at the intersection of Coburg Road and Cedarwood Drive.

S.2.4.3. EmX Alternative

The development of the Coburg Road Corridor EmX Alternative would add or reconstruct 102,310 ft^2 of new impervious surface area to the Willamette River drainage basin – 177,597 ft^2 in the Debrick Slough drainage basin, and 533,015 ft^2 in the Dodson Slough drainage basin (of which 32,827 ft^2 would be new roadway and sidewalk). Although the alternative crosses the Willamette River, no improvements are expected to Ferry Street Bridge. Construction will occur within the Willamette River floodplain at the intersection of Coburg Road and Cedarwood Drive.

S.2.5. Martin Luther King, Jr. Boulevard Corridor

S.2.5.1. No-Build Alternative

No substantive impacts are expected to result from the No-Build Alternative.

S.2.5.2. Enhanced Corridor Alternative

The Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative would add or reconstruct 70,842 ft^2 of impervious surface area that drains to the Willamette River (of which 8,971 ft^2 would be new roadway and sidewalk), and 254,457 ft^2 of impervious area to the area draining to the Q Street Canal (of which 2,217 ft^2 would be new roadway and sidewalk). Much of the Enhanced Corridor Alternative falls within the Willamette River floodplain (which includes parts of the Q Street Canal as well). Existing culverts would not be affected.

S.3. Mitigation Options

Best management practices may be implemented to help minimize the adverse environmental consequences resulting from the construction and redevelopment of impervious surface areas for the MovingAhead project. Such mitigation options may include water quality facilities, such as swales, planters, ponds, pervious pavement, and proprietary structures. These would reduce the negative impacts to water quality from stormwater runoff and are likely to improve the water quality, particularly where existing impervious area is being replaced and associated water quality facilities do not currently exist. To comply with state and local regulations, and federal mandates, water quality and flow control facilities will be required in the Russel Creek, Q Street Canal, Dodson Slough, Debrick Slough, Spring Creek, and Amazon Creek drainage basins and water quality facilities will be required in the Willamette River drainage basin. Potential locations for facilities are identified in the following subsections.

S.3.1. Highway 99 Corridor

Four locations, common to both build alternatives, were identified for potential water quality and flow control facilities for runoff prior to discharge to Amazon Creek. The following locations were selected based on the construction footprint and hydrology:

- W. 6th Avenue and W. 7th Avenue
- Highway 99 and Fairfield Avenue
- Highway 99 and Barger Drive
- Ruskin Street and Barger Drive

S.3.2. River Road Corridor

Four locations common to both build alternatives were identified for water quality facilities (for discharge to the Willamette River) and water quality and flow control facilities (to Spring Creek) at the following intersections:

- River Road and Horn Lane (Willamette River)
- River Road and Maynard Avenue (Willamette River)
- River Road and Silver Lane (Willamette River)
- River Road and Hunsaker Lane (Spring Creek)

S.3.3. 30th Avenue to Lane Community College Corridor

Four locations common to both build alternatives for water quality and flow control facilities were identified at the following intersections:

- 11th Avenue and Pearl Street (Willamette River)
- 19th Avenue and Pearl Street (Amazon Creek)
- Amazon Parkway and Hilyard Street (Amazon Creek)
- E. 30th Avenue and Spring Boulevard (Russel Creek)

S.3.4. Coburg Road Corridor

Three locations, common to both build alternatives, were identified for water quality and flow control facilities at the following intersections along the Coburg Road Corridor based on the construction footprint and hydrology:

- Coburg Road and Cedarwood Drive (Willamette River)
- Coburg Road and Frontier Road (Debrick Slough)
- Coburg Road and Crescent Avenue (Dodson Slough)

S.3.5. Martin Luther King, Jr. Boulevard Corridor

The following two intersections were identified as potential locations for water quality and flow control facilities along the Martin Luther King, Jr Boulevard Corridor:

- Martin Luther King, Jr. Boulevard and Centennial Loop (Q Street Canal)
- Martin Luther King, Jr. Boulevard and Kinsrow Avenue (Q Street Canal)

S.4. Conclusions

The construction of any MovingAhead build alternative includes reconstructing existing impervious surface and constructing new impervious surface and the potential for negative impacts on the water quality of receiving waterways. With mitigation measures, such as water quality and flow control facilities, there would be a net water quality improvement associated with the reconstructed impervious areas and the impacts of the new impervious area would be reduced. Siting and designing these facilities will require coordination with both the City and ODOT.

Construction would also occur within the Willamette River floodplain for both the Coburg Road and Martin Luther King, Jr. Boulevard Corridors while construction would occur within the Amazon Creek floodplain for the 30th Avenue to LCC Corridor. Neither the Highway 99 Corridor nor River Road Corridor would include construction within a floodplain.

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1. Introduction

1.1. MovingAhead Technical Reports

A total of 20 technical reports have been prepared for the MovingAhead Project. The technical reports have been prepared to support the selection of preferred alternatives for the MovingAhead Project and subsequent environmental documentation. The technical reports assume that any corridors advanced for environmental review will require a documented categorical exclusion under the National Environmental Policy Act (NEPA). Any corridors requiring a higher level of environmental review would be supported by the technical evaluation but might not be fully covered by the technical evaluation.

Technical reports have been prepared for the following disciplines:

- Acquisitions and Displacements
- Air Quality
- Capital Cost Estimating
- Community Involvement, Agency and Tribal Coordination
- Community, Neighborhood, and Environmental Justice
- Cultural Resources
- Ecosystems (Biological, Fish Ecology, Threatened and Endangered Species, Wetlands and Waters of the U.S. and State)
- Energy and Sustainability
- Geology and Seismic
- Hazardous Materials
- Land Use and Prime Farmlands
- Noise and Vibration
- Operating and Maintenance Costs
- Parklands, Recreation Areas, and Section 6(f)
- Section 4(f)
- Street and Landscape Trees
- Transportation
- Utilities
- Visual and Aesthetic Resources
- Water Quality, Floodplain, and Hydrology

In general, each technical report includes the following information for identifying effects:

- Relevant laws and regulations
- Contacts and coordination
- Summary of data sources and analysis methods described in the *MovingAhead Environmental Disciplines Methods and Data Report* (CH2M HILL, Inc. [CH2M] et al., 2015, June)
- Affected environment
- Adverse and beneficial effects including short-term, direct, indirect and cumulative
- Mitigation measures
- Permits and approvals
- References

1.2. Water Quality, Floodplain, and Hydrology Technical Report and Purpose

This technical report presents the results of the water quality, floodplain, and hydrology assessment for the MovingAhead corridor alternatives. Water quality is affected by the quantity of impervious surface area as well as the amount of traffic. The amount of impervious surface also affects the volume of runoff, which could create adverse hydrologic impacts to receiving waterways. Changes in both water quality and quantity would likely occur as roadway and bicycle and pedestrian pathway improvements are made if mitigation measures are not employed. The hydraulics, hydrology, and floodplain of an area may also be affected if mitigation measures are not taken. The potential water quality, quantity, and floodplain-related effects and possible mitigation measures are considered in the selection of corridor preferred alternatives.

1.3. Discipline Experts

Table 1.3-1 identifies discipline experts who contributed to the preparation of this report. This table includes their areas of expertise, affiliated organizations, titles, and years of experience.

Table 1.3-1. Discipline Experts

Discipline	Technical Expert	Affiliated Organization	Title / Years of Experience
Water Quality, Floodplain, and Hydrology	Theresa Ring	CH2M	Staff Engineer / 2 years
Editors			
	Scott Richman	CH2M	Senior Project Manager / 24 years
	Lynda Wannamaker	Wannamaker Consulting	President / 33 years
	Ryan Farncomb	CH2M	Senior Transportation Planner / 7 years
	Rick Attanasio	CH2M	Senior Engineer / 30 years
	Kristin Hull	CH2M	Senior Project Manager / 15 years
	Sasha Luftig	LTD	Transit Development Planner
	Scott Richman	CH2M	Senior Project Manager / 24 years

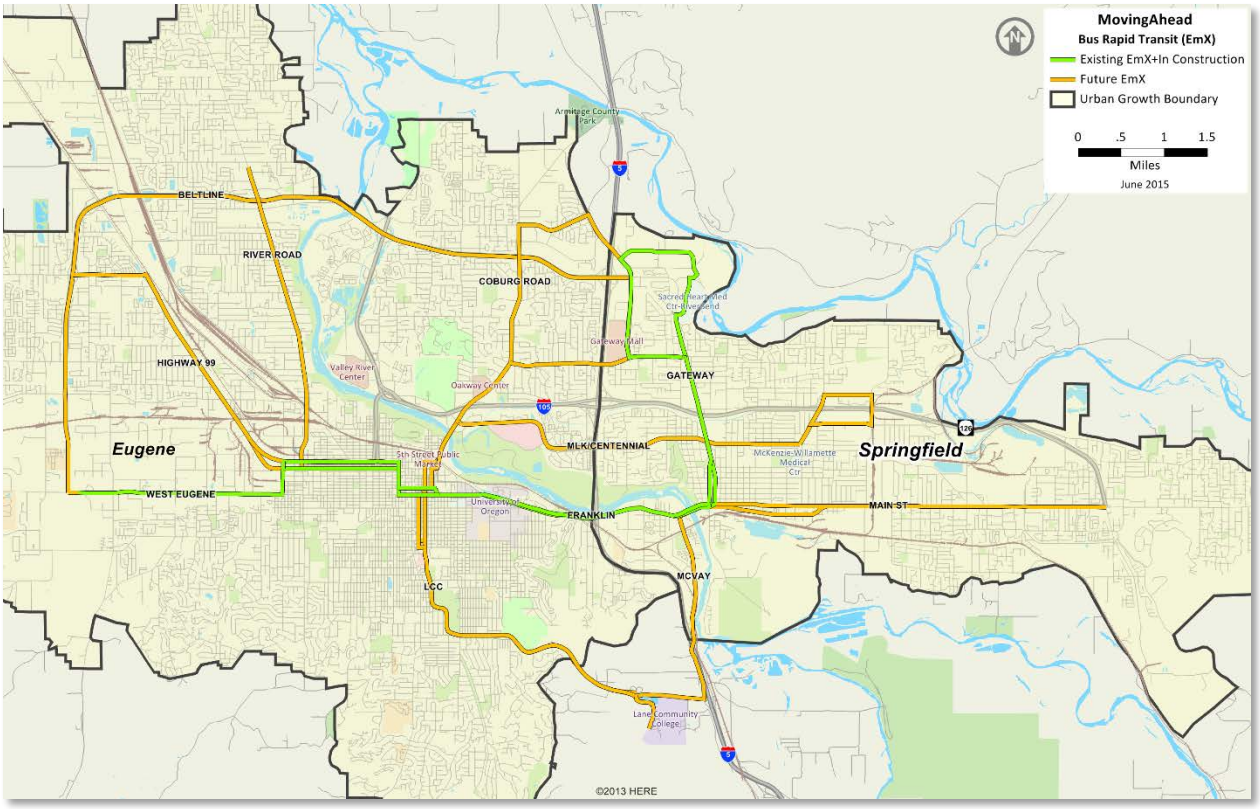
Source: MovingAhead Project Team. (2017).

1.4. Study Background

The purpose of the MovingAhead Project is to determine which high-capacity transit corridors identified in the adopted *Central Lane Metropolitan Planning Organization Regional Transportation Plan* (Lane Council of Governments [LCOG], 2011, December; RTP) and the *Lane Transit District Long Range Transit Plan* (Lane Transit District [LTD], 2014) as part of the Frequent Transit Network (FTN) are ready to advance to capital improvements programming in the near term. The study is being conducted jointly with the City of Eugene and LTD to facilitate a streamlined and cost-efficient process through concurrent planning, environmental review, and design and construction of multiple corridors. The study area includes Eugene and portions of unincorporated Lane County.

The *Lane Transit District Long-Range Transit Plan* (LTD, 2014) identifies the full Martin Luther King, Jr. Boulevard / Centennial Boulevard Corridor as a future part of the FTN. Initially, MovingAhead considered options on Centennial Boulevard to serve Springfield as part of this corridor. Because Springfield does not have the resources available to consider transit enhancements on Centennial Boulevard at this time, MovingAhead will only develop Emerald Express (EmX) and Enhanced Corridor Alternatives within Eugene. Figure 1.4-1 presents LTD's existing and future bus rapid transit (BRT) system.

Figure 1.4-1. Lane Transit District's Bus Rapid Transit (BRT) System



Source: LTD. (2015, Amended 2015, June).

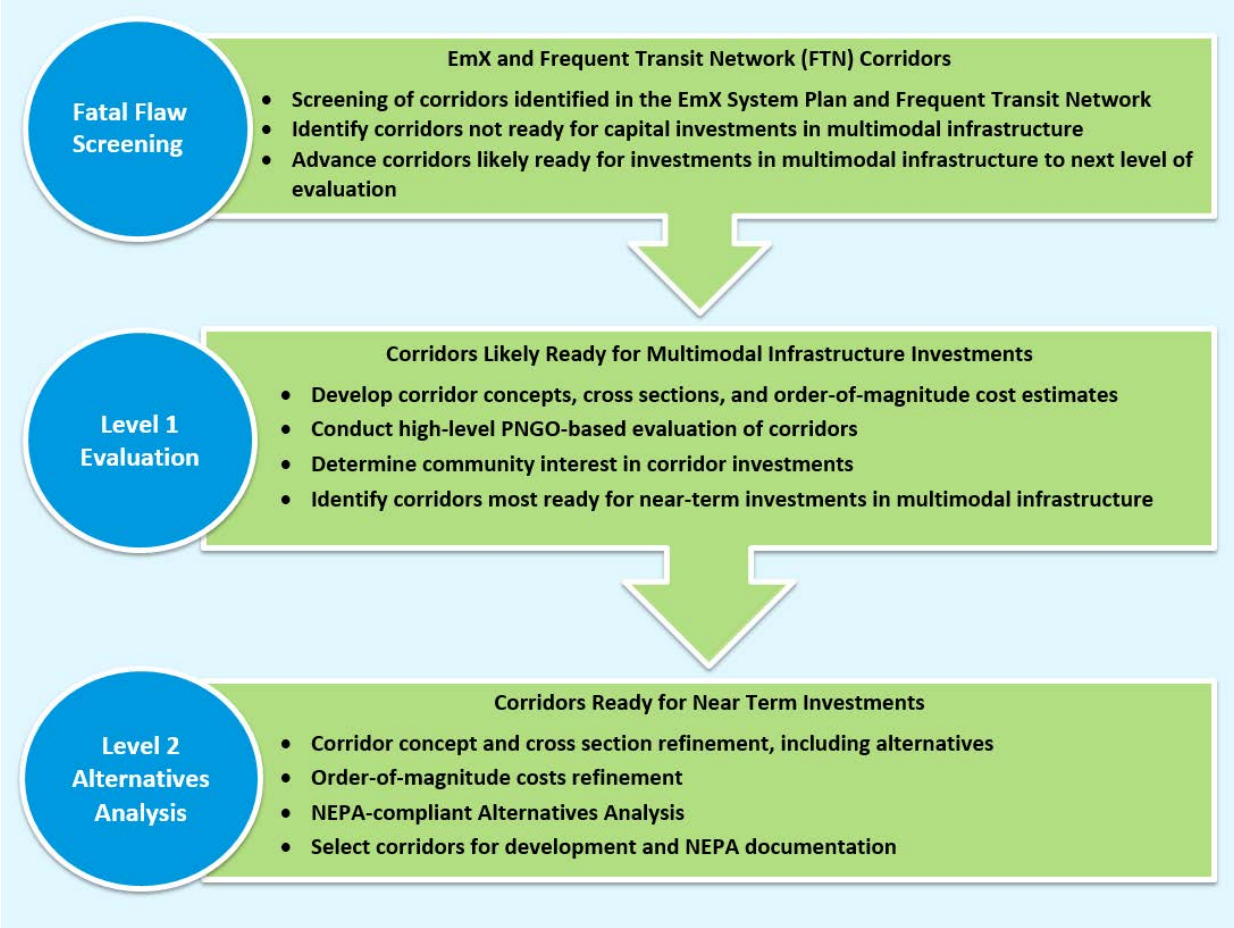
1.5. Screening and Evaluation of Multimodal Options

The MovingAhead Project process includes two phases. This first phase has three discrete but closely related tasks: identifying transit improvements; identifying improvements for bicyclists, pedestrians, and users of mobility devices; and preparing a NEPA-compliant evaluation of alternatives focused on the region's transportation system. Corridor options identified as part of the first phase were developed using multimodal cross sections that include variations on automobile, truck, and bus travel lanes; bicycle lanes; landscaping strips; and sidewalks. At the end of the first phase, the City of Eugene and LTD will select the corridors that are most ready for near-term capital improvements and prioritize improvements for funding. The selected corridors will be advanced to the second phase, which will focus on preparing NEPA environmental reviews (Documented Categorical Exclusions), and initiating the Federal Transit Administration (FTA) project development process.

1.5.1. Fatal Flaw Screening

The project team conducted a fatal flaw screening in February 2015 to identify which of the 10 corridors should not move forward to the Level 1 Screening Evaluation (Figure 1.5-1). This high-level evaluation used criteria based on MovingAhead's Purpose, Need, Goals, and Objectives (LTD, 2015, Amended 2015, June) and existing data to determine which corridors were not ready for capital investment in BRT or multimodal infrastructure in the next 10 years. The screening was conducted with local, regional, and state agency staff. Of the 10 corridors identified, the following three corridors were not advanced from the fatal flaw screening to the Level 1 Screening Evaluation: 18th Avenue, Bob Straub Parkway, and Randy Papé Beltline Highway. Table 1.5-1 shows the results of the fatal flaw screening.

Figure 1.5-1. MovingAhead Phase 1 Steps



Source: Wannamaker Consulting. (2015).

Although originally advanced from the fatal flaw screening, the Main Street-McVay Highway Corridor was also not advanced to the Level 1 Screening Evaluation because the Springfield City Council (on May 18, 2015) and LTD Board (on May 20, 2015) determined that the corridor is ready to advance to a study to select a locally preferred transit solution. At the time (May 2015), the Main Street-McVay Highway Corridor was on a schedule ahead of the MovingAhead Project schedule. If the Main Street-McVay Highway Corridor study schedule is delayed and its progress coincides with this project, the corridor could be reincorporated back into MovingAhead.

Table 1.5-1. Results of the Fatal Flaw Screening

Corridor	Advanced to Level 1	Consider Later
Highway 99	✓	
River Road	✓	
Randy Papé Beltline		✓
18th Avenue		✓
Coburg Road	✓	
Martin Luther King Jr. Boulevard / Centennial Boulevard	✓	
30th Avenue to Lane Community College	✓	
Main Street-McVay Highway	✓	
Valley River Center	✓	
Bob Straub Parkway		✓

Source: LTD and City of Eugene. (2015, June).

The six remaining multimodal corridors were advanced to the Level 1 Screening Evaluation to determine how they compared with each other in meeting the Purpose, Need, Goals, and Objectives.

1.5.2. Level 1 Screening Evaluation

The Level 1 Screening Evaluation assessed how each corridor would perform according to the Purpose, Need, Goals, and Objectives of MovingAhead. The Level 1 Screening Evaluation used existing studies and readily available data to evaluate each corridor. Based on community input and technical analysis, the following corridors and alternatives were advanced from the Level 1 Screening Evaluation to the Level 2 Alternatives Analysis (AA) (Table 1.5-2):

- No-Build Alternatives: all corridors
- Enhanced Corridor and EmX Alternatives:
  - Highway 99 Corridor
  - River Road Corridor
  - 30th Avenue to Lane Community College (LCC) Corridor
  - Coburg Road Corridor
- Enhanced Corridor Alternative:
  - Martin Luther King Jr. Boulevard Corridor

The Valley River Center Corridor received the least public support during public outreach and was not carried forward to the Level 2 AA.

For a detailed discussion of alternatives and design options considered for each corridor, but not carried forward to the Level 2 AA, please refer to the *Alternatives and Design Options Considered but Eliminated Technical Memorandum* (CH2M, 2016).

Table 1.5-2. Corridors and Transit Alternatives Advanced to the Level 2 Alternatives Analysis

Corridor	EmX	Enhanced Corridor	No-Build
Highway 99	✓	✓	✓
River Road	✓	✓	✓
30th Avenue to LCC	✓	✓	✓
Coburg Road	✓	✓	✓
Martin Luther King Jr. Boulevard		✓	✓

Source: CH2M. (2016).

1.5.3. Level 2 Alternatives Analysis

To guide the Level 2 AA, LTD prepared new ridership forecasts and related evaluation measures using the LCOG regional model. Base-year and future-year forecasts were prepared for corridor alternatives based upon updated inputs and transit networks specific to each corridor. The planning horizon year used for the Level 2 AA is 2035. The built and natural environments, transit operations, traffic, finance, historical resources, and other areas were also evaluated as part of the Level 2 AA. The findings from the Level 2 AA will aid LTD and the City of Eugene in determining how corridors should be prioritized for capital investments over the next 5 years. Selected corridors will be advanced to Phase 2.

1.6. Purpose and Need

The prioritization of capital investments in multimodal transit corridors is a powerful tool for implementing local and regional comprehensive land use and transportation plans, agency strategic plans, and other community planning documents. Capital investments in multimodal transit corridors can have a substantial impact on patterns of growth and development. By coordinating the timing of, and prioritizing the funding for, strategic multimodal capital investments, the MovingAhead Project (a multimodal transit corridor study) helps ensure that future development is consistent with our region's plans and vision.

The Purpose and Need Statement was refined based on public and agency input.

1.6.1. Purpose

The purpose of the MovingAhead Project is to:

- Develop a Capital Improvements Program that forecasts and matches projected revenues and capital needs over a 10-year period
  - Balance desired multimodal transit corridor improvements with the community's financial resources
  - Ensure the timely and coordinated construction of multimodal transit corridor infrastructure
  - Eliminate unanticipated, poorly planned, or unnecessary capital expenditures
- Identify the most economical means of financing multimodal transit corridor capital improvements
- Establish partnerships between LTD, City of Eugene, and other local agencies that prioritize multimodal transit infrastructure needs and promote interagency cooperation
- Ensure that multimodal transit corridor investments are consistent with local comprehensive land use and transportation plans

1.6.2. Need

The need for the MovingAhead Project is based on the following factors:

- LTD's and the region's commitment to implementing the region's vision for BRT in the next 20 years consistent with the RTP that provides the best level of transit service in a cost-effective and sustainable manner.
- Need for streamlined environmental reviews to leverage systemwide analysis.
- Need to build public support for implementation of the systemwide vision.
- Selection of the next EmX / FTN corridors is based on long-range operational and financial planning for LTD's service.

1.6.3. Goals and Objectives

Goal 1: Improve multimodal transit corridor service

- Objective 1.1: Improve transit travel time and reliability
- Objective 1.2: Provide convenient transit connections that minimize the need to transfer
- Objective 1.3: Increase transit ridership and mode share in the corridor
- Objective 1.4: Improve access for people walking and bicycling, and to transit
- Objective 1.5: Improve the safety of pedestrians and bicyclists accessing transit, traveling in and along the corridor, and crossing the corridor

Goal 2: Meet current and future transit demand in a cost-effective and sustainable manner

- Objective 2.1: Control the increase in transit operating cost to serve the corridor
- Objective 2.2: Increase transit capacity to meet current and projected ridership demand
- Objective 2.3: Implement corridor improvements that provide an acceptable return on investment
- Objective 2.4: Implement corridor improvements that minimize impacts to the environment and, where possible, enhance the environment
- Objective 2.5: Leverage funding opportunities to extend the amount of infrastructure to be constructed for the least amount of dollars

Goal 3: Support economic development, revitalization, and land use redevelopment opportunities for the corridor

- Objective 3.1: Support development and redevelopment as planned in other adopted documents
- Objective 3.2: Coordinate transit improvements with other planned and programmed pedestrian and bicycle projects
- Objective 3.3: Coordinate transit improvements with other planned and programmed roadway projects
- Objective 3.4: Minimize adverse impacts to existing businesses and industry
- Objective 3.5: Support community vision for high capacity transit in each corridor
- Objective 3.6: Improve transit operations on state facilities in a manner that is mutually beneficial to vehicular and freight traffic flow around transit stops and throughout the corridor
- Objective 3.7: Improve transit operations in a manner that is mutually beneficial to vehicular traffic flow for emergency service vehicles

1.6.4. Evaluation Criteria

Evaluation criteria will be used during the Trade-off Analysis, which is part of the Level 2 AA, to aid in determining how well each of the corridor alternatives would meet the project's Purpose, Need, Goals, and Objectives. The evaluation criteria require a mix of quantitative data and qualitative assessment. The resulting data will be used to measure the effectiveness of each proposed corridor alternative and

to assist in comparing and contrasting the alternatives and options. In Table 1.6-1, evaluation criteria are listed for each of the project's objectives. Some objectives have only one criterion for measuring effectiveness, while others require several criteria.

Table 1.6-1. Evaluation Criteria

Goals and Objectives		Evaluation Criteria
Goal 1: Improve multimodal transit corridor service		
Objective 1.1:	Improve transit travel time and reliability	• Round trip p.m. peak transit travel time between select origins and destinations • On-time performance (no more than 4 minutes late) of transit service
Objective 1.2:	Provide convenient transit connections that minimizes the need to transfer	• Number of transfers required between heavily used origin-destination pairs
Objective 1.3:	Increase transit ridership and mode share in the corridor	• Average weekday boardings on corridor routes • Transit mode share along the corridor • Population within 0.5 mile of transit stop • Employment within 0.5 mile of transit stop
Objective 1.4:	Improve access for people walking and bicycling, and to transit	• Connectivity to existing pedestrian facilities • Connectivity to existing bicycle facilities
Objective 1.5:	Improve the safety of pedestrians and bicyclists accessing transit, traveling in and along the corridor, and crossing the corridor	• Opportunity to provide a safe and comfortable environment for pedestrians and bicyclists in the corridor
Goal 2: Meet current and future transit demand in a cost-effective and sustainable manner		
Objective 2.1:	Control the increase in transit operating cost to serve the corridor	• Cost per trip • Impact on LTD operating cost • Cost to local taxpayers
Objective 2.2:	Increase transit capacity to meet current and projected ridership demand	• Capacity of transit service relative to the current and projected ridership
Objective 2.3:	Implement corridor improvements that provide an acceptable return on investment	• Benefit / cost assessment of planned improvements
Objective 2.4:	Implement corridor improvements that minimize impacts to the environment and, where possible, enhance the environment	• Results of screening-level assessment of environmental impacts of transit solutions
Objective 2.5:	Leverage funding opportunities to extend the amount of infrastructure to be constructed for the least amount of dollars	• Number and dollar amount of funding opportunities that could be leveraged • Meet the FTA's Small Starts funding requirements

Table 1.6-1. Evaluation Criteria

Goals and Objectives		Evaluation Criteria
Goal 3:	**Support economic development, revitalization and land use redevelopment opportunities for the corridor**	
Objective 3.1:	Support development and redevelopment as planned in other adopted documents	• Consistent with the BRT System Plan and FTN concept • Consistent with the *Regional Transportation System Plan* (Central Lane Metropolitan Planning Organization [MPO], 2007) • Consistent with local comprehensive land use plans
Objective 3.2:	Coordinate transit improvements with other planned and programmed pedestrian and bicycle projects	• Capability of transit improvement to coordinate with other planned and programmed pedestrian and bicycle projects identified in adopted plans and Capital Improvements Programs
Objective 3.3:	Coordinate transit improvements with other planned and programmed roadway projects	• Capability of transit improvement to coordinate with other planned and programmed roadway projects identified in adopted plans and Capital Improvements Programs
Objective 3.4:	Minimize adverse impacts to existing businesses and industry	• Impacts to businesses along the Corridor measured in number and total acres of properties acquired, parking displacements, and access impacts. • Impact on freight and delivery operations for Corridor businesses
Objective 3.5:	Support community vision for high capacity transit in corridor	• Community vision includes high capacity transit in corridor
Objective 3.6:	Improve transit operations on state facilities in a manner that is mutually beneficial to vehicular and freight traffic flow around transit stops and throughout the corridor	• Impact on current and future year intersection LOS on state facilities • Impact on current and future year p.m. peak hour auto / truck travel times on state facilities
Objective 3.7:	Improve transit operations in a manner that is mutually beneficial to vehicular traffic flow for emergency service vehicles	• Qualitative assessment of potential impacts to emergency service vehicle traffic flow and access

Source: LTD and City of Eugene. (2015, June).

BRT = bus rapid transit
FTA = Federal Transit Administration
FTN = Frequent Transit Network
LOS = level of service
LTD = Lane Transit District

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2. Alternatives Considered

This section briefly reviews the major features of the alternatives considered in the Level 2 AA. For full details on each alternative and the five corridors described in this technical report – Highway 99, River Road, 30th Avenue to LCC, Coburg Road, and Martin Luther King, Jr. Boulevard – refer to the *MovingAhead Level 2 Definition of Alternatives* (CH2M et al., 2016, July). Each corridor location is shown on Figures 2.1-1 and 2.1-2 for the Enhanced Corridor Alternatives and the EmX Alternatives, respectively.

Figure 2.1-1. Enhanced Corridor Alternatives Overview

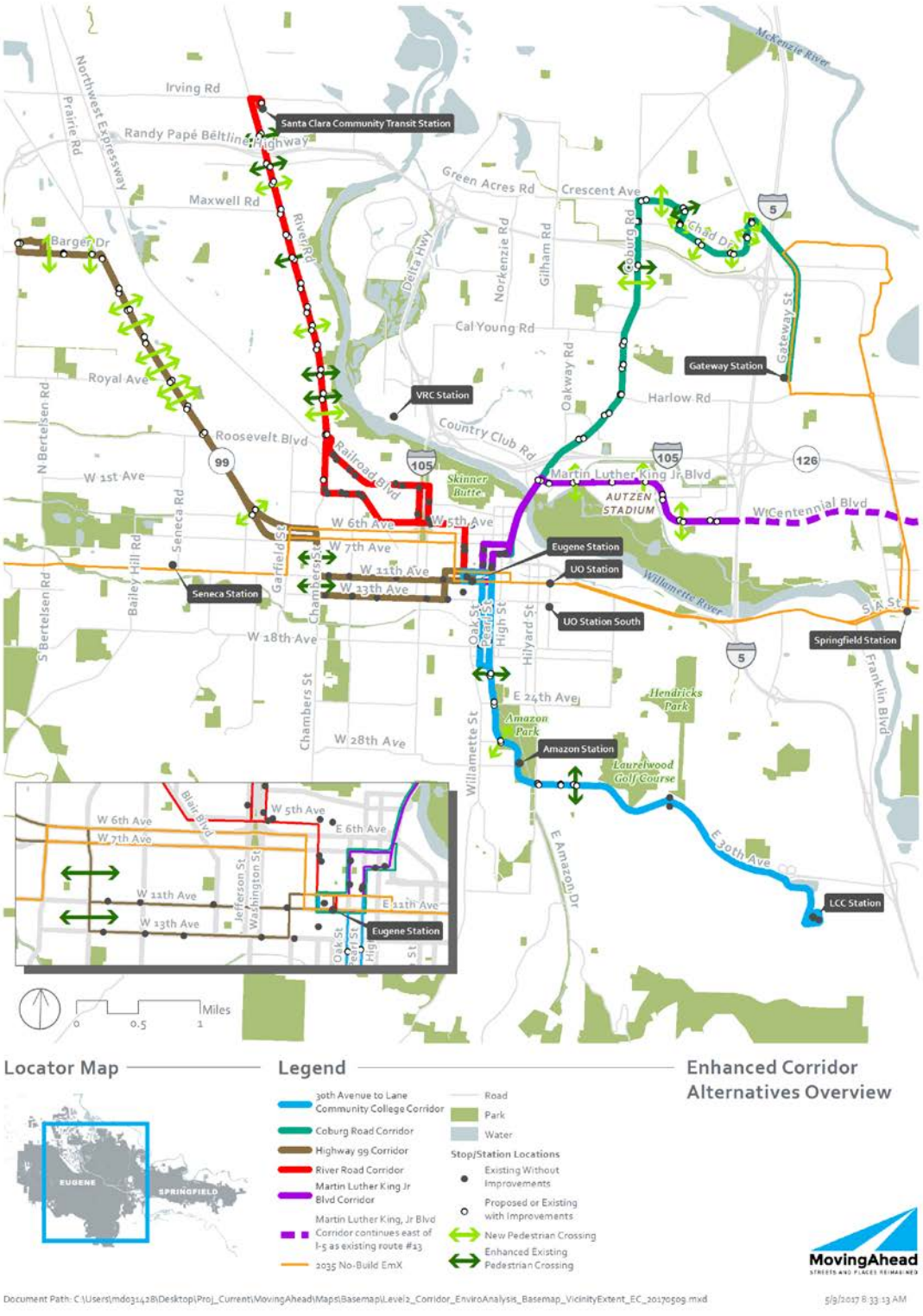
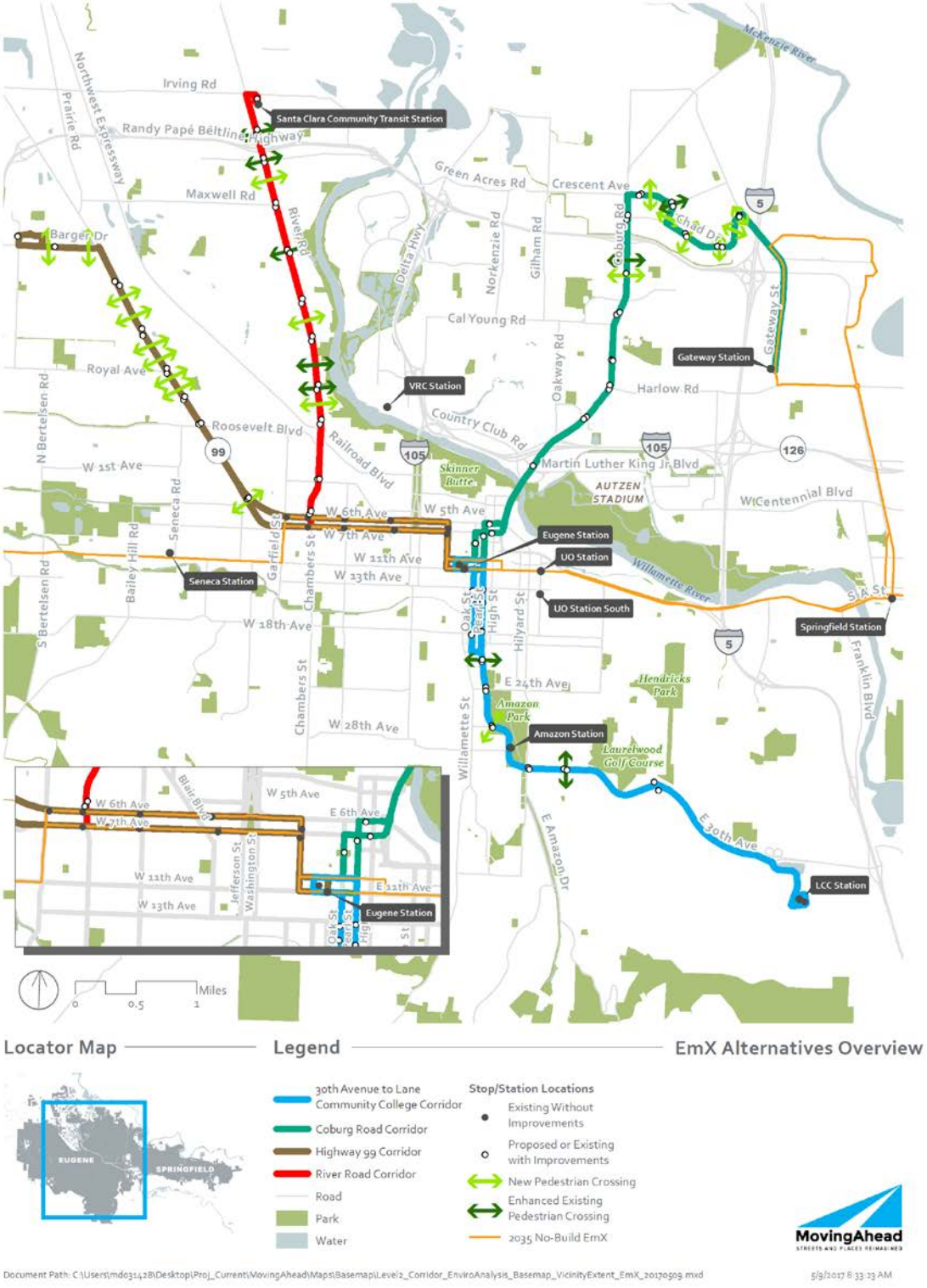


Figure 2.1-2. EmX Alternatives Overview



2.1. No-Build Alternative Transit Network

This section describes the No-Build Alternative transit network, which is based on projected conditions in the year 2035, the project's environmental forecast year. For each corridor, the No-Build Alternative serves as a reference point to gauge the benefits, costs, and effects of the build alternatives.

2.1.1. Capital Improvements

Under the No-Build Alternative, the following capital improvements are anticipated by 2035:

- **West Eugene EmX Extension**. Currently under construction, the West Eugene EmX Extension (WEEE) project and its associated capital improvements will be completed in 2017.
- **Santa Clara Community Transit Center**. The existing River Road Station is located at the southeast corner of the River Road / Randy Papé Beltline Highway interchange between the eastbound on-ramp and River Avenue. To meet growing demand and avoid the impacts of increasing congestion, LTD plans to relocate the River Road Station to a site north of the Randy Papé Beltline Highway at the southeast corner of River Road and Hunsaker Lane. Once relocated to the new site, the River Road Station would be renamed the Santa Clara Community Transit Center. This new transit center is planned to include a mix of uses including a park and ride lot, residential housing, community space, and commercial uses. The River Road Station relocation to the new site is anticipated to be completed by the end of 2018.
- **Main Street EmX Extension**. Included in the RTP and currently under study, the extension of the existing Franklin EmX line on Main Street from Springfield Station to Thurston Station and associated capital improvements (e.g., stations, bicycle and pedestrian facilities, and signal modifications) is anticipated to be completed within the 20-year planning horizon (2035). The No-Build Alternative transit network assumes EmX service on Main Street. However, the outcome of this study, and the ultimate improvements chosen, are uncertain at this time.
- **McVay Highway Enhanced Corridor**. Included in the RTP and currently under study, Enhanced Corridor service from Springfield Station on McVay Highway to LCC and associated capital improvements (e.g., improved stops, transit queue jumps, and improved bicycle and pedestrian crossings) is anticipated to be completed within the 20-year planning horizon (2035).

2.1.2. Transit Operations

The No-Build Alternatives for each corridor include changes to transit service anticipated as a result of the WEEE project, Main Street EmX Extension project, development of the Santa Clara Community Transit Center, and other changes to fixed route service. The following changes to the existing 2016 fixed route services are anticipated by 2035:

- Eliminated routes:
  - Route 11 (replaced by Main Street EmX service)
  - Route 32 (replaced by WEEE service)
  - Route 76 (replaced by WEEE service)
  - Route 85 (replaced by Enhanced Corridor service on the McVay Highway)
  - Route 43 (replaced by WEEE service)
- Other route modifications:
  - Add WEEE service (replaces Route 43 service on W. 11th Avenue) as extension of existing EmX service

- Add Main Street EmX service from Springfield Station to Thurston Station
- Add Route 2 with service from Barger Drive / Echo Hollow Road to Eugene Airport
- Add Route 16 to connect north and south of Main Street with EmX service
- Add Enhanced Corridor service on McVay Highway from Springfield Station to LCC (replaces Route 85)
- Reroute Route 33 and extend to Amazon Parkway
- Reroute Route 36 to extend north of W. 11th Avenue to Barger Drive (replaces Route 43)
- Reroute Route 41 via Highway 99 / Royal Avenue / W. 11th Avenue
- Reroute Route 40 via Royal Avenue / Elmira Road / Roosevelt Boulevard / Chambers Street / W. 2nd Avenue / Oak and Pearl Streets
- Add Route 44 paralleling Route 40 above to serve West Eugene
- Reroute Route 55 to extend to Santa Clara Community Transit Center
- Reroute Route 93 with service continuing to Eugene Station via Seneca Station and service terminating at the WEEE terminus

- Change in service frequencies:
  - Increase service on Route 24 from 30-minute peak frequencies to 15-minute peak frequencies
  - Increase service on Route 28 from approximately 30-minute peak frequencies (varying 20- to 30-minute intervals) to 15-minute peak frequencies
  - Increase service on Route 41 from 30- and 15-minute peak frequencies to 15-minute peak frequencies
  - Increase service on Route 51 from 60-minute off-peak frequencies to 30-minute off-peak frequencies
  - Increase service on Route 52 from 60-minute off-peak frequencies to 30-minute off-peak frequencies
  - Increase service on Route 66 from 30- and 15-minute weekday a.m. peak, off-peak, and p.m. peak frequencies to 15-minute weekday a.m. peak, off-peak, and p.m. peak frequencies
  - Increase service on Route 67 from approximately 30-minute weekday a.m. peak, off-peak, and p.m. peak frequencies to 15-minute weekday a.m. peak, off-peak, and p.m. peak frequencies
  - Increase service on Route 78 from approximately 60-minute frequencies from 8 a.m. to 6 p.m. to 30-minute weekday a.m. peak, off-peak, and p.m. peak frequencies
  - Increase service on Route 79x from 30-minute peak frequencies to 10-minute peak frequencies, and modify off peak frequencies to 15 minutes from between 10 and 30 minutes currently
  - Decrease a.m. peak service on Route 93 from 60-minute frequencies to 120-minute frequencies during a.m. peak hours, and increase from no service between Veneta and the WEEE terminus to 120-minute frequencies during p.m. peak hours (off-peak service is 120-minute frequencies between Veneta and the WEEE terminus)
  - Decrease a.m. peak service on Route 96 from 30-minute frequencies to 60-minute frequencies, and increase off-peak service from no service between 8:20 a.m. and 3:40 p.m. to 60-minute off-peak frequencies

Key transportation improvements specific to each corridor are described under each corridor's No-Build Alternative.

2.2. Enhanced Corridor Alternatives

Enhanced Corridor Alternatives are intended to address the project's Purpose, Need, Goals, and Objectives without major transit capital investments, instead focusing on lower-cost capital improvements, operational improvements, and transit service refinements. Features could include

transit queue jumps (lanes for buses that allow the bus to "jump" ahead of other traffic at intersections using a separate signal phase), stop consolidation, enhanced shelters, and redesigned service to improve cross-town connectivity. These features improve reliability, reduce transit travel time, and increase passenger comfort.

Enhanced Corridor service would run from 6:45 a.m. to 11:30 p.m. weekdays, 7 a.m. to 11 p.m. Saturdays, and 8 a.m. to 8 p.m. Sundays. Service frequencies are assumed to be 15 minutes during all periods.

2.3. EmX Alternatives

EmX (BRT) Alternatives are characterized by exclusive guideways (business access and transit lanes [BAT] or bus-only lanes); branded, multi-door 60-foot-long BRT vehicles; enhanced stations with level boarding platforms instead of stops; off-board fare collection; signal priority; wider stop spacing; and frequent and redesigned service to improve cross-town connectivity.

EmX service is assumed to run from 6:45 a.m. to 11:30 p.m. weekdays, 7 a.m. to 11 p.m. Saturdays, and 8 a.m. to 8 p.m. Sundays. Service frequencies are assumed to be 10 minutes during all periods.

2.4. Highway 99 Corridor

The Highway 99 Corridor begins at the Eugene Station, travels through downtown, then extends northwest along Highway 99 to Barger Drive, turning west at Barger Drive to terminate on Cubit Street north of the intersection of Barger Drive and Cubit Street east of the Randy Papé Beltline Highway. This corridor is approximately 10.5 round-trip miles.

2.4.1. No-Build Alternative

The Highway 99 Corridor No-Build Alternative includes existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the *DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016; Draft Eugene 2035 TSP). The No-Build Alternative would not include capital improvements on Highway 99. As part of the Draft Eugene 2035 TSP, the following transportation improvements are planned along or adjacent to the corridor:

- Upgrade Bethel Drive, from Highway 99 to Roosevelt Boulevard, to a two-lane urban facility with sidewalks on both sides of the road, bicycle lanes, and planting strips
- Widen Barger Drive immediately west of the Randy Papé Beltline Highway interchange to include an additional travel lane in each direction
- Add a shared-use path on the west side of Highway 99 from Roosevelt Boulevard south to the intersection of W. 7th Avenue and Garfield Street (the section of this project from Roosevelt to W. 5th Avenue has been completed)
- Add bicycle lanes on Garfield Street from Roosevelt Boulevard south to W. 6th Avenue
- Add a bicycle lane on W. 6th Avenue from Garfield Street to W. 5th Avenue
- Complete the sidewalk network on Highway 99 from Roosevelt Boulevard south to Garfield Street
- Add a shared-use path on Roosevelt Boulevard from Maple Street to Highway 99
- Add a bicycle lane on Roosevelt Boulevard from Highway 99 east to railroad tracks

Under the No-Build Alternative, Highway 99 Corridor service would remain at 15-minute headways during peak periods and 30-minute headways during off-peak periods and evenings. Under the No-Build

Alternative, a slight change is also made to Route 93, which would stop at the Pearl Buck Center in the absence of Route 44.

2.4.2. Enhanced Corridor Alternative

Capital improvements under the Highway 99 Corridor Enhanced Corridor Alternative would include enhanced bicycle and pedestrian crossings; improvements to existing bus stops and the construction of new stops; construction of queue jumps at some intersections; traffic signal reconstruction; construction of bus-only left turn lanes; and roadway widening at some locations in the corridor.

Existing conventional fixed-service routes would remain the same as with the No-Build Alternative, with the exception of the elimination of Route 41. Service west of WinCo would also remain the same or be improved.

2.4.3. EmX Alternative

The Highway 99 Corridor EmX Alternative would include creating BAT lanes on segments of W. 7th Avenue and Highway 99; reconstructing the Highway 99 / Roosevelt Boulevard intersection (traffic signal, turn lanes, and queue jump); completing other intersection modifications in the corridor; roadway widening at some locations; and constructing nine new enhanced pedestrian and bicycle crossings, new sidewalks, and a pedestrian bridge across the railroad line from Highway 99 to the Trainsong neighborhood. Four existing bus stop locations would be improved to EmX stations, in addition to constructing new stations. Some existing EmX stations would be used for the Highway 99 Corridor EmX service.

Route 44 is a conventional service line added to this alternative only, providing coverage on 11th and 13th Avenues as well as service to the Pearl Buck Center on W. 1st Avenue, with 30-minute headways during all periods. This would be a decrease in service for the 11th and 13th Avenue corridors that currently have 15-minute peak service. Route 44 is primarily intended to replace conventional service lost with the removal of the existing Route 41. Route 41 would be replaced with the Highway 99 Corridor EmX service described in this alternative.

2.5. River Road Corridor

The River Road Corridor begins at the Eugene Transit Center, travels through downtown and then north to the Santa Clara Community Transit Center (intersection of Hunsaker Lane and River Road). This corridor is approximately 10.3 round-trip miles.

2.5.1. No-Build Alternative

The River Road Corridor No-Build Alternative would include existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. There would be no additional major bus capital improvements under the No-Build Alternative.

As part of the Draft Eugene 2035 TSP, the following transportation improvements are planned adjacent to and along the River Road Corridor:

- Upgrade the Hunsaker Lane / Beaver Street intersection to urban collector standards, including two travel lanes, a center turn lane, bicycle lanes, sidewalks on both sides of the road, and planting strips from River Road to Division Avenue
- Provide bicycle boulevards on Ruby Avenue, Horn Lane, Arbor Drive, and Park Avenue

- Include sidewalks on Hunsaker Lane, Howard Avenue, and Hilliard Lane
- Provide protected bicycle lanes on River Road from the Northwest Expressway to Division Avenue

Under the No-Build Alternative, River Road Corridor service would remain at 30-minute headways for both Routes 51 and 52 (which together effectively provide 15-minute service during peak periods) and off-peak periods. After 6:15 p.m., there is no longer a combined 15-minute frequency, and headways return to 30 minutes.

2.5.2. Enhanced Corridor Alternative

Capital improvements constructed as part of the River Road Corridor Enhanced Corridor Alternative would include BAT lanes on River Road approaching the Randy Papé Beltline Highway and other roadway improvements, like traffic signal reconstruction at certain locations along the corridor. Improvements to existing bus stops and the construction of new stops would also occur.

Routes 51 and 52 would be eliminated, and Enhanced Corridor service for River Road includes a split alignment in order to serve portions covered by those routes at 30-minute headways. In this arrangement, the area from Railroad Boulevard to W. 1st Avenue is served by one Enhanced Corridor service as a replacement for the Route 51 service, while the area along Blair Boulevard and W. 2nd Avenue is served by the other alignment to replace service lost with removal of Route 52. Those alignments meet at Railroad Boulevard and River Road to serve the River Road Corridor with consistent 15-minute headways.

2.5.3. EmX Alternative

New construction under the River Road Corridor EmX Alternative would include lane repurposing on River Road for BAT lanes, constructing short sections of exclusive bus lanes near the Randy Papé Beltline Highway, reconstructing traffic signals and intersections at several locations, constructing new bicycle and pedestrian crossings, improving existing stops to EmX stations, and constructing new stations. Some existing EmX stations would be used with the River Road EmX service.

Transit service changes would also include modifying headways on Route 40 during the a.m. and p.m. peak hours to 15 minutes, developing a new Route 50 “River Road Connector” with 30-minute headways all day, and eliminating Routes 51, 52, and 55. These replacements ensure no loss in existing coverage or service.

2.6. 30th Avenue to Lane Community College Corridor

The 30th Avenue to LCC Corridor begins at Eugene Station and travels south along Pearl Street (outbound) to Amazon Parkway, then on E. 30th Avenue to its terminus at the LCC Station. The return trip travels on Oak Street (inbound), which is the northbound couplet to Pearl Street. This corridor is approximately 10.2 round-trip miles.

2.6.1. No-Build Alternative

The 30th Avenue to LCC Corridor No-Build Alternative would include existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. There would be no additional major bus capital improvements to the 30th Avenue to LCC Corridor under the No-Build Alternative.

The Draft Eugene 2035 TSP identifies the following transportation improvements along or adjacent to the corridor:

- Bicycle boulevard on Alder Drive

For the portion of E. 30th Avenue in unincorporated Lane County, Lane County does not plan to improve bicycle facilities along the road.

Under the No-Build Alternative, 30th Avenue to LCC Corridor service would remain at 30-minute headways on Route 81. The Route 82 service would remain at 10-minute headways during the a.m. peak, 15-minute headways during off-peak periods, and 20-minute headways during the p.m. peak, with no weekend service.

2.6.2. Enhanced Corridor Alternative

Capital improvements as part of the 30th Avenue to LCC Corridor Enhanced Corridor Alternative would include the construction of new bus stops, capital improvements to some existing bus stops, a new traffic signal on Amazon Parkway at E. 20th Avenue, and new bike facilities on Oak and Pearl Streets.

Under the 30th Avenue to LCC Corridor Enhanced Corridor Alternative, service to LCC provided by Routes 81 and 82 would be eliminated and replaced by Enhanced Corridor service. The direct connection between LCC and the University of Oregon Station along Route 81 would be eliminated. It would be replaced by connecting the 30th Avenue to LCC Corridor Enhanced Corridor Alternative to the Franklin EmX line with a transfer at Eugene Station.

2.6.3. EmX Alternative

The 30th Avenue to LCC Corridor EmX Alternative would include repurposing parking and general-purpose lanes to BAT lanes on Oak and Pearl Streets, constructing queue jumps, extending E. 20th Avenue, adding a new traffic signal on Amazon Parkway, and adding a new cycle track on High Street. In addition to constructing new EmX stations, existing bus stops would be improved to EmX stations in certain locations.

Service to LCC provided by Routes 81 and 82 would be replaced with EmX service. The direct connection between LCC and the University of Oregon Station along Route 81 would be eliminated. It would be replaced by connecting the 30th Avenue to LCC Corridor EmX Alternative to the Franklin EmX line with a transfer at Eugene Station.

2.7. Coburg Road Corridor

The Coburg Road Corridor begins at Eugene Station and continues to Coburg Road using the Ferry Street Bridge. The corridor continues north on Coburg Road to Crescent Avenue, east on Crescent Avenue and Chad Drive to N. Game Farm Road, and south on N. Game Farm Road and Gateway Street to the existing Gateway Station at the Gateway Mall. Although service extends from N. Game Farm Road to the Gateway Station, capital improvements for the corridor terminate at Interstate 5 (I-5). This corridor is approximately 11.2 round-trip miles.

2.7.1. No-Build Alternative

The Coburg Road Corridor No-Build Alternative includes existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. There

would be no additional major transportation improvements to the Coburg Road Corridor under the No-Build Alternative.

Under the No-Build Alternative, the Coburg Road Corridor service would remain at 15-minute headways on Routes 66 and 67 at all weekday times, 30-minute headways on Saturdays, and 60-minute headways on Sundays.

2.7.2. Enhanced Corridor Alternative

The Coburg Road Corridor Enhanced Corridor Alternative would include new traffic signal construction, intersection reconstruction at several locations on Coburg Road, the addition of queue jumps, and the addition of BAT lanes south of the Interstate 105 (I-105) interchange. New crossings for bicyclists and pedestrians would be constructed. Existing bus stops would be improved and new stops would also be constructed.

Route 12 would be altered to serve Valley River Center and Marcola Road. A new route (Route 60) would be added to serve Valley River Center, and Routes 66 and 67 would be eliminated. This change would provide new service and coverage to the Cal Young neighborhood and along Hayden Bridge Way in Springfield. It would require current passengers along Harlow Road to transfer in order to get downtown.

2.7.3. EmX Alternative

Improvements to the corridor under the Coburg Road Corridor EmX Alternative would include construction of exclusive transit lanes at several locations on Coburg Road and intersection reconstruction at multiple locations. New bicycle and pedestrian crossings and EmX stations would be constructed, and some existing bus stops would be improved to EmX stations.

As in the Coburg Road Corridor Enhanced Corridor Alternative, Route 12 would be altered to serve Valley River Center and Marcola Road, and Route 60 would be added to serve Valley River Center, while Routes 66 and 67 would be eliminated. This change would provide new service and coverage to the Cal Young neighborhood and along Hayden Bridge Way in Springfield. It would require current passengers along Harlow Road to transfer in order to get downtown.

2.8. Martin Luther King, Jr. Boulevard Corridor

The Martin Luther King, Jr. Boulevard Corridor begins at Eugene Station and travels through downtown Eugene on Oak and Pearl Streets and on 7th and 8th Avenues. The corridor uses the Ferry Street Bridge to reach Martin Luther King, Jr. Boulevard and continues east on Martin Luther King, Jr. Boulevard past Autzen Stadium to Centennial Boulevard. Although transit service continues along Centennial Boulevard, capital improvements for the corridor terminate at I-5. The corridor is approximately 6.0 round-trip miles.

2.8.1. No-Build Alternative

The Martin Luther King, Jr. Boulevard Corridor No-Build Alternative includes existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. The Draft Eugene 2035 TSP identifies the following transportation improvements along or adjacent to the Martin Luther King, Jr. Corridor:

- Add a center turn lane along sections of Martin Luther King, Jr. Boulevard from Club Road to Leo Harris Parkway

Under the No-Build Alternative, the Martin Luther King, Jr. Boulevard Corridor service would remain at 30-minute headways.

2.8.2. Enhanced Corridor Alternative

Capital improvements associated with the Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative would include reconstructing traffic signals at the intersections of Coburg Road and Martin Luther King, Jr. Boulevard and of Martin Luther King, Jr. Boulevard and Centennial Loop; repurposing existing outside general-purpose lanes to BAT lanes on Martin Luther King, Jr. Boulevard; adding a new traffic signal at the intersection of Martin Luther King, Jr. Boulevard and Leo Harris Parkway; enhancing pedestrian crossings; constructing new bus stops; and improving existing bus stops. Existing Route 13 would be eliminated.

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3. Methods and Data

This section describes the analysis methodologies and data used to document the existing surface water and stormwater conditions and analyze the potential water quality and quantity impacts of project alternatives for the MovingAhead project. This section also documents existing floodplain conditions and analyzes the potential floodplain impacts of project alternatives.

LTD prepared study documents including the methodologies and data report used for the MovingAhead project's Level 2 AA.

The water resources related evaluation identifies potential significant adverse impacts and beneficial effects of the various project alternatives and design options on project area floodplains, hydrology, and water quality. Mitigation options and facility design requirements were determined in accordance with regulations. This section introduces each water resources related subject area evaluated in the MovingAhead project study.

Floodplain regulations affect potential project stormwater discharges and permit requirements. Many jurisdictions require a no-rise certification to maintain downstream conveyance capacities and prevent significant property damage during flood events. Discharges in floodplain areas may be restricted to meet this certification requirement. Structures allowed within a floodplain must be anchored and resistant to water damage. City codes require no increase in the 100-year water surface elevation. Executive Order (EO) 11988, to be superseded in the near future by EO 13690, requires projects with a federal nexus to consider the short- and long-term impacts of building within the floodplain. Adding or removing fill in a floodplain usually requires additional permits and mitigation to prevent changes to the existing high-water level. Floodplain analysis in this report identifies areas of potential impacts or beneficial effects from project alternatives on area floodplains and any associated permits and mitigation required for the proposed improvements.

The intention of the **hydrology** evaluation is to quantify the effect of the project concerning the volume and peak flow rates of stormwater runoff and to address anticipated impacts. Peak flow rates and total volume will be sensitive to the amount of net additional impervious area associated with the project as well as the amount of replaced impervious surface area for which flow controls are employed. The hydrology study assesses anticipated changes to the runoff quantity. This includes an investigation of stormwater facilities. The evaluation provides requirements for treatment facilities and approximate locations.

The **water quality** assessment addresses potential impacts to receiving waterbodies from stormwater system discharges. Water quality becomes critical when the waterbody accepting runoff contains threatened or endangered fish species. Fish are sensitive to small quantities of common pollutants. Water quality treatment requirements are primarily dictated by local regulations that are passed, in part, to satisfy state and federal requirements. The various applicable regulations, codes and policies are described below by their genesis as federal, state or local.

The water quality, floodplain, and hydrology analysis has been prepared in compliance with NEPA, applicable federal and state environmental legislation and policy, and local and state planning and land use policies and design standards.

3.1. Relevant Laws and Regulations

The following subsections provide the relevant federal, state, and local laws consulted to conduct impact assessments for floodplains, hydrology, and water quality. The laws may apply only to one alternative or may apply broadly to several alternatives.

3.1.1. Federal

National Environmental Policy Act (NEPA), 42 United States Code (U.S.C.) 4321-4347. NEPA requires federal agencies to consider the potential environmental consequences of their proposals, document the analysis, and make this information available to the public for comment prior to implementation. NEPA mandates, to the fullest extent possible, that the policies, regulations, and laws of the federal government be interpreted and administered in accordance with its environmental protection goals. NEPA also requires federal agencies to use an interdisciplinary approach in planning and decision making for any action with the potential to adversely affect the environment.

Following are federal laws and regulations specific to each discipline addressed in this report.

3.1.1.1. Floodplains

Federal Emergency Management Act (FEMA) Regulations (Code of Federal Regulations Title 44, Chapter 1). The FEMA floodway standards include the policies and procedures associated with the initial establishment of the regulatory floodway based on a maximum allowable 1 foot rise in the Base Flood Elevation (BFE) and the procedures for permitting development within the regulatory floodway after it has been established. The flood fringe are lands outside the floodway at or below the BFE that store, but do not effectively convey, floodwaters. Lands that compose the flood fringe will be inundated during a 1 percent chance flood event but, due to physical characteristics of the floodplain, convey shallow, slower moving waters. The floodway and BFE of the 1 percent chance flood are determined using hydraulic modeling techniques. FEMA regulations allow for state and local government regulations that are more stringent (allow something less than a 1-foot rise) to take precedence.

FEMA Procedures for "No-Rise" Certificates: Section 60.3 (d) (3) of the National Flood Insurance Program requires that communities prohibit encroachments, fill, new development, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses that the proposed encroachment would not result in any increase in flood levels within the community of the base flood (100-year) discharge.

Executive Orders (11988 and 13690). EO 11988 was issued in 1977, by President Carter, and required federal agencies to consider long- and short-term impacts of floodplains. It applies to the 100-year floodplain and requires federal agencies to avoid floodplain impacts where possible and to minimize impacts when unable to avoid.

EO 13690 issued in 2015, by President Obama, amends EO 11988 and creates a new Federal Flood Risk Management Standard. The new approach allows agencies to select one of three approaches for establishing flood elevations and hazard areas:

- Use data and methods informed by best-available, actionable climate science
- Build 2 feet above the 100-year (1 percent-annual-chance) flood elevation for standard projects, and 3 feet above for critical buildings like hospitals and evacuation centers
- Build to the 500-year (0.2 percent-annual-chance) flood elevation

These EOs impact both federal projects and non-federal projects with federal funding. EO 11988 has been adopted by federal agencies; EO 13690 is currently in process of being adopted.

3.1.1.2. Hydrology

Standard Local Operating Procedures for Endangered Species (SLOPES V) (dated March 14, 2014). This regulation contains the Programmatic Biological Opinion from the National Marine Fisheries Service pursuant to Section 7(a)(2) of the Endangered Species Act for transportation projects and defines the requirements for managing stormwater under said Biological Opinion.

3.1.1.3. Water Quality

Clean Water Act (CWA), 33 U.S.C. 1251-1387. The CWA requires states to set water quality standards for all contaminants in surface waters, based on the "beneficial" or "designated" uses for the water body and makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit was obtained under its provisions. It also recognizes the need to address the problems posed by nonpoint source pollution. Some relevant provisions of the CWA include Section 303(d), Section 401, and Section 404.

- **Section 303(d).** This section requires states to develop a list of water quality limited segments. These waters do not meet water quality standards. The law requires states to establish priority rankings for waterway segments on the lists and develop action plans, referred to as total maximum daily loads (TMDLs), to improve water quality. TMDLs identify the pollutant load reductions necessary from point and nonpoint sources and guide implementation work by federal, state, tribal, territorial, and local water quality protection programs. In Oregon, the Oregon Department of Environmental Quality (ODEQ) develops Section 303(d) lists and TMDLs for approval by the U.S. Environmental Protection Agency (EPA).
- **Section 401 Water Quality Certification.** This section requires an applicant for a federal license or permit to conduct an activity that may result in a discharge to waters of the State or waters of the U.S. to also obtain a certification that the activity complies with state water quality requirements and standards. Applicants in Oregon submit a Joint Permit Application to the U.S. Army Corps of Engineers, which forwards the application to the certifying state agency, ODEQ. ODEQ then determines whether to certify that the project meets state water quality standards and does not endanger waters of the State or U.S., or wetlands.
- **Section 404 Permits.** This section establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Given the linear nature of transportation projects, impacts to waters of the U.S., including wetlands, are often unavoidable. Under the Section 404(b)(1) guidelines, every effort must be made to minimize impacts to jurisdictional waters and wetlands to the maximum extent practical. A Section 404 permit would be required for any build alternative that involves work within a jurisdictional wetland or below the ordinary high water mark of any water body in the project area. A Section 404 permit triggers the need for a Section 401 Water Quality Certification.

National Pollutant Discharge Elimination System (NPDES) Permits. Section 402 prescribes the process for obtaining an NPDES permit. EPA requires NPDES permits for construction activities as well as for municipalities of certain size that discharge stormwater into waterways. In Oregon, the Oregon Department of Environmental Quality (ODEQ) administers these permits, as discussed in more detail in Section 3.1.2.

- **1200-C Permit.** An NPDES General Construction 1200-C Stormwater Permit is mandatory for construction activities on sites covering more than 1 acre. This permit requires a Temporary Erosion

and Sediment Control Plan. The ODEQ website provides guidance on selecting methods of erosion and sediment control.

- **Municipal Separate Storm Sewer System (MS4) Permit Program**. The MS4 Program requires entities owning a municipal separate storm sewer system to develop a stormwater management program that describes the stormwater control practices that will be implemented to reduce the discharge of pollutants to the sewer system.

Safe Drinking Water Act (SDWA), 42 U.S.C. 300f to 300j-26. The SDWA requires many actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs, and groundwater wells. SDWA authorizes EPA to set national health-based standards for drinking water to protect against both naturally occurring and human-made contaminants. The Oregon drinking water program provides direct oversight of drinking water systems. This law would apply only if infiltration basins or underground injection control measures were incorporated into the preferred project design. Local codes encourage infiltration of treated stormwater where feasible.

3.1.2. State

3.1.2.1. Floodplains

Oregon Revised Statutes 196.795 to 196.990, Oregon's Removal-Fill Law. Removal or fill within jurisdictional wetlands, waters of the State, or fish habitat requires a Removal-Fill permit from the Oregon Department of State Lands (DSL), which requires a wetland delineation, conceptual mitigation plan, and stormwater control plan as part of the permit application.

3.1.2.2. Hydrology

Oregon Administrative Rules 340-045-0005 to 340-045-0080, ODEQ, NPDES, and Water Pollution Control Federation Permits. In Oregon, ODEQ enforces NPDES permits (1200-C Stormwater Permit and MS4 Permit) and authorizes Section 401 Water Quality Certifications.

Oregon Department of Transportation (ODOT) 2014 Hydraulic Manual. The ODOT hydraulic manual describes the standard of practice for stormwater treatment facilities including estimating methods, capacities, and design guidelines.

3.1.2.3. Water Quality

Oregon Administrative Rules 340-045-0005 to 340-045-0080, NPDES, and Water Pollution Control Federation Permits. In Oregon, ODEQ enforces NPDES permits and authorizes Section 401 Water Quality Certifications. An NPDES General Construction 1200-C Stormwater Permit is mandatory for construction activities on sites covering more than 1 acre. This permit requires a Temporary Erosion and Sediment Control Plan. The ODEQ website provides guidance on selecting methods of erosion and sediment control.

As part of the Section 401 Water Quality Certification process, applicants may be required to incorporate protective measures into their construction and operational plans. These measures may include bank stabilization, treatment of stormwater runoff, spill protection, and fish and wildlife protection.

Oregon Revised Statutes 196.795 to 196.990, Oregon's Removal-Fill Law. Removal or fill within jurisdictional wetlands, waters of the State, or fish habitat requires a Removal-Fill permit from DSL, which requires a wetland delineation, conceptual mitigation plan, and stormwater control plan as part of the permit application.

Oregon Revised Statutes Chapter 468B, Water Quality. This statute authorizes the Environmental Quality Commission to set water quality standards for waters of the State. ODEQ and the U.S. Department of Agriculture have enforcement authority, including permitting responsibilities. The issuing authority also is responsible for reviewing proposed construction documents.

3.1.3. Local

3.1.3.1. Floodplains

City of Eugene Land Use Code, Site Development Standards (EC 9.6700-9.6709). These code sections describe the limitations of, and standards for, development in floodplains and special flood hazard areas in Eugene.

3.1.3.2. Hydrology

City of Eugene Land Use Code, Stormwater Development Standards (EC 9.6790 to 9.6976). Stormwater Development Standards are regulations for locating, designing, constructing, and maintaining stormwater facilities, applicable to development of new and replaced impervious surfaces. These sections include applicability criteria, and standards related to flood control, stormwater quality, flow controls for the headwaters area of Eugene, oil controls, source controls, and operations and maintenance of stormwater facilities.

City of Eugene Stormwater Basin Master Plans. These plans include technical information about the stormwater system including hydrologic and hydraulic modeling methodology and results.

3.1.3.3. Water Quality

City of Eugene Land Use Code, Stormwater Development Standards (EC 9.6790 to 9.6976). Stormwater Development Standards are regulations for locating, designing, constructing, and maintaining stormwater facilities, applicable to development of new and replaced impervious surfaces. These sections include applicability criteria and standards related to flood control, stormwater quality, flow controls for the headwaters area of Eugene, oil controls, source controls, and operations and maintenance of stormwater facilities. EC 9.6790 references the City's Stormwater Management Manual for implementation of the Stormwater Development Standards.

City of Eugene Stormwater Management Manual. This manual provides stormwater management principles and techniques that help preserve or mimic the natural hydrologic cycle and achieve water quality goals. The manual provides developers and design professionals with specific requirements for reducing the impacts of stormwater runoff quantity and pollution resulting from new development.

City of Eugene Land Use Code Waterside Protection, Water Quality, Wetland Buffer, and Water Resources Overlay Zones (EC 9.4700-9.4980). These zones protect water quality and natural resources in designated waterways, riparian zones, and adjacent wetlands by restricting certain development activities within a designated waterway or wetland setback area. The intention of these zones is to maintain and enhance the water quality and natural resource functions and benefits of these waterway and wetland features.

City of Eugene *Comprehensive Stormwater Management Plan* (1993). This plan provides the policy framework for the City of Eugene stormwater program. The Stormwater Management Plan lays the foundation for a multiple objective approach to managing stormwater in Eugene including through public education, onsite treatment, operational practices, land use regulations, and other means to

eliminate and reduce the discharge of pollutants to the municipal storm system, prevent flooding, and protect and enhance stormwater-related natural resources.

3.1.3.4. Watershed Master Plans

The following documents may potentially be applicable to the site. The information within these documents may provide site-specific requirements for water quality or flow control.

- **City of Eugene Stormwater Basin Master Plan, Volumes 1 through 8, 2002 and 2012 (City of Eugene)**. These plans provide background/contextual information about the Eugene stormwater system, are used in developing the City stormwater capital improvement program and provide contextual support for the now-codified stormwater development standards. The basin plans also include technical information about the system including hydrologic and hydraulic modeling methodology and results.
- **City of Springfield *Stormwater Master Plan* (2010)**

3.2. Analysis Area

The analysis area was similar for all aspects of the water resources, but is significantly dependent on the selected alternatives. The analysis area for the MovingAhead Project was the contributing drainages, waterways, and floodplains adjacent to each corridor, all of which are located in the Eugene-Springfield metropolitan area. Corridor-specific analysis areas were defined based on the alternatives selected for further analysis in the Level 2 AA.

3.3. Contacts and Coordination

3.3.1. Federal

- U.S. Army Corps of Engineers
- EPA
- Federal Highway Administration
- FTA
- U.S. Department of Transportation
- FEMA

3.3.2. State

- ODEQ
- DSL
- ODOT

3.3.3. Local

- City of Eugene
- Lane County
- LCOG

3.4. Level 1 Screening

No data were collected for the Level 1 Screening.

3.5. Level 2 Alternatives Analysis

Existing maps and data were reviewed to identify floodplains, the stormwater management system, and the current 303(d) list of impaired waters within the project area. Relevant regulatory requirements were also reviewed. This information was overlain on the project alternatives to identify potential conflicts with any of these resources. Impacts were documented where an alternative encroaches on a floodplain and where an alternative has the potential to release runoff to the waterway or floodplain. In addition, impacts to water quality were analyzed in terms of runoff-related pollutants to waterbodies with established TMDLs.

3.5.1. Data Collection

Several types of information were collected for this analysis. Specific tasks include the following, in order of specialization.

3.5.1.1. Floodplains

- Project staff reviewed updated FEMA National Flood Insurance Program Flood Insurance Rate Maps (FEMA, n.d.), along with associated online geodatabases and mapping applications containing the same information.
- Staff identified the approximate location of 100-year floodplains and elevations, and confirmed boundaries shown on local maps.
- Relevant floodplain regulations of local agencies were reviewed.
- Staff collected information on permitting requirements related to storm drainage for alternatives that involve crossing a floodplain.

3.5.1.2. Hydrology

- Relevant stormwater regulations were reviewed.
- Staff reviewed online databases to obtain estimated drainage areas and existing impervious surface area for each affected drainage basin. Drainage area and existing impervious surface area were estimated using U.S. Geological Survey (USGS) StreamStats web application (USGS, 2016).

3.5.1.3. Water Quality

- An updated 303(d) list of streams within the project area was reviewed as well as any established TMDLs pertinent to the affected project area.
- Relevant local water quality regulations were reviewed.
- Staff identified and described the water quality status of waterbodies affected by the project.

3.5.2. Significance Thresholds

3.5.2.1. Floodplains

A significant impact would occur if construction of an alternative would cause the base flood elevation to rise. This would include building a new structure within any part of the floodplain or permanent use

of land below the flood elevation for new stormwater management facilities. Maintenance activities for existing structures within the floodplain, however, were not considered significant.

3.5.2.2. Hydrology

A significant impact is defined as the necessitation of new flow control structures that release treated stormwater to the floodplain or area waterbodies. Alternatives that require the addition of new flow control structure(s) in close proximity to the floodplain or area waterbodies are defined as resulting in a significant impact. Potential impacts on downstream deficiencies were also considered in accordance with the stormwater basin master plan.

3.5.2.3. Water Quality

Impacts to water quality are considered significant if the treated stormwater runoff would cause a waterbody to exceed a pollutant standard as established by ODEQ (ORS 468B). This applies to waterbodies regardless if they have a defined TMDL or are on the 303(d) list of impaired waters.

3.5.3. Impact Analysis

3.5.3.1. Long-Term Impacts Analysis Approach

For each discipline, a long-term impact analysis was conducted independently. The event horizon for long-term impacts will extend until 2035.

Floodplains

Alternatives that involve crossing the floodplain were analyzed for long-term impacts by reviewing the standard section detail for the proposed roadway and geographic information system based topography, in addition to local maps of the existing drainage system. An adverse impact is defined as an overlap of the relevant road section on the existing floodplain. Beneficial effects are defined as the avoidance of impacts to the floodplain. To provide a factor of safety and to allow for uncertainty in defining a floodplain, beneficial effects apply only to an alternative that remains a minimum of 20 feet away from the defined floodplain.

Hydrology

Hydrology impacts were assessed by obtaining maps and records of the existing stormwater management system and by comparing them against topographical maps. Existing stormwater management system records were used to determine the location of existing outfalls, while topographic maps indicate the changes in elevation throughout an alternative. If an alternative involves the expansion of the existing road, it is likely that elevations for the new section of the road will be similar to the existing road. The estimated runoff from expanded road surfaces will increase.

Water Quality

Long-term impacts to water quality may occur with release of additional treated stormwater runoff to receiving waters. However, impacts are significant if the receiving water body has applicable TMDL requirements or is on the 303(d) list of impaired waters. Identification of waterbodies in the study area and their TMDL requirements is a first step toward assessing long-term impacts. Potential impacts of each alternative have been assessed for any waterbodies with TMDLs within the study area. This involves estimating the probable location of additional flow control and water quality treatment

facilities based on topography. The effects of releasing treated stormwater runoff into a receiving waterbody is qualitatively described.

3.5.3.2. Short-Term Impacts Approach

Floodplains

Each alternative was assessed for the potential requirements of construction easements within the floodplain boundary. This approach involves outlining the floodplain and overlapping it with the anticipated road section. Section outlines that lie within 20 feet of the floodplain delineation are assumed to have a short-term impact. The assumption is that a 20-foot-wide temporary construction easement will be required to construct the road. Within this easement, the contractor may store equipment, materials, or fill that could affect flood elevations during a storm event.

Hydrology

Short-term impacts to hydrology and hydraulics would involve removing existing stormwater management system components with the intention to replace or enlarge the system. Another potential short-term impact would involve directing stormwater runoff temporarily into the existing stormwater management system. To assess the potential for these impacts, the width of a typical cross section for each alternative was overlain upon a map of the existing system. The use of appropriate sediment control and erosion prevention best management practices is expected to prevent adverse effects from changing the existing stormwater drainage system.

Water Quality

Short-term impacts were determined by assessing the probable construction impacts from modifications or additions to, or removal of, the existing stormwater management system. Clearing, grading, and removal or fill operations for the roadway could potentially have a temporary impact on water quality if not mitigated. Appropriate erosion and sediment control measures would be expected to mitigate those impacts. Assessment involved overlaying the roadway section and the existing storm system on a topographic map and reviewing the anticipated construction process.

3.5.3.3. Indirect Impact Analysis Approach

For purposes of this analysis, indirect impacts were defined as those reasonably foreseeable adverse and beneficial impacts separated by time and space from the direct impacts of proposed alternatives. The approach for indirect impact analysis consisted of using information obtained on existing environmental conditions; predicting indirect impacts using literature reviews, case studies, and qualitative professional judgment; and assessing their significance using standards or criteria as described in Section 3.5.3. Examples of factors considered in the analysis include location and size of improvements as well as features and function. Resultant findings have been documented below as they relate to floodplains, hydrology, and water quality.

3.5.3.4. Cumulative Impact Analysis Approach

For purposes of this analysis, cumulative impacts are defined as those resulting from the incremental impact of the alternative when added to other past, present, and reasonably foreseeable future actions. Similar to the indirect impact analysis approach, the approach for adverse and beneficial cumulative impact analysis consists of using information obtained on existing environmental conditions. In this approach, information obtained about future conditions as described in master plans and other sources

was also considered. Cumulative impacts will be predicted using literature reviews, case studies, and qualitative professional judgment. Significance will be assessed using criteria as described in the significance thresholds section. Examples of factors considered in the analysis include location and size of improvements as well as features and function. Resultant findings are documented below as they relate to floodplains, hydrology, and water quality.

3.5.3.5. Mitigation Measures Approach

Following the impacts identification and assessment, impact mitigation measures were identified and evaluated. Specific mitigation measures are dependent on a variety of factors including size of improvements and location, and might consist of reducing the magnitude of the impacts or including features that will compensate for the impacts. Applicable regulations were reviewed for mitigation thresholds and any directives on specific mitigation measures to be applied. Where regulations do not speak to thresholds or required mitigation measures, qualitative professional judgment was used to develop appropriate mitigation measures.

4. System-Level Environmental Consequences

4.1. Affected Environment

4.1.1. Project Setting

The project is located in the City of Eugene, Oregon, and crosses the Willamette River. The Willamette River drains the Willamette Valley in western Oregon and is approximately 187 miles long. The project area is located at approximately river mile (RM) 181, and is 181 miles upstream of the Willamette River confluence with the Columbia River. The five transit corridors also drain to Russel Creek, Q Street Canal, Debrick Slough, Dodson Slough, Spring Creek, and Amazon Creek. Figure 4.1-1 shows the location of the affected watercourses and their watersheds. The Amazon Creek is part of the Long Tom River Watershed.

The nearest USGS gage to the project, USGS gage 14158100 at Owosso Bridge, is approximately 3.4 river miles downstream of the Ferry Street Bridge. This gage took temperature and turbidity measurements from November 2010 through October 2015 and dissolved oxygen measurements from September 2014 through the present. Discharge is not measured at this location.

Two USGS flow gages are near the project along the Willamette River. Gage 14152000 is on the Middle Fork Willamette approximately 12.9 river miles upstream of Ferry Bridge near Jasper, Oregon. Nearly 1,350 square miles drain to this point. Gage 14157500 is on the Coast Fork Willamette approximately 11 miles upstream near Goshen, Oregon. Nearly 650 square miles drain to this point. Both stations have a recording period of October 1905 to present. Together, these two gages cover 2,000 of the 2,050 square miles of drainage at Ferry Bridge, and can be used as a reasonable estimate for the discharge of the Willamette River for the project. The annual combined average of these two gauges is 5,637 cubic feet per second.

Average monthly flows for the Willamette River are shown in Table 4.1-1.

The existing drainage from the majority of the existing project area is collected in Eugene's drainage system (a combination of pipes and open waterways including ditches and streams) and is discharged without treatment to one of the water courses. The proposed project would collect runoff, treat it in water quality facilities as required, and then discharge the runoff to the receiving waterways.

4.1.1.1. Hydrology

Eugene is characterized by warm dry summers and mild wet winters with December the wettest month on average. Table 4.1.-2 shows the average monthly rainfall.

Figure 4.1-1. Floodplains and Affected Waterways in the MovingAhead Project Area

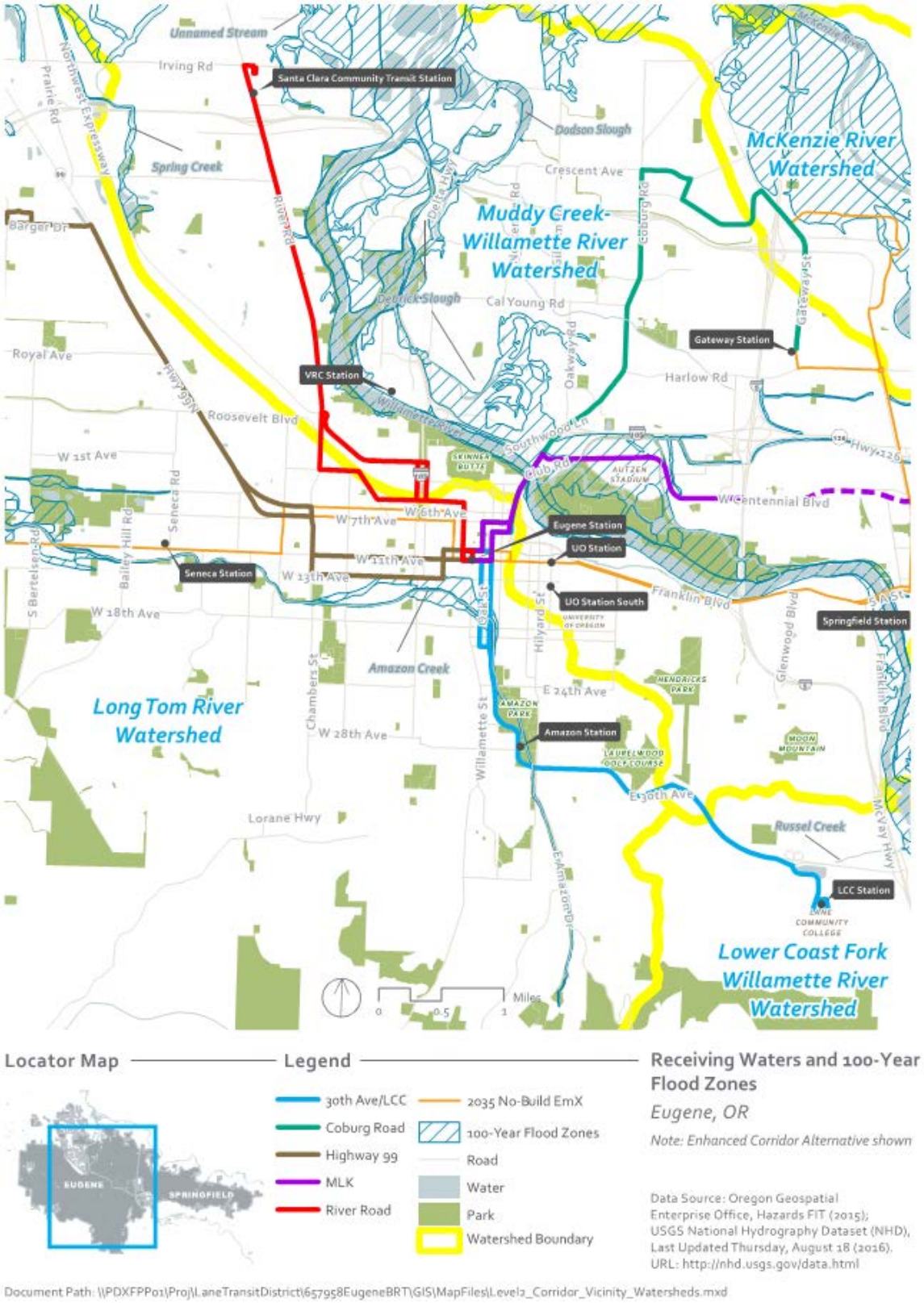


Table 4.1-1. Average Monthly Flows for the Willamette River (USGS Stream Gages 14152000 and 14157500)

Month	Average Discharge (cubic feet per second)	
	Middle Fork Willamette at Jasper USGS Gage 14152000	Coast Fork Willamette near Goshen USGS Gage 14157500
January	7,040	3,540
February	4,600	2,690
March	3,840	2,210
April	3,580	1,610
May	3,850	1,060
June	3,110	619
July	2,000	246
August	2,190	329
September	2,780	542
October	3,180	817
November	5,660	1,850
December	7,040	3,260
Annual Average	4,073	1,564
Combined Average	5,637	

Table 4.1-2. Average Annual Precipitation for Eugene, Oregon

Month	Average Precipitation (inches)
January	7.2
February	5.2
March	5.0
April	2.9
May	2.3
June	1.4
July	0.4
August	0.7
September	1.3
October	3.5
November	7.2
December	7.7
Annual Average	45.0

4.1.1.2. Receiving Waters

Willamette River

The Willamette River runs through Eugene and receives runoff from many of the transit corridors. Ferry Street Bridge, on the Coburg Road and Martin Luther King, Jr. Boulevard Corridors, is at approximately 181 river miles upstream of the Willamette River confluence with the Columbia River. At that point, the river has a tributary drainage of approximately 2,050 square miles. The drainage area includes the drainage area of Russel Creek and the Q Street Canal, but does not include the areas of the other basins in the project as they all join the Willamette River downstream of the project. All five corridors have some areas that eventually drain to the Willamette River, either relatively directly or indirectly via Amazon Creek and the Long Tom River.

Russel Creek

Russel Creek is near I-5 by LCC. Part of the 30th Avenue to LCC Corridor drains to Russel Creek. The creek has a drainage area of 1.7 square miles at Forest Boulevard. Russel Creek joins the Willamette River upstream of the rest of the project at RM 186.3.

Q Street Canal

The Q Street Canal runs north of the Willamette River approximately parallel to Highway 126. It drains 1.5 square miles at Centennial Loop, the point furthest downstream that collects runoff from the

project. Q Street Canal joins the Willamette River at RM 181.1. Most of the Martin Luther King, Jr. Boulevard Corridor drains to the Q Street canal.

Dodson Slough

Dodson Slough is in north Eugene on the east side of the Willamette River and receives runoff from the Coburg Road Corridor. It has a drainage area of 8.5 square miles near Lakeview Drive, the furthest downstream point that collects runoff from the project. Its confluence with the Willamette River is at RM 176.1.

Debrick Slough

Debrick Slough is also in north Eugene on the east side of the Willamette River. At the Eugene Country Club, it drains 1.0 square mile. Parts of the Coburg Road Corridor drain to Debrick Slough, which has a confluence with the Willamette River at RM 176.9.

Spring Creek

Spring Creek is in the north part of Eugene, west of the Willamette River. It drains an area of 3.8 square miles at Lynnbrook Drive, the most downstream point that collects runoff from the project area. Parts of the River Road Corridor drain to Spring Creek, which joins the Willamette River at RM 170.7.

Amazon Creek

Amazon Creek is in south Eugene and has a drainage area of 37.9 square miles at Clear Lake Road, the point furthest downstream that will collect runoff from the project area. Highway 99 and 30th Avenue to LCC Corridors drain to Amazon Creek. The creek then flows into the Long Tom River, which has a confluence with the Willamette at RM 148.8.

4.1.2. 303(d) Listed Streams

Both Amazon Creek and the Willamette River are on the 303(d) list of impaired waters. Table 4.1-3 shows the parameters for which the watercourses are listed as well as the status of the TMDL. Spring Creek, Russel Creek, Debrick Slough, Dodson Slough, and Q Street Canal are not on the 303(d) list.

4.1.3. Existing Water Quality

Water quality parameters from the ODEQ Laboratory Analytical Storage and Retrieval Web Application (ODEQ, 2008) for the Willamette River, Russel Creek, Q Street Canal, and Amazon Creek were analyzed for concentrations of pollutants for which either Amazon Creek or the Willamette River has an approved TMDL. Data were unavailable for Spring Creek, Debrick Slough, and Dodson Slough. The existing water quality for the four waterways where data is available are summarized in Table 4.1-4. No data were available for dichloroethylenes, tetrachloroethylenes, trichloroethylenes, or dioxin from any station and was not included in the table.

E. coli and dissolved oxygen are the only two contaminants in Amazon Creek with approved TMDLs. The E. coli levels observed were less than the single sample limit of 406 organisms per 100 milliliters. No 30-day log means were available. No data were available for dissolved oxygen levels in Amazon Creek.

Table 4.1-3. Summary of Federal CWA 303(d) Listed River and Creeks in the Project Area (2012)

River	Parameter	Season	TMDL Status	Criteria
Amazon Creek RM 0-22.6	Arsenic	Year Round	Needed	NA
	Copper	Year Round	Needed	NA
	Dichloroethylenes	Year Round	Needed	NA
	Dissolved Oxygen	Year Round	Approved	Cool water: Not less than 6.5 mg/L
	E. coli	Fall, Winter, Spring	Approved	30-day log mean of 126 E. coli organisms per 100 mL; no single sample > 406 organisms per 100 mL
	Lead	Year Round	Needed	NA
	Tetrachloroethylene	Year Round	Needed	NA
	Trichloroethylene	Year Round	Needed	NA
Willamette River RM 174.5-186.6	Dioxin (2,3,7,8-TCDD)	Year Round	Approved	Oregon ODEQ Table 31: 0.01 µg/L (acute); 38 pg/L (chronic)
	Iron	Year Round	Needed	NA
	Dissolved Oxygen	Year Round	Needed	NA
	Lead	Year Round	Needed	NA
	Temperature	Year Round	Approved	Salmon and trout rearing and migration: 18 degrees Celsius 7-day-average maximum
	Temperature	October 15 – May 15	Approved	Salmon and steelhead spawning: 13 degrees Celsius 7-day-average maximum
	E. coli	Fall, Winter, Spring	Approved	30-day log mean of 126 E. coli organisms per 100 mL; no single sample > 406 organisms per 100 mL
	Mercury	Year Round	Needed	NA

> = greater than
µg/L = microgram(s) per liter
mg/L = milligram(s) per liter
mL = milliliter(s)
NA = not applicable
pg/L = picogram(s) per liter

Table 4.1-4. 303(d) Water Quality Limited Streams in the MovingAhead Project

	Station Name (Upstream to Downstream)	Station Identifier	Arsenic (mg/L)	Copper (mg/L)	Dissolved Oxygen (mg/L)	E. Coli (Total Coliform) (CFU/100 mL)	Lead (mg/L)	Iron (mg/L)	Temperature (°C)	Mercury (mg/L)
Willamette River	Coast Fork/Main Channel Willamette	33830	NA	NA	NA	NA	NA	NA	NA	NA
	Willamette River at Highway 126 (Springfield)	10359	0.22	0.87	10.53	NA	0.012	0.93	15.1	< 0.0005
	Willamette River at I-5 (Eugene)	10851	NA	NA	NA	NA	NA	NA	NA	NA
	Willamette River	33832	NA	NA	NA	NA	NA	NA	17.8	NA
	Willamette River at Ferry Street	10358	NA	NA	NA	1270	NA	NA	NA	NA
	Willamette River at Greenway Bike Bridge, Eugene	29044	NA	NA	11.22	NA	NA	NA	NA	NA
	Willamette River at Beltline Bridge	10357	NA	NA	NA	4327	NA	NA	NA	NA
	Unknown	33884	NA	NA	NA	NA	NA	NA	NA	NA
	Willamette River upstream of McKenzie River at RM 177	28723	NA	NA	NA	NA	NA	NA	17.6	NA
	Willamette River at Delta Sand and Gravel	10621	NA	NA	NA	3750	NA	NA	NA	NA
Amazon Creek	Amazon Creek at Martin Street	29707	NA	NA	NA	NA	NA	NA	NA	NA
	Amazon Creek at 29th Street	25624	NA	NA	NA	275	NA	NA	18.8	NA
	Amazon Creek at Chambers Street	25623	NA	NA	NA	NA	NA	NA	NA	NA
	Amazon Creek at Beltine Road	36389	NA	NA	NA	NA	NA	NA	NA	NA
	Amazon Creek at South Pacific Railroad Bridge	25620	NA	NA	NA	143	NA	NA	NA	NA

Table 4.1-4. 303(d) Water Quality Limited Streams in the MovingAhead Project

	Station Name (Upstream to Downstream)	Station Identifier	Arsenic (mg/L)	Copper (mg/L)	Dissolved Oxygen (mg/L)	E. Coli (Total Coliform) (CFU/100 mL)	Lead (mg/L)	Iron (mg/L)	Temperature (°C)	Mercury (mg/L)
Russel Creek	Russel Creek, 125 feet upstream of LCC outfall	35405	NA	NA	NA	22.5	NA	NA	NA	NA
	Russel Creek, 100 feet downstream of LCC outfall	35406	NA	NA	NA	9	NA	NA	NA	NA
	Russel Creek, 50 feet downstream of LCC outfall	35407	NA	NA	NA	16	NA	NA	NA	NA
	Russel Creek, at LCC outfall pipe / lagoon flow	35408	NA	NA	NA	16	NA	NA	NA	NA
Q Street Canal	Q Street Canal, Alton Baker Parkway Spillway near Willamette River	34499	<2.0	1.7	NA	NA	2.1	0.638	18.7	NA
	Q Street Canal, mouth of Canoe Channel	34498	<2.0	<1.5	NA	NA	<1.5	0.18	18.6	NA

Source: *Water Quality Laboratory Analytical Storage and Retrieval (LASAR) Database*. ODEQ. (2008).
°C = degree(s) Celsius
> = greater than
< = less than
CFU = Colony-Forming Unit
mg/L = milligram(s) per liter
mL = milliliter(s)
NA = no data available

The Willamette River at the project site has approved TMDLs for dioxin, temperature, and E. coli. Although there is a TMDL for dioxin in the Willamette River, no data were available to compare. The temperature TMDL for the Willamette River during the summer months is 18 degrees Celsius (°C), 7-day average maximum. Two of the five stations that measured temperature exceeded that limit. No data were available for the winter months. E. coli levels exceeded the TMDL at all three stations it was measured.

Though Russel Creek is not on the 303(d) list, it drains to the Willamette River and the same parameters were analyzed. Only E. coli was measured in Russel Creek and the values did not exceed the Willamette River TMDL.

Q Street Canal drains to the Willamette River at the Ferry Street Bridge. No data is available for E. coli. The temperatures in Q Street Canal exceeded the TMDL for the Willamette River.

4.2. Long-Term Direct Impacts

The expected increases in impervious area in each corridor would increase the amount of stormwater runoff and would likely change runoff patterns as the topography, impervious surface, and infiltration rates would change. The amount of new and reconstructed impervious area is different for each corridor and is described in subsequent subsections. Note that the areas listed include some square footage that may be used for landscaping during the final design. That additional landscaping could decrease the total amount of added impervious area. These areas are not currently receiving treatment and the new and replaced impervious surface would require treatment, thus providing a net benefit to water quality.

The Willamette River and Amazon Creek are on the ODEQ 303(d) list of water quality limited streams and are of particular concern. For example, the runoff concentration and volume of metals, such as copper, may increase.

The anticipated impact to the water quality is not quantified in this report as it is outside the scope of the AA. However, it can generally be said that without mitigation, water quality of waters receiving runoff from an increase in pollutant generating surfaces such as roadways is likely to deteriorate. The impacts could be minimized by implementing the mitigation measures outlined in Section 4.5.

Most bicycle and pedestrian paths are not considered pollution generating impervious surfaces as they constitute a minimal or low source of pollutants in stormwater runoff. They would, however, increase impervious surface area and may change runoff volume if large areas are developed.

For a conservative estimate, all new and redeveloped impervious area is combined in this report, regardless of whether it would generally be considered a pollution generating surface area or non-pollutant generating surface area. The single exception to this is for the River Road Corridor where only non-pollution generating surface area would be reconstructed within the Amazon Creek Basin and as such, no treatment facilities are identified.

4.3. Indirect and Cumulative Effects

All alternatives include improvements that could lead to increases in population and redevelopment along the corridor, which could lead to associated infrastructure improvements. Often, redevelopment requires upgraded stormwater treatment, which would continue to improve water quality.

Cumulative effects on both the quantity and quality of runoff may result from the development of two or more of the corridor alternatives because all affected watercourses eventually reach the Willamette River. However, due to the large drainage area and high amounts of existing impervious area in the

Willamette River Basin, the cumulative effects are likely to be minimal. Even if build alternatives in all five transit corridors are developed, the new and reconstructed impervious surface area in the Willamette Basin would total 207,259 square feet (ft^2) (0.05 percent of total existing impervious basin area) and 716,118 ft^2 (0.16 percent of total existing impervious basin area) for the Enhanced Corridor and EmX Alternatives, respectively. Cumulative effects on other water bodies in the project area are described in the following subsections.

4.4. Short-Term Construction-Related Impacts

Short-term impacts from construction events could result, including temporary increases in water quantity when the soil is compacted in the staging area or turbidity when soil is disrupted during the construction phase prior to treatment facilities being installed.

4.5. Potential Mitigation Measures

Long-term direct impacts could be mitigated by directing runoff to water quality or flow control facilities prior to discharge into the receiving waterways. These facilities, when properly designed, would mitigate, at least to some degree, the quantity impacts of the project and would improve the water quality of the runoff from the new impervious area from each build alternative as well as the existing contributing impervious area. These areas are not currently receiving treatment. Therefore, any new treatment will add a net benefit to water quality. In addition, where runoff discharges to TMDL water bodies, stormwater facilities will be designed to minimize that exceedances. The City of Eugene *Stormwater Management Manual* (2014) and ODOT Hydraulic Manual (2014) would be used to guide the selection and design of required facilities. At the time of this writing, ODOT regulations and SLOPES V are more stringent and would be used.

The water quality treatment design goal, as directed by ODOT Hydraulic Manual guidelines, is to provide treatment for all runoff generated by the water quality design storm from the contributing impervious area using best management practices that use infiltration, media filtration, or vegetative filtration. For this project location, the water quality design storm is 1.4 inches in 24 hours.

The water quantity control design goal, as directed by SLOPES V guidelines, is to limit peak design release rates to, at a minimum, match post-construction peak runoff rates to pre-development peak runoff rates for a 10-year design storm. Flow control is only required for runoff that drains directly to a basin with less than 100 square miles of drainage area at the point of project discharge. Runoff discharged to the Willamette River does not need to pass through a flow control facility as the change in water quantity is minimal in comparison to the rest of basin. For all other water bodies affected by the MovingAhead build alternatives, detention facilities would be required to reduce peak runoff rate increases and minimize negative effects to the receiving waterbody. For all receiving waterbodies, downstream system deficiencies will need to be considered during the flow control analysis.

These facilities would need to be sized for each build alternative as design progresses. Potential locations for these facilities are identified in the following sections and were based on the expected construction footprint of the alternative, hydrology, and drainage patterns of the existing infrastructure.

Best management practices and erosion control would be used to prevent negative impacts to water quality and hydraulics of receiving waterways resulting from construction of the alternatives. Monitoring must also take place for in-water work as required for the Section 401 certification and for the discharge of runoff from construction sites as required by the NPDES 1200-C permit.

5. Highway 99 Corridor Environmental Consequences

5.1. Affected Environment

Stormwater runoff from the Highway 99 Corridor currently drains into the existing storm sewer system and is conveyed to either Amazon Creek or the Willamette River. Figures 5.1-1 and 5.1-2 show the construction footprint along Highway 99 and the affected waterways for the Enhanced Corridor and EmX Alternatives, respectively.

Figure 5.1-1. Highway 99 Corridor Enhanced Corridor Alternative Construction Footprint and Affected Waterways

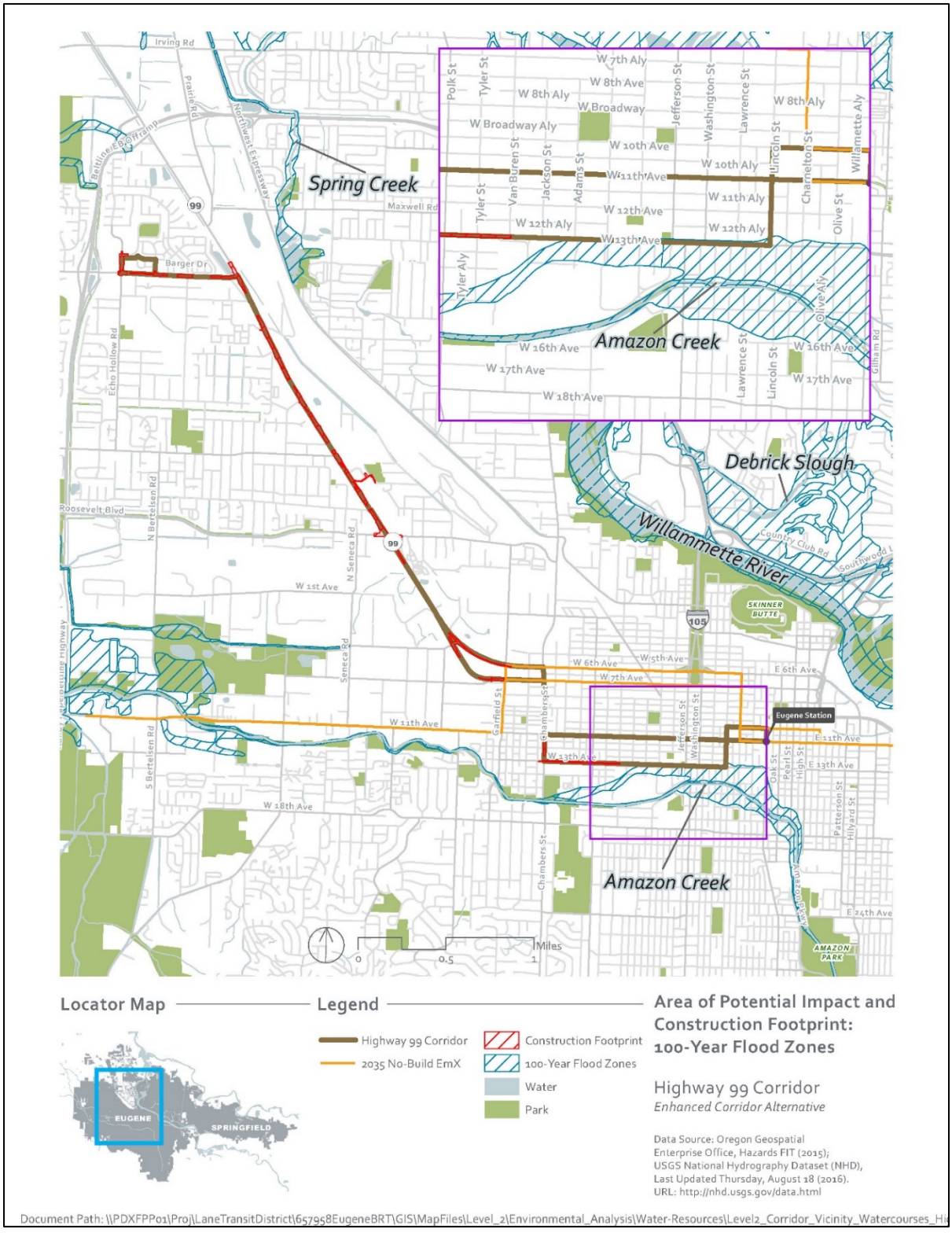
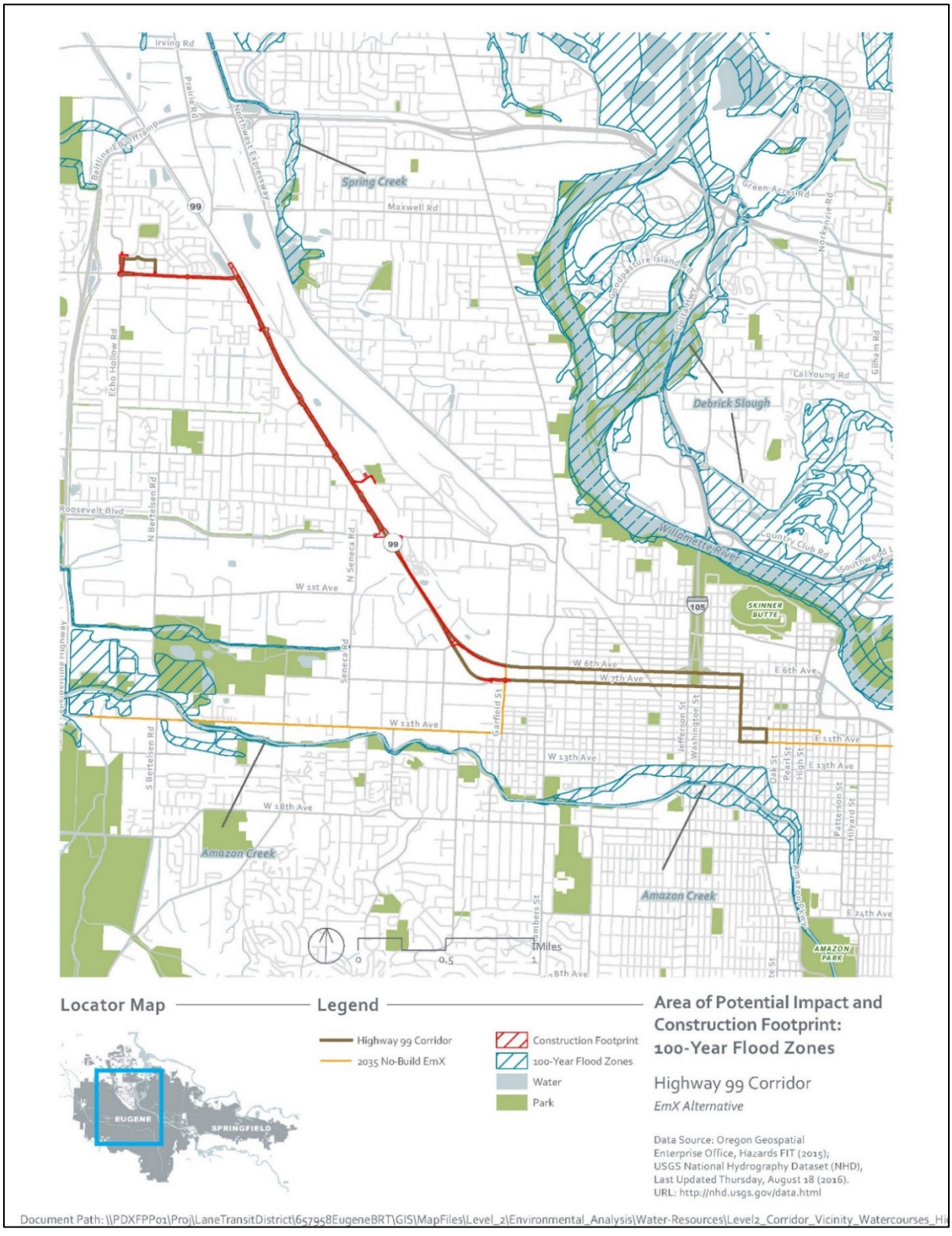


Figure 5.1-2. Highway 99 Corridor EmX Alternative Construction Footprint and Affected Waterways



5.2. Long-Term Direct Impacts

5.2.1. No-Build Alternative

Parts of Bethel Drive and Barger Drive drain to Amazon Creek. Any increase in impervious area resulting from the upgrades to the two roadways for the No-Build Alternative would potentially increase the volume and velocity of stormwater runoff from the road to the waterway. The roadway projects would also allow increased traffic to pass through, thus increasing the pollutant load to receiving waters. The amount of new impervious surface area is unknown until further design of the improvements is completed.

5.2.2. Enhanced Corridor Alternative

The Enhanced Corridor Alternative for the Highway 99 Corridor would create or reconstruct 171,124 square feet of impervious area including sidewalks, roadway, and new bus stations that drain to Amazon Creek, of which 64,824 square feet would be new impervious surface. The 171,124 ft^2 of impervious area would constitute 0.05 percent of the impervious area in the creek's drainage basin defined for this project. Although parts of the corridor drain to the Willamette River, no new impervious area is expected to be developed in the Willamette River drainage basin under the Enhanced Corridor Alternative. Table 5.2-1 shows the expected increase and modifications in the Highway 99 Corridor for both the Enhanced Corridor and EmX Alternatives.

Table 5.2-1. Highway 99 Corridor Existing and New Impervious Surface Quantities

		Enhanced Corridor Alternative		EmX Alternative	
	Existing Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)	New and Reconstructed Impervious Area/Net Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious area (ft^2)
Amazon Creek	334,939,461	171,124 / 64,824	0.05 / 0.02	215,198 / 92,901	0.06 / 0.02
Willamette River	462,920,832	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0
Total	**797,860,293**	**171,124 / 64,824**	**0.02 / 0.02**	**215,198 / 92,901**	**0.03 / 0.02**

[a] Total impervious area in drainage basin

No direct impacts on the either the Amazon Creek or Willamette River floodplains are expected as the result of the Enhanced Corridor Alternative as no structures are anticipated in the streams.

5.2.3. EmX Alternative

The EmX Alternative for the Highway 99 Corridor would create or reconstruct 215, 198 ft^2 of impervious area, of which 92,901 would be new impervious surface. The 215, 198 ft^2 of impervious area would constitute 0.06 percent of the impervious area in the Amazon Creek drainage basin defined for this project. No new impervious area is expected to drain to the Willamette River.

No direct impacts on either the Amazon Creek or Willamette River floodplains are expected as the result of the EmX Alternative as no structures are anticipated in the streams.

5.3. Indirect and Cumulative Effects

5.3.1. No-Build Alternative

No cumulative impacts are expected as a result of the No-Build Alternative.

5.3.2. Enhanced Corridor Alternative

Cumulative effects in the corridor may occur if the 30th Avenue to LCC Corridor is also developed because it would also impact the Amazon Creek drainage basin. As much as 269,648 ft^2 of new or reconstructed impervious area may be added in the Amazon Creek drainage basin if both corridors are developed with the Enhanced Corridor Alternative. This would constitute 0.08 percent of the impervious area in the Amazon Creek Basin.

5.3.3. EmX Alternative

Cumulative effects in the corridor may occur if the 30th Avenue to LCC Corridor is also developed because it would also impact the Amazon Creek drainage basin. As much as 366,635 ft^2 of new or reconstructed impervious area may be added if both corridors are developed with the EmX Alternative. This would constitute 0.11 percent of the impervious area in the Amazon Creek Basin.

5.4. Short-Term Construction-Related Impacts

No short-term or construction impacts are expected in the floodplains of Amazon Creek and the Willamette River as a result of any build alternatives.

5.5. Potential Mitigation Measures

Mitigation measures may include water quality and flow control facilities designed in more detail as the alternatives progress as discussed in Section 4.5. Facilities may be located at the following locations based on the construction footprint and hydrology:

- W. 6th Avenue and W. 7th Avenue
- Highway 99 and Fairfield Avenue
- Highway 99 and Barger Drive
- Ruskin Street and Barger Drive

5.6. Permits and Approvals

Table 5.6-1 summarizes the permits and approvals that would be required for this corridor.

Table 5.6-1. Highway 99 Corridor Permits and Approvals Required for Build Alternatives

Permits and Approvals	Alternatives	
	Enhanced Corridor	EmX
NPDES	✓	✓
NPDES General Construction 1200-C Stormwater Permit, including Temporary Erosion and Sediment Control Plan	✓	✓
Section 401 Water Quality Certification	✓	✓
SLOPES V Programmatic Approval or Individual Biological Opinion for Each Corridor	✓	✓
City of Eugene Development Permit	✓	✓
City of Eugene Erosion Control Permit	✓	✓

6. River Road Corridor Environmental Consequences

6.1. Affected Environment

Stormwater runoff from the River Road Corridor currently drains into the existing storm sewer system and is conveyed to either Amazon Creek or the Willamette River. Figures 6.1-1 and 6.1-2 show the construction footprint along the River Road Corridor and the affected waterways for the Enhanced Corridor and EmX Alternatives, respectively.

Figure 6.1-1. River Road Corridor Enhanced Corridor Alternative Construction Footprint and Affected Waterways

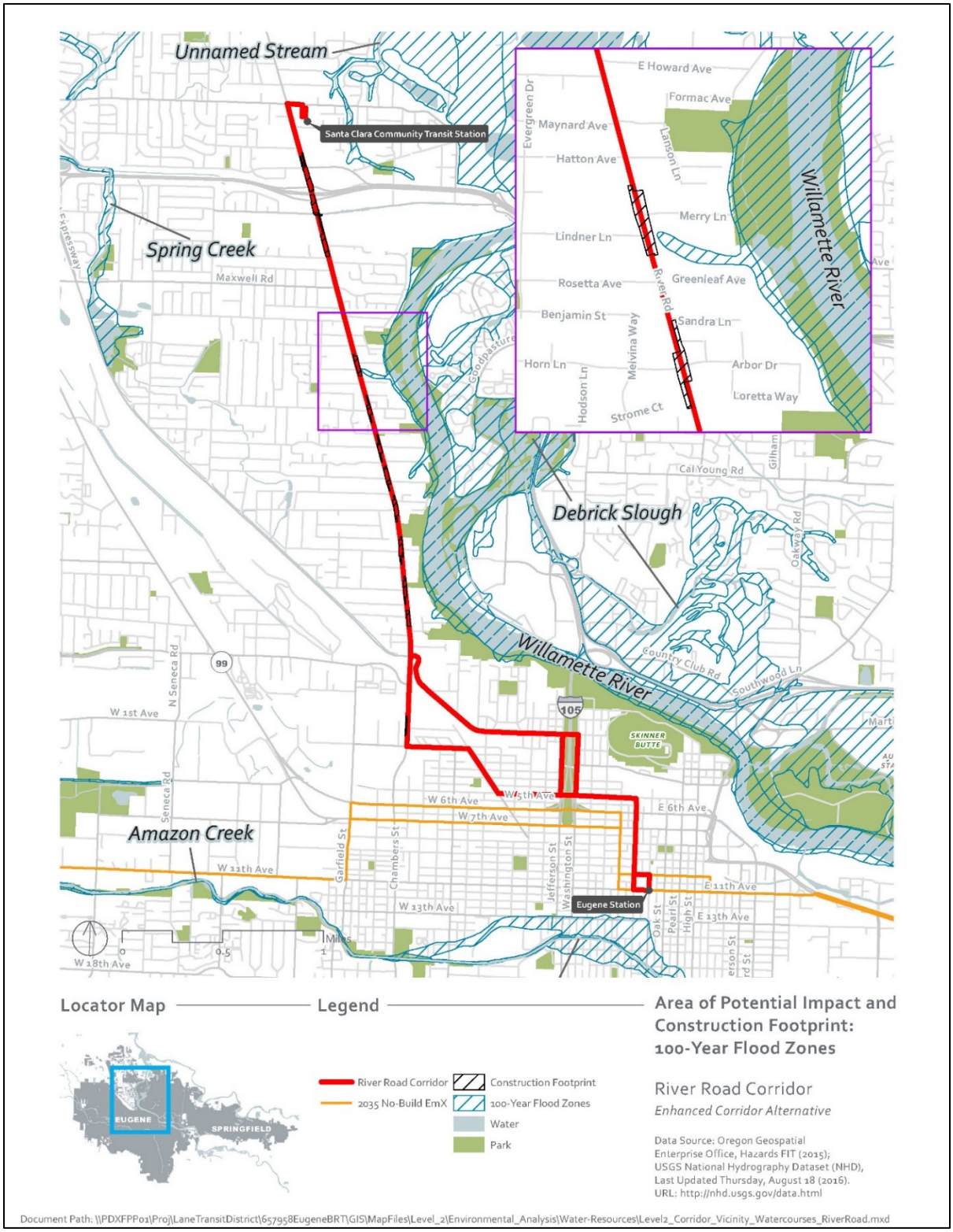
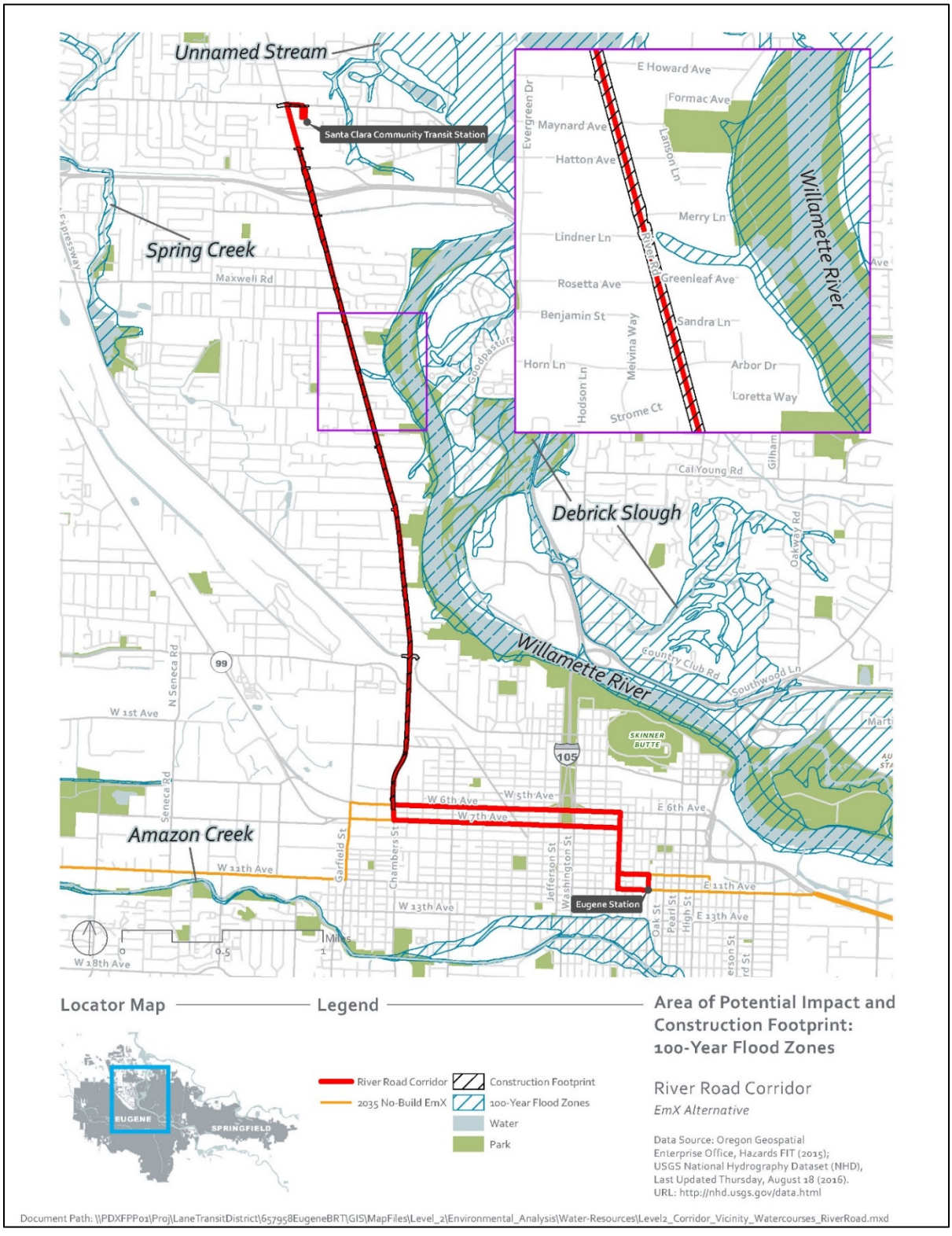


Figure 6.1-2. River Road Corridor EmX Alternative Construction Footprint and Affected Waterways



6.2. Long-Term Direct Impacts

6.2.1. No-Build Alternative

Both Hunsaker Lane and Beaver Street drain to Spring Creek. Any increase in impervious area resulting from the upgrades to the two roadways for the No-Build Alternative would potentially increase the volume and velocity of stormwater runoff from the road to Spring Creek. The roadway projects would also allow increased traffic to pass through, increasing the pollutant load to receiving waters. The amount of new impervious surface area is unknown until further design of the improvements is completed.

6.2.2. Enhanced Corridor Alternative

This alternative would add or reconstruct 109,573 ft^2 of impervious area. Of this amount, 81,207 ft^2 would drain to Spring Creek, which would be 0.17 percent of the impervious area in the creek's drainage basin. New roadway and sidewalk impervious surface in the Spring Creek basin would total 1,956 ft^2. A total of 28,366 ft^2 of new and reconstructed impervious area would be built in the Willamette River drainage basin, which would represent less than 0.01 percent of the basin's impervious area. New roadways and sidewalks would total 18,801 ft^2 of this amount. New and reconstructed impervious areas within the Amazon Creek drainage basin would total 1,123 ft^2, which would be less than 0.1 percent of the impervious surface of the basin.

Table 6.2-1 shows the expected increase and modifications in the River Road Corridor for both the Enhanced Corridor and EmX Alternatives.

Table 6.2-1. River Road Corridor Existing and New Impervious Surface Quantities

		Enhanced Corridor Alternative		EmX Alternative	
	Existing Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] /New Roadway and Sidewalk Percent of Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)
Amazon Creek[b]	334,939,461	1,123 / 0	<0.01 / 0	2,917 / 0	<0.01 / 0
Spring Creek	48,795,842	81,207 / 1,956	0.17 / <0.01	188,287 / 4,234	0.39 / <0.01
Willamette River	462,920,832	28,366 / 18,801	<0.01 / <0.01	557,646 / 49,489	0.12 / <0.01
Total	**846,656,135**	**109,573 / 20,757**	**0.01 / <0.01**	**748,850 / 53,723**	**0.14 / <0.01**

< = less then

[a] Total Impervious Area in Drainage Basin

[b] Non-pollutant generating surface only

No direct impacts on either Spring Creek or the Willamette River floodplain are expected as the result of the Enhanced Corridor Alternative.

6.2.3. EmX Alternative

The EmX Alternative would add or reconstruct 748,850 ft^2 of impervious area. A total of 188,287 ft^2 would be located in the Spring Creek drainage basin and 557,646 ft^2 in the Willamette River drainage basin. This would constitute 0.39 percent and 0.12 percent of the basins' impervious areas, respectively. This alternative would also add or reconstruct 2,917 ft^2 of non-pollutant generating impervious surface that drains to Amazon Creek would be added or reconstructed.

No direct impacts on either floodplain are expected as the result of the EmX Alternative.

6.3. Indirect and Cumulative Effects

No cumulative impacts are expected to result in Spring Creek from any build alternative. Potential cumulative impacts to the Willamette River were discussed in Section 4.3.

6.4. Short-Term Construction-Related Impacts

No construction impacts are expected in the floodplains of Spring Creek and Willamette River as a result of any build alternatives.

6.5. Potential Mitigation Measures

Mitigation measures may include water quality and flow control facilities designed in more detail as the alternatives progress as discussed in Section 4.5. Four locations have been identified for water quality facilities (for discharge to the Willamette River) and flow control facilities (to Spring Creek) at the following intersections:

- River Road and Horn Lane (Willamette River)
- River Road and Maynard Avenue (Willamette River)
- River Road and Silver Lane (Willamette River)
- River Road and Hunsaker Lane (Spring Creek)

6.6. Permits and Approvals

Table 6.6-1 summarizes the permits and approvals that would be required for this corridor.

Table 6.6-1. River Road Corridor Permits and Approvals Required for Build Alternatives

Permits and Approvals	Alternatives	
	Enhanced Corridor	EmX
NPDES	✓	✓
NPDES General Construction 1200-C Stormwater Permit, including Temporary Erosion and Sediment Control Plan	✓	✓
Section 401 Water Quality Certification	✓	✓
SLOPES V Programmatic Approval or Individual Biological Opinion for Each Corridor	✓	✓
City of Eugene Development Permit	✓	✓
City of Eugene Erosion Control Permit	✓	✓

7. 30th Avenue to Lane Community College Corridor Environmental Consequences

7.1. Affected Environment

Figures 7.1-1 and 7.1-2 show the construction footprint along the 30th Avenue to LCC Corridor for the Enhanced Corridor and EmX Alternatives, respectively, and the three waterways that receive runoff from the corridor: Russel Creek, Amazon Creek, and the Willamette River. Both alternatives also cross the Amazon Creek flood zone.

Figure 7.1-1. 30th Avenue to LCC Corridor Enhanced Corridor Alternative Construction Footprint and Affected Waterways

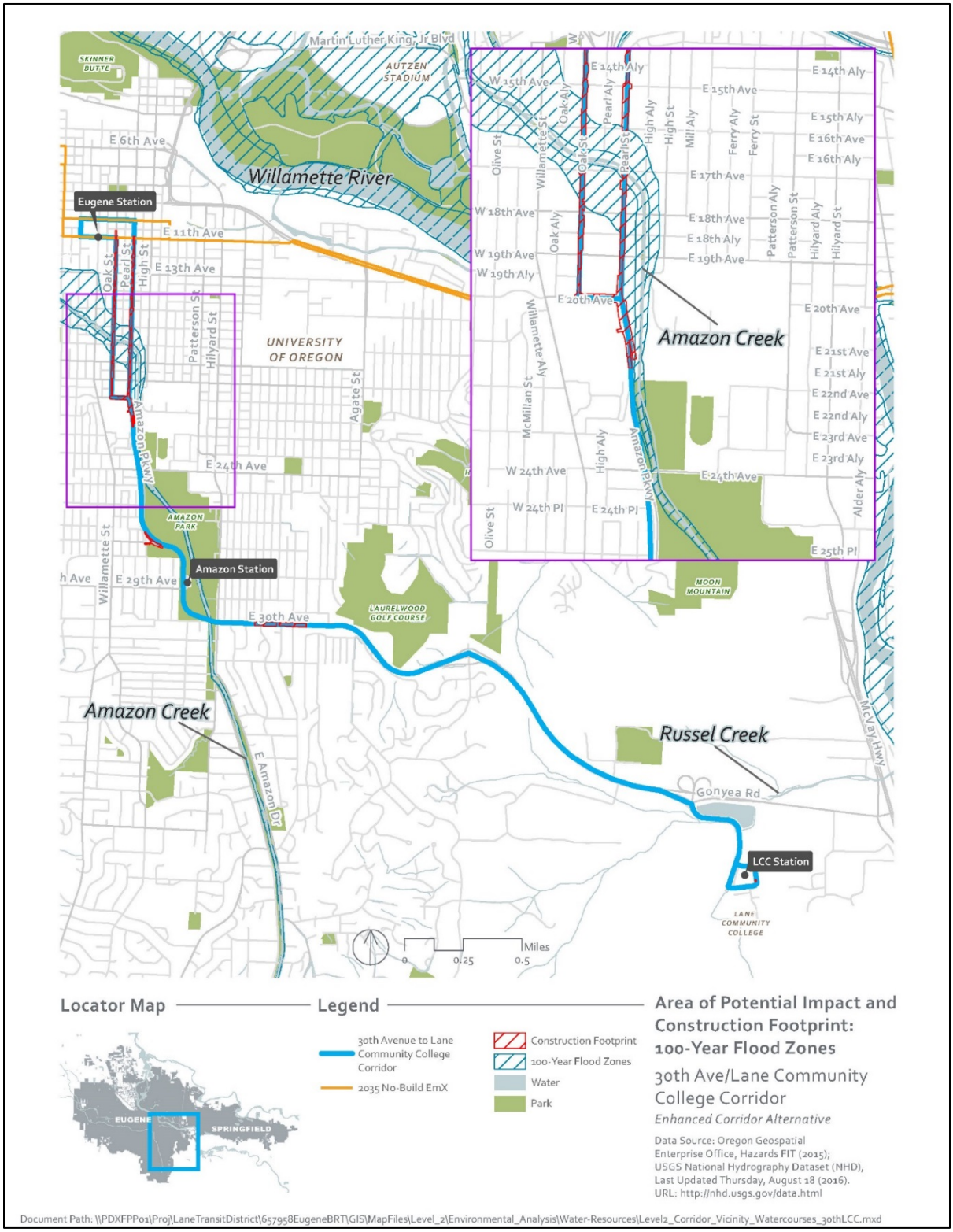
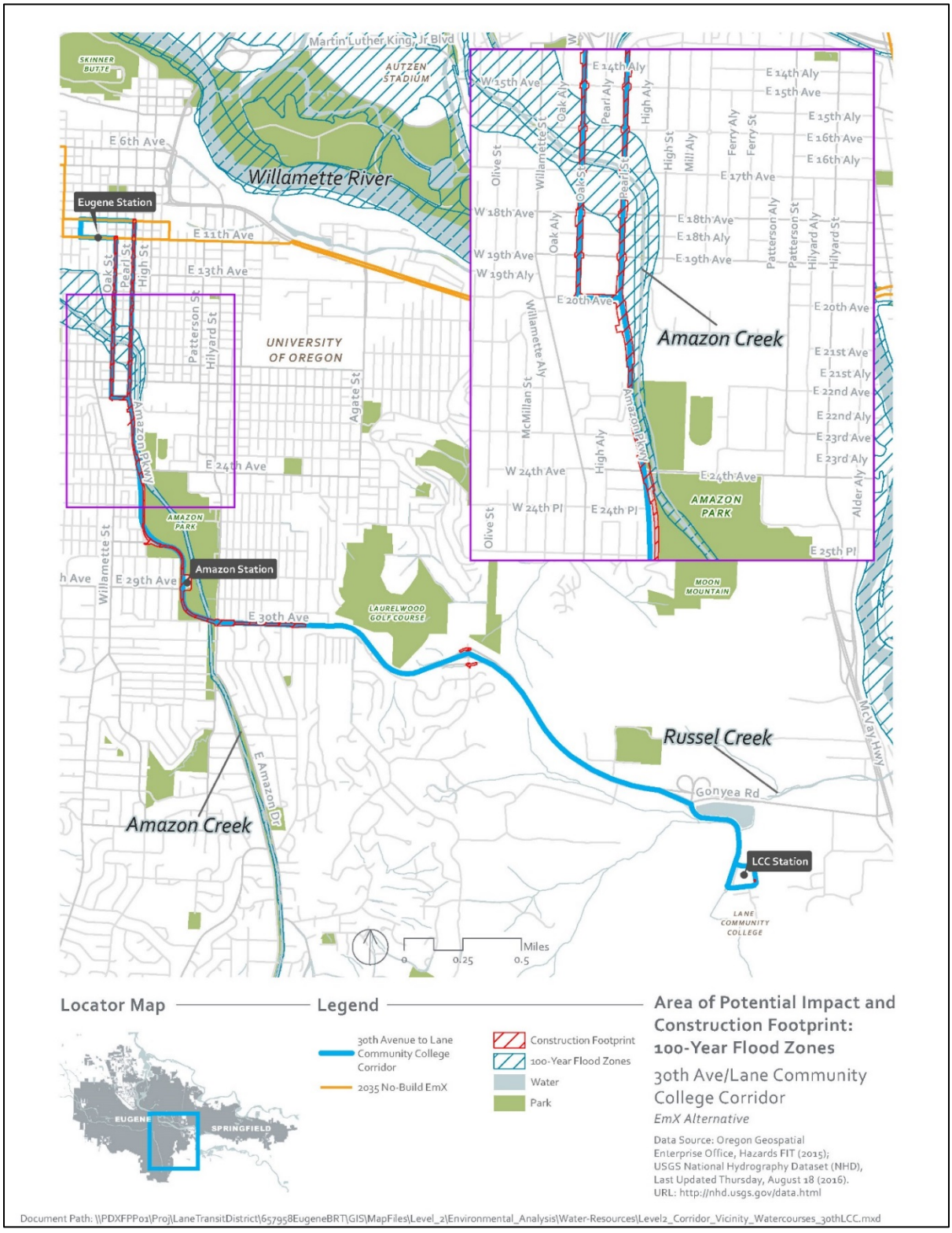


Figure 7.1-2. 30th Avenue to LCC Corridor EmX Alternative Construction Footprint and Affected Waterways



7.2. Long-Term Direct Impacts

7.2.1. No-Build Alternative

No increase in roadway impervious area is expected in the No-Build Alternative. The bicycle boulevard along Alder Street would add some impervious area, but it would not be pollutant generating and no water quality facilities would be required.

7.2.2. Enhanced Corridor Alternative

This alternative would include adding or reconstructing 110,801 ft^2 of impervious area. Amazon Creek would receive runoff from 98,524 ft^2 of new or reconstructed impervious area while the Willamette River would receive runoff from approximately 12,277 ft^2. The new and reconstructed impervious area would constitute 0.03 percent and less than 0.01 percent of existing impervious area in Amazon Creek and the Willamette River, respectively. Of the 98,524 ft^2 of new and reconstructed impervious area that would be located in the Amazon Creek drainage basin, 26,915 ft^2 would be new roadway and sidewalk. None of the new and reconstructed impervious area in the Willamette drainage basin would be new roadway or sidewalk. Though the corridor is located within the Russel Creek drainage basin, no added or reconstructed impervious area is expected to drain to Russel Creek for this alternative. Table 7.2-1 shows the expected affected impervious area in the 30th Avenue to LCC Corridor for both the Enhanced Corridor and EmX Alternatives.

Table 7.2-1. 30th Avenue to LCC Corridor Existing and New Impervious Surface Quantities

		Enhanced Corridor Alternative		EmX Alternative	
	Existing Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)
Russel Creek	2,753,912	0.0 / 0.0	0.0 / 0	1,724 / 0	0.06 / 0
Amazon Creek	334,939,461	98,524 / 26,915	0.03 / <0.01	151,437 / 35,749	0.05 / 0<.01
Willamette River	462,920,832	12,277 / 0	<0.01 / <0.01	56,162 / 0	0.01 / 0
Total	**800,614,205**	**110,801 / 26,915**	**0.01 / 0.01**	**209,323 / 35,749**	**0.03 / 0.01**

< = less than

[a] Total impervious area in drainage basin

Construction is expected within the Amazon Creek floodplain near 17th Avenue as improved bus stations and pedestrian crosses are anticipated.

Two culverts pass Amazon Creek under the project downtown at 17th Avenue. A third culvert passes the creek under the project at Hilyard Street. No direct impacts are expected at this crossing as no construction is planned in the area.

No direct impacts on the either Russel Creek or the Willamette River floodplain are expected as the result of the Enhanced Corridor Alternative.

7.2.3. EmX Alternative

The EmX Alternative would add or reconstruct 209,323 ft^2 of impervious. Almost 1,724 ft^2, 0.06 percent of the existing impervious area, would drain to Russel Creek. A total of 151,437 ft^2, 0.05 percent of the existing impervious area, would drain to Amazon Creek. The Willamette River would receive runoff from 56,162 ft^2 of new or reconstructed impervious area, 0.01 percent of the existing impervious area.

Construction is expected within the Amazon Creek floodplain near 17th Avenue as improved bus stations and pedestrian crosses are anticipated.

Similar to the Enhanced Corridor Alternative, the EmX Alternative crosses Amazon Creek in three places. However, changes to the culverts are not included as part of the anticipated improvements.

No direct impacts on either the Willamette River or Russel Creek floodplain are expected as the result of the EmX Alternative.

7.3. Indirect and Cumulative Effects

7.3.1. No-Build Alternative

No cumulative impacts are expected as a result of the No-Build Alternative.

7.3.2. Enhanced Corridor Alternative

Cumulative effects in the 30th Avenue to LCC Corridor may occur if the Highway 99 Corridor is also developed because it would also impact the Amazon Creek drainage basin. As much as 269,648 ft^2 of new and reconstructed impervious area may be added to the Amazon Creek drainage basin if both corridors are developed with the Enhanced Corridor Alternative. This would constitute 0.08 percent of the impervious area in the Amazon Creek Basin.

No cumulative effects are expected in Russel Creek.

7.3.3. EmX Alternative

Cumulative effects in the corridor may occur if the Highway 99 Corridor is also developed because it would also impact the Amazon Creek drainage basin. As much as 366,635 ft^2 of new and reconstructed impervious area may be added if both corridors are developed with the EmX Alternative. This would constitute 0.11 percent of the impervious area in the Amazon Creek Basin.

No cumulative effects are expected in Russel Creek.

7.4. Short-Term Construction-Related Impacts

7.4.1. No-Build Alternative

No construction impacts are expected in the floodplains of Russel Creek, Amazon Creek, or the Willamette River as a result of the No-Build Alternative.

7.4.2. Enhanced Corridor and EmX Alternatives

Enhanced pedestrian crossings and bus stations near 17th Avenue, where the project crosses Amazon Creek, would result from the Enhanced Corridor and EmX Alternatives. The redevelopment of this crossing may cause some temporary impacts to the floodplain, including increased turbidity and a change in runoff patterns. The impacts are expected to last only as long as the construction as no new permanent structures are anticipated in the floodplain.

7.5. Potential Mitigation Measures

Mitigation measures may include water quality and flow control facilities designed in more detail as the alternatives progress as discussed in Section 4.5. Four locations for water quality and flow control facilities were identified at the following intersections:

- 11th Avenue and Pearl Street (Willamette River)
- 19th Avenue and Pearl Street (Amazon Creek)
- Amazon Parkway and Hilyard Street (Amazon Creek)
- E. 30th Avenue and Spring Boulevard (Russel Creek)

7.6. Permits and Approvals

Table 7.6-1 summarizes the permits and approvals that would be required for this corridor.

Table 7.6-1. 30th Avenue to LCC Corridor Permits and Approvals Required for Build Alternatives

	Alternatives	
Permits and Approvals	**Enhanced Corridor**	**EmX**
Floodplain Development Permit	✓	✓
NPDES General Construction 1200-C Stormwater Permit, including Temporary Erosion and Sediment Control Plan	✓	✓
Section 401 Water Quality Certification	✓	✓
SLOPES V Programmatic Approval or Individual Biological Opinion for Each Corridor	✓	✓

8. Coburg Road Corridor Environmental Consequences

8.1. Affected Environment

Stormwater runoff from the Coburg Road Corridor drains to the Willamette River, Debrick Slough, and Dodson Slough. The corridor also crosses the North Beltline Floodway, which drains to Dodson Slough. Figures 8.1-1 and 8.1-2 show the Coburg Road Corridor and affected waterways for the Enhanced Corridor and EmX Alternatives, respectively. Both alternatives cross the Willamette River flood zone.

Figure 8.1-1. Coburg Road Corridor Enhanced Corridor Alternative Construction Footprint and Affected Waterways

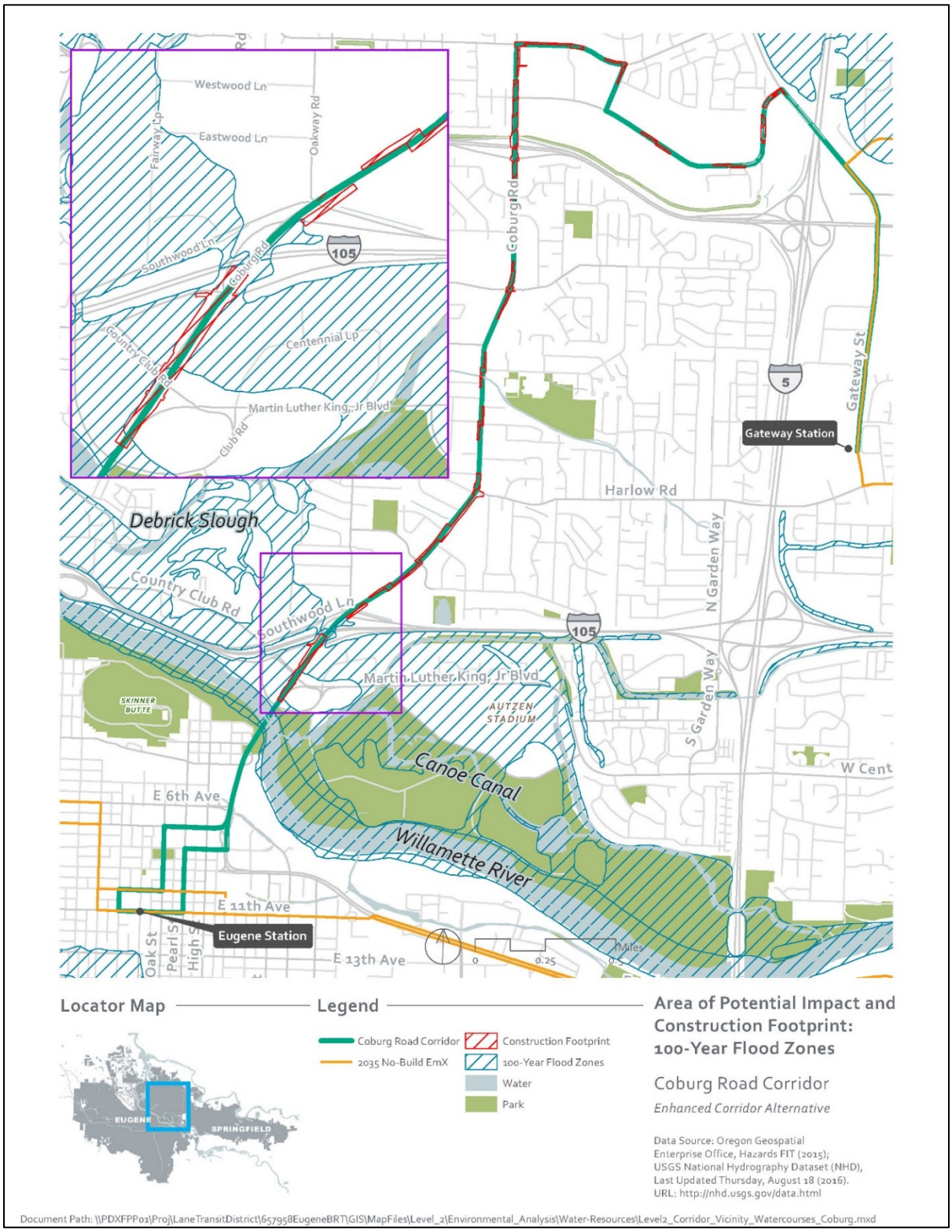
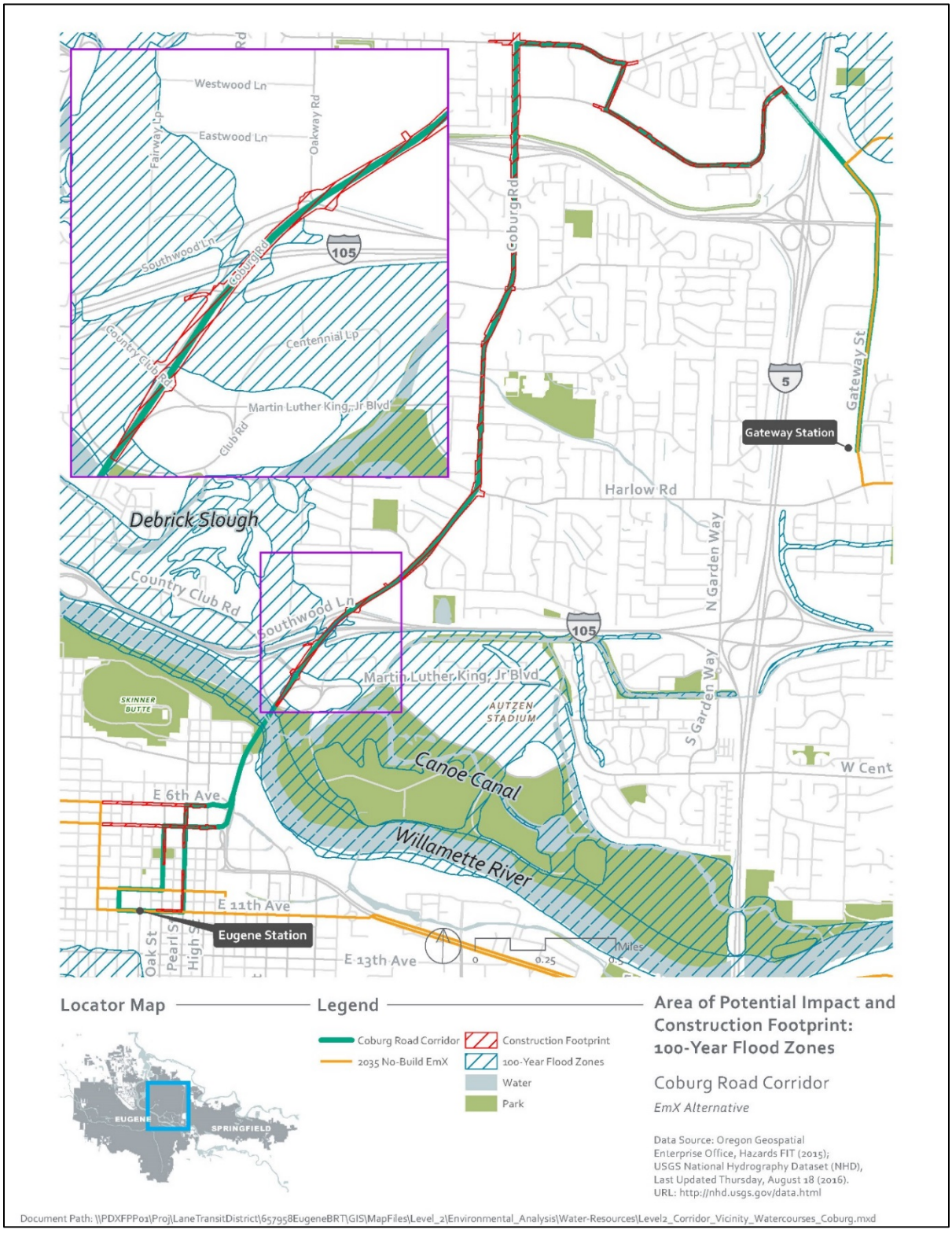


Figure 8.1-2. Coburg Road Corridor EmX Alternative Construction Footprint and Affected Waterways



8.2. Long-Term Direct Impacts

8.2.1. No-Build Alternative

No direct impacts are expected from the No-Build Alternative.

8.2.2. Enhanced Corridor Alternative

A total of 358,576 ft^2 of impervious area would be added or reconstructed for the Enhanced Corridor Alternative. The Willamette River would receive runoff from almost 95,774 ft^2 of new and reconstructed impervious area while the Debrick Slough would receive runoff from approximately 92,523 ft^2 and Dodson Slough would receive runoff from 170,279 ft^2 of impervious area. The new and reconstructed impervious area would make up 0.02 percent, 0.94 percent, and 0.14 percent of the impervious area in the Willamette River, Debrick Slough, and Dodson Slough, respectively. Table 8.2-1 shows the expected new and reconstructed impervious area in the Coburg Road Corridor for the Enhanced Corridor Alternative.

Table 8.2-1. Coburg Road Corridor Existing and New Impervious Surface Quantities

		Enhanced Corridor Alternative		EmX Alternative	
	Existing Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)
Debrick Slough	9,843,305	92,523 / 22,525	0.94 / 0.22	177,597 / 0	1.80 / 0
Dodson Slough	122,850,073	170,279 / 95,744	0.14 / 0.8	533,015 / 32,827	0.43 / 0.03
Willamette River	462,920,832	95,774/8,215	0.02 / <0.01	102,310 / 16,605	0.02 / <0.01
Total	**595,614,210**	**358,576 / 126,484**	**0.06 / 0.02**	**812,922 / 49,432**	**0.14 / <0.01**

[a] Total impervious area in drainage basin

The Willamette River is crossed by the project at the Ferry Street Bridge. However, no improvements are expected to be made to the existing bridge and no impacts to the floodplain or hydraulics of the Willamette River are anticipated.

8.2.3. EmX Alternative

Over 812,922 ft^2 of impervious area would be added or reconstructed for the EmX Alternative. A total of 102,310 ft^2 would drain to the Willamette River, 0.02 percent of the basin's existing impervious area. A total of 177,597 ft^2 would drain to Debrick Slough, 1.80 percent of the basin's impervious area. Dodson Slough would receive runoff from an additional 533,015 ft^2 of impervious area, 0.43 percent of the basin's impervious area.

8.3. Indirect and Cumulative Effects

No cumulative impacts are expected in Debrick or Dodson Slough as a result of any build alternative.

8.4. Short-Term Construction-Related Impacts

Some construction would occur within the Willamette floodplain, at the intersection of Coburg Road and Cedarwood Drive, and may result in temporary impacts such as changes in runoff patterns and sediment transport (turbidity). Impacts are expected to last only as long as construction. No construction impacts are expected in the floodplains of Debrick Slough or Dodson Slough as a result of any build alternatives.

8.5. Potential Mitigation Measures

Mitigation measures may include water quality and flow control facilities designed in more detail as the alternatives progress as discussed in Section 4.5. Facilities may be located at the following intersections along the Coburg Road Corridor based on the construction footprint and hydrology:

- Coburg Road and Cedarwood Drive (Willamette River)
- Coburg Road and Frontier Road (Debrick Slough)
- Coburg Road and Crescent Avenue (Dodson Slough)

8.6. Permits and Approvals

Table 8.6-1 summarizes the permits and approvals that would be required for this corridor.

Table 8.6-1. Coburg Road Corridor Permits and Approvals Required for Build Alternatives

	Alternatives	
Permits and Approvals	**Enhanced Corridor**	**EmX**
Oregon Removal-Fill Permit	✓	✓
Floodplain No-Rise Certification	✓	✓
Floodplain Development Permit	✓	✓
NPDES General Construction 1200-C Stormwater Permit, including Temporary Erosion and Sediment Control Plan	✓	✓
Section 401 Water Quality Certification	✓	✓
SLOPES V Programmatic Approval or Individual Biological Opinion for Each Corridor	✓	✓
City of Eugene Development Permit	✓	✓
City of Eugene Erosion Control Permit	✓	✓

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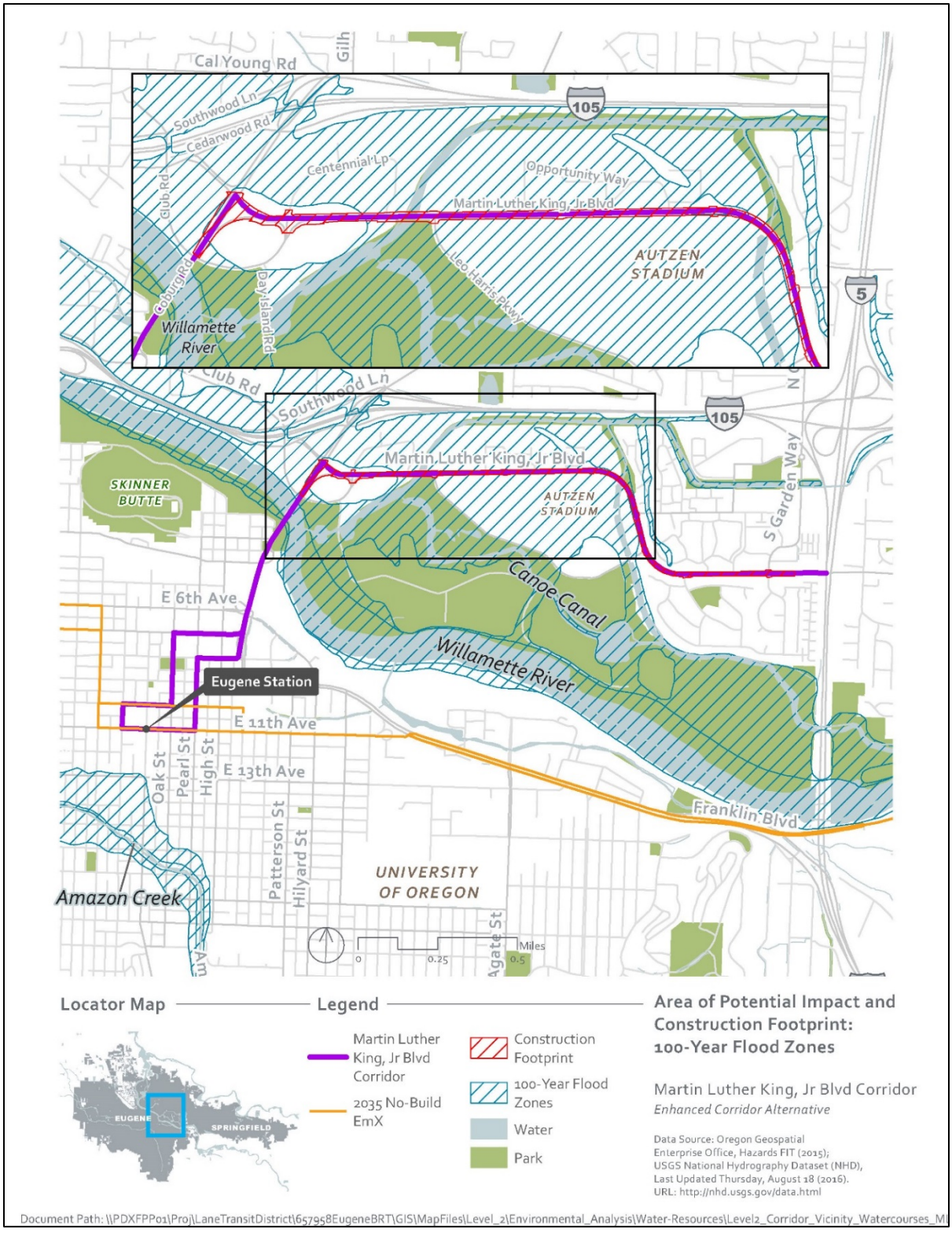
9. Martin Luther King, Jr. Boulevard Corridor Environmental Consequences

9.1. Affected Environment

Figure 9.1-1 shows the construction footprint along the Martin Luther King, Jr. Boulevard Corridor and the receiving waterways, Q Street Canal, and the Willamette River for the Enhanced Corridor Alternative. The corridor crosses the Willamette River flood zone.

Figure 9.1-1. Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative Construction Footprint and Affected Waterways



9.2. Long-Term Direct Impacts

9.2.1. No-Build Alternative

No direct impacts are expected from the No-Build Alternative.

9.2.2. Enhanced Corridor Alternative

The Enhanced Corridor Alternative would add or reconstruct 325,299 ft^2 of impervious surface is expected to be added or reconstructed as the result of the Enhanced Corridor Alternative. A total of 254,457 ft^2, 0.07 percent of the basin's existing impervious area, would drain to Q Street Canal. A total of 70,842 ft^2, 0.02 percent of the basin's existing impervious area, would drain to the Willamette River. Table 9.2-1 shows the expected modifications in the Martin Luther King, Jr. Boulevard Corridor for the Enhanced Corridor Alternative.

Table 9.2-1. Martin Luther King, Jr. Boulevard Corridor Existing and New Impervious Surface Quantities

		Enhanced Corridor Alternative		EmX Alternative	
	Existing Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)	New and Reconstructed Impervious Area / New Roadway and Sidewalk Impervious Area (ft^2)	Percent of Impervious Area[a] / New Roadway and Sidewalk Percent of Impervious Area (ft^2)
Q Street Canal	18,899,325	254,457 / 2,217	1.34 / 0.01	NA	NA
Willamette River	462,920,832	70,842 / 8,971	0.02 / 0.01	NA	NA
Total	**481,820,157**	**325,299 / 11,188**	**0.06/<0.01**	**NA**	**NA**

NA = not applicable

[a] Total impervious area in drainage basin

The project crosses the Willamette River at the Ferry Street Bridge. However, no improvements are expected to be made to the existing bridge and no impacts to the hydraulics of the Willamette River are anticipated.

A bridge at Centennial Loop and a culvert near Kinsrow Avenue pass Q Street Canal under the project. No modifications are expected to either the bridge or culvert and floodplain and hydraulic impacts to the canal are not anticipated.

9.3. Indirect and Cumulative Effects

No cumulative effects are expected in the Q Street Canal for any build alternative.

9.4. Short-Term Construction-Related Impacts

9.4.1. No-Build Alternative

No construction impacts are expected in the floodplains of Q Street Canal and the Willamette River as a result of any build alternatives.

9.4.2. Enhanced Corridor Alternative

Much of the Enhanced Corridor Alternative falls within the floodplain of the Willamette River (which includes parts of the Q Street Canal). Construction resulting from developed sidewalks, shelters, pullouts, and pedestrian crossings could result in temporary impacts such as a change in turbidity and runoff patterns. Impacts are expected to end when construction is completed.

9.5. Potential Mitigation Measures

Mitigation measures may include water quality and flow control facilities designed in more detail as the alternatives progress as discussed in Section 4.5. The following two intersections were identified as potential locations for water quality facilities along the Martin Luther King, Jr. Boulevard Corridor:

- Martin Luther King, Jr. Boulevard and Centennial Loop (Q Street Canal)
- Martin Luther King, Jr. Boulevard and Kinsrow Avenue (Q Street Canal)

9.6. Permits and Approvals

Table 9.6-1 summarizes the permits and approvals that would be required for this corridor.

Table 9.6-1. Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative Permits and Approvals Required

Permits and Approvals	Enhanced Corridor Alternative
Oregon Removal-Fill Permit	✓
Floodplain No-Rise Certification	✓
Floodplain Development Permit	✓
NPDES General Construction 1200-C Stormwater Permit, including Temporary Erosion and Sediment Control Plan	✓
Section 401 Water Quality Certification	✓
SLOPES V Programmatic Approval or Individual Biological Opinion for Each Corridor	✓
City of Eugene Development Permit	✓
City of Eugene Erosion Control Permit	✓

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Appendix A: Glossary and Naming Conventions

This appendix includes a detailed list of acronyms, abbreviations and technical terms used throughout this report. It also includes naming conventions used in the MovingAhead project.

Acronyms and Abbreviations

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
/H-RCP	Historic Structures or Sites Combine Zone
/WP	Waterside Protection
/WQ	Water Quality
°C	degree(s) Celsius
µg/L	microgram(s) per liter
µg/m^3	microgram(s) per cubic meter
AA	Alternatives Analysis
AAC	all aluminum conductor
AASHTO	American Association of State Highway and Transportation Officials
AAI	All Appropriate Inquiry
ACS	American Community Survey
ADA	Americans with Disabilities Act
AEO	Annual Energy Outlook
APE	Area of Potential Effect
API	Area of Potential Impact
approx.	approximately
ARTS	All Roads Transportation Safety Program
ATR	Automated Traffic Recording
BAT	business access and transit
BEST	Better Eugene Springfield Transit
BFE	Base Flood Elevation
BMP	best management practice
BPA	Bonneville Power Administration
BRT	bus rapid transit
Btu	British thermal unit
c	circa

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CFR	Code of Federal Regulations
CFU	Colony-Forming Unit
CH2M	CH2M HILL, Inc.
CIG	Capital Investment Grant
CIP	Capital Improvements Program
City	City of Eugene
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COGP	County Opportunity Grant Program
Corps	U.S. Army Corps of Engineers
CRL	Confirmed Release List
CSZ	Cascadia Subduction Zone
CTR	commute trip reduction
CWA	Clean Water Act
CY	cubic yard
dB	decibel
dBA	A-weighted decibel
DBE	Disadvantaged Business Enterprise
DEIS	Draft Environmental Impact Statement. Also referred to as Draft EIS.
DEQ	Oregon Department of Environmental Quality
DKS	DKS Associates
DLS	Donation Land Claim
DOE	Determination of Eligibility
DOGAMI	Oregon Department of Geology and Mineral Industries
DOT	Department of Transportation

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
Draft EIS	Draft Environmental Impact Statement. Also referred to as DEIS.
Draft Envision Eugene	Draft Envision Eugene Community Vision (Envision Eugene, 2016, July)
Draft Eugene 2035 TSP	Draft Eugene 2035 Transportation System Plan (City of Eugene, 2016)
DSL	Oregon Department of State Lands
DU	dwelling unit
EA	Environmental Assessment or each
EC	City of Eugene Code
EC	eligible contributing
EC	Enhanced Corridor Alternative (in some tables)
ECLA	Eugene Comprehensive Lands Assessment (ECONorthwest, 2010, June)
ECSI	Environmental Cleanup Site Information database (Oregon DEQ, 2016)
EFH	essential fish habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EmX	Emerald Express, Lane Transit District's Bus Rapid Transit System
EmX	EmX Alternative (in some tables)
EOA	Equity and Opportunity Assessment
EPA	U. S. Environmental Protection Agency
ES	eligible significant
ES NR	eligible significant NRHP
ESA	Endangered Species Act or Environmental Site Assessment
ESH	essential indigenous anadromous salmonid habitat
ESU	Evolutionarily Significant Unit
EWEB	Eugene Water & Electric Board
FAST Act	Fixing America's Surface Transportation Act
FEIS	Final Environmental Impact Statement. Also referred to as Final EIS.
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act of 1974
Final EIS	Final Environmental Impact Statement. Also referred to as FEIS.
FOE	Finding of Effect
FPPA	Farmland Protection Policy Act, 7 U.S.C. 4201-4209 and 7 CFR 658

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
FRA	Federal Railroad Administration
ft	foot (feet)
ft^2	square foot (feet)
FTA	Federal Transit Administration
FTN	Frequent Transit Network
FY	fiscal year
GAN	Grant Anticipation Note
GARVEE	Grant Anticipation Revenue Vehicle
GHG	greenhouse gas
GIS	geographic information system
GLO	General Land Office
Heritage	Heritage Research Associates, Inc.
HGM	Hydro-geomorphic
HMTA	Hazardous Materials Transport Act of 1975, with amendments in 1990 and 1994
HOV	high-occupancy vehicle
HPNW	Historic Preservation Northwest
I-5	Interstate 5
I-105	Interstate 105
IOF	Immediate Opportunity Fund
ISA	International Society of Arboriculture
ISTEA	Intermodal Surface Transportation Efficiency Act
kV	kilovolt(s)
LaneACT	Lane Area Commission on Transportation
LCC	Lane Community College
LCDC	Land Conservation and Development Commission
LCOG	Lane Council of Governments
Ldn	day-night sound level
LE	Listed Endangered
LEP	limited English proficiency
L_{eq}	equivalent sound level
LF	lineal foot (feet)
LGAC	Local Government Affairs Council

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
LGGP	Local Government Grant Program
LID	Local Improvement District
L_{max}	maximum sound level
L_{min}	minimum sound level
LNG	liquefied natural gas
LOS	level of service
LPA	Locally Preferred Alternative
LRAPA	Lane Regional Air Protection Agency
LRFP	LTD's Long-Range Financial Plan
LRT	Light Rail Transit
LRTP	LTD's Long-Range Transit Plan
LT	Listed Threatened
LTD	Lane Transit District
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
m	meter(s)
MAP-21	Moving Ahead for Progress in the 21st Century
MBTA	Migratory Bird Treaty Act
Metro Plan	Metro Plan, Eugene-Springfield Metropolitan Area General Plan (LCOG et al., 1987, as updated on 2015, December 31)
mg/kg	milligram(s) per kilogram
MI	mile(s)
mL	milliliter(s)
MMA	Michael Minor and Associates, Inc.
MOA	Memorandum of Agreement
MOE	Measure of Effectiveness
MPC	Metropolitan Policy Committee
mpg	miles per gallon
mph	miles per hour
MPO	Metropolitan Planning Organization
MTIP	Metropolitan Transportation Improvement Program Federal FY 2015 to Federal FY 2018 (Central Lane MPO, adopted 2014, October, as amended)
Mw	Earthquake moment magnitude

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
N/A	not applicable
NA	not applicable; no data available
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NAVD88	North American Vertical Datum of 1988
ND	nodal development
NEPA	National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321-4347
NFA	no further action
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrous dioxide
NO_x	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NPMS	National Pipeline Mapping System
NPS	Department of Interior's National Park Service
NR	Natural Resource
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NS	no standard established
NW Natural	Northwest Natural
O_3	ozone
O&M	operations and maintenance
OAR	Oregon Administrative Rule
OARRA	Oregon Archaeological Records Remote Access
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
OPA	Oil Pollution Act of 1990
OPRD	Oregon Parks and Recreation Department

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
OR	Oregon
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
OTIB	Oregon Transportation Infrastructure Bank
Pb	lead
PCB	polychlorinated biphenyl
PEM	Palustrine Emergent Wetland
PM	particulate matter
PM_{10}	particulate matter – 10 microns in diameter
$PM_{2.5}$	particulate matter – 2.5 microns in diameter
PMT	Project Management Team
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PROS	Parks, Recreation, and Open Space
PUC	Public Utilities Commission
Qls	landslide and debris avalanche deposits
Qtg	terrace and fan deposits
Qty	quantity
RCRA	Resource Conservation and Recovery Act of 1976
RFFA	reasonably foreseeable future action
ROW	right of way
RRFB	Rectangular Rapid Flash Beacon
RTP	*Central Lane Metropolitan Planning Organization Regional Transportation Plan* (LCOG, adopted 2007, November; 2011, December). (The RTP includes the Financially Constrained Roadway Projects List)
SARA	Superfund Amendments and Reauthorization Act of 1986
SARA III	Emergency Planning and Community Right to Know Act of 1986; part of the SARA amendments
SC	sensitive critical
SCC	Standard Cost Categories
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SDC	Systems Development Charge

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
SDWA	Safe Drinking Water Act
sec	second(s)
Section 4(f)	Section 4(f) of the Department of Transportation Act of 1966
Section 6(f)	Section 6(f) of the LWCF Act of 1965
Section 106	Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800.5)
SF	square foot (feet)
SHPO	Oregon State Historic Preservation Office
SIP	State Implementation Plan
SMU	Species Management Unit
SO_2	sulfur dioxide
SOC	species of concern
SSGA	Small Starts Construction Grant Agreement
STA	Special Transportation Area
STIP	Statewide Transportation Improvement Program
SV	Sensitive Vulnerable
SY	square yard(s)
TAP	Transportation Alternatives Program
TAZ	transportation analysis zone
TCE	Temporary Construction Easement
TD	transit-oriented development
TDM	Transportation Demand Management
TEA-21	Transportation Equity Act for the 21st Century
Teoe	siliciclastic marine sedimentary rocks
TESCP	Temporary Erosion and Sediment Control Plan
TIF	Tax Increment Financing
TIP	Transportation Improvement Program
TMDL	total maximum daily load
TOD	transit-oriented development
TPAU	Department of Transportation – Transportation Planning Analysis Unit
TPR	Transportation Planning Rule
TransPlan	Eugene-Springfield Transportation System Plan (City of Eugene et al., adopted 2002, July)

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
TRB	Transportation Research Board
TSI	Transportation System Improvement
TSM	Transportation System Management
TSP	Transportation System Plan
UGB	Urban Growth Boundary
UMTA	Urban Mass Transit Administration
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 U.S.C. 4601 et. seq., 49 CFR Part 24
URA	Urban Renewal Area
U.S.C.	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
v/c	volume-to-capacity
VHT	vehicle hours traveled
VMT	vehicle miles traveled
VOC	volatile organic compound
WEEE	West Eugene EmX Extension
WEG	wind erodibility group
YOE	year of expenditure

Terms

Table A-2. Terms

Terms	Definitions
Accessibility	The extent to which facilities are barrier-free and useable for all persons with or without disabilities.
Action	An "action," a federal term, is the construction or reconstruction, including associated activities, of a transportation facility. For the purposes of this Handbook, the terms "project," "proposal," and "action" are used interchangeably unless otherwise specified. An action may be categorized as a "categorical exclusion" or a "major federal action."
Agricultural / Forest / Natural Resource	AG, EFU-25, EFU-30, EFU-40, F-1, F-2, and NR
Alignment	Alignment is the street or corridor that the transit project would be located within.
Alternative Fuels	Low-polluting fuels which are used to propel a vehicle instead of high-sulfur diesel or gasoline. Examples include methanol, ethanol, propane or compressed natural gas, liquid natural gas, low-sulfur or "clean" diesel and electricity.
Alternatives Analysis (AA)	The process of evaluating the costs, benefits, and impacts of a range of transportation alternatives designed to address mobility problems and other locally-defined objectives in a defined transportation corridor, and for determining which particular investment strategy should be advanced for more focused study and development. The Alternatives Analysis (AA) process provides a foundation for effective decision making.
Area of Potential Effect	A term used in Section 106 to describe the area in which historic resources may be affected by a federal undertaking.
Area of Potential Impact	An assessment's Area of Potential Impact for the project is defined separately for each discipline.
Auxiliary Lanes	Lanes designed to improve safety and reduce congestion by accommodating cars and trucks entering or exiting the highway or roadway, and reducing conflicting weaving and merging movements.
Base Fare	The price charged to one adult for one transit ride; excludes transfer charges, and reduced fares.
Base Period	The period between the morning and evening peak periods when transit service is generally scheduled on a constant interval. Also known as "off-peak period."
Boarding	Boarding is a term used in transit to account for passengers of public transit systems. One person getting on a transit vehicle equals one boarding. In many cases, individuals will have to transfer to an additional transit vehicle to reach their destination and may well use transit for the return trip. Therefore, a single rider may account for several transit boardings in one day.
Bus Phase	An exclusive traffic signal phase for buses and/or BRT vehicles.

Table A-2. Terms

Terms	Definitions
Bus Rapid Transit (BRT)	A transit mode that combines the quality of rail transit and the flexibility of buses. It can operate on bus lanes, high-occupancy vehicle (HOV) lanes, expressways, or ordinary streets. The vehicles are designed to allow rapid passenger loading and unloading, with more doors than ordinary buses.
Business Access and Transit (BAT) Lane	In general, a BAT lane is a concrete lane, separated from general-purpose lanes by a paint stripe and signage. A BAT lane provides Bus Rapid Transit (BRT) priority operations, but general-purpose traffic is allowed to travel within the lane to make a turn into or out of a driveway or at an intersecting street. However, only the BRT vehicle is allowed to use the lane to cross an intersecting street.
Busway	Exclusive freeway lane for buses and carpools.
Capital Improvements Program (CIP)	A CIP is a short-range plan, usually 4 to 10 years, which identifies capital projects and equipment purchases, provides a planning schedule, and identifies options for funding projects in the program.
Categorical Exclusion (CE)	A CE means a category of actions that do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required.
Chambers Special Area Zone	S-C
Charter Tree	A tree defined by the Eugene Charter (City of Eugene, 2002, updated 2008) as "… (a living, standing, woody plant having a trunk 25 inches in circumference at a point 4-½ feet above mean ground level at the base of the trunk) of at least fifty years of age within publicly owned rights of way for streets, roads, freeways, throughways, and thoroughfares and within those portions of the city which were in the incorporated boundaries of the city as of January 1, 1915, shall be designated historic street trees and recognized as objects of high historic value and significance in the history of the city and deserving of maintenance and protection." These trees have special historic importance to the City and require special processes be followed if their removal is proposed, including a public vote on the project proposing the removal.
Charter Tree Boundary	Defined by the Eugene Charter (City of Eugene, 2002, updated 2008) as "…those portions of the city which were in the incorporated boundaries of the city as of January 1, 1915." Trees within this boundary may, if they meet certain criteria, be granted the special title and protective status of a Charter Tree, defined above.
City of Eugene Zoning Classifications	Industrial (I-2 and I-3), Commercial (C-3), Mixed-Use (C-1, C-2, GO, S-C, S-CN, S-DR, S-DW, S-E, S-F, S-HB, S-JW, S-RN, S-W, and S-WS), Single-Family Residential (R-1), Multi-Family Residential (R-2 and R-3), Institution (PL and PRO), Agricultural / Forest / Natural Resource (AG, EFU-25, EFU-30, EFU-40, F-1, F-2, and NR), Office (E-1 and E-2), Special Area Zone (Non-Mixed Use) (S-H and S-RP), Downtown Westside Special Area Zone (S-DW), Chambers Special Area Zone (S-C)
Clean Air Act Amendments of 1990	The comprehensive federal legislation that establishes criteria for attaining and maintaining the federal standards for allowable concentrations and exposure limits for various air pollutants; the act also provides emission standards for specific vehicles and fuels.

Table A-2. Terms

Terms	Definitions
Collector Streets	Collector streets provide a balance of both access and circulation within and between residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access, and are located in residential neighborhoods, distributing trips from the neighborhood and local street system.
Commercial	C-3
Commuter Rail	Commuter rail is a transit mode that is a multiple car electric or diesel propelled train. It is typically used for local, longer-distance travel between a central city and adjacent suburbs, and can operate alongside existing freight or passenger rail lines or in exclusive rights of way.
Compressed Natural Gas (CNG)	An alternative fuel; compressed natural gas stored under high pressure. CNG vapor is lighter than air.
Conformity	The ongoing process that ensures the planning for highway and transit systems, as a whole and over the long term, is consistent with the state air quality plans for attaining and maintaining health-based air quality standards; conformity is determined by metropolitan planning organizations (MPOs) and the U.S. Department of Transportation (U.S. DOT), and is based on whether transportation plans and programs meet the provisions of a State Implementation Plan.
Congestion Mitigation and Air Quality (CMAQ)	Federal funds available for either transit or highway projects that contribute significantly to reducing automobile emissions, which cause air pollution.
Cooperating Agency	Regulations that implement the National Environmental Policy Act define a cooperating agency as any federal agency, other than a lead agency, which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action significantly affecting the quality of the human environment.
Coordination Plan	Required under Moving Ahead for Progress in the 21st Century (MAP-21), the coordination plan contains procedures aimed at achieving consensus among all parties in the initial phase of environmental review and to pre-empt disagreements that can create delays later on in a project.
Corridor	A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways, and transit route alignments.
Corridor Transit Service Characteristics	The amount of transit service provided in each corridor, measured by daily vehicle hours traveled, daily vehicle miles traveled, and daily place-miles of service.
Demand Responsive	Non-fixed-route service utilizing vans or buses with passengers boarding and alighting at pre-arranged times at any location within the system's service area. Also called “Dial-a-Ride.”
Diesel Multiple Unit (DMU)	Each unit carries passengers and can be self-powered by a diesel motor; no engine unit is required.

Table A-2. Terms

Terms	Definitions
Documented Categorical Exclusion (DCE)	A DCE means a group of actions that may also qualify as Categorical Exclusions (CEs) if it can be demonstrated that the context in which the action is taken warrants a CE exclusion; i.e., that no significant environmental impact will occur. Thus, these actions are referred to as DCEs. Such actions require some National Environmental Policy Act documentation, but not an Environmental Assessment or a full-scale Environmental Impact Statement. DCEs documentation must demonstrate that, in the context(s) in which these actions are to be performed, they will have no significant environmental impact or that such impacts will be mitigated.
Downtown Westside Special Area Zone	S-DW
Draft Environmental Impact Statement (DEIS)	The DEIS is the document that details the results of the detailed analysis of all of the projects alternatives. The DEIS contains all information learned about the impacts of a project and alternatives.
Earmark	A federal budgetary term that refers to the specific designation by Congress that part of a more general lump-sum appropriation be used for a particular project; the earmark can be designated as a minimum and/or maximum dollar amount.
Effects	Effects include ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. Effects include: (1) direct effects that are caused by the action and occur at the same time and place, and (2) indirect effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use; population density or growth rate; and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8).
Electrical Multiple Unit (EMU)	The EMU is heavier than a light rail vehicle, but it is powered in the same way by an overhead electrical system.
EmX	Lane Transit District's Bus Rapid Transit System, pronounced "MX," short for Emerald Express.
Environmental Assessment (EA)	A report subject to the requirements of the National Environmental Policy Act (NEPA) demonstrating that an Environmental Impact Statement (EIS) is not needed for a specific set of actions. The EA can lead to a Finding of No Significant Impact (FONSI).
Environmental Impact Statement (EIS)	A comprehensive study of likely environmental impacts resulting from major federally-assisted projects; EISs are required by the National Environmental Policy Act.

Table A-2. Terms

Terms	Definitions
Environmental Justice	A formal federal policy on environmental justice was established in February 1994 with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." There are three fundamental environmental justice principles: • To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations. • To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process. • To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.
Envision Eugene	The City of Eugene's Comprehensive Plan (latest draft or as adopted). Envision Eugene includes a determination of the best way to accommodate the community's projected needs over the next 20 years.
Evaluation Criteria	Evaluation criteria are the factors used to determine how well each of the proposed multimodal alternatives would meet the project's Goals and Objectives. The Evaluation Criteria require a mix of quantitative data and qualitative assessment. The resulting data are used to measure the effectiveness of proposed multimodal alternatives and to assist in comparing and contrasting each of the alternatives to select a preferred alternative.
Exclusive Right of Way	A roadway or other facility that can only be used by buses or other transit vehicles.
Fatal Flaw Screening	The purpose of a Fatal Flaw Screening is to identify alternatives that will not work for one reason or another (e.g., environmental, economic, community). By using a Fatal Flaw Screening process to eliminate alternatives that are not likely to be viable, a project can avoid wasting time or money studying options that are not viable and focus on alternatives and solutions that have the greatest probability of meeting the community's needs (e.g., environmentally acceptable, economically efficient, implementable).
Finding of No Significant Impact (FONSI)	A document prepared by a federal agency showing why a proposed action would not have a significant impact on the environment and thus would not require preparation of an Environmental Impact Statement (EIS). A FONSI is based on the results of an Environmental Assessment (EA).
Fixed Guideway System	A system of vehicles that can operate only on its own guideway constructed for that purpose (e.g., rapid rail, light rail). Federal usage in funding legislation also includes exclusive right of way bus operations, trolley coaches, and ferryboats as "fixed guideway" transit.
Fixed Route	Service provided on a repetitive, fixed-schedule basis along a specific route with vehicles stopping to pick up and deliver passengers at set stops and stations; each fixed-route trip serves the same origins and destinations, unlike demand responsive and taxicabs.
Geographic Information System (GIS)	A data management software tool that enables data to be displayed geographically (i.e., as maps).

Table A-2. Terms

Terms	Definitions
Goals and Objectives	Goals and objectives define the project's desired outcome and reflect community values. Goals and objectives build from the project's Purpose and Need Statement. • Goals are overarching principles that guide decision making. Goals are broad statements. • Objectives define strategies or implementation steps to attain the goals. Unlike goals, objectives are specific and measurable.
Guideway	A transit right of way separated from general purpose vehicles.
Headway	Time interval between vehicles passing the same point while moving in the same direction on a particular route.
Heritage Tree	The C*ity of Eugene Urban Forest Management Plan* (City of Eugene Public Works Department Maintenance Division, 1992) defines "Heritage Trees" as: "Any tree of exceptional value to our community based on its size (relative to species), history, location, or species, or any combination of these criteria." Such a tree cannot be removed "except when otherwise necessary for the public health, safety, or welfare."
Hydrology	Refers to the flow of water including its volume, where it drains, and how quickly it flows.
Impacts	A term to describe the positive or negative effects upon the natural or built environments as a result of an action (i.e., project).
In-vehicle Travel Time	The amount of time it takes for a transit vehicle to travel between an origin and a destination.
In-vehicle Walk and Wait Travel Time	The amount of in-vehicle travel time plus time spent walking to transit, initial wait time, transfer wait time (if any), and time walking from transit to the destination.
Independent Utility	A project or section of a larger project that would be a usable and reasonable expenditure even if no other projects or sections of a larger project were built and/or improved.
Industrial	I-2 and I-3
Institution	PL and PRO
Intergovernmental Agreement	A legal pact authorized by state law between two or more units of government, in which the parties contract for, or agree on, the performance of a specific activity through either mutual or delegated provision.
Intermodal	Those issues or activities that involve or affect more than one mode of transportation, including transportation connections, choices, cooperation, and coordination of various modes. Also known as "multimodal."
Jefferson Westside Special Area Zone	S-JW
Joint Development	Ventures undertaken by the public and private sectors for development of land around transit stations or stops.

Table A-2. Terms

Terms	Definitions
Key Transit Corridors	Key Transit Corridors are mapped in Envision Eugene and are anticipated to be significant transit corridors for the City and the region
Kiss & Ride	A place where commuters are driven and dropped off at a station to board a public transportation vehicle.
Land and Water Conservation Fund (LWCF) Act of 1965	16 U.S.C. 4601-4 et seq. The Land and Water Conservation Fund (LWCF) State Assistance Program was established by the LWCF Act of 1965 to stimulate a nationwide action program to assist in preserving, developing, and providing assurance to all citizens of the United States (of present and future generations) such quality and quantity of outdoor recreation resources as may be available, necessary, and desirable for individual active participation. The program provides matching grants to states and through states to local units of government, for the acquisition and development of public outdoor recreation sites and facilities.
Landscape Tree	A living, standing, woody plant having a trunk that exists on private property.
Lane Regional Air Protection Agency (LRAPA)	LRAPA is responsible for achieving and maintain clean air in Lane County using a combination of regulatory and non-regulatory methods
Layover Time	Time built into a schedule between arrival at the end of a route and the departure for the return trip, used for the recovery of delays and preparation for the return trip.
Lead Agency	The organization that contracts and administers a study. For transit projects, FTA would typically fill this role. The lead agency has the final say about the project's purpose and need, range of alternatives to be considered, and other procedural matters.
Level of Detail	The amount of data collected, and the scale, scope, extent, and degree to which item-by-item particulars and refinements of specific points are necessary or desirable in carrying out a study.
Level of Service (LOS)	LOS is a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure. LOS is most commonly used to analyze highways, but the concept has also been applied to intersections, transit, and water supply.
Light Rail Transit (LRT)	Steel wheel/steel rail transit constructed on city streets, semi-private right of way, or exclusive private right of way. Formerly known as "streetcar" or "trolley car" service, LRT's major advantage is operation in mixed street traffic at grade. LRT vehicles can be coupled into trains, which require only one operator and often are used to provide express service.
Limited (or Controlled) Access	Restricted entry to a transportation facility based upon facility congestion levels or operational condition. For example, a limited access roadway normally would not allow direct entry or exit to private driveways or fields from said roadway.
Liquefaction	A phenomenon associated with earthquakes in which sandy to silty, water saturated soils behave like fluids. As seismic waves pass through saturated soil, the structure of the soil distorts, and spaces between soil particles collapse, causing ground failure.

Table A-2. Terms

Terms	Definitions
Liquefied Natural Gas (LNG)	An alternative fuel; a natural gas cooled to below its boiling point of 260 degrees Fahrenheit so that it becomes a liquid; stored in a vacuum bottle-type container at very low temperatures and under moderate pressure. LNG vapor is lighter than air.
Local Streets	Local streets have the sole function of providing direct access to adjacent land. Local streets are deliberately designed to discourage through-traffic movements.
Locally Preferred Alternative (LPA)	The LPA is the alternative selected through the Alternatives Analysis process completed prior to or concurrent with National Environmental Policy Act analysis. This term is also used to describe the proposed action that is being considered for New Starts or Small Starts funds.
Low-Income Persons	Those whose median household income is at or below the Department of Health and Human Services poverty guidelines. For a four-person household with two related children, the poverty threshold is $24,300 (year 2016 dollars).
Maintenance area	An air quality designation for a geographic area in which levels of a criteria air pollutant meet the health-based primary standard (national ambient air quality standard, or NAAQS) for the pollutant. An area may have on acceptable level for one criteria air pollutant, but may have unacceptable levels for others. Maintenance/attainment areas are defined using federal pollutant limits set by EPA.
Maintenance facility	A facility along a corridor used to clean, inspect, repair and maintain bus vehicles, as well as to store them when they are not in use.
Major Arterial	Major arterial streets should serve to interconnect the roadway system of a city. These streets link major commercial, residential, industrial, and institutional areas. Major arterial streets are typically spaced about one mile apart to assure accessibility and reduce the incidence of traffic using collectors or local streets for through traffic in lieu of a well-placed arterial street. Access control, such as raised center medians, is a key feature of an arterial route. Arterials are typically multiple miles in length.
Major Investment Study (MIS)	An alternatives analysis study process for proposed transportation investments in which a wide range of alternatives is examined to produce a smaller set of alternatives that best meet project transportation needs. The purpose of the study is to provide a framework for developing a package of potential solutions that can then be further analyzed during an Environmental Impact Statement process.
Metro Plan Designations	Commercial, Commercial / Mixed Use, Government and Education, Heavy Industrial, High Density Residential / Mixed-Use, High Density Residential, Light-Medium Industrial, Low Density Residential, Medium Density Residential, Medium Density Residential / Mixed-Use, Mixed-Use, Parks and Open Space, Major Retail Center, Campus Industrial, University Research
Metropolitan Planning Organization (MPO)	The organization designated by local elected officials as being responsible for carrying out the urban transportation and other planning processes for an area.

Table A-2. Terms

Terms	Definitions
Minimum Operable Segment	A stand-alone portion of the alternative alignment that has independent utility, allowed by FTA to be considered as interim termini for a project. A minimum operable segment (MOS) provides flexibility to initiate a project with available funding while pursuing additional funding to complete the remainder of the project.
Minor Arterial	A minor arterial street system should interconnect with and augment the urban major arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than major arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system. The minor arterial street system includes facilities that allow more access and offer a lower traffic mobility. Such facilities may carry local bus routes and provide for community trips, but ideally should not be located through residential neighborhoods.
Minority	A person who is one or more of the following: • Black: a person having origins in any of the black racial groups of Africa • Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race • Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent • American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition • Native Hawaiian and Other Pacific Islander: a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands
Mitigation	A means to avoid, minimize, rectify, or reduce an impact, and in some cases, to compensate for an impact.
Mixed-Use	C-1, C-2, GO, S-C, S-CN, S-DR, S-DW, S-E, S-F, S-HB, S-JW, S-RN, S-W, and S-WS
Modal Split	A term that describes how many people use different forms of transportation. Frequently used to describe the percentage of people using private automobiles as opposed to the percentage using public transportation, walking, or biking. Modal split can also be used to describe travelers using other modes of transportation. In freight transportation, modal split may be measured in mass.
Mode	A particular form or method of travel distinguished by vehicle type, operation technology, and right-of-way separation from other traffic.
Moving Ahead for Progress in the 21st Century (MAP-21)	Moving Ahead for Progress in the 21st Century (MAP-21) was signed by President Obama on July 6, 2012, reauthorizing surface transportation programs through FY 2014. It includes new and revised program guidance and regulations with planning requirements related to public participation, publication, and environmental considerations.

Table A-2. Terms

Terms	Definitions
MovingAhead Project	The City of Eugene and LTD are working with regional partners and the community to determine which improvements are needed on some of our most important transportation corridors for people using transit, and facilities for people walking and biking. MovingAhead will prioritize transit, walking, and biking projects along these corridors so that they can be funded and built in the near-term. The project will focus on creating active, vibrant places that serve the community and accommodate future growth. During Phase 1, currently underway, the community will weigh in on preferred transportation solutions for each corridor and help prioritize corridors for implementation. When thinking about these important streets, LTD and the City of Eugene refer to them as corridors because several streets may work as a system to serve transportation needs.
Multi-Family Residential	R-2 and R-3
Multimodal	Multimodal refers to various modes. For the MovingAhead project, multimodal refers to Corridors that support various transportation modes including vehicles, buses, walking and cycling.
National Environmental Policy Act of 1969 (NEPA)	A comprehensive federal law requiring analysis of the environmental impacts of federal actions such as the approval of grants; also requiring preparation of an Environmental Impact Statement for every major federal action significantly affecting the quality of the human environment.
New Starts	Federal funding granted under Section 3(i) of the Federal Transit Act. These discretionary funds are made available for construction of a new fixed guideway system or extension of any existing fixed guideway system, based on cost-effectiveness, alternatives analysis results, and the degree of local financial commitment.
No Action or No-Build Alternative	An alternative that is used as the basis to measure the impacts and benefits of the other alternative(s) in an environmental assessment or other National Environmental Policy Act action. The No-Build Alternative consists of the existing conditions, plus any improvements that have been identified in the Statewide Transportation Improvement Program.
Nonattainment Area	Any geographic region of the United States that the U.S. Environmental Protection Agency (EPA) has designated as not attaining the federal air quality standards for one or more air pollutants, such as ozone and carbon monoxide.
Notice of Intent	A federal announcement, printed in the *Federal Register*, advising interested parties that an Environmental Impact Statement will be prepared and circulated for a given project
Off-Peak Period	Non-rush periods of the day when travel activity is generally lower and less transit service is scheduled. Also called "base period."
Office	E-1 and E-2

Table A-2. Terms

Terms	Definitions
Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP)	The 2013-2017 Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP), entitled *Ensuring Oregon's Outdoor Legacy* (OPRD, No Date), constitutes Oregon's basic 5-year plan for outdoor recreation. The plan guides the use of LWCF funds that come into the state; provides guidance for other OPRD-administered grant programs; and provides recommendations to guide federal, state, and local units of government, as well as the private sector, in making policy and planning decisions.
Park and Ride	Designated parking areas for automobile drivers who then board transit vehicles from these locations.
Participating Agency	A federal or non-federal agency that may have an interest in the project. These agencies are identified and contacted early-on in the project with an invitation to participate in the process. This is a broader category than "cooperating agency" (see Cooperating Agency).
Passenger Miles	The total number of miles traveled by passengers on transit vehicles; determined by multiplying the number of unlinked passenger trips times the average length of their trips.
Peak Hour	The hour of the day in which the maximum demand for transportation service is experienced (refers to private automobiles and transit vehicles).
Peak Period	Morning and afternoon time periods when transit riding is heaviest.
Peak/Base Ratio	The number of vehicles operated in passenger service during the peak period divided by the number operated during the base period.
Place-miles	Place-miles refers to the total carrying capacity (seated and standing) of each bus and is calculated by multiplying vehicle capacity of each bus by the number of service miles traveled each day. Place-miles highlight differences among alternatives caused by a different mix of vehicles and levels of service.
Preferred Alternative	An alternative that includes a major capital improvement project to address the problem under investigation. As part of the decision making process, the Preferred Alternative is compared against the No Action or No-Build Alternative from the standpoints of transportation performance, environmental consequences, cost-effectiveness, and funding considerations.
Purpose and Need	The project Purpose and Need provides a framework for developing and screening alternatives. The purpose is a broad statement of the project's transportation objectives. The need is a detailed explanation of existing conditions that need to be changed or problems that need to be fixed.
Queuing	Occurs when traffic lanes cannot fit all the vehicles trying to use them, or if the line at an intersection extends into an upstream intersection.
Record of Decision (ROD)	A decision made by FTA as to whether the project sponsor receives federal funding for a project. The Record of Decision follows the Draft EIS and Final EIS.
Regulatory Agency	An agency empowered to issue or deny permits.
Resource Agency	A federal or state agency or commission that has jurisdictional responsibilities for the management of a resource such as plants, animals, water, or historic sites.

Table A-2. Terms

Terms	Definitions
Revenue Hours	Hours of transit service available for carrying paying riders.
Ridership	The number of people using a public transportation system in a given time period.
Ridesharing	A form of transportation, other than public transit, in which more than one person shares the use of the vehicle, such as a van or car, to make a trip. Also known as "carpooling" or "vanpooling."
Right of Way	Publicly owned land that can be acquired and used for transportation purposes.
Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU)	SAFETEA-LU was passed by Congress July 29, 2005, and signed by the President August 10, 2005. Includes new and revised program guidance and regulations (approximately 15 rulemakings) with planning requirements related to public participation, publication, and environmental considerations. SAFETEA-LU covers FY 2005 through FY 2009 with a total authorization of $45.3 billion.
Scoping	A formal coordination process used to determine the scope of the project and the major issues likely to be related to the proposed action (i.e., project).
Screening Criteria	Criteria used to compare alternatives.
Section 4(f) of the Department of Transportation Act of 1966	23 U.S.C. 138 and 49 U.S.C. 303. Parks are subject to evaluation in the context of Section 4(f) of the Department of Transportation Act of 1966, which governs the use of publicly-owned/open to the public park and recreation lands, government-owned wildlife lands, and historic resources.
Section 4(f) resources	(i) any publicly owned land in a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or (ii) any land from a historic site of national, state, or local significance
Section 6(f) of the LWCF Act of 1965	The LWCF's most important tool for ensuring long-term stewardship is its "conversion protection" requirement. Section 6(f)(3) strongly discourages conversions of state and local park, and recreational facilities to other uses. Conversion of property acquired or developed with assistance under the program requires approval of the Department of Interior's National Park Service (NPS) and substitution of other recreational properties of at least equal fair market value, and of reasonably equivalent usefulness and location.
Section 106	Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies take into account the effect of government-funded construction projects on property that is included in, or eligible for inclusion in, the NRHP.
Shuttle	A public or private vehicle that travels back and forth over a particular route, especially a short route or one that provides connections between transportation systems, employment centers, etc.
Single-Family Residential	R-1
Special Area Zone (Non-Mixed Use)	S-H and S-RP
State Implementation Plan (SIP)	A state plan mandated by the Clean Air Act Amendments of 1990 that contains procedures to monitor, control, maintain, and enforce compliance with national standards for air quality.

Table A-2. Terms

Terms	Definitions
Strategy	An intended action or series of actions which when implemented achieves the stated goal.
Street Tree	A living, standing, woody plant having a trunk that exists in the public right of way.
Study Area	The area within which evaluation of impacts is conducted. The study area for particular resources will vary based on the decisions being made and the type of resource(s) being evaluated.
Throughput	The number of users being served at any time by the transportation system.
Title VI	This Title declares it to be the policy of the United States that discrimination on the ground of race, color, or national origin shall not occur in connection with programs and activities receiving federal financial assistance and authorizes and directs the appropriate federal departments and agencies to take action to carry out this policy.
Transit Oriented Development (TOD) or Nodal Development	A strategy to build transit ridership, while discouraging sprawl, improving air quality and helping to coordinate a new type of community for residents. TODs are compact, mixed-use developments situated at or around transit stops. Sometimes referred to as Transit Oriented Communities, or Transit Villages.
Transit System	An organization (public or private) providing local or regional multi-occupancy-vehicle passenger service. Organizations that provide service under contract to another agency are generally not counted as separate systems.
Transitway	A Bus Rapid Transit (BRT) priority lane generally with a concrete lane, with or without concrete tracks with grass-strip divider, and a curb separation, traversable by general-purpose vehicles at signalized intersections.
Transportation Demand Management (TDM)	Strategies to attempt to reduce peak period automobile trips by encouraging the use of high occupancy modes through commuter assistance, parking incentives, and work policies that alter the demand for travel in a defined area in terms of the total volume of traffic, the use of alternative modes of travel, and the distribution of travel over different times of the day.
Transportation Improvement Program (TIP)	A program of intermodal transportation projects, to be implemented over several years, growing out of the planning process and designed to improve transportation in a community. This program is required as a condition of a locality receiving federal transit and highway grants.
Travel Shed	Synonymous with “corridor” (see Corridor). A subarea in which multiple transportation facilities are experiencing congestion, safety, or other problems.
urban plaza	An urban plaza is a place that can be used for socializing, relaxation, and/or events.
v/c ratio	Used as a principal measure of congestion. The “v” represents the volume or the number of vehicles that are using the roadway at any particular period. The “c” represents the capacity of a roadway at its adopted level of service (LOS). If the volume exceeds the capacity of the roadway (volume divided by capacity exceeds 1.00), congestion exists.

Table A-2. Terms

Terms	Definitions
Vehicle Hours of Delay	Cumulative delay experiences by transit vehicles during high traffic periods.
Water Quality	Refers to the characteristics of the water, such as its temperature and oxygen levels, how clear it is, and whether it contains pollutants.
Whiteaker Special Area Zone	S-W

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Appendix B: Construction Activities

General Construction Methods

The following section describes how construction of the Locally Preferred Alternative (LPA) would likely be staged and sequenced. This description is based on Lane Transit District's (LTD's) experience with the Franklin, Gateway, and West Eugene EmX Corridors. The final plan for construction methods, sequencing, and staging will be determined in coordination with the contractor and permitting authorities.

Utility work will generally be completed before the transportation infrastructure is constructed. Utility work, often conducted by local utility companies, occurs separately from project-related construction. After completing required utility relocation and other preparatory site work, the contractor will begin with construction of new transit lanes, bike lanes, sidewalks, and any other "flatwork." The contractor will modify existing signals or construct new traffic signals as part of this work. In some cases, the contractor may construct the signal footings but install signal arms after initial work is complete. Flatwork for stations, including curbs, ramps, and station footings, will be completed as the work progresses along the alignment. Streets and street segments will be restored to normal operations after this work is complete. The contractor is expected to progress approximately two blocks every 2 weeks, with additional time required – up to 2 weeks – for each enhanced stop or EmX station. Additional time will be required at intersections that require new or substantially modified traffic signals. The construction sequencing will be determined through coordination between the contractor and local residents, businesses, and property owners regarding construction scheduling preferences. It is expected that, for each major segment, the work would start at one end of the segment and progress to the other end of the segment. All flatwork is expected to be completed in two construction seasons.

Stations will be fabricated during the second construction season and installed during the subsequent (final) construction season, along with landscaping, fare machines, real-time passenger information, enhanced stop or EmX station amenities, and other similar items.

The contractor and LTD will coordinate closely with the Oregon Department of Transportation (ODOT) and with the City of Eugene (as appropriate to the jurisdiction) on traffic control. Depending on the segment, ODOT or the City will review and approve traffic plans for construction.

On streets with multiple lanes in each direction (or multiple lanes in one direction for one-way streets), at least one lane of traffic will be open at all times. Flaggers will coordinate travel at intersections and other points of congestion, as necessary. On streets with a single lane, it may be necessary to close one direction of traffic for certain periods. In those situations, flaggers will be used to manage the traffic flow safely. The contractor and LTD will also coordinate with businesses to ensure that the project maintains access for patrons and deliveries.

Coordination with Businesses and Residents

LTD's Franklin, Gateway, and West Eugene EmX projects demonstrated LTD's commitment to communicating with impacted businesses, residences, and travelers, both before and during construction. As with those projects, LTD will contact all businesses and residents along the alignment well before construction begins to solicit local concerns, issues, and scheduling preferences. Businesses and residents will also be able to communicate with the contractor and LTD during construction. LTD's

construction liaison will provide e-mail updates and serve as an ongoing point of contact to address concerns and to provide information to affected businesses, residents, and other interested persons. LTD will provide a 24-hour hotline to quickly address construction concerns from businesses and residences.

LTD will also work to enhance activity at businesses affected by construction. This can be done through attractive signage, direct communications with the public (e.g., direct mail and advertising), and community events (e.g., street fairs). These techniques succeeded in keeping business areas active during previous EmX projects.