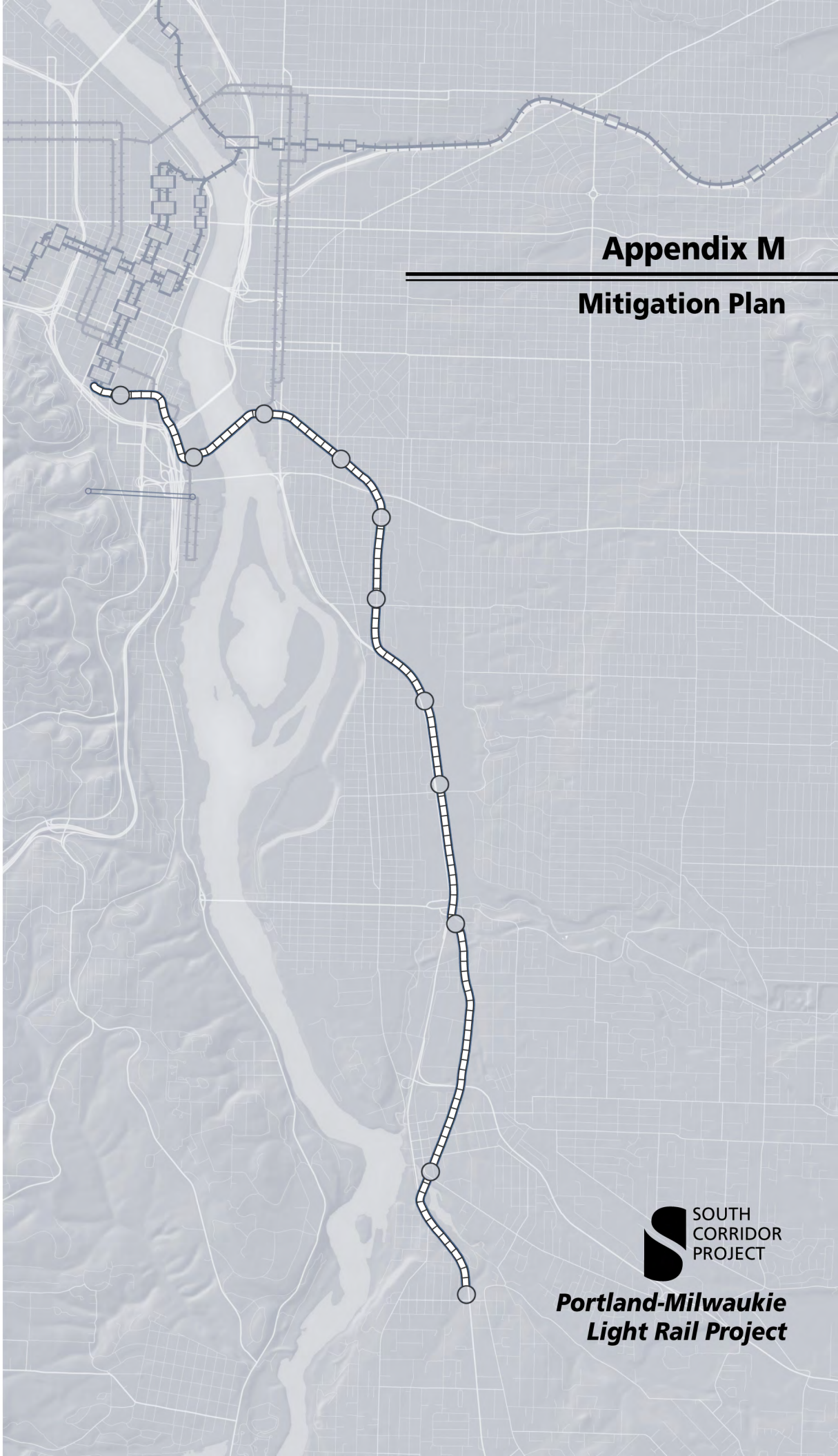

Appendix M

Mitigation Plan

SOUTH CORRIDOR PROJECT

Portland-Milwaukie Light Rail Project

APPENDIX M. MITIGATION

This appendix summarizes mitigation measures described in Chapters 3 and 4 of this FEIS, the Biological Assessment for the project, the Appendix K Final 4(f) Evaluation, and the Memorandum of Agreement defined through the project's Section 106 consultations regarding Historic, Cultural, and Archaeological Resources. Section M.1 lists the mitigation measures proposed for adverse long-term effects in Chapter 3, Environmental Analysis and Consequences, Section M.2 lists the mitigation measures proposed for short-term (construction) effects in Chapter 3, Environmental Analysis and Consequences, and Section M.3 lists the mitigation and enhancement measures proposed in Chapter 4, Transportation.

This appendix has been structured to focus on the additional mitigation measures the project will undertake, after taking into account the avoidance, minimization measures already incorporated within the project, and compliance with applicable local, state, and federal permits and regulations. When FTA produces its Record of Decision for the project, the mitigation commitments of the project will be listed. During final design and as part of construction planning, the project will continue to consider opportunities to design the project to further reduce environmental impacts through avoidance. The mitigation measures for the project may also be refined in response to other project permitting or approval requirements, or as a result of other agency or public comments received by FTA following the FEIS publication.

M.1 LONG-TERM MITIGATION: ENVIRONMENTAL RESOURCES

This section presents mitigation measures for long-term impacts for the environmental resources described in Chapter 3 of the FEIS. Table M-1 summarizes the mitigation commitments for all resources except for noise and vibration; these mitigation measures are summarized in Tables M-2 and M-3, respectively.

Table M-1
Long-Term Mitigation: Environmental Resources

Chapter/Section	Measure/Description
3.1 Acquisitions and Displacements	TriMet will conduct property acquisitions and provide for relocation of displaced parties in compliance with 49 CFR Part 24 Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended. Advisory Services will be offered to relocated businesses, including coordination with Portland Development Commission, Portland State University, Portland Community College, State of Oregon, and other business planning services.
3.2 Land Use and Economy	No land use or economic mitigation is required.
3.3 Community Impact Assessment and Environmental Justice	Mitigated with the project's commitments in other environmental areas and through TriMet's public involvement programs to provide outreach and communications to a variety of populations, including those whose primary language is not English.

Table M-1
Long-Term Mitigation: Environmental Resources

Chapter/Section	Measure/Description
3.4 Visual Quality and Aesthetics	For areas identified as having high impacts (South Waterfront and Willamette River, Hosford-Abernethy, historic Milwaukie, Island Station, and Oak Lodge), TriMet will continue to work during final design in coordination with local jurisdictions and neighborhood representatives to develop project elements that minimize effects to neighborhood scale and character. This will include coordination with the City of Portland's Design Review Process and the City of Milwaukie Design and Landmarks Committees.
3.5 Historic, Archaeological, and Cultural Resources	Historic Resources The Project will have three adverse effects to historic resources (Royal Foods Warehouse and Office, 2425 SE 8th Avenue, Portland, Westmoreland Park, 7605 SE McLoughlin Boulevard, and R. Derwey House, 2206 SE Washington Street, Milwaukie). Mitigation for the adverse effects will be conducted in accordance with the signed formal Memorandum of Agreement (MOA) with the SHPO, TriMet and FTA and executed for inclusion in the FEIS (See Appendix N, Agency Coordination and Correspondence). Secondary impacts to five additional historic built environment resources at 2405 SE Harrison, 2326 SE Monroe, 2313 SE Wren, and 2206 SE Washington streets in Milwaukie and 1635 SE Rhone Street in Portland due to noise and vibration will be mitigated in accordance with the terms of the MOA. Archaeological Resources Potential adverse impacts to archaeological resources due to construction will be mitigated by the identification, avoidance, monitoring, minimization, and treatment procedures defined in the MOA. (See Appendix N, Memorandum of Agreement).
3.6 Parks and Recreational Resources	During Final Design, FTA and TriMet will continue to coordinate with Portland Parks and Recreation (PP&R), the City of Milwaukie, Metro and the North Clackamas Parks and Recreation Department (NCPRD) to develop project design and construction details consistent with the letters of understanding and mitigation commitments included within Appendix K, Section 4(f) Final Evaluation. The project will meet the City of Portland and the City of Milwaukie applicable permitting requirements for development within the Greenway Zone.
3.7 Geology and Soils	No mitigation required.
3.8 Ecosystems	The Biological Opinion issued by National Oceanic and Atmospheric Administration (NOAA) Fisheries for the project (June 23, 2010) identifies mitigation measures and terms and conditions for construction and operation of the project. The project will comply with these measures, terms, and conditions. See Section M.4 for a listing. Wetlands The project will meet the requirements of Section 404 permit conditions to be approved by the United States Army Corps of Engineers (USACE) and Oregon Division of State Lands (DSL). Unavoidable impacts to wetlands will be mitigated through compensatory wetland mitigation (CWM). Wetlands mitigation requirements will be met through partial funding of the City of Portland's Westmoreland Park Duck Pond Restoration Project, and in compliance with the permitting requirements of the USACE and the Oregon DSL. If for some reason the Westmoreland Park Restoration Project is not a feasible means to mitigate wetland and fish passage impacts, the Portland-Milwaukie Light Rail Project plans to purchase necessary credits at the Foster Creek wetland mitigation bank.

Table M-1
Long-Term Mitigation: Environmental Resources

Chapter/Section	Measure/Description
3.8 Ecosystems (cont.)	Wildlife Provide for nesting and roosting habitats where practicable for native birds and bats. Vegetation, Waterways and Fisheries The project will mitigate detrimental effects to vegetation, waterways and fisheries, including impacts to both habitat quality and quantity, through compliance with federal, state, and local regulations and permitting requirements, including the conservation recommendations and terms and conditions stipulated in the Biological Opinion, and as described below for Water Quality and Hydrology. The project will mitigate for impacts to the Willamette River and its associated habitat by partnering with the City of Portland on a planned city project that will provide creation and enhancement of shallow water and active channel areas at a site located south (upstream) of the Ross Island Bridge on the western bank (and adjacent to two derelict pile fields that are proposed to be removed by the project). The site is known as the Central District and is part of the planned South Waterfront Greenway and consists of two properties. The city's project will upgrade an existing path to meet City of Portland greenway standards (two separated paths for bicycles and pedestrians), while excavating the existing bank to provide approximately 25,500 square feet of shallow-water beach habitat and 17,400 square feet of re-naturalized riverbank. In addition, 20,000 square feet of derelict piles will be removed.
3.9 Water Quality and Hydrology	Hydrologic and water quality impacts will be minimized by following the City of Portland's stormwater management program and *2008 Stormwater Management Manual*; the project will meet the City of Portland's stormwater criteria along the entire light rail alignment. The City of Portland criteria were developed to manage stormwater to meet EPA's Clean Water Act and Safe Drinking Water Act. Through the application of the City's Stormwater Management Manual, the project will incorporate design criteria, best practices and standards that will protect water quality in rivers and streams (including 303(d) listed waters), and protect watershed health as well as protect groundwater as a drinking water resource. To address a net rise in the base flood elevation of the Willamette River, TriMet will obtain a Conditional Letter of Map Revision (CLOMR) in consultation with the City of Portland and FEMA. The project will provide floodplain cut and fill balancing at Crystal Springs Creek, Johnson Creek, and Kellogg Lake for removal and fill within the floodplain.
3.10 Noise and Vibration	See Tables M-2 and M-3 for noise and vibration mitigation measures.
3.11 Air Quality	No mitigation is required.
3.12 Energy	No mitigation is required.
3.13 Hazardous Materials	Properties proposed for lease or acquisition will be evaluated in further detail using Environmental Site Assessments (ESAs) for the potential for encountering hazardous materials or incurring environmental liability. All hazardous materials encountered during construction will be addressed in accordance with applicable state and federal regulations.
3.14 Utilities	No significant long term impacts to utilities are expected and no additional mitigation measures are required.
3.15 Public Services	No mitigation required.
3.16 Safety and Security	TriMet will apply its existing safety and security programs to include the project.
3.17 Section 4(f)	Impacts to Section 4(f) properties will be addressed in accordance with the mitigation commitments defined in the Final Section 4(f) Evaluation and its accompanying letters of concurrence and agreements.

Table M-2 summarizes required noise mitigation measures for light rail, bus, streetcar, warning bell, and traffic noise for the LPA to Park Avenue and the MOS to Lake Road.

Table M-2
Summary of Noise Mitigation Measures for Light Rail, Bus, Streetcar, Warning Bell, and Traffic Noise

Rec. #[1]	Area Description[2]	Impact Type[3]	Noise Levels		Criteria FTA/FHWA	Mitigation[6]	Exterior Level with mitigation[7]	Residual Impacts[8]
			Existing[4]	Project[5]				
Downtown Portland								
TR1	Village at Lovejoy Fountain 2nd & 3rd floors	Traffic	65	**67**	65 (FHWA)	Sound Insulation	67	Interior (0) Exterior (17)
TR1a	Village at Lovejoy Fountain 4th & 5th floors	Traffic	65	**66**	65 (FHWA)	Sound Insulation	66	
TR2	American Plaza Ground & 2nd floors	Traffic	65	**68**	65 (FHWA)	Sound Insulation	68	
TR2a	American Plaza 3rd, 4th & 5th floors	Traffic	65	**67**	65 (FHWA)	Sound Insulation	67	
D1	Digital One/Mission Control	LRT/Bus	66	**63**	62	Sound Insulation	63	Interior (0) Exterior (1)
SE Powell Boulevard Overpass to Tacoma Station								
TR15	2-SFR on SE 17th Ave. at SE Rhone St.	Traffic	65	**67**	65 (FHWA)	Sound Insulation	67	Interior (0) Exterior (2)
Highway 224 to Lake Road Station (MOS to Lake Rd.)								
R33	North of SE Harrison St. (east – SFR)	Bells/LRT	62	**63**	59	Sound Insulation (or walls) and directional bells	63	None Exterior (1 on Harrison)
R34	North of SE Harrison St. (west – SFR)	Bells/LRT	62	**64**	59	Sound Insulation (or walls) & directional bells with shrouds	63	None Exterior (1 on Harrison)
R35	Spring Creek Apartments (closest MFR to tracks)	Bells/LRT	62	**61**	59	Insulation and directional bells with shrouds	61	Interior (0) Exterior (6)
R36	Spring Creek Apartments (closest MFR to crossing)	Bells/LRT	62	**60**	59	Insulation and directional bells	58	None
R37	SE Monroe St. (SFR nearest tracks)	Bells	62	**64**	59	Insulation and directional bells	61	None exterior (1)

Table M-2
Summary of Noise Mitigation Measures for Light Rail, Bus, Streetcar, Warning Bell, and Traffic Noise

Rec. #[1]	Area Description[2]	Impact Type[3]	Noise Levels		Criteria FTA/FHWA	Mitigation[6]	Exterior Level with mitigation[7]	Residual Impacts[8]
			Existing[4]	Project[5]				
R37A	SE Monroe St. (SFR 2nd home)	Bells	62	**63**	59	Insulation and directional bells	60	None exterior (1)
R37B	SE Monroe St. (SFR 3rd home)	Bells	62	**62**	59	Insulation and directional bells	59	None exterior (1)
R38	SE Lake Rd. (SFR)	LRT	62	**60**	59	Noise wall or Insulation	59	None with Wall Exterior (1 w/insulation)
Lake Road Station to Park Avenue Station (LPA to Park Ave.)								
R42	SE Wren St. (closest SFR)	LRT	68	**64**	63	Noise wall	59	None
R43	SE Wren St. (other SFR)	LRT	65	**61**	61	Noise wall	56	None
R47	SE 27th Ave. (SFR south of displacement)	LRT	65	**62**	61	Noise wall	57	None
R48	SE 27th Ave. (SFR south of displacement)	LRT	65	**61**	61	Noise wall	56	None
R49	SE 27th Ave. (SFR near switch)	LRT	65	**61**	61	Noise wall	56	None
Ruby Junction Facility								
Ruby	NW Eleven Mile Rd. (SFR Near Ruby Junction)	Ruby Junction	N/A	N/A	50 (nighttime) City of Gresham	Noise insulation or acquisition and relocation	N/A	None

[1] Receiver numbers as shown on Figure 3.10-6 in the FEIS.
[2] General description of sensitive receiver.
[3] Impact type: LRT = Light rail; Bells = warning bells at crossing gates; traffic = traffic noise impact; bus = bus traffic.
[4] Existing L_{dn} for Category 2 and L_{eq} for Category 1 or 3 land uses.
[5] Project L_{dn} for Category 2 and L_{eq} for Category 1 or 3 land uses. **Bold-** typeface exceeds criteria.
[6] Proposed mitigation methods.
[7] Noise level with mitigation measures
[8] Number of remaining noise impacts with mitigation.
9 City of Gresham Noise Ordinance Applied. Existing and combined noise levels are not applicable.

Interior noise levels will be mitigated to meet HUD standards, reducing the impact. Exterior noise levels will exceed FTA criteria.

Table M-3 shows the light rail vibration mitigation measures for the LPA to Park Avenue and the MOS to Lake Road.

Table M-3
Light Rail Vibration Mitigation Measures

Rec. #	Area Description[1]	Land Use Type[2]	Vibration Criteria[3]	Vibration Level[4]	Mitigation[5]	Level with Mitigation[6]	Impacts with Mitigation[7]
Downtown Portland							
S1	Unitus Credit Union/PSU Classrooms[8]	3	75	**79**	Flange bearing crossover	74[9]	0
R1 R1a	Lovejoy Fountain Apartments (MFR)*	2	72	**72**	Rail boot	68	0
East Bank Waterfront to SE Powell Boulevard Overpass							
O1	Portland Opera	1	75	**80**	Flange bearing crossover	75[9]	1
SE Powell Boulevard Overpass to Tacoma Station							
R15	SE Rhone St. and SE 17th Ave. (SFR)	2	72	**74**	Ballast mats	63	0
Highway 224 to Lake Road Station (MOS to Lake Rd.)							
R32	North of SE Harrison St. (west – SFR)	2	72	**73**	Tire derived aggregate	59	0
R34	North of SE Harrison St. (east – SFR)	2	72	**82**		72	2
R35	South of SE Harrison St. (closest MFR to track)	2	72	**83**		72	6
R36	South of SE Harrison St. (MFR)	2	72	**75**			0
R37	SE Monroe St. (SFR)	2	72	**76**			0
S9	SE Washington St. "L" Bldg	3	75	**82**		72	0
S10	Tartan and Thistle Restaurant	3	75	**76**		65	0
S11	SE Washington St. (Center)	3	75	**82**		72	0
S12	SE 21st at SE Adams St. (Jenco Scientific and Electrodyne Inc.)	3	75	**82**		71	0
R38	SE Lake Rd. (SFR by structure)	2	72	**72**	Resilient fasteners	69	0

Table M-3
Light Rail Vibration Mitigation Measures

Rec. #	Area Description[1]	Land Use Type[2]	Vibration Criteria[3]	Vibration Level[4]	Mitigation[5]	Level with Mitigation[6]	Impacts with Mitigation[7]
Lake Road Station to Park Avenue Station (LPA to Park Ave.)							
R47	SE 27th Ave. (SFR south of displacement)	2	72	**73**	Ballast mats	63	0
R48	SE 27th Ave. (SFR south of displacement)	2	72	**74**	Spring frog	59	0
R49	SE 27th Ave. (SFR near switch)		72	**73**		58	0

[1] General description of sensitive receiver location: SFR = single-family residence / MFR = multifamily residence / Comm = commercial.
[2] Land use by FTA criteria.
[3] FTA vibration criteria.
[4] Predicted maximum vibration level during train pass-by – **Bold** typeface indicates a vibration impact.
[5] Potential vibration mitigation measures pending additional testing during final design.
[6] Vibration levels with proposed mitigation.
[7] Residual vibration impacts.
[8] Additional testing will be performed at the Unitus Credit Union building, Lovejoy Fountain Apartments, and Portland Opera building, and all residential structures to determine the level of mitigation required.
[9] Assumes a 5 VdB reduction for special trackwork.

M.2 SHORT-TERM MITIGATION: ENVIRONMENTAL RESOURCES

Table M-4 presents short-term (construction) mitigation measures.

Table M-4
Short-Term Mitigation: Environmental Resources

Chapter/Section	Measure/Description
3.1 Acquisitions and Displacements	None proposed.
3.2 Land Use and Economy	• Develop and implement a construction outreach plan that will ensure that impacted community members such as local residents, businesses, community members, institutions, and property owners are fully informed about potentially major disruptions such as temporary street closures; utility relocations; out of the ordinary construction noise, vibration, light, or glare; changes in transit service; and parking availability. • Make a plan to establish effective communication with residents and businesses through means such as holding public meetings with project team members and the contractor and producing materials and processes to distribute information about construction updates, alerts, and construction schedules. • Provide outreach to impacted community members such as affected business owners, institutions, chambers of commerce, merchants associations, ethnic community organizations, and others on measures to assist impacted businesses maintain their customer base during construction; this could include promotional programs and other marketing or advertising programs to encourage patronage during construction. • Provide clear signage to identify and make accessible paths to and from major transportation facilities, such as designated pedestrian routes, bicycle lanes, bus

Table M-4
Short-Term Mitigation: Environmental Resources

Chapter/Section	Measure/Description
	routes and stops, designated truck routes, and tunnel entrances. • Provide a hotline service, ombudsman or other easily accessible points of contact for the public to leave construction complaints and obtain timely resolution. • Maintain access to businesses and other properties during construction activities when possible and coordinate closely with businesses during times of limited access due to public safety or construction-related issues.
3.3 Community Impact Assessment and Environmental Justice	None proposed
3.4 Visual Quality and Aesthetics	None proposed
3.5 Historic, Archaeological, and Cultural Resources	None proposed.
3.6 Parks and Recreational Resources	During final design, short-term mitigation measures will be coordinated with park owners, and will incorporate the terms and agreements defined in the FEIS Appendix K, Final Section 4(f) evaluation. Mitigation measures will include providing detour routes around construction areas and temporarily modifying access points to maintain access to park resources where possible. Construction duration around park facilities will be minimized to the extent possible.
3.7 Geology and Soils	None proposed.
3.8 Ecosystems	The project will comply with terms and conditions in the Biological Opinion issued for the project. See Section M.4 for a listing. Other construction period impact mitigation for fisheries, wetlands, and Endangered Species are incorporated within the mitigation measures and permit compliance commitments established for long term impacts. <u>Wildlife</u> The project will comply with the requirements of the Migratory Bird Treaty Act and will provide protection for active bird nests by conducting preconstruction surveys and either avoiding or relocating nests that could be affected by vegetation removal and other clearing or grading conducted for the project. In addition to protection for bird nests, the project will further define during final design and construction planning specific mitigation measures to avoid or reduce potential impacts, including the following: • Avoid removal of native vegetation. • Where native vegetation removal is unavoidable, perform clearing activities outside of the bird nesting season (approximately March 1 to September 1), and leave cut trees and large shrubs on-site to provide cover for small mammals, ground-nesting birds, reptiles and amphibians. • If clearing is necessary during the bird nesting season, have a qualified biologist survey the clearing areas for migratory bird nests prior to clearing. • Retain snags, downed woody material, and forest floor duff to the greatest extent possible. • Avoid disturbing bats during the breeding season (May to September). If this is not feasible and if approved by the Project Manager, apply exclusionary methods prior to this date to exclude bats from accessing suitable habitat. An exclusionary device is any method that denies bats physical access to the nest site area (for example: nets and hole blockers). • Exclusionary devices must be installed a minimum of 30 days before the bat breeding season. • Inspect, maintain, and repair bat exclusionary devices to prevent active occupancy by bats during the breeding season.

Table M-4
Short-Term Mitigation: Environmental Resources

Chapter/Section	Measure/Description
	• Provide for nesting and roosting habitats where practicable for native birds and bats.
3.9 Water Quality and Hydrology	The light rail project will mitigate its potential short-term impacts through full compliance with applicable regulations including the erosion control manuals and National Pollutant Discharge Elimination System (NPDES) permitting requirements of the local jurisdictions.
3.10 Noise and Vibration	None proposed
3.11 Air Quality	Construction contractors will comply with state regulations (OAR 340-208-0210) requiring that reasonable precautions be taken to avoid dust emissions. TriMet is assessing the use of incentives with the contractors to encourage best management practices with regard to air quality and diesel powered construction equipment. This includes incentives for using low-sulfur fuel for diesel equipment, cleaner fuels for other equipment, properly maintaining equipment, reducing idling, retrofitting diesel engines with verified technologies, and replacing older equipment and engines.
3.12 Energy	None proposed.
3.13 Hazardous Materials	Lead and asbestos surveys will be conducted prior to the acquisition of buildings and structures, consistent with OAR 248, and abatement will be conducted prior to demolition, renovation or repair. The project will comply with all other applicable state and federal regulatory and permitting requirements for the handling of hazardous materials, and no additional mitigation is proposed.
3.14 Utilities	None proposed.
3.15 Public Services	TriMet will coordinate with the police departments, fire and rescue providers, schools, USPS, and hospitals regarding construction detours and changes that will occur as a result of project construction.
3.16 Safety and Security	None proposed.
3.17 Section 4(f)	Construction period impacts to Section 4(f) properties will be addressed in accordance with the mitigation commitments defined in the Final Section 4(f) Evaluation and its accompanying letters of concurrence and agreements.

M.3 TRANSPORTATION MITIGATION

This section presents mitigation for transportation impacts related to the proposed project. Section M.3.1 describes potential mitigation related to pedestrian, bicycle, and off-street parking, Sections M.3.2 summarizes mitigation proposed for vehicle operations by geographic area (Subareas A through D), Section M.3.3 addresses freight concerns, and Section M.3.4 presents mitigation measures for construction impacts.

M.3.1 Pedestrian and Bicycle Facilities

Pedestrian Facilities

The following section summarizes measures that mitigate pedestrian conditions within each sub-area of the project corridor.

Table M-5 summarizes the mitigation that is designed as part of the project near proposed stations (within a 500-foot radius).

Table M-5
Pedestrian Mitigation by Transit Station

Location	Measures
Clinton Station	Provide new traffic signals with crosswalks in the SE 11th Avenue/SE 12th Avenue/SE and alternate bicycle crossing for Clinton Street area to address gaps in the pedestrian and bicycle systems.
Rhine Station	Provide sidewalks, crosswalks, and pedestrian facilities for the new 17th Avenue overcrossing of SE Powell Blvd.

Bicycle Facilities

Table M-6 identifies project mitigation related to bicycle facilities and connectivity.

Table M-6
Bicycle Mitigation by Transit Station

Location	Measures
Clinton Station	Provide bicycle access along SE Clinton Street for the portion of roadway that crosses SE 11th Avenue and SE 12th Avenue. This would provide direct access to the Clinton Station to/from the west.
Rhine Station	Provide multi-use path for the new SE 17th Avenue overcrossing of SE Powell Boulevard.

Parking Mitigation

Table M-7 identifies project mitigation-related to parking.

Table M-7
Off-Street Parking Mitigation Measures

Location	LPA to Park Ave.	MOS to Lake Rd.	Measures
Lincoln Station	•	•	Consistent with real property acquisition commitments (Section M-1), compensate the property owner for the loss of approximately seven off-street parking spaces at 2000 SW 5th Avenue.
OMSI Station	•	•	Consistent with real property acquisition commitments (Section M-1), compensate the Portland Opera for the loss of up to nine off-street parking spaces.
Clinton Station	•	•	Consistent with real property acquisition commitments (Section M-1), compensate the property owner for the loss of approximately twenty off-street parking spaces between SE 11th and SE 12th, south of SE Clinton Street.
17th Avenue/Holgate Station	•	•	Replace TriMet's off-street parking supply or undertake a combination of relocation and parking management strategies that address loss of parking for TriMet's Center Street facilities. Consistent with real property acquisition commitments (Section M-1), compensate the property owners for the loss of other off-street lots.
Tacoma Station	•[1]		Coordinate with the City of Portland and the City of Milwaukie to monitor for increases in parking activity in station area neighborhoods and, if impacts occur, apply the cities' existing parking management program measures.
Lake Road Station	•	•	Coordinate with the City of Milwaukie to apply its existing parking management strategies and maximize station access benefits to minimize effects of parking removal.
Park Avenue Station	•[1]		Coordinate with Clackamas County to monitor for increases in transit-related parking activity in station area neighborhoods, and, if impacts occur, apply parking management strategies.

• - Indicates alternative with project-related improvements.
•[1] – LPA Phasing Option

M.3.2 Motor Vehicle Impacts and Mitigation

Tables M-8 through M-11 summarize the mitigation proposed to for the LPA to Park Avenue and MOS to Lake Road and to allow for operations similar to the No-Build Alternative.

Table M-8
Sub-area A - Portland State University to SE Powell Boulevard
Summary of 2030 Motor Vehicle Operation Mitigation

Intersection	Type of Impact: Operations	Queuing	Access	Warrants	Measures	Criteria to Meet	Operations: No-Build	Operations: Proposed Project (Mitigated)
LPA to Park Ave. and MOS to Lake Road								
SW Naito Parkway/SW Harrison Street		◆			Increase green time for the northbound movement for the AM peak hour Provide vehicle queue detection northbound at SW Lincoln Street and provide a northbound clear-out phase; this clear-out phase will need to consider the northbound vehicle queue to the Hawthorne Bridge	500 ft	n/a	Queue lengths: PM peak <325 ft AM peak >500 ft
SE Water Avenue/light rail alignment	◆				Install signals at the east and west ends of the OMSI Station that are triggered when buses and light rail trains are entering and leaving the station	safety	n/a	improved safety
SE 8th Avenue between SE Division Place and SE Division Street	◆				Add gates on SE 8th Avenue at the light rail tracks to prevent conflicting movements between light rail and vehicles	n/a	n/a	improved safety
SE 8th Avenue/SE Division Street	◆				Include a clear-out phase for vehicles on SE 8th Avenue to avoid conflicts with trains and light rail Prohibit eastbound right turns on red	n/a	n/a	queue clear-out
SE 8th Avenue/SE Division Place	◆				Include a clear-out phase for vehicles on SE 8th Avenue to avoid conflicts with trains and light rail	100 ft	n/a	queue clear-out

Intersection	Type of Impact				Measures	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Proposed Project (Mitigated)
SE 11th Avenue/SE Division Street	◆	◆			Signal timing at this intersection will need to be coordinated with the other signals in the near vicinity (12th/Division, 11th/Clinton, 12th/Clinton, Milwaukie/Gideon, 8th/Division Street, and 8th/Division Place); advanced traffic signal control strategies and/or other innovative software and hardware may be necessary	LOS D SB 2000 ft EB 400 ft WB 200 ft	LOS C SB 1125 ft EB 775 ft WB 150 ft	LOS E[1] SB 900 ft EB 375 ft WB 175 ft
SE 12th Avenue/SE Division Street			◆		Improve intersection to allow larger trucks to turn northbound to westbound. The new street improvement will allow for adequate turning radii for WB-67 trucks (with 53 foot trailers). Signal timing at this intersection will need to be coordinated with the other signals in the near vicinity (11th/Division, 11th/Clinton, 12th/Clinton, Milwaukie/Gideon, 8th/Division Street, and 8th/Division Place).	LOS D	LOS C	LOS C
SE 11th Avenue/SE Clinton Street		◆			Implement advanced traffic signal control strategies to coordinate signal timing and allow for progression of southbound movement at this intersection with the traffic signals at SE 11th Avenue/SE Division Street and SE Milwaukie Avenue/SE Powell Boulevard to operate with a clear-out phase as trains approach the at-grade crossing on SE 11th Avenue New signals in this area should include 2070 controllers or conform to the most up-to-date City of Portland standards	275 ft SB	n/a	150 ft SB[1]
SE Clinton Street/SE 12th Avenue		◆			Implement advanced traffic signal control strategies to coordinate signal timing and allow for progression of vehicles along SE 11th and 12th avenues and adequate clear-out phasing for vehicles to get off the light rail tracks as trains approach	200 ft NB	n/a	100 ft NB

Intersection	Type of Impact				Measures	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Proposed Project (Mitigated)
					New signals in this area should include 2070 controllers or conform to the most up-to-date City of Portland standards			
SE Milwaukie Avenue/SE Gideon Street	◆				Restripe the second eastbound lane as a shared through/left. By providing the left-turn capability from both lanes, queuing and operations will improve in this short connecting segment. New signals in this area should include 2070 controllers or conform to the most up-to-date City of Portland standards	LOS D	n/a	LOS C
SE Milwaukie Avenue/SE Powell Boulevard		◆			Extend striping of southbound left-turn pocket north to approximately SE Gideon Street. Roadway cross section would also include bicycle lanes on both the east and west sides of the roadway in this section.	500 ft SB	n/a	250 ft SB
SE 8th Avenue/SE Woodward Street		◆			Install a traffic signal at this intersection Install advance queue warning detectors and flashing beacons for the northbound SE McLoughlin Boulevard exit ramp onto Powell Boulevard.	950 ft SB 200 ft EB2 0.99 without signal or 0.85 with signal	1000 ft SB (PM peak) 300 ft EB (PM peak) V/C = 1.54	300 ft SB (PM peak) 500 ft EB (AM peak)3 V/C = 0.74 (PM) V/C = 0.73 (AM)

Notes: Jurisdictional operational standard.
LOS = Level of service based on average intersection delay.
V/C = Volume to capacity ratio.

1 The results shown here are based on VISSIM analysis that do not account for the possibility of adaptive signal timing or other advanced signal timing methods. As part of the final engineering design phase, the 11th/12th/Division/Clinton area will continue to be analyzed using specialized signal timing methods.

2 The length of the roadway segment is about 1,000 feet between the gore area on SE McLoughlin Boulevard and SE 8th Avenue/SE Woodward Street: however, for adequate sight distance around the exit ramp, the maximum queue length is 200 feet. Due to the limited sight distance, an end of queue warning system is recommended for the exit ramp.

3 The eastbound queue may increase due to downstream congestion at SE 8th Avenue/SE Powell Boulevard and westbound across the Ross Island Bridge. There is a westbound merge on SE Powell Boulevard at the east end of the Ross Island Bridge from three lanes to two lanes. This merge area creates westbound vehicle queues, particularly during the AM peak period, that impact the eastbound vehicle queue at SE 8th Avenue/SE Woodward Street by limiting vehicles from flowing freely onto SE Powell Boulevard.

Table M-9
Sub-area B - SE Powell Boulevard to SE Tacoma Street
Summary of 2030 Motor Vehicle Operation Mitigation

Intersection	Type of Impact				Measures	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Mitigated Proposed Project
LPA to Park Ave. & MOS to Lake Rd.								
17th Ave./SE Pershing Street			◆		Traffic control to provide a safe crossing for motor vehicles, light rail, and pedestrians/bikes is required. A gated crossing is anticipated to provide safe operations with minimal queuing and delay.	n/a	n/a	n/a
SE 17th Ave./SE Holgate Blvd.	◆	◆			Provide a minimum of 300 feet for the southbound left turn. Provide a minimum of 300 feet for the westbound left turn. Provide a minimum of 100 feet for the eastbound left turn. Operate intersection with a 110-second cycle length Coordinate light rail operations with north-south vehicle phases.	SBL 300 ft WBL 300 ft EBL 100 ft LOS D	SBL 275 ft WBL n/a EBL n/a LOS D	SBL 300 ft WBL 300 ft EBL 25 ft LOS D
SE 17th Ave./SE McLoughlin Blvd.		◆			Provide dual southbound left-turn lanes. Add pedestrian crossing on west leg of intersection. Provide a minimum of 300 feet for the westbound right-turn lane. Adjust signal timing to optimize southbound left-turn lane green time without impacting green time along SE McLoughlin Boulevard.	SBL 400ft WBR 300 ft V/C 1.10	SB Queue >500 ft WBR n/a V/C 1.17	SB Queue >500 ft WBR 300 ft V/C 0.97

Notes: LOS = Level of service based on average intersection delay. V/C = Volume to capacity ratio.

Table M-10
Sub-area C - SE Tacoma Street to Highway 224
Summary of 2030 Motor Vehicle Operation Mitigation

Intersection	Type of Impact				Measure	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Proposed Project
LPA to Park Ave.								
Tacoma Park-and-Ride south access			◆		Consolidate business accesses south of park-and-ride with access road. Only allow right-in operations to minimize affects of weaving on SE McLoughlin Boulevard.	990 ft	n/a	990 ft access spacing
SE Tacoma St./SE McLoughlin Blvd. SB Off-Ramp	◆				Restripe for dual stage left turn onto SE Tacoma St. or Modify interchange and signalize intersection. or Do nothing and seek a design exception.	V/C = 0.85	V/C = 0.22 V/C = 0.72	V/C = 0.50 V/C = 0.45[3]
SE Tacoma St./SE McLoughlin Blvd. NB On- /Off-Ramp		◆			Restripe SE Tacoma Street between park-and-ride access and SE Tenino Drive to be a two-way center turn lane. Seek design exception to allow for operations over 0.85 V/C ratio rather than widen SE Tacoma Street to meet standards.	150 ft V/C = 0.85	n/a V/C = 0.64	150 ft storage V/C = 0.87
SE Johnson Creek Blvd./SE 32nd Ave.	◆	 ◆		 ◆	Add westbound right-turn pocket of 100 feet.[1] Signalize intersection.[1]	LOS D	LOS F	LOS D
MOS to Lake Rd.								
Tacoma Park-and-Ride south access			◆		Consolidate business accesses south of park-and-ride with access road. Only allow right-in operations to minimize affects of weaving on SE McLoughlin Boulevard.	990 ft	n/a	990 ft access spacing
SE Tacoma St./SE McLoughlin Blvd. SB /Off-Ramp	◆				Restripe for dual stage left turn onto SE Tacoma St. or Modify interchange and signalize intersection. or Do nothing and seek a design exception.	V/C= 0.85	V/C = 0.22 V/C = 0.72	V/C = 0.53 V/C = 0.48[3]

Intersection	Type of Impact				Measure	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Proposed Project
SE Tacoma St./SE McLoughlin Blvd. NB On- /Off-Ramp	◆	◆	◆		Restripe westbound left-turn lane to be back to back with eastbound left-turn lane at SE Tacoma St./SE Tenino Dr. Seek design exception to allow for operations over 0.85 V/C ratio rather than widen SE Tacoma Street to meet standard.	150 ft V/C = 0.85	n/a V/C = 0.64	150 ft storage V/C = 0.98
SE Johnson Creek Blvd./SE 32nd Ave.	◆	◆		◆	Add westbound right-turn pocket of 100 feet. [1] Signalize intersection. [1]	LOS D	LOS F	LOS D

Notes:

1 LOS = Level of service based on average intersection delay.

2 V/C = Volume to capacity ratio.

3 Improvement needed under No-Build Alternative as well to meet jurisdictional standard.

Table M-11
Sub-Area D - Highway 224 to SE Park Avenue
Summary of 2030 Motor Vehicle Operation Improvements

Intersection	Type of Impact				Measures	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Mitigated Proposed Project
LPA to Park Ave.								
SE Park Ave./SE Oatfield Rd.	◆	◆		◆	Signalization Add eastbound right-turn pocket Add northbound left-turn lane Add southbound left-turn lane	LOS D	LOS F	LOS A
SE Park Ave. between SE 27th Ave. and SE McLoughlin Blvd		◆			Stripe for back to back left turns slight side by side left turns in middle of section to accommodate eastbound and westbound queuing	280 ft	EBL Queue = 250 ft WBL Queue = n/a	EBL Queue = 125 ft WBL Queue = 175 ft
LPA Phasing Option								
SE Park Ave/SE McLoughlin Blvd	◆	◆			Retain southbound approach Modify eastbound approach to be separate left-turn pocket and shared through right-turn lane	V/C 0.99	V/C = 1.00	V/C = 0.98
SE Park Ave./SE Oatfield Rd.	◆	◆		◆	Add eastbound right-turn pocket Retain east-west stop controlled intersection Retain southbound, northbound, and westbound approaches	LOS D	LOS F	LOS F
SE Park Ave. between SE 27th Ave. and SE McLoughlin Blvd		◆			Stripe for back-to-back left turns/slight side-by-side left turns in middle of section to accommodate eastbound and westbound queuing	280 ft	EBL Queue = 250 ft WBL Queue = n/a	EBL Queue = 125 ft WBL Queue = 175 ft
MOS to Lake Rd.								
SE Harrison St./SE Main St.	◆				Signalize intersection or Add eastbound right-turn lane	LOS D	LOS F	LOS B LOS C
SE McLoughlin Blvd./SE Washington St.	◆	◆			Add second westbound left-turn lane or Remove and relocate west leg of intersection (currently City of Milwaukie is pursuing this)	d/c ratio = 1.10 Queue Storage ~500 ft	d/c ratio = 1.10 SB Queue = 450 ft	d/c ratio = 1.10 SB Queue = 300 ft d/c ratio = 1.06 SB Queue = 175 ft

Intersection	Type of Impact				Measures	Criteria to Meet	Operations	
	Operations	Queuing	Access	Warrants			No-Build	Mitigated Proposed Project
SE McLoughlin Blvd./SE Park Ave.	◆				Add westbound right-turn pocket Improve signal timing	d/c ratio = 0.99	d/c ratio = 1.00	d/c ratio = 1.00
SE Washington St./SE Oak St..	◆	◆			Signalize or Roundabout or Restrict eastbound left turns or Seek a design exception	d/c ratio = 1.10 Queue Storage ~500 ft	d/c ratio = 1.10 SB Queue = 450 ft	d/c ratio = 1.10 SB Queue = 300 ft d/c ratio = 1.06 SB Queue = 175 ft

Notes: LOS = Level of service based on average intersection delay.
d/c ratio = demand-to-capacity ratio.

[1] Improvement needed under No-Build Alternative as well to meet jurisdictional standard.

M.3.3 Freight Mitigation

None required.

M.3.4 Construction Mitigation

During final design, further definition of the following construction mitigation measures will be defined to help minimize construction impacts by area. The following is a list of the potential construction mitigation measures to be employed.

- During construction, affected transit stops will be temporarily relocated to the nearest possible location on the same transit route without interfering with the construction process.
- During construction, temporary sidewalks and/or pathways will be provided to replace any sidewalks and/or trails adjacent to the project that are affected by construction.
- To minimize the amount of truck excavation trips to and from the sites, efforts will be made to recycle as much of the excavated earth from the project sites as practical.
- A comprehensive public outreach program will be developed to inform local residents and businesses of potential delays and impacts to the local street network due to temporary construction.
- To help minimize on-street parking impacts and where available, temporary parking will be identified to mitigate the temporary loss of on-street parking due to construction.
- Where available, staging areas will be used to help minimize the impact of materials and equipment intruding into surrounding residential or commercial areas.
- If Portland Spirit mooring impacts cannot be avoided and to avoid the potential for permanent displacements and relocation as described in Section 3.1, the project would provide off-site temporary mooring facilities so that Portland Spirit may dock its two largest vessels at another location during construction, while still maintaining operations.

M.4 CONDITIONS OF THE BIOLOGICAL OPINION

The Portland-Milwaukie Light Rail Project is being designed to first avoid and then minimize and compensate for all unavoidable impacts. The project has avoided and minimized impacts through many years of project planning and design, including the design and analysis of alternatives and alignment options that were considered but not advanced due to impacts to ecosystem and other resources (see Chapter 2). Certain alignment options and design specifics also have been modified to reduce impacts to resources. These avoidance and minimization efforts will continue (with ongoing agency input) through final design and construction, and as a result of the project's incorporation of the requirements for local, state, and federal regulations and permit conditions, including the conservation recommendations and terms and conditions stipulated in the Biological Opinion issued by NOAA Fisheries on June 23, 2010. These regulatory and permit requirements involve the following:

- In-Water Work Periods. All work within the active channels of project waterways will be completed in accordance with the Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources (ODFW 2008). Specific to this project, these in-water work periods are: Johnson Creek and tributaries (Crystal Springs, Crystal, and Spring creeks), July 15 to August 31; Kellogg Creek and tributaries (Courtney Springs Creek), July 15 to September 30; and Willamette River, July 1 to October 31 (July 15 to October 15 for pile driving operations).
- Cessation of Work. Project operations shall cease under high-flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage. The project shall ensure that cofferdams are not overtopped.
- Piling Installation. When possible, a vibratory hammer shall be used to install pilings. If the use of an impact hammer is necessary to install the piling to the load-bearing depth, the piling will be installed first with a vibratory hammer, until it proves no longer effective, and then proofed with an impact hammer. When using an impact hammer to drive or proof steel piles, one of the following sound attenuation devices must be used to reduce sound pressure levels by a minimum of 10 dB: (1) Completely isolate the pile from flowing water by dewatering the pile. (2) If water velocity is 1.6 feet per second or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column. (3) If water velocity is greater than 1.6 feet per second, surround the piling being driven by a confined bubble curtain (e.g., a bubble ring surrounded by fabric or metal sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.
- Bubble Curtain. For each pile to be driven in the water, install and operate a bubble curtain with the following specifications: (1)General - A confined bubble curtain is composed of an air compressor(s), supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipe(s), and a means of confining the bubbles. (2) The confinement shall extend from the substrate to a sufficient elevation above the maximum water level expected during pile installation such that when the air delivery system is adjusted properly, the bubble curtain does not act as a water pump (i.e., little or no water should be pumped out of the top of the confinement system). (3) The confinement shall contain resilient pile guides that prevent the pile and the confinement from coming into contact with each other and do not transmit vibrations to the confinement sleeve and into the water column (e.g. rubber spacers, air filled cushions). (4) In water less than 15 meters deep, the system shall have a single aeration ring at the substrate level. In waters greater than 15 m deep, the system shall have at least two rings, one at the substrate level and the other at mid-depth. (5) The lowest layer of perforated aeration pipe shall be designed to ensure contact with the substrate without sinking into the substrate and shall accommodate for sloped conditions. (6) Air holes shall be 1.6 mm (1/16-inch) in diameter and shall be spaced approximately 20 mm (3/4 inch) apart. Air holes with this size and spacing shall be placed in four adjacent rows along the pipe to provide uniform bubble flux. (7) The system shall provide a bubble flux of 2.0 cubic meters per minute per linear meter of pipe in each layer (21.53 cubic feet per minute per linear foot of pipe in each layer). The total volume of air per layer is the product of the bubble flux and the circumference of the ring: Vt = 2.0 m3/min/m * Circ of the aeration ring in m or Vt =

21.53 ft3/min/ft * Circ of the aeration ring in feet (8) Flow meters shall be provided as follows: (a) Pressure meters shall be installed at all inlets to aeration pipelines and at points of lowest pressure in each branch of the aeration pipeline. (b) Flow meters shall be installed in the main line at each compressor and at each branch of the aeration pipelines at each inlet. In applications where the feed line from the compressor is continuous from the compressor to the aeration pipe inlet the flow meter at the compressor can be eliminated. (c) Flow meters shall be installed according to the manufacturer's recommendation based on either laminar flow or non-laminar flow.

- Contaminated Sediments. Resuspension of contaminated sediments in the water column will be minimized during in-water work at the Willamette River and Kellogg Lake. Sediments within the footprint of the work bridges or areas of riverbed disturbance at the Willamette River would be capped with a clean sand layer prior to pile installation. At Kellogg Lake, similar measures may be taken if deemed necessary.
- Hydroacoustic Monitoring. Hydroacoustic monitoring of impact pile installation will occur according to a protocol approved by NMFS.
- Pile Driving Monitoring. The FTA shall prepare a pile driving monitoring plan, as described in WSDOT (2009), at least 60 days before pile driving commences, and submittal. Pile driving shall be monitored at a minimum of two locations, approximately 30 feet and 521 feet (Willamette) and 154 feet (Kellogg) from the piles. At Johnson and Crystal Springs Creek pile driving will be monitored in water, in line with the crossing. During construction, pile driving activities shall be monitored. If an impact hammer is used and hammer strikes are exceed, contact NMFS immediately at 503-231-2307 or Christina.fellas@noaa.gov. Piling Removal. Temporary piles shall be removed with a vibratory hammer and shall never be intentionally broken by twisting or bending. Except when piles are hollow and when they were placed in clean, sand-dominated substrate, the holes left by the removed pile shall be filled with clean, native sediments immediately following removal. No filling of holes shall be required when hollow piles are removed from clean, sand-dominated substrates.
- Fish Capture and Release. In accordance with an approved fish salvage plan, a qualified biologist will capture and remove fish in any area that is to be isolated from the active channel of any project waterway.
- Sick, injured, or dead fish. The applicant posts the following notice prominently at the work site: NOTICE: If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through the NMFS Office of Law Enforcement at 1-800-853-1964, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (1) NMFS consultation number; (2) the date, time, and location of discovery; (3) a brief description of circumstances and any information that may show the cause of death; and (4) photographs of the fish and where it was found. The NMFS also suggests that the finder coordinate with local biologists to recover any tags or other

relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded. Fish Passage. Fish passage must be provided for any adult or juvenile fish within the action area during construction, unless passage did not exist prior to construction. After construction, fish passage that meets NMFS's fish passage criteria (NMFS 2008a) must be provided for the life of the project.

- Fish Screens. NMFS must review and approve all fish screens for surface water diverted by gravity or pumps that exceeds the flow rate of 3 cubic feet per second. Each fish screen must be installed, operated, and maintained according to NMFS's fish screen criteria (NMFS 2008a).
- Surface Water Diversion. Surface water may be diverted only if water from developed sources is unavailable or inadequate. When surface water is diverted, water shall only be taken from the source with the greatest flow, and a fish screen that meets the above criteria shall be utilized. No water will be diverted from Crystal Springs Creek, Johnson Creek, Crystal Creek, Spring Creek, or Courtney Springs Creek.
- Construction Discharge Water. All water discharged during construction (e.g., concrete washout, pumped water for work area isolation, and drilling fluids) shall be treated with the best available technology in order to remove any contaminants, sediments, debris, etc. Pollutants such as green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours shall not be allowed to contact any wetland, waterbody, or stream channel below OHW.
- Staging Areas. The environmental impacts of heavy machinery on-site will be minimized to the greatest extent possible. A vehicle staging area will be located 150 feet or more from any waterbody or in an isolated hard zone. Vehicles will be fueled, maintained, and stored in this location. Vehicles and equipment will be inspected daily for fluid leaks before operation within 50 feet of any waterbody, and will be repaired, if necessary, before leaving the staging area. Inspections will be documented in a record that will be available for review on request. Vehicles will be steam-cleaned before operation below OHW and as often as necessary to ensure that mud, grease, external oil, and other contaminants do not enter surface water. Generators, pumps, cranes, and any other stationary equipment operated within 150 feet of waterbodies shall be diapered, contained, and maintained as necessary to prevent contaminants from entering surface waters.
- Preconstruction Activity. Before significant alteration to the action area, the clearing limits shall be flagged, and erosion and sediment controls shall be installed and properly functioning.
- Site Preparation. Native materials found on-site (e.g., large wood, vegetation, topsoil, and channel bed materials) shall be preserved to the greatest extent possible and used in restoration.
- Pesticide-Treated Wood. Pesticide-treated wood will not be installed below OHW. During the removal of pesticide-treated wood piers on-site, no wood debris shall be allowed to fall into the water, and any debris falling into the water shall be removed

immediately. Pesticide-treated wood and debris will be disposed of properly, and will be stored in a dry place away from OHW until disposal.

- Erosion and Sediment Control Plan and Pollution Control Plan. These plans shall describe practices that will be used to: contain and control a spill of hazardous materials; avoid or minimize pollution and erosion at all roads, stream crossings, drilling sites, construction sites, borrow pits, equipment and material storage sites, fueling operations, and staging areas; control dust pollution; prevent construction debris from dropping into any waterbody, and to remove any material that does drop with a minimum of disturbance; avoid or minimize resource damage if the action area is inundated by precipitation or high stream flow; stabilize all disturbed soils following any break in work, unless construction will resume within four days; and inspect erosion and sediment controls, monitor in-stream turbidity, and make repairs to best management practices that are not functioning correctly.
- Site Stabilization. All disturbed areas shall be stabilized following any break in work unless construction will resume within four days.
- Work Area Isolation. Any action, except for piling installation or removal, that involves a substantial amount of excavation, backfilling, embankment construction, or similar work below OHW where adult or juvenile fish are reasonably certain to be present, or 300 feet or less upstream from spawning habitats, must be effectively isolated from the active stream. A work area isolation plan will be developed and reviewed by NMFS before the commencement of this work.
- Site Restoration. Any action that results in significant disturbance of riparian vegetation, soils, streambanks, or the stream channel must clean up and restore those features after the action is complete. If disturbance is to occur, a notification shall be sent to NMFS explaining how site restoration will be completed.
- Scour Protection. Permanent scour protection will be necessary at the Willamette River bridge's two in-water tower structures. The scour protection installed around the western tower will minimize potential disturbance to the Zidell Companies' sediment cap and to contaminated materials within their sediment management area. Scour protection will also be provided for the west work bridge piles below OHW inside Zidell's sediment management area, in addition to the scour protection around the western tower. Permanent scour protection at the eastern tower will prevent the undermining of the City of Portland's 36-inch critical water line and other nearby utility lines.

The project would mitigate its potential short- and long-term impacts through full compliance with all applicable regulations as summarized in Table 3.8.1. It should be noted that further refinement of mitigation designs, including determination of the size and location of mitigation features, would occur during final design and project permitting. Discussions with federal, state, and local agencies to determine appropriate mitigation measures have been initiated and will continue during the final design and permitting.