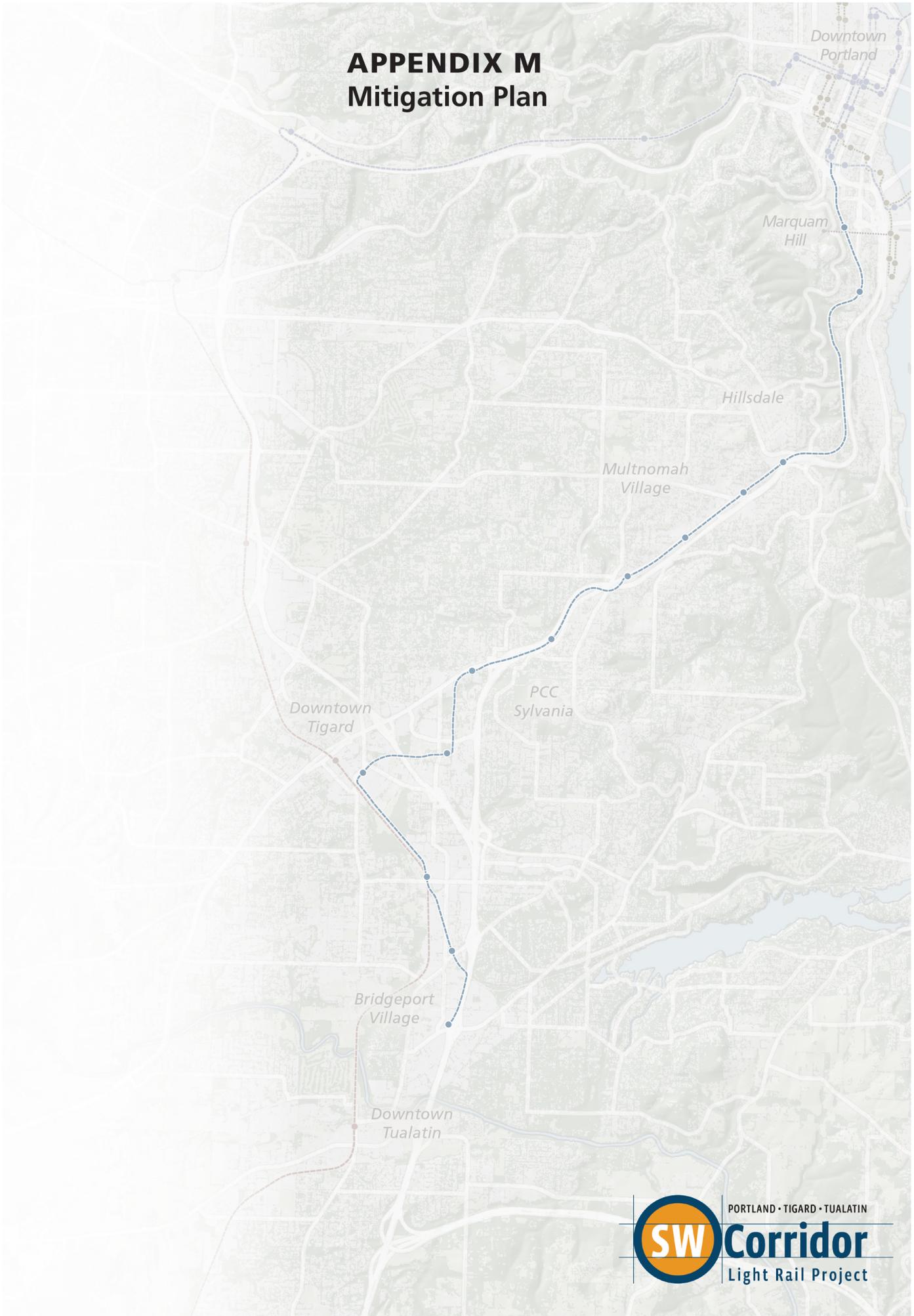


APPENDIX M Mitigation Plan



APPENDIX M – MITIGATION PLAN

This appendix summarizes the mitigation measures described in the following chapters and appendices of the Southwest Corridor Light Rail Project (Project) Final Environmental Impact Statement (EIS):

Section	Page
M.1 Transportation Impacts	M-1
M.2 Environmental Impacts	M-5

- Chapter 3, Transportation Impacts and Mitigation
- Chapter 4, Environmental Impacts and Mitigation
- Appendix D, Final Section 4(f) Evaluation
- Appendix K, Memorandum of Agreement (MOA) for Historic and Archaeological Resources
- Appendix L, Biological Opinion

This appendix focuses on the additional mitigation measures that the Tri-County Metropolitan Transportation District of Oregon (TriMet) or other project sponsors will undertake, after taking into account the avoidance and minimization measures already incorporated within the Project. The Project’s mitigation commitments will be listed in the Record of Decision, which will be issued by the Federal Transit Administration (FTA) no sooner than 30 days after the Notice of Availability of this Final EIS.

M.1. Transportation Impacts

This section identifies proposed mitigation measures to address the anticipated transportation impacts of the Project.

Long-Term Transportation Mitigation

Table M-1 lists long-term transportation mitigation measures for the Preferred Alternative and terminus options and for the related transportation improvements. No mitigation measures are needed for impacts to public transportation, active transportation or freight facilities or for indirect and cumulative transportation impacts.

Motor vehicle operations for the Ross Island Bridgehead Reconfiguration were analyzed with the assumption that the Preferred Alternative would also be constructed. All mitigation measures identified for the Preferred Alternative in Table M-1 will still be required if the Ross Island Bridgehead Reconfiguration is constructed in addition to the Preferred Alternative. Table M-1 identifies three mitigation measures attributed to the Ross Island Bridgehead Reconfiguration that would not be required for the Preferred Alternative alone.

Table M-1. Long-Term Mitigation Measures for Transportation Impacts (*multipage table*)

Impact Location and Issue	Preferred Alternative and Terminus Options	Related Transportation Improvements
Motor Vehicle Operations: Segment A		
I-405 northbound off-ramp at SW Sixth Ave. and SW Jackson St.: Increased queuing caused by new pedestrian signal	TriMet will coordinate with ODOT during final design to avoid increasing queues within the safe stopping distance zone of the off-ramp, compared to queues under the 2035/2045 No-Build Alternative. Mitigation could include adding a queue dump detector to hold the pedestrian phase when queuing conditions are present on SW Sixth Ave. north of SW Jackson St. or on the I-405 off-ramp.	None required.
SW Barbur Blvd. at SW Hooker St.: Queue spillback from the signalized southbound left turn	TriMet will coordinate with ODOT and PBOT during final design to ensure vehicle throughput (V/C ratio) would not exceed both the No-Build Alternative and the jurisdictional standards, and to ensure that queues would be prevented from extending back into the intersection of SW Sheridan St./SW Barbur Blvd.	None required.
South Portland from I-405 to SW Hamilton St.: Potential through traffic diversions to neighborhood streets	TriMet will work with the City of Portland to establish a South Portland Neighborhood Monitoring and Management Program during project testing and year of opening.	None required.
SW Naito Pkwy. at SW Sheridan St.: Queues from signalized northbound left turn	None required.	The City of Portland and ODOT will coordinate during final design to ensure queues would not result in safety concerns. Mitigation could include adding a second westbound lane on SW Sheridan St. between SW First Ave. and SW Naito Pkwy. and extending the northbound left-turn lane storage bay by 100 feet, and/or another design mutually agreed upon by the City of Portland and ODOT that would improve the safety of the roadway system, and avoid worsening surrounding street system congestion affecting ramp queue backups on I-5 and I-405 compared to the No-Build Alternative.
SW Kelly Ave. at SW Macadam Ave.: Westbound queuing due to limited dual lane storage	None required.	The City of Portland and ODOT will coordinate during final design to ensure queues would not result in safety concerns. Mitigation could include channelizing the westbound right turn and converting the south-leg pedestrian crossing to a Z-crossing two-stage crosswalk. These modifications would facilitate shorter signal cycle lengths. Mitigation could also involve another design mutually agreed upon by the City of Portland and ODOT that would improve the safety of the roadway system, and avoid worsening surrounding street system congestion affecting ramp queue backups on I-5 and I-405 compared to the No-Build Alternative.

Table M-1. Long-Term Mitigation Measures for Transportation Impacts (*multipage table*)

Impact Location and Issue	Preferred Alternative and Terminus Options	Related Transportation Improvements
<p>SW First Ave. at SW Arthur St.: Southbound left-turn queues</p>	<p>None required.</p>	<p>The City of Portland and ODOT will coordinate during final design to ensure queues would not result in safety concerns. Mitigation could include restriping the southbound left-turn lanes as a drop lane and an option lane, and/or another design mutually agreed upon by the City of Portland and ODOT that would improve the safety of the roadway system, and avoid worsening surrounding street system congestion affecting ramp queue backups on I-5 and I-405 compared to the No-Build Alternative.</p>
<p>Motor Vehicle Operations: Segment B</p>		
<p>SW 19th Ave./SW Barbur Blvd. intersection: Pedestrian crossing increases vehicle delay</p>	<p>TriMet will coordinate with the City of Portland during final design to confirm operational and design details for pedestrian access and safety, intersection vehicle delay and general operations. Mitigation could include creating Z-crossing two-stage crosswalks, with the light rail platforms as the refuges.</p>	<p>None required.</p>
<p>SW Barbur Blvd./Barbur Transit Center/SW Taylors Ferry Rd.: Pedestrian crossing increases vehicle delay</p>	<p>During final design and permitting, TriMet will coordinate with ODOT and PBOT to confirm operational and design details for pedestrian access and safety, intersection vehicle delay, general operations, and queuing levels on I-5 exit ramps to achieve conditions that do not exceed both the No-Build Alternative and jurisdictional standards.</p>	<p>None required.</p>
<p>Motor Vehicle Operations: Segment C</p>		
<p>SW 65th Ave./SW Haines St./ I-5 northbound ramps: Both terminus options would result in minor increased delay at this all-way stop-controlled intersection; no queuing issues would occur.</p>	<p>Preferred Alternative: None required. Terminus options: TriMet will coordinate with ODOT to further define design and operational details, such as a traffic signal or roundabout at this location.</p>	<p>None required.</p>
<p>I-5/SW Upper Boones Ferry Rd./railroad crossing/SW 72nd Ave.: The Preferred Alternative’s new at-grade light rail crossing of SW Upper Boones Ferry Rd. would increase queues on I-5 southbound off-ramp, where a freight rail crossing and intersections with SW Upper Boones Ferry Rd. already result in delays and queues for the No-Build Alternative.</p>	<p>Preferred Alternative: TriMet will coordinate with ODOT, the City of Tigard and other local jurisdictions to secure design approvals for a light rail crossing that avoids worsening ramp queue backups on the I-5 southbound ramp compared to the No-Build Alternative. Options to mitigate the impact include participating in a larger regional roadway improvement project that would grade separate SW Upper Boones Ferry Rd. above light rail and the existing at-grade freight rail crossing, and/or reconfiguring nearby intersections and signal control systems. Terminus options: None required.</p>	<p>None required.</p>

Table M-1. Long-Term Mitigation Measures for Transportation Impacts (multipage table)

Impact Location and Issue	Preferred Alternative and Terminus Options	Related Transportation Improvements
<p>SW Lower Boones Ferry Rd./ I-5 northbound ramp: Impacts, which would result from the Preferred Alternative only, are dependent on the number of park and ride spaces and forecast year of analysis¹</p> <p><i>2035 Forecast Year:</i></p> <ul style="list-style-type: none"> · 710-space park and ride would not require mitigation. · 960-space park and ride would need mitigation to remedy queuing issues. <p><i>2045 Forecast Year:</i></p> <ul style="list-style-type: none"> · 710-space park and ride would need mitigation to remedy queuing issues. · 960-space park and ride would need mitigation to remedy queuing issues. 	<p>Preferred Alternative: TriMet will coordinate with ODOT to avoid having queues back up into the safe stopping distance on the off-ramp beyond what the queues would be under the 2035/2045 No-Build Alternative. Mitigation options include reconfiguring and/or reconstructing ramps to add adequate vehicle storage, adjusting signal timing of the interchange and local connecting roads, and/or reducing the size of the park and ride to 710 spaces.</p> <p>Terminus options: None required.</p>	None required.
Parking		
<p>Corridor-wide: Potential impacts of drivers using side street parking or off-street parking lots as informal park and rides</p>	TriMet will work with local jurisdictions after project opening to assess parking impacts and implement parking management policies as required. For example, time-limited parking and residential parking permits could mitigate on-street parking impacts.	None required.
Safety		
<p>Corridor-wide: Safety of in-street light rail operations</p>	TriMet will coordinate with the local roadway authorities during design and comply with regulations related to the safety of in-street light rail operations.	None required.
<p>Corridor-wide: Safety of modifications to I-405 and I-5 rights of way</p>	TriMet will prepare Interchange Access Modification Requests and meet other applicable design and documentation requirements of ODOT and FHWA, including a detailed safety analysis and hazard minimization assessment, as part of ODOT and FHWA review and approval processes.	None required.
<p>Corridor-wide: Safety of rail roadway crossings and light rail running adjacent to freight rail</p>	TriMet will coordinate during design and comply with regulations related to new or modified rail roadway crossings. This coordination will include the railroad, local roadway authorities, the State Safety Oversight Agent and the Federal Railroad Administration during the design and permitting phases. In addition, all light rail at-grade roadway crossings and any modifications to existing freight rail at-grade roadway crossings will require permitting through ODOT and will be required to meet applicable design standards to ensure safety for all travel modes.	None required.

Note: FHWA = Federal Highway Administration; I-5 = Interstate 5; I-405 = Interstate 405; ODOT = Oregon Department of Transportation; PBOT = Portland Bureau of Transportation; V/C = volume-to-capacity.

¹ Two scenarios were used in analyzing impacts from the Bridgeport Park and Ride to understand the impacts of different options.

Short-Term Transportation Mitigation

Table M-2 lists short-term transportation mitigation measures for the Preferred Alternative and terminus options and for the related transportation improvements. Most of the short-term impacts would be avoided or minimized through compliance with state and local permitting requirements, and would not require additional mitigation.

Table M-2. Short-Term Mitigation Measures for Transportation Impacts

Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Temporary construction impacts to transportation	None required. Construction-related transportation impacts would be prevented or minimized by complying with state and local permitting requirements.	None required. Construction-related transportation impacts would be prevented or minimized by complying with state and local permitting requirements.
Impacts to interstate or state highways during construction	None required beyond complying with applicable federal and state permitting requirements.	None required beyond complying with applicable federal and state permitting requirements.
Temporary closures of bus stops during construction	TriMet will work with agencies with jurisdiction and the public to develop plans for bus stop closures required during construction, including identifying temporary stop and bus layover locations and identifying alternative mobility options, to minimize disruption to riders.	Project sponsors will work with TriMet to develop plans for transit service during construction.
Temporary loss of parking at park and ride lots	<p>TriMet will mitigate the temporary loss of parking at park and ride lots through one or more of the following measures, determined in consultation with local jurisdictions and facility owners:</p> <ul style="list-style-type: none"> · construction period rider notices and public communication strategies, including information about alternative park and ride locations · implement service increases, routing modifications or other measures to encourage transit trips that do not require automobile access · develop temporary parking for transit riders to use during construction · build new park and ride spaces before removing existing spaces · lease parking lots and/or new parking areas near the closed park and ride lots 	None required.

M.2. Environmental Impacts

This section identifies proposed mitigation measures to address the anticipated environmental impacts of the Project. Table M-3 lists long-term and short-term mitigation measures for the Preferred Alternative and terminus options and for the related transportation improvements.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (multipage table)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Acquisitions, Displacements and Relocations			
Long term	Acquisition of property and displacement or relocation of existing uses	When acquiring properties and relocating existing residents and businesses, TriMet will comply with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Chapter 35 of the Oregon Revised Statutes, and TriMet’s acquisition and relocation policy, procedures, and guidelines.	Project sponsors will comply with relevant laws and regulations when acquiring properties, including Chapter 35 of the Oregon Revised Statutes and the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as applicable.
Short term	Use of property during construction	For portions of properties needed for temporary use during construction, TriMet will restore the affected area to its previous condition and/or provide alternative compensation, as specified in the conditions of the easement agreement negotiated for each property.	For portions of properties needed for temporary use during construction, project sponsors will restore the affected area to its previous condition and/or provide alternative compensation, as specified in the conditions of the easement agreement negotiated for each property.
Land Use			
Long term	Land use conversion	None required. TriMet will follow requirements outlined in Section 4.1, Acquisitions, Displacements and Relocations. TriMet could also partner with property owners and local agencies to plan for optimal use of property no longer needed after construction.	None required. Project sponsors would comply with applicable regulations and guidance related to land use acquisition.
Long term	Local plan compatibility	None required. Long-term land use impacts would be compatible with existing plans and policies.	None required. Long-term land use impacts would be compatible with existing plans and policies.
Short term	Use of property during construction	None required.	None required.
Economics			
Long term	Business displacement	None required. As outlined under Acquisitions, Displacements and Relocations, TriMet will comply with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970; Chapter 35 of the Oregon Revised Statutes; and TriMet’s acquisition and relocation policy, procedures, and guidelines.	None required.
Long term	Tax loss due to property conversion	None required. The loss of tax revenue from converted properties represents a small portion of municipal revenues.	None required.
Long term	Affordable housing	None required. Displaced housing units would not adversely affect regional supply, and consistent with the Uniform Relocation Assistance and Real Property Acquisition Policies Act, TriMet would provide compensation to business owners and qualified residents.	None required.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (multipage table)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Short term	Disruptions to business activities during construction	TriMet will provide notices and signage to maintain business accessibility and visibility during construction. As part of the Project, TriMet will coordinate with businesses affected during construction, including providing business hotlines to report construction concerns and updates; programs offering business planning assistance, marketing and retail consulting; business-oriented workshops; and promotions to generate patronage.	None required.
Communities			
Long term and short term	Neighborhood cohesion, neighborhood quality of life, community facilities and transit-dependent populations	None required beyond the mitigation strategies identified in other sections of the Final EIS.	None required beyond the mitigation strategies identified in other sections of the Final EIS.
Visual Quality			
Long term	Changes to designated viewpoints, where project elements would be visible	None required. For locations where the Preferred Alternative could be visible from an identified scenic resource, such as the variety of regulated views, corridors and/or design districts, the Preferred Alternative would need to conform to applicable design review standards.	None required. Project sponsors would be required to develop projects to be consistent with applicable plans and policies with regard to urban design and landscaping.
Short term	Construction-related activities	TriMet will locate construction staging areas away from scenic viewpoints. Where construction staging areas are within view corridors (in the vicinity of the Gibbs Station and the Marquam Hill Connection), TriMet will implement shielding or other methods to minimize visual impact.	None required.
Historic and Archaeological Resources			
Long term and short term	Unavoidable adverse effects on historic and archaeological resources	TriMet and FTA will comply with the stipulations in the Section 106 Memorandum of Agreement that was developed in consultation with the State Historic Preservation Office and other consulting parties, attached as Appendix K to this Final EIS. The stipulations include compliance with the Archaeological Site Protection and Monitoring Plan, which is provided in this Final EIS as Attachment G.	The project sponsors will comply with the stipulations associated with pre-construction investigation and construction monitoring requirements in the Section 106 Memorandum of Agreement, attached as Appendix K to this Final EIS. These stipulations are described in more detail in the Archaeological Site Protection and Monitoring Plan, which is provided in this Final EIS as Attachment G.
Parks and Recreation Resources			
Long term	Duniway Park	Per written agreement between TriMet and the City of Portland/Portland Parks and Recreation, TriMet will reconfigure the driveway and parking area at the park's eastern edge near the circular track.	N/A
Long term	Lair Hill Park	TriMet will replace park trees and adjacent street trees in accordance with a written mitigation approach agreement between TriMet and the City of Portland/Portland Parks and Recreation.	N/A

Table M-3. Mitigation Measures for Environmental Impacts by Resource (multipage table)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Long term	Terwilliger Parkway	TriMet will coordinate with the City of Portland to improve protected views currently blocked by trees and overgrowth; work with the City to design details to minimize impacts to wildlife; contribute funds for the development of a Natural Resource Management Plan; and incorporate measures related to the historic aspects of Terwilliger Parkway.	N/A
Long term	George Himes Park	Per written agreement between TriMet and the City of Portland/Portland Parks and Recreation, TriMet will restore the connecting trail to SW Trail #3 where it may be impacted by construction within ODOT right of way and will contribute to the development of a George Himes Natural Resources Management Plan, along with other park supporting measures.	N/A
Long term	Fulton Park	None required.	N/A
Long term	Burlingame Park	N/A	None required.
Short term	Construction activities and easements within City parks	None required. Construction activities would require permitting and approvals from the City of Portland; TriMet would comply with the requirements of the city's non-park use permit, and would replace removed trees in accordance with the City of Portland's Tree Code. Consistent with mitigation defined in Section 4.9, Ecosystems, TriMet will coordinate with consulting tribes to offer opportunities to harvest culturally significant native plants, such as the western red cedar, before construction. Additionally, to the extent practical, TriMet will incorporate culturally sensitive native plant species, as identified by the Section 106 consulting tribes, within landscaped areas.	None required. Construction activities would require permitting and approvals from the City of Portland; project sponsor would comply with the terms of those permits.
Geology, Soils and Hydrogeology			
Long term	None identified	None required. The Preferred Alternative would be developed to minimize risk in accordance with engineering standards and applicable regulations.	None required. Project sponsors would be required to develop projects to be consistent with applicable standards.
Short term	Erosion, landslides and settlement during construction	None required. The Preferred Alternative would be developed to comply with applicable regulations and permitting requirements, including an Oregon Department of Environmental Quality 1200C permit that includes requirements for addressing erosion and stormwater during construction.	None required beyond those required by applicable regulations and permitting requirements.
Ecosystems			
Long and short Term	Impacts to threatened or endangered species	TriMet will adhere to mitigation requirements stipulated in the Biological Opinion issued by the National Marine Fisheries Service, attached as Appendix L of this Final EIS.	None required beyond those required by applicable regulations and permitting requirements.
Long term	Unavoidable impacts to wetlands and waters from fill, vegetation removal or disruption of hydrology	TriMet will mitigate unavoidable impacts to wetlands and waters consistent with state and federal regulations.	Project sponsors will mitigate unavoidable impacts to wetlands and waters consistent with state and federal regulations.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (multipage table)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Long term	Removal of vegetation, including trees, within the construction footprint or the buffer area	<p>TriMet will coordinate with consulting tribes to offer opportunities to harvest culturally significant native plants before construction.</p> <p>To comply with the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, TriMet will consult with state and federal resource agencies on measures to avoid impacts on migratory birds due to vegetation removal. These measures may include pre-construction surveys for migratory birds and/or restrictions on vegetation clearing during the breeding season for migratory birds.</p> <p>TriMet will mitigate tree removal through coordination with the applicable city government or local agency under the applicable ordinance, based on location of the impact. To the extent practical, TriMet will incorporate culturally sensitive native plant species, as identified by the Section 106 consulting tribes, within landscaped areas.</p>	Project sponsors will mitigate tree removal through coordination with the applicable city government or local agency under the applicable ordinance, based on the location of the impact.
Long term	Unavoidable impacts to E-zones and sensitive lands	<p>TriMet will design the Marquam Hill Connection to provide wildlife passage below and minimize light spillover to vegetated areas below.</p> <p>TriMet will likely address unavoidable impacts to areas with E-zones within the City of Portland and sensitive lands overlays within the City of Tigard through on-site or off-site mitigation. An environmental review process would likely be required for E-zone impacts. A sensitive lands approval, in addition to a comprehensive plan amendment and environmental, social, economic and energy consequences analysis, could be required.</p>	Project sponsors will likely address unavoidable impacts to areas with E-zones within the City of Portland and sensitive lands overlays within the City of Tigard through on-site or off-site mitigation. An environmental review process would likely be required for E-zone impacts. A sensitive lands approval, in addition to a comprehensive plan amendment and environmental, social, economic and energy consequences analysis, could be required.
Long term	Impacts to wildlife associated with the Marquam Hill Connection	TriMet will work with the City of Portland/Portland Parks and Recreation to develop design details for the Marquam Hill Connection to minimize impacts to wildlife, including bird friendly cabs and elevator headhouse, with an elevator guideway span clearance designed to accommodate wildlife passage, which while minimizing impacts to views.	N/A
Short term	Impacts to wetlands and waters from erosion, spills and vegetation damage or disruption of hydrology	During construction activities that are taking place in proximity to wetlands and waters, TriMet will use best management practices to avoid erosion, spills, vegetation damage or disruption of hydrology. Standard specifications and special provisions will direct contractors to avoid and minimize impacts.	During construction activities that are taking place in proximity to wetlands and waters, project sponsors will use best management practices to avoid erosion, spills, vegetation damage or disruption of hydrology. Standard specifications and special provisions will direct contractors to avoid and minimize impacts.
Short term	Impacts to wetlands from temporary work platform piles and decking	TriMet will restore disturbed sites to pre-project conditions.	None required. No impacts from related transportation improvements are anticipated.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (*multipage table*)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Water Resources			
Long term	Red Rock Creek floodplain or floodway encroachment	<p>During final design and permitting, TriMet will seek FEMA approval of a Conditional Letter of Map Revision, in accordance with 44 CFR 65.12:</p> <ol style="list-style-type: none"> 1. TriMet will complete a detailed survey and hydraulic modeling to confirm the base flood elevation and delineate the regulated floodway boundary in coordination with the City of Tigard and FEMA. 2. TriMet will refine designs to minimize unavoidable encroachments in the floodplain and minimize or avoid encroachments within the floodway defined in step 1. 3. TriMet will provide compensatory flood storage where encroachments within the floodplain are unavoidable. 4. If any encroachments to the floodway are identified in step 2, or if adequate compensatory storage areas cannot be identified for floodplain encroachments under step 3, then TriMet will perform a net-rise analysis to map the floodplain and floodway boundaries that would result from the Project. 5. If the Project would impact new areas by the increased base flood elevation or channel impacts, TriMet will coordinate with the local jurisdictions and FEMA to provide flood-impact prevention or mitigation in accordance with 44 CFR 65.12, such as relocating a stream, elevating buildings or installing flood berms. 6. TriMet, in coordination with the City of Tigard, will submit a Conditional Letter of Map Revision to FEMA for conditional approval. 7. After construction, TriMet, in coordination with the City of Tigard, will submit a Letter of Map Revision to FEMA. <p>Through the steps outlined above, TriMet will also meet the City of Tigard’s requirements for a detailed engineering study to confirm that the Project would not increase the base (100-year) flood elevation.</p>	None required.
Short term	None expected	None required.	None required.
Noise and Vibration			
Long term	Light rail noise impacts	TriMet will conduct further noise analysis closer to project construction to verify impacts based on final design. TriMet will mitigate all severe light rail noise impacts and will consider mitigation to address moderate light rail noise impacts. Mitigation strategies that could be used include special trackwork at crossovers, sound walls where they can be feasibly and reasonably constructed, and sound insulation for remaining impacts.	None required. The related transportation improvements would not cause light rail noise.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (multipage table)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Long term	Light rail wheel squeal	None required. Tight-radius curves would be considered for lubrication if squeal is identified during initial system testing per TriMet policy. If lubrication is necessary, general maintenance of the rail would include servicing the curves to prevent squeal impacts in noise-sensitive areas.	None required. The related transportation improvements would not cause light rail wheel squeal.
Long term	Traffic noise impacts	TriMet will conduct further noise analysis to verify traffic noise impacts and detailed mitigation based on final design. TriMet will mitigate for impacts where increased traffic noise would exceed applicable criteria by installing sound walls where they can be feasibly and reasonably constructed; other techniques such as sound insulation would be considered if sound walls would not be effective in reducing impacts.	Project sponsors for the Ross Island Bridgehead Reconfiguration will conduct further traffic noise analysis to verify traffic noise impacts and detailed mitigation based on final design. The analysis methods will be consistent with applicable standards based in part on the source of funding. The station access improvements would not cause traffic noise impacts and would not require mitigation.
Long term	Vibration impacts	TriMet will mitigate for vibration impacts exceeding FTA's thresholds. Mitigation strategies would likely include several different methods of absorbing vibration near the tracks, so the vibration is not transmitted into the adjacent soil. These methods include the use of high compliance direct fixation fasteners, ballast mats, tire-derived aggregate and floating slabs.	None required. The related transportation improvements would not cause vibration impacts.
Short term	Noise impacts during construction	None required. Project construction noise would generally meet the local noise regulations, and seek noise variances from local regulators for required nighttime construction activities.	None required. Project construction noise would generally meet the local noise regulations, and seek noise variances from local regulators for required nighttime construction activities.
Short term	Vibration impacts during construction	During final design, TriMet will perform a review of vibration sensitive and historic buildings. If necessary, TriMet will conduct vibration monitoring during construction.	None required. Project construction noise would meet the local noise regulations.
Air Quality and Greenhouse Gases			
Long term	Carbon monoxide and greenhouse gas emissions	None required. The Preferred Alternative and terminus options would reduce carbon monoxide and greenhouse gas emissions compared to the No-Build Alternative.	None required.
Short term	Dust, diesel emissions during construction	None required beyond those required by applicable regulations and permitting requirements.	None required beyond those required by applicable regulations and permitting requirements.
Energy			
Long term and short term	Impacts to energy demand on utilities	None required.	None required.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (multipage table)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Hazardous Materials			
Long term and short term	Existing hazardous materials	<p>TriMet will conduct pre-acquisition site investigation for parcels that would be acquired for the Preferred Alternative or terminus options. The level of investigation for each parcel is listed in Appendix B4-14, and may include one or more of the following:</p> <ul style="list-style-type: none"> · Simple Phase II investigation: sites with potential or residual soil contamination that has not been completely defined or confirmed · Complex Phase II investigation: sites with potential or confirmed groundwater contamination that has not been completely defined and sites located adjacent to properties that have potential or confirmed groundwater contamination likely to impact subject site · Structures and Building Surveys (hazardous building materials abatement): sites with structures of an age where building materials that are now considered hazardous to human health, such as lead paint, asbestos, or polychlorinated biphenyls (PCBs), or creosote timbers, could have been used during construction; this abatement could be paired with any of the previous three possible subsurface investigation scenarios. <p>For sites with defined contamination based on investigations, TriMet will conduct clean up and remediation activities as required by environmental regulators, including:</p> <ul style="list-style-type: none"> · hazardous structures or building materials containment, removal and disposal · soil excavation and disposal · remediation technologies such as in-situ chemical injection, bioremediation, or air-sparge/soil vapor extraction · contaminated groundwater removal and treatment/disposal · groundwater monitoring 	None required beyond those required by applicable regulations and permitting requirements.
Utilities			
Long term	None identified	N/A	N/A
Short term	Utility impacts and relocation	None required. All affected utility companies would be contacted during the preliminary engineering phase to help locate and map potentially affected utilities, and to develop plans to coordinate either protection of the facilities within the construction area or relocation of impacted facilities.	None required. All affected utility companies would be contacted during the preliminary engineering phase to help locate and map potentially affected utilities, and to develop plans to coordinate either protection of the facilities within the construction area or relocation of impacted facilities.
Public Services			
Long term	Route changes	None required. As standard practice and as part of the permitting process, TriMet would coordinate with service providers before opening day of the Project to plan for operational service.	None required. As standard practice and as part of the permitting process, project sponsors would coordinate with service providers during design and before construction is complete to avoid and mitigate potential impacts.

Table M-3. Mitigation Measures for Environmental Impacts by Resource (*multipage table*)

Time Period	Impact Type	Preferred Alternative and Terminus Options	Related Transportation Improvements
Short term	Street closures and detours	TriMet will develop a construction management plan in coordination with providers of public services in the corridor.	Project sponsors will coordinate with service providers regarding construction plans, including timing and duration.
Safety and Security			
Long term	Station security and safety	None required. Design and operations would consider best management practices including Crime Prevention through Environmental Design approaches and engagement with existing local agencies and emergency service providers to address site-specific needs.	None required.
Long term	Operational safety	None required. TriMet would prepare a Safety and Security Management Plan, in coordination with the Fire, Life and Safety Committee.	None required. Operational safety of the related transportation improvements would follow applicable safety procedures required by the project sponsors.
Short term	Construction safety	None required. Construction safety would follow TriMet’s applicable safety procedures.	None required. Construction of the related transportation improvements would follow applicable safety procedures required by the project sponsors.

Note: FEMA = Federal Emergency Management Agency; FTA = Federal Transit Administration; N/A = not applicable (no impacts to that resource); ODOT = Oregon Department of Transportation

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