Appendix L

Mitigation Matrix

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
3.1 Transportation				
Loss of on-street parking	L	1	When on-street parking is removed, City of Vancouver policy calls for replacement parking to be provided within 750 feet. Given the constrained nature of the downtown area, it is very challenging to identify areas for replacement parking that would not displace existing buildings (businesses and residences), travel lanes, parks, or other current uses. Mitigating circumstances include: the existing parking supply is greatly underutilized; the introduction of light rail will enable greater use of transit and reduce the need for parking space. Mitigation measures include: Working with City to attain compliance or partial exemption from City parking policy. Coordination between C-TRAN and the City would occur to develop shared parking use agreements that would allow some use of the new park and ride facilities. The project team has worked with property owners and the City of Vancouver to identify the following mitigations for the loss of on-street parking: 1. The addition of 50 stalls within the SR 14 loop. 2. The acquisition of the existing city parking lot south of Smith Tower, which will be repurposed to serve Smith Tower residents.	NEPA, Local Ordinances
Transit Safety and Security				
*New mode could increase vehicle crashes	L	1	Safety measures will be designed into the project, where needed, including: *Physical barriers such as medians, fencing, landscaping, or chain and bollard (short, vertical posts) to help channel automobiles, pedestrians, and bicyclists; *Signage, tactile pavers, audio warnings, and pavement markings at track crossings to alert individuals they are approaching tracks; *Active treatments such as flashing lights, bells, and illuminated and audible warning devices in traffic signals; *The creation of inviting, well-lighted platforms and station areas; *Maintaining clear sight lines for oncoming trains; and *Implementing a public safety education campaign before the start of service.	NEPA
*Bicycle safety could be impacted due to new tracks and stations	L	1	The project would provide bicycle access to station locations by perpendicular access streets within each city's bicycle network. Station areas include bicycle facilities, which could include secure storage areas. The project would coordinate with each governing jurisdiction to determine the appropriate number of bicycle storage facilities per station. Local jurisdictions should consider access to light rail stations as bicycle system plans are updated.	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
*Pedestrian safety could be impacted due to new tracks and stations	L	1	The project would provide pedestrian access to stations by establishing “through-walking areas” adjacent to the planned station locations. Through-walking areas are clear pathways free of street furniture or other impediments. The project would strive to maintain these areas at approximately 7 to 8 feet in width in busy pedestrian locations such as downtown and 6 feet in width in areas with lower levels of pedestrian traffic.	NEPA
*Potential security issues at new stations	L	2	Strategies such as crime prevention through environmental design (CPTED) and the use of police, private security patrols, and security cameras would be employed as appropriate to make the light rail facilities as safe and secure as possible. The existing policies and procedures for operations during a potential catastrophic event and to prevent terrorist activities developed by TriMet and FTA would be expanded to include the CRC project and C-TRAN. Finally, design criteria such as platform location and length, pedestrian crossings, and alignment design would be used to ensure that the project operates safely.	NEPA, Transit Agency Operating Procedures
Vancouver Local Street Performance				
*One intersection would operate unacceptably during am peak (2 intersections with highway phasing option) *Three intersections would operate unacceptably during pm peak (6 intersections with highway phasing option)	L	1	The City of Vancouver and WSDOT, as appropriate, would monitor traffic operations and pursue the following mitigation measures recommended under the LPA, as traffic conditions warrant. The deteriorated performance in most locations is due to forecasted background traffic growth, not the impacts of the CRC project. Cost-sharing on measures that are warranted by traffic performance is being coordinated with the City: *Monitor and adjust ramp meter rates at Fourth Plain Boulevard ramps, if/when these are installed in the future. Due consideration, but not equal weight will be given to the local system to minimize queuing from the ramp meter. Emphasis will be on avoiding significant adverse impacts and traffic operational failures on the freeway system. *Add a third lane westbound on 15th Street between Washington Street and Columbia Street. Adding the third through lane will allow the drop lane at 15th Street and Washington Street to become a left/through lane adding additional capacity to the 15th Street corridor. *Add a southbound right turn lane at 15th Street and Columbia Street *Add a third eastbound left turn at the Mill Plain interchange when needed in the future *Monitor and adjust ramp meter rates at Mill Plain Boulevard on-ramps, if/when these are installed in the future. Due consideration, but not equal weight, will be given to the local system to minimize queuing from the ramp meter. Emphasis will be on avoiding significant adverse impacts and traffic operational failures on the freeway system.	NEPA
Portland Local Street Performance				
*One intersection would operate unacceptably during am peak	L	1	The City of Portland would monitor traffic operations. Will pursue the following mitigation measures for the following	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			intersections: Going Street and Interstate Avenue: *Optimize light rail transit pre-emption at intersection. *Install advanced signal controllers to manage light rail transit pre-emption. *Change the westbound right lane into a through/right choice lane to allow traffic to continue westbound.	
Temporary Effects				
Traffic				
*Increased congestion on several major traffic facilities in the corridor including I-5 and, potentially, I-205	T	1	A variety of activities, ranging from scheduling construction activities to minimize conflicts during peak travel periods to using alternative construction techniques or equipment. Measures would be implemented as appropriate to mitigate the short-term traffic impacts, including: *Work with appropriate jurisdictions to obtain approval of traffic control plans and any necessary agreements *Develop during final design and maintain throughout construction a program of coordination with and outreach to affected business and community interests to oversee the development and implementation of a transportation management plan. This plan would address a variety of traffic, transit, and alternative mode strategies designed to minimize the transportation impacts of project construction. The plan would also identify detour routes *As part of the outreach program, establish a telephone complaint and information system to be staffed around the clock by personnel with authority to require the contractor to initiate immediate corrective action. *Wherever possible or practical, limit or concentrate work areas to minimize disruptions to vehicular traffic and bus and pedestrian circulation, as well as to business access. *Identify, provide and/or advertise temporary parking locations to replace parking temporarily displaced by construction. *Relocate affected loading zones, property accesses, bus stops, and other specially designated parking and access points before construction begins to allow new traffic patterns to be established *As appropriate, develop and implement functional and reasonable alternative construction techniques to minimize traffic impacts. *The project will maintain paratransit services for qualifying, mobility-impaired Hayden Island residents, and will maintain construction period shuttle service on the island when needed.	NEPA
*Impacts resulting from traffic relocations or detours	T	1		
*Full or partial street closures	T	1		
*Increased truck traffic associated with construction activity	T	1		
*Intrusion of non-local traffic into residential areas as a result of temporary street closures and traffic detours	T	1		
*Disruptions to vehicular and pedestrian access to businesses and community services *High levels of truck traffic are anticipated in connection with earthwork and the delivery of materials at the bridge crossings, freeway mainline segments, and interchanges.	T	2		
Transit				
*Temporary loss of on- or off-street parking	T	1	*Mitigation measures would be instituted where bus routes are impacted. *Working with the two transit agencies, Transportation Management Associations (TMAs), and other organizations,	NEPA
*Transit service delays	T	1		
*Relocation or temporary elimination of	T	1		

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
bus stops			the project would conduct a communications campaign to inform the public about these transit changes. Associated mitigation measures would be developed by the DOTs and transit agencies on both sides of the river. These agencies would communicate the new routing, the potential for more crowded buses and slower travel times, and mitigation measures through TV, radio, email, a web site, newspapers, and other multimedia instruments to broadcast rider alerts to potentially impacted customers. *The temporary effects of bridge and highway construction near downtown Vancouver would require mitigation for five C-TRAN bus routes: one local fixed route bus (4 – Fourth Plain), three limited stop peak period-only routes (41 – Camas/Washougal Limited, 44 – Fourth Plain Limited, and 47 – Battle Ground Limited), and one all day service express bus (105 – I-5 Express). These buses could use the Mill Plain Boulevard interchange exit to access downtown Vancouver. *If needed, an additional bus or two would be provided to maintain existing headways on Route 4 during the nighttime hours, and headways would be adjusted, as needed, where ridership demand allows. *A lane closure would have the potential to delay transit because it runs in general highway traffic along this section. If the lane closure occurs during the same time that the northbound ramp to downtown Vancouver is closed, then a second bus would be added, if needed, to compensate for the time required for the trip to Mill Plain Boulevard and back to lower downtown. *Light rail guideway construction could require rerouting the buses on Hayden Island. *The same communication campaign of rider alerts would be made for both C-TRAN and TriMet buses for all of these mitigation measures. *However, buses currently running south on Broadway would be permanently relocated to either Columbia or C Street. *The new routing through downtown Vancouver would receive new signs and temporary bus stops. Rider alerts would be made through a communications campaign via the Internet, email, and hard copy postings on buses and at service stops. *Bus routes needing temporary relocation would receive temporary benches and shelters at service stops, depending on the duration of relocation (any relocation greater than 6 months would warrant such treatments) and the number of boardings per day. *During construction, affected transit stops would be temporarily relocated to the nearest possible location on the same transit route without interfering with the construction process. *Temporary sidewalks and/or pathways would be provided to replace any sidewalks and/or trails adjacent to the project that are affected by construction. To help minimize on-street	
*Rerouting of bus routes	T	1		
*Deterioration in reliability for bus routes using affected roadways and facilities within the corridor	T	1		

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			parking impacts, temporary parking would be identified to mitigate the temporary loss of specific on-street parking due to construction. *Mitigated parking losses would include displaced spaces reserved for disabled motorists, spaces identified as critically important to businesses for which no reasonable alternative exists, and others. *Keeping businesses open and accessible during light rail construction would be a top priority of these agencies. During previous light rail transit construction projects, TriMet has kept construction disruption to a minimum while maintaining access to businesses, and has rapidly responded to concerns and potential issues. Mitigation of short-term impacts to businesses during transit construction can be accomplished through a number of activities.	
*Impacts to Bike/pedestrian mobility	T	1	*Coordination with jurisdictions and bicycle/pedestrian groups to disseminate information about construction, closures and detours *Temporary enclosures to maximize the safety of bicyclists and pedestrians traveling beneath structures under construction *Additional signage and/or lighting along popular bicycle and pedestrian routes that may experience an increase in vehicle traffic, and associated increased potential for vehicle and bicycle or pedestrian interactions, due to traffic detours. *Separate queuing space or lanes for bicycles, level non-skid crossings of steel plates, and traffic calming measures in work zones to improve safety for bicyclists. If it is not possible to establish bicycle lanes within the work zone, provide alternate routes	NEPA
3.2 Aviation and Navigation				
Aviation safety and security				
*Intrusion into Pearson Field airspace	L	1	*Roadway or accent lighting will be designed to limit light or glare that could affect air navigation. *The LPA would improve safety over the No-Build alternative, therefore no additional mitigation is necessary.	FAA Form 7460-1 Notice of Proposed Construction or Alteration
*Stormwater ponds and structures located within 5,000 foot zone around runways and may attract birds	L	1	*Stormwater ponds within 5,000 foot zone around runways would include features to discourage birds from utilizing the ponds. *Structures designed to minimize locations for birds to roost or nest.	
Temporary Effects				
*River navigation impacts due to blockages from construction barges and activities	T	1	*Construction staging would minimize adverse effects to river navigation. *Restrictions on river travel would be communicated in advance. *Public involvement and education programs to provide information to tug operators, pilots and general public. *Additional tugs may be needed to aid in temporary navigation. *Coast Guard will review plans through permitting process.	Section 9 Rivers and Harbors Act - USCG

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
*Tall cranes would intrude into Pearson Field airspace	T	3	*Obstruction marking and lighting to make construction equipment visible to aircraft.	FAA Form 7460-1 Notice of Proposed Construction or Alteration
*Construction dust or emissions could pose a short-term aviation hazard by reducing visibility	T	3	*Construction materials and activities would be managed to minimize dust, glare and smoke.	FAA Form 7460-1 Notice of Proposed Construction or Alteration
3.3 Property Acquisitions and Displacements				
Permanent property acquisitions both full and partial	L	1	*Purchase property or property right for fair market value as determined through an appraisal	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as amended (Uniform Act)
Permanent easements	L	1	*Purchase property or property right for fair market value as determined through an appraisal	Uniform Act
Displacement of publicly-owned facilities	L	1	*Relocation assistance or functional replacement	Uniform Act
Displacement of floating homes in North Portland Harbor	L	1	*The floating homes will be purchased at fair market value and the occupants will be provided relocation assistance that may include payments.	Uniform Act
Displacement of other residences	L	1	*Purchase property at fair market value and provide relocation assistance	Uniform Act
Displacement of 30+ businesses on Hayden Island	L	1	*Purchase property at fair market value and provide relocation assistance	Uniform Act
Displacement of Safeway on Hayden Island	L	1	*Purchase property at fair market value and provide relocation assistance	Uniform Act
Displacement of marine businesses on North Portland Harbor	L	1	*Purchase property at fair market value and provide relocation assistance	Uniform Act
Displacement of other businesses	L	1	*Purchase property at fair market value and provide relocation assistance	Uniform Act
Displacement of shared light industrial and residential uses in Ruby Junction	L	1	*Purchase property at fair market and provide relocation assistance *Possibly assist in search for suitable residential/industrial properties	Uniform Act
Accesses closed/modified on Broadway and Washington	L	1	*Most parcels have alternate access. If not adequate, it has been determined to be an acquisition or displacement. Purchase property at fair market value and provide relocation assistance.	Uniform Act
Temporary Effects				
*Blockage of property access during construction	T	1	*Provide continued access to properties during construction, maximized to the extent possible	Uniform Act
*Temporary use of property via	T	1	*Payment to property owners in exchange for the use of	Uniform Act

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
easements			their property during construction	
*Use of large off-site staging and casting area	1	T	*Contractor would likely lease site from owner	None
3.4 Land Use and Economic Activity				
Business displacements and access modifications	L	1	*See Property Acquisitions section*	Uniform Act
Increased operating costs for truck movement due to tolling	L	1	No mitigation designated or required.	
Loss of existing commercial and residential uses on Hayden Island	L	1	*(see property acquisition and displacement mitigation)* Mitigating circumstances include project support for redevelopment through: *Provision of light rail station *Completion of Tomahawk Island Drive *Addition of direct access to island	
Loss of parking	L	1	*See Transportation section*	
Indirect Effects				
*Likely to redistribute a relatively small amount of future growth in jobs and housing to the I-5 corridor	L	2	Not an adverse effect. Sprawl unlikely to occur from project given toll, LRT, other project elements and context. No additional mitigation required by project but continued local and regional planning and growth management are important factors.	NEPA
*Development transitions from auto-oriented to transit-oriented on Hayden Island	L	2	No mitigation needed. This effect is consistent with existing plans and policies. Cities can implement these policies to further encourage compact mixed-use development and trainsit-oriented growth.	City of Portland Codes Title 33 and Vancouver Municipal Code Title 18
Temporary Effects				
*Loss of easy access to some businesses during construction; potentially reduced patronage during construction due to reduced access and visibility	T	2	Programs to help businesses during construction: *Maintaining access to businesses *Signs to identify the location of access points to businesses *Business planning assistance *Contractors coordinate schedule, pace and order of construction to minimize impact to nearby businesses *Identify local businesses to provide services during construction Mitigation by others: *City of Vancouver is establishing a Growth and Transportation Efficiency Center which could develop and administer a construction communication and mitigation plan *Tri-Met and C-TRAN: Small business assistance, Marketing and retail consulting, Promotions to generate patronage in construction areas	NEPA
*Effects to freight during construction	T	2	*At least one river navigation channel would remain open during construction *Signs would be posted to encourage commercial freight vehicles not serving destinations in the Portland-Vancouver I-5 corridor to shift from I-5 onto I-205 during construction.	NEPA
3.5 Neighborhoods and Environmental Justice				
Impact of toll collection system (transponders) for low-income travelers	L	1	A variety of methods would improve low-income drivers' access to transponders used by the electronic tolling	NEPA, EJ EO

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
and limited-English-proficiency travelers. Also, toll is higher portion of income for low income drivers but this is offset by project benefits. Neither of these is a disproportionate high and adverse effect.			system. For the CRC project, mitigation for low-income and minority populations that need to purchase transponders would include: *Providing information about transponders in multiple languages. *Public buildings, including city and county offices, will be used to allow lower income and minority communities to acquire transponders. *Enabling people without credit cards or checking accounts to obtain transponders by paying with cash or Electronic Benefit Transfer (EBT) (Quest) cards, which are issued for federal program benefits. WSDOT has coordinated closely with other agencies in Washington State, and the EBT, Quest cards can be used for transponder acquisitions. ODOT will work to enable the Oregon Trail Cards to be used for transponder acquisition in Oregon. *Sharing information with and through other public service providers. *Training social service workers with information about the tolling system	
Displacement of Safeway and bottle return center	L	1	*See Property Acquisitions section regarding Safeway displacement* *Provide on-site notice and information regarding the closure of the bottle return center, including directions to other locations on the island that accept returns, and directions to larger, off-island bottle return centers.	Uniform Act
Displacement of service industry jobs due to displacement of businesses	L	2	*These impacts will also be offset by a combination of factors including the approximately 20,000 jobs (job-years) associated with constructing the LPA, some of which will be created to provide basic services (such as those displaced) to construction employees. Additionally, the Hayden Island Plan reflects a planned redevelopment on the island, to which the new light rail station will significantly contribute. The surrounding redevelopment will likely include retail and food service establishments providing similar jobs to those displaced by the LPA. *Mitigation for loss of service industry jobs would consist of programs developed prior to construction to promote the use of local workers by utilizing apprenticeships and job training programs. Federal funding does not allow for preferential treatment of local firms in contracting. However, the project will provide outreach to local contractors and job training programs. A monitoring and evaluation program would be necessary to track these measures through final design, construction, and operation for the facilities to ensure the benefits of promoting participation from minority-owned businesses are realized.	
Adverse impact to an EJ population due to the Ruby Junction expansion which displaces homes and home-based businesses. This impact would include disproportionate numbers of minority	L	1	*See Property Acquisitions section*	Uniform Act

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
households.				
Displacement of floating homes in North Portland Harbor	L	1	*See Property Acquisitions section*	Uniform Act
Displacement of homes and businesses in Vancouver	L	1	*See Property Acquisitions section*	Uniform Act
Increased transit noise on streets with residences	L	1	*See Noise section*	NEPA
Increased traffic noise in neighborhoods	L	1	*See Noise section*	NEPA
Impacts to Marshall Community Center and Park and Luepke Senior Center	L	1	*See Park and Recreation section*	NEPA
Displacement of existing buildings and surface parking within the Clark College Annex area and displacement of some trees and landscaping	L	1	*See Public Services section*	NEPA
Impacts to Waterfront Park	L	1	*See Parks and Recreation section*	NEPA
Loss of community resources and neighborhood cohesion	L	1	*DOTs will work with Tri-Met to maintain the existing bus service that regularly connects Hayden Island with nearby grocery and other retail services. This would include additional routing on the island to provide greater transit access during construction. *DOTs will work with Tri-Met to maintain paratransit service for qualifying, mobility impaired Hayden Island residents.	
Temporary Effects				
*Construction effects to neighborhoods and EJ populations	T	1	*Provide effective detours that minimize out-of-direction travel and delays for travelers, and minimize cut-through traffic. *Maintain transit service where possible throughout the construction phase. *Use best management practices to reduce noise, dust, and vehicle emissions during construction. *Use existing or newly acquired right-of-way for construction staging to minimize additional temporary property acquisitions. *Communicate information and obtain feedback about construction activities, impacts and mitigation throughout neighborhoods, including focused outreach to limited-English-proficiency populations.	NEPA
3.6 Public Services and Utilities				
Displace ODOT permit center	L	1	*Relocation or possible functional replacement	Uniform Act
Displace Clark Public Utilities building near SR 14	L	1	*Acquisition and relocation assistance or functional replacement	Uniform Act
Displace parking, landscaping, illumination and electronic swing gate at FHWA offices	L	1	*The DOT will restripe the existing parking lot and will work with the City to encourage restriping the on-street parking on 5th Street to further replace lost parking spaces.	Uniform Act
Displace Clark College Annex structures, parking and landscaping	L	1	*Landscaped screening buffer between the new park and ride and the fields, and a pedestrian connection from the parking area to the fields.	Uniform Act
Impacts to intersections on critical access	L	1	*LPA would improve overall local street traffic.	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
routes			*Mitigation for intersections as described in Transportation section	
Indirect Effects				
*TOD development could occur sooner as a result of constructing the LPA, therefore implementing elements of individual service plans such as changing service boundaries may occur sooner than the long range plans anticipated *Specific TOD activity could result in increased congestion on the critical emergency access routes causing indirect adverse effects on response times of public services	L	3	*No mitigation needed *Anticipated density increase in downtown Vancouver and on Hayden Island is consistent with current long-range plans and growth assumptions, the project will not impact individual long-range service plans	NEPA
Temporary Effects				
*Construction-related congestion on I-5 and local streets	T	2	*Provide information regarding construction to service providers. *During construction, as emergency responders monitor response times, if unacceptable delays are occurring due to construction, WSDOT and/or ODOT will meet with emergency service representatives to address construction concerns and develop solutions for better detour route communication. *The DOTs will coordinate with emergency service providers to maintain emergency access during construction and through construction zones.	NEPA
*Utilities may be affected by construction	T	2	*To maintain services, temporary utility relocation and/or staging, and sequencing provisions for the construction of new structures and demolition of the existing structures would need to occur prior to the start of project construction.	NEPA
*Service outages during construction.	T	3	*Work closely with utility service providers to reduce the number and extent of service outages during construction or relocation activities, and to provide advance notice when such outages might occur.	NEPA
3.7 Parks and Recreation				
Permanent acquisition of 4.2 acres of parks and recreation resources, including 1.4 acre from VNHR, 1.0 acre of Clark College recreation fields, 0.6 acre of Marshall Community Park, including 0.1 acre of FLP land, 0.4 acre of Waterfront Park, 0.3 acre of Kiggins Sports Fields, 0.3 acre of Leverich Community Park, Less than 0.1 acres of temporary use at East Delta Park.	L	1	*Purchase property at fair-market value per the Uniform Act *Return 6(f) parkland temporarily occupied during construction to its original condition and recreational utility or better. Make sure nonconforming temporary use lasts less than 180 days (6 months) or a permanent acquisition will occur. Document agreement between FHWA and PP&R that impact does not constitute a conversion. *Replace FLP parkland acquired with adjacent substitution parcel of equivalent or greater market value and recreational utility. *Transfer portion of vacated state right-of-way beneath the existing I-5 bridge landings in Vancouver for City's planned Waterfront Park redevelopment. Allow City to use portion of the state right-of-way beneath the new bridge and freeway for basketball courts (that will remain in agency ownership),grading of areas where former bridge structure is	Uniform Act; Section 4(f) of USDOT Act; Federal-Lands-to-Parks; Section 4(f) of USDOT Act (23 CFR 774); RCO Manual 7/ Section 4(f) of USDOT Act

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			removed, as well as other measures to support City's planned redevelopment of Waterfront Park.	
Reduction of on- and off-street parking for park and recreation visitors, including at Marshall Community Center, Marshall Park, Luepke Senior Center, Clark College Recreation Fields	L	1	Restripe parking lot to provide for lost spaces or change access points to allow for drop off areas *Provide signage indicating parking at Marshall Park is reserved for patrons of the park. *Potential shared use agreement for park-and-ride *Increased access via light rail	NEPA; Section 4(f) of USDOT Act (23 CFR 774)
Park and Ride at Clark College may increase traffic, noise, littering and other unwanted activities	L	1	Design the Clark Park and Ride to benefit adjacent park and recreation resources, such as providing new bicycle and pedestrian connections, and minimize unwanted impacts such as increased noise, loitering, vandalism, or litter.	NEPA; Section 4(f) of USDOT Act (23 CFR 774)
Increased noise levels at some parks	L	1	*See Noise section.*	NEPA
Removal of trees and vegetation from parks in Vancouver	L	1	*Tree replanting and revegetation-in most cases trees will be replanted in the same or similar location as the trees removed, where possible	City of Vancouver Tree Removal permitting process
Changes in views to and from parks	L	1	*See Visual section.*	NEPA
Displacement of Public Art from Waterfront Park	L	1	*See Visual section.*	NEPA
Permanent realignment of 550 feet of trails	L	1	*Trail access and continuity would be restored and replaced. There would be an overall improvement in trail access and facilities.	NEPA; Section 4(f) of USDOT Act (23 CFR 774)
Indirect Effects				
*Potential for additional residents and employees of new development to increase demand on existing and planned parks and recreation facilities.	L	3	*No project mitigation for this impact; increased employment and residential densities are consistent with local plans and zoning; revenue or fees from new development could help fund new park and recreation facilities.	NEPA
Temporary Effects				
*Temporary property easements for construction access	T	1	*Compensate owner and/or restore site after use	NEPA
*Increased noise, glare, dust, and vibration during construction.	T	1	*See Visual, Noise and Vibration, and Air Quality sections.*	
*Construction-related changes to access or traffic operations (closures, detours, and congestion) could delay or deter park users.	T	1	*Provide adequate signage for any limited or closed access points and detour routes. *Possible adoption of a joint public information campaign with parks jurisdictions for some of the longer closures. *Maintain safety for bicyclists and pedestrians traveling on trails and between facilities with temporary protection *Additional signage and lighting possible.	
*Changes in views from parks during construction	T	1	See Visual section.	
*Bridge construction activities would temporarily restrict some recreational use of the river.	T	1	*River users would be provided with a safe passage or detour.	
*Trees and vegetation in construction	T	1	*Tree replanting and revegetation; protection of trees that	VMC

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
area would be removed during construction			are close to construction activities but not displaced (per VMC 20.770.090).	20.770.090
*Traffic rerouting could increase traffic along Columbia Way and Lower River Road	T	3	*Additional signage and lighting.	NEPA
*Traffic rerouting could pose an increased risk to bicyclists traveling along these popular routes	T	3	*Maintain safety for bicyclists and pedestrians traveling on trails and between facilities with temporary enclosures or clear passage.	
3.8 Historic and Archaeological Resources				
Removal of 1917 NRHP-listed Bridge	L	1	*Extensive documentation, interpretation, marketing plan.	Section 106 of NHPA
Removal of Pier 99 Building in Oregon	L	1	*Extensive documentation, interpretation, marketing plan.	Section 106 of NHPA
Vancouver National Historic Reserve (and associated district) [land acquisitions, visual, noise, cultural landscape)	L	1	*Funding to rehabilitate building 405 for curation facility/museum. Landscaping and screening in Village area, sound walls/structures.	Section 106 of NHPA
Visual impact to Clark County Historic Museum (Carnegie Library at 1511 Main St)	L	2	*The design of the nearby Park and Ride facility will be compatible with the Carnegie Library.	Section 106 of NHPA
Noise impacts to NRHP-eligible homes on 17th Avenue.			*Provide residential sound insulation which will potentially include window improvements and air conditioning. Secretary of Interior standards for rehabilitation will be followed for any NRHP-eligible structures.	Section 106 of NHPA and NEPA
Temporary Effects				
*Disruption to downtown Vancouver may have an effect on the economic viability of the historic commercial buildings. During construction the economic viability of the businesses in the downtown historic buildings would likely diminish because of access and parking issues	T	1	*See Land Use and Economic Activity section*	NEPA
*Potential for construction-related impacts to two historic structures: the Barracks Hospital building and Clark County Museum	T	2	*Construction-related vibration will be actively measured and monitored to avoid levels that could cause building damage	
*Potential for construction-related impacts to VNHR [noise, night-work lighting]	T	1	*Cultural Resources MOA will include recommended management practices intended to mitigate temporary noise and light impacts	
*Temporary construction easements for construction throughout the project area	T	1	*Project anticipates that the construction specifications would require that properties be restored to landowners in the same condition after construction is complete	
*Construction could impact archaeological resources	T	2	*Advance testing of landforms identified as having the potential for supporting archaeological remains and monitoring during project construction *Testing for archaeological sites potentially buried in the deep sediments that have accumulated along the south shore of the Columbia River *Disposition of any artifacts or samples recovered during	

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			archaeological investigations or during construction will be determined in consultation with agencies, property owners, and appropriate tribes, with consideration given to feedback from other interested parties. *Curation of recovered materials is an essential element of archaeological investigations and is required as part of federal and state permitting processes.	
3.9 Visual and Aesthetics				
General intrusion of CRC project on views	L	1	The following techniques would be employed to improve or offset the visual effects of the CRC project. Plans and specifications to be determined during final design: *Planting vegetation, street trees, and landscaping for screening or visual quality. *Designing landscape plans and other visual treatments consistent with adopted guidance and plans *Shielding station and facility lighting from nearby residences and the night sky. *Minimizing structural bulk, such as for ramps and columns. *Minimizing the number of pier columns in the SR 14 interchange design. *Designing architectural features to blend with the surrounding community context. *Placement of public art (to be relocated when necessary and added as part of transit stations and gateways). *Integrating lighting with facilities in a manner that produces a positive visual and aesthetic impact, reduces night sky light pollution, reduces possible light trespass into residential units, and contributes to crime prevention through environmental design (CPTED). *Utilization of the UDAG Design Guidelines, as well as those of both Cities, the transit agencies, and the VNHR. *Selecting new and replacement pole and utility cabinet locations, colors, and styles in relation to their context and in accordance with municipal lighting standards.	NEPA
Columbia River				
*Visual change due to higher bridges and ramps; removal of bridge towers	L	1	*The proposed bridge design would present less visual clutter for skyline or horizon views while maintaining the drama (vividness) that large-span bridges add to views. A potential lighting scheme, to be determined in final design, would contribute to vividness in the corridor; with indirect lighting, it would help to minimize light trespass.	NEPA
*Addition of piers for collector-distributer bridges and light rail transit bridge in North Portland Harbor	L	1		
Vancouver National Historic Reserve				
*Specific views would experience a high degree of change, including views from the Hudson's Bay Company Village and Post Hospital	L	1	*Collaborate with NPS on screening and landscaping plan for Village area. See above regarding Community Connector.	NEPA
Light Rail in Vancouver. Visual impacts along transit alignment in Vancouver expected to be low				
*Light rail stations, facilities would visually alter existing views on streets.	L	1	*Each transit station would be designed with consistent design treatments that tie facilities together. Each transit	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
*Visual character of 17th Street would change noticeably by addition of light rail			station and park and ride will be the subject of a design process incorporating relevant guidelines, which will include UDAG guidelines, design guidelines from both Cities, the VNHR, C-TRAN, the Central Park Plan, downtown stakeholders, and the general public.	
Transit bridge "landing" in Vancouver: The landing would require a very large, solid footing that would occupy much of a block of Washington Street	L	1	Would include robust landscaping, public art, or other façade treatments for the walls of the structure	
Park and Rides				
*Clark park and ride structure would be inconsistent with mid-rise buildings of nearby campus	L	1	*Will meet city design guidelines *The public and technical process would inform decisions on façade treatments, landscaping, lighting, and the mix of uses	NEPA
*Mill Plain park and ride would be inconsistent with existing single-story surroundings, but consistent with the projected levels of development in the Vancouver City Center Vision Plan	L	1		
*Columbia park and ride would be consistent with surrounding area	L	1		
Highway Footprint				
*On Hayden Island, the LPA's highway's mainline footprint will be significantly wider than existing facility.	L	1	*The final design of the Hayden Island interchange would support and be consistent with the City of Portland's Hayden Island Plan, utilize the UDAG design guidelines, and incorporate the results of local design charrette(s) that will be conducted during final design phase.	NEPA
*In Vancouver, right of way is only slightly wider than existing; visual experience to and from the highway would be substantially altered as sloped landscaped edges become landscaped walls.	L	1	*A lid over I-5 (the Community Connector) has been conceptually developed as part of the project. With the lid, the change in visual character and quality would be substantially different from the existing views. The experience for I-5 motorists will also be very different. Though the Connector is not mitigation itself, its design and feature will enhance the visual experience for motorists and pedestrians.	
Indirect Effects				
*Potential development could have beneficial or adverse impacts on historic properties	L	3	*See Historic and Archaeological Resources section* *Since indirect impacts on views are anticipated to be neutral or positive, no additional mitigation is necessary.	NEPA
Temporary Effects				
*Construction related equipment visible	T	1	*Locate construction equipment and stockpile materials in less visually sensitive areas, when feasible, and in areas not visible from the road or to residents and businesses in order to minimize visual obtrusiveness	NEPA
*Vegetation removed for construction	T	1	*Revegetation	
*Lighting for nighttime construction could affect residential areas	T	1	*Shield construction site lighting to reduce spillover of light onto nearby residences and businesses.	

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
*Off-site Staging, Port of Vancouver Parcel 1A-low degree of visual change	T	1	*Shielding of construction site lighting to reduce spillover of light onto nearby residences and businesses. *Locating construction equipment and stockpiling materials in less visually sensitive areas, when feasible, and in areas not visible from the road or to residents and businesses in order to minimize visual obtrusiveness	NEPA
*Off-site Staging, Red Lion Hotel site-moderate degree of change	T	1		
*Off-site Staging, Old Thunderbird Hotel-high degree of change	T	1		
3.10 Air Quality				
Carbon monoxide and nitrogen oxide emissions in Subarea 2 (SR 14 to SR 500) would have less reduction than the No-Build Alternative	L	1	There would be no violations of air quality standards. Long-term air quality impacts are not expected to occur as a result of the project, and mitigation for long-term impacts is not proposed.	National Ambient Air Quality Standards (NAAQS) and State Implementation Plans (SIPs)
Hotspot analysis: The Mill Plain Boulevard and I-5 interchange would have higher carbon monoxide concentration than No-Build (but still below national standard)	L	1	No violations of the NAAQS were shown for the LPA	National Ambient Air Quality Standards (NAAQS) and State Implementation Plans (SIPs)
Indirect Effects				
*Expected to result in minor redistribution of future population and employment growth from outlying areas to the I-5 corridor. This would be expected to reduce total VMT and reduce regional emissions, but could result in minor localized increases in emissions where development densities increase.	L	3	On a regional basis, long-term air quality impacts are not expected to occur as a result of the project, and mitigation for long-term impacts is not proposed.	NEPA
Temporary Effects				
*Generation of dust from construction activities, direct exhaust emissions from construction equipment, and exhaust emissions from a temporary increase in congestion on the mainline highway and local streets in the project area. Traffic congestion increases idling times and reduces travel speeds, resulting in increased vehicle emission levels.	T	1	*Construction mitigation would focus on controlling dust and exhaust emissions from demolition and construction activities and on minimizing the effects of traffic congestion. The contractor would be required to develop a pollution control plan that includes documentation of operational measures that would be used to reduce emissions. Section 290 of the ODOT standard specifications describes requirements for environmental protection, including air pollution control measures. *Contractors are required to comply with ODOT standard specifications (Section 290) for dust, diesel vehicles, and burning activities described above. Section 290 requires contractors to comply with Oregon Revised Statutes (ORS) 468 and 468A, Oregon Administrative Rules (OAR) 340-014 and OAR 340-200 through OAR 340-268, and all other applicable laws. In order to control dust, the project will require all contractors to develop and implement a dust	Section 290 of the ODOT standard specifications and ORS 468 and 468A, OAR 340-014 and 340-200 through 340-268. Washington Administrative Code (WAC) 173-400-040

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			control plan and to maintain air quality permits on all portable equipment. *Follow ODOT's specifications for truck staging areas for diesel-powered vehicles--should be located where truck emissions have a minimum impact on sensitive uses such as residences, schools, hospitals and nursing homes. Trucks and other diesel-powered equipment will limit idling to 5 minutes when the equipment is not in use or in motion or in a limited set of additional circumstances. *In Vancouver, Washington Administrative Code (WAC) 173-400-040 places limits on fugitive dust that causes a nuisance or violates regulations. In addition to compliance with the WAC, WSDOT will voluntarily comply with ODOT standard specifications related to air quality for work performed in Washington.	
			*Diesel construction vehicles and equipment will use ultra-low sulfur diesel or will otherwise comply with any new regulations in place at the time of construction. In addition, the DOTs are evaluating potential additional emission control technologies for construction equipment. The DOTs will continue to monitor and evaluate changes in technology and related regulations. Decisions regarding any additional emission controls will be made during final design.	
			WSDOT and ODOT will work with neighborhoods and vulnerable populations to address their air quality concerns as the project moves into final design and then into construction.	NEPA
*Off-site staging and casting: Construction of concrete structures or asphalt paving activities may require equipment or operations that will emit pollutants	T	I	Stationary sources, such as concrete mix and asphalt plants, are generally required to obtain an Air Contaminant Discharge Permit from either DEQ or SWCAA and to comply with regulations for controlling dust and other pollutant emissions.	Air Contaminant Discharge Permit from either DEQ and/or SWCAA
3.11 Noise and Vibration				
Highway noise impacts	L	I	Noise walls, where reasonable and feasible, along highway right of way	23 CFR 772, WSDOT Traffic Noise Analysis and Abatement Policy and Procedures, ODOT Noise Manual
Moderate transit noise impacts to floating homes	L	1	Sound barriers along portions of the elevated local multimodal bridge structure where noise impacts would occur.	FTA Transit Noise and Vibration Impact Assessment Report
Moderate transit noise impacts to single family residences, including warning bell at crossing gate	L	1	*Residential sound insulation *Warning bell equipped with direction shrouds *Track curves with a radius of 300 feet or less, or where otherwise needed, equipped with wayside lubricators	FTA Transit Noise and Vibration Impact

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
				Assessment Report
Transit vibration impacts	L	1	*Rail boots installed along the entire embedded track portion of alignment *Minor modifications to the existing rail track and electrical system on the Steel Bridge	FTA Transit Noise and Vibration Impact Assessment Report
Temporary Effects				
*General construction can result in noise and vibration effects to surrounding receivers near project area	T	1	Whether in Oregon or Washington, contractor will comply with ODOT standard specifications relating to noise, including: *Limitation of hours and days on which construction is performed *Equipment using sound-control devices *Equipment comply with EPA noise standards *Strategic placement of material stockpiles If specific noise complaints are received, contractor may be required to: *Locate stationary construction equipment as far from nearby noise-sensitive properties as feasible. *Shut off idling equipment. *Reschedule construction operations to avoid periods of noise annoyance identified in the complaint. *Notify nearby residents whenever extremely noisy work will be occurring. *Install temporary or portable acoustic barriers around stationary construction noise sources. *Operate electrically powered equipment using line voltage power rather than generators. In addition to the noise mitigation measures found in ODOT's standard specifications (above), additional noise mitigation measures will include *more restrictive hours and days on which construction is performed *Construction log that records equipment used and type of activity that might help with potential noise effects *Establishment of a complaint hotline *Use broadband back-up alarms, or restrict the use of back-up beepers during evening and nighttime hours, and use spotters	WAC 173-60, Section 290 of the ODOT standard specifications, Portland Municipal Code, Vancouver Municipal Code
*Vibration generated by general construction can result in vibration effects to surrounding receivers.	T	1	Contractor will perform vibration monitoring of all activities that might produce vibration levels at or above 0.5 inch per second whenever there are structures located near the construction activity. If vibration levels approach this standard, alternate construction methods will be employed to avoid vibration-related damage.	NEPA
3.12 Energy				
LPA is expected to reduce energy consumption compared to No-build	L	1	Due to its operational improvements and reductions in travel demand, the LPA lowers long-term energy consumption; therefore, mitigation measures to reduce	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			long-term effects would not be warranted.	
Indirect Effects				
*Increase in TOD expected to reduce energy consumption due to transit ridership	L	3	Since energy consumption is expected to decrease due to indirect effects, no additional mitigation is necessary	NEPA
Temporary Effects				
*LPA construction would require 11.48 million mBtus of energy	T	1	A variety of measures would reduce energy consumption during construction. As the project advances in design and more detail becomes available, additional analysis will help further identify specific measures and approaches for reducing energy consumption during construction. Potential measures include: *Construction materials reuse and recycling. *Encouraging workers to carpool or use transit. *Turning off equipment when not in use to reduce energy consumed during idling. *Maintaining equipment in good working order to maximize fuel efficiency. *As practical, routing truck traffic through areas where the number of stops and delay times would be minimized, and using off-peak travel times to maximize fuel efficiency. *As practical, scheduling construction activities that would temporarily hinder traffic flow during off-peak hours when traffic volumes are considerably lower. *As practical, scheduling construction activities during daytime hours or during summer months when daylight hours are the longest to minimize the need for artificial light.	NEPA
3.13 Electric and Magnetic Fields				
Operation of light rail would increase EMF in rail right-of-way, near substations, and in light rail vehicles.	L	1	The levels of anticipated EMF are below exposure standards for both the workplace and general public. Thus, mitigation would not be necessary. However, because light rail electric power substations tend to generate the highest EMF intensities in the field measurements, the substations have been designed and sited to minimize exposure to users of the system, the general public, and sensitive land uses.	NEPA
Indirect Effects				
*Mixed-use development near substations may have indirect effect of new sensitive uses locating near substations	L	3	Although the potential for sensitive users to locate near substations in the future is difficult to quantify, the substation locations are located adjacent to transportation facilities, and not developable parcels, and therefore mitigation at this time is not necessary.	NEPA
Temporary Effects				
*Construction of the LPA would produce modest amounts of EMF, since EMF from construction is expected to be modest, and below exposure standards, no mitigation is necessary.			None	

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
3.14 Water Quality and Hydrology				
Water Quality				
*The LPA would slightly increase pollution generating impervious surface area, but greatly decrease the amount of untreated impervious surface area. The LPA would decrease anticipated pollutants entering all surface water features in the project area compared to the No-Build Alternative, with the exception of dissolved copper at the Columbia Slough which may experience a slight increase (0.01 to 0.02 lbs per year)	L	1	*Project incorporates stormwater management and treatment prior to being infiltrated or released to surface water. *Project will complete all necessary permits *Some or all of the water quality BMPs from ODOT's stormwater quality memo will be included in the CRC project *Revegetation of construction easements and other areas after the project is complete	Section 401 (Clean Water Act). NPDES. Local stormwater management guidelines.
Hydrology				
*Encroachment in floodplains *New roads within the project area would either be elevated above the floodplain or would avoid floodplains altogether. *No structures would be placed within the 100-year floodplain of Fairview Creek at the Ruby Junction Maintenance Facility.	L	1	*Flood-rise impact to the Columbia River is expected to be negligible, but a flood-rise analysis will be conducted during the final design to calculate the impact of the piers in the water. If necessary, mitigation would be identified to negate flood rise impacts.	Executive Order 11988
Indirect effects				
*The anticipated redistribution of jobs and housing demand will be regionally small but could be locally notable in LRT station areas. Most of this is expected to occur on already developed properties. Where it would occur on undeveloped properties, receiving waters may be affected through the addition of impervious surface.	L	3	No mitigation required by project. Any new development or redevelopment will be regulated by local, state and federal requirements to protect water quality and avoid flooding impacts.	Federal, state, and local regulations
Temporary Effects				
Temporary in-water impacts				
*Construction of bridge piers could increase turbidity	T	1	*Use cofferdams for shallow pier construction to decrease turbidity.	Section 404 and Section 401 (Clean Water Act)
*Construction of bridge piers could disturb existing pollutants	T	2	*Low probability of disturbing contaminated sediments, but they will be tested and if found, removed if necessary.	
*Construction of bridge piers could introduce new pollutants to waterways	T	2	*To prevent new contaminants from entering waterways, full containment of hazardous materials and green concrete will occur	
Temporary upland, below-grade construction				
*Dewatering can increase the likelihood of existing contaminants migrating through the groundwater and potentially into surface waters	T	3	*Sites with existing soil or groundwater contamination near construction areas have been identified and will be further studied and tested before any groundwater pumping occurs, in order to avoid causing such contamination to spread.	CERCLA. Section 401 (Clean Water Act). OAR 340. WAC 173.

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
Temporary ground disturbance				
*Due to the generally flat topography, construction of LPA is not likely to cause substantial amounts of erosion. However, construction activities can increase soil erosion; if runoff contains extra sediment from erosion, waterways can become turbid and can build up excessive sediment deposits. Main risk is at the I-5/SR 500 interchange near Burnt Bridge Creek.	T	1	*National Pollutant Discharge Elimination System (NPDES) *Construction Stormwater Discharge Permits would regulate the discharge of stormwater from construction sites. These permits include discharge water quality standards, runoff monitoring requirements, and provision for preparing a Stormwater Pollution Prevention Plan (SWPPP). *The SWPPP would contain all the elements of a Temporary Erosion and Sediment Control Plan (TESCP) and Spill Prevention Control and Countermeasures Plan (SPCCP). *The contractor would meet the requirements of and follow the process described in ODOT Standard Specifications Section 00280.30 and/or WSDOT Standard Specification 8-01.3(1)B. *The erosion and spill control lead would be listed on the Emergency Contact List as part of ODOT Standard Specifications Section 00290.20(g) and/or WSDOT Standard Specification 1-05.13(1). The ESC lead would also be responsible for ensuring compliance with all local, state, and federal erosion and sediment control requirements *All TESCP measures would be inspected as prescribed. Contractor would follow maintenance and repair as described in ODOT Standard Specifications Section 00280.60 to 00280.70 and/or WSDOT Standard Specification 8-01.3(15).	NPDES. City of Portland Codes (CPC) Title 10 and Vancouver Municipal Codes (VMC) Chapter 14.24.
Temporary: Off-site staging and casting				
*May increase stormwater runoff and may increase pollutant levels in the runoff	T	1	*See mitigation measures above: NPDES, SWPPP, TESCP, SPCCP*	See regulatory drivers above
3.15 Wetland and Jurisdictional Waters				
Direct impact to wetland buffers and environmental zones at Victory Interchange, Kiggins Bowl, and Burnt Bridge Creek	L	1	*In Oregon, if the CRC project is not exempt from environmental zone regulations (33.430.080) and the project does not meet the City of Portland's development standards (33.430.140 through .190), environmental review and mitigation will be required by the City. The mitigation site plan must demonstrate that the mitigation will replace all of the resources and functions affected, and will be within the same watershed as the affected environmental zone (unless another location better achieves the mitigation objectives), and that a suitable mitigation site is owned by the applicant. *In the project area in Washington, wetland buffers are regulated by the City of Vancouver under its critical areas protection ordinance. Compensatory mitigation is required to address affected functions by achieving a functional equivalency or improvement and providing a similar wetland or buffer function. Approval criteria require no net loss of functions or values for any activity impacting a critical area.	Clean Water Act, City of Portland environmental zone regulations, City of Vancouver critical areas protection ordinance.
Possibility of impact to potential Vancouver Way Wetland.	L	2	If LPA Option A is advanced into final design, ODOT and FHWA will secure right-of-entry to the property containing the potential Vancouver Way Wetland in order to confirm the presence or absence of a wetland at this location. If presence is confirmed, then the project would comply with	Clean Water Act, City of Portland environmental zone

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			the relevant regulatory and permitting requirements, including avoiding, minimizing, and mitigating wetland impacts.	regulations, Oregon Removal/Fill law.
New permanent bridge piers in the Columbia River and North Portland Harbor would cover an area of 1.40 acres and displace a volume of 47,400 cubic yards. Demolition of the existing bridges in the main stem of the Columbia River would result in removal activity in approximately 0.64 acres of waterway and 44,300 cubic yards of material, for a net 0.76 acres of river impacted and 3,100 cubic yards water displaced by the LPA. In addition, the project may impact roadside ditches that may be considered jurisdictional.	L	1	*Include mitigation and conservation plans and actions to identify and implement habitat protection, restoration, and enhancement as appropriate. These actions are intended not only to compensate for unavoidable impacts of bridge construction and demolition to species, habitats, and resource sites, but to achieve a "net conservation benefit." *In Oregon, the Hood River Off-Channel Reconnection Project is planned as compensatory mitigation for temporary and permanent impacts to the Columbia River. In Washington, the Lewis River Confluence Side Channel Restoration Project is planned. *Mitigation for impacts to jurisdictional ditches, if any occur, will likely involve reconstruction of the ditches and revegetation with native plants.	Clean Water Act, Oregon Removal/Fill law, Washington Hydraulic Project Approval, Washington Shoreline Management Act
As with the existing bridge piers, replacement bridge piers in the Columbia River for the LPA may result in long-term impacts to aquatic species, including protected fish species.	L	2		
Indirect Effects				
Although the project is not expected to generate any substantial new demand for development outside established urban areas, it could indirectly induce at least some development on currently undeveloped properties that contain wetlands, and could therefore result in indirect impacts to wetlands or wetland buffers.	L	3	This kind of induced development is likely to be very low, and to the extent it occurs, it would be subject to federal and state regulations that require avoidance, minimization, and mitigation for wetland impacts. Therefore, little or no long-term decreased wetland habitat function or disruption of wetland flow patterns would be expected to occur as a result of indirect effects of the LPA.	Federal, state, and local regulations
Temporary Effects				
Temporary impacts to wetlands buffers and waterways are more likely to occur at locations where long-term impacts are anticipated. Temporary impacts may include impacts to roadside ditches that may be considered jurisdictional.	T	2	*Replacement of vegetation that is cleared for construction activities; mitigation will occur in accordance with local regulatory guidance. *Temporary disturbances to wildlife activity, hydrology, and water quality would be avoided as much as possible through the use of best management practices such as silt fences, construction fencing, and wildlife exclusionary netting during the construction process. Mitigation for these impacts will likely involve reconstruction of the ditches and revegetation with native plants.	City of Portland Environmental Zone regulations. City of Vancouver Critical Areas Ordinance
The staging and casting/assembly sites may contain wetlands and activities may increase stormwater runoff over existing conditions and may increase pollutant loading.	T	2	The development and use of any staging and casting sites would meet all applicable stormwater requirements during and following utilization of the sites. All necessary permits would be secured prior to site development and operations, and the project would be required to avoid, minimize and mitigate wetland impacts, if any would occur.	Federal, state, and local regulations

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
3.16 Ecosystems				
The LPA is expected to have long-term beneficial effects on aquatic resources compared to the No-Build Alternative, primarily through improvements to water quality.	L	1	*Since LPA would improve water quality, no additional mitigation is necessary	City of Portland Environmental Zone regulations. City of Vancouver Critical Areas Ordinance. Section 401 and 404 of the Clean Water Act. Washington Hydraulic Project Approval. Endangered Species Act.
*Larger piers would continue to provide cover for predatory fish and displacement of shallow water habitat (although the project would provide a net gain in shallow water habitat)			*Discouraging predator use of piers and promoting aquatic habitat conservation efforts. *A Hydraulic Project Approval (HPA) issued by WDFW, a Removal-Fill Permit issued by DSL, and a Section 404 permit issued by USACE under the Clean Water Act will likely require mitigation actions for construction activities that will affect fish and shellfish habitat of state waters. *Long-term impacts to terrestrial and riparian resources will be addressed through avoidance and minimization measures and replanting vegetation.	
*Existing bridge habitat for Peregrine falcons would be removed (although no long-term adverse effects on the overall viability of the species in anticipated)				
*The project will be constructed in areas that have protected habitat (Washington Priority Habitat, Vancouver Critical Areas, Metro Title 13, and City of Portland E-zones), however, the additional acreage should not adversely affect the overall function of terrestrial and riparian habitat or the long-term sustainability of plant and animal species in the project area. The project will be mostly constructed over existing roadways or within existing rights-of-way.				
Indirect Effects				
*Most of the induced development is expected to occur in downtown Vancouver and on Hayden Island and would be subject to relevant environmental laws, regulations, policies, and codes in force at the time. This would help to minimize or mitigate adverse effects of such actions on resources important to juvenile salmonids and other aquatic species, including shorelines, wetlands, stream banks, and their buffers.	L	3	*No project mitigation required. Development and redevelopment, including removal or renovation of existing in-water structure and near-shore development, would comply with the relevant laws, regulations, policies, and code in force at the time of the action. The development and redevelopment would likely trigger the need to upgrade to existing stormwater treatment regulations. Local regulations require the avoidance or minimization of impacts to protected resources. With implementation of regulations, adverse impacts to existing resources would likely be small.	Federal, state, and local regulations
Temporary Effects				
*In-water construction of bridge piers could stir up sediments from the riverbed, which would increase turbidity and adversely affect fish. *Cofferdams installed to isolate work areas around bridge piers would temporarily displace aquatic habitat. *Underwater noise from impact pile driving and heavy machinery could injure or kill nearby fish.	T	1	*NPDES Construction Stormwater Discharge Permits would regulate the discharge of stormwater from construction sites. These permits include discharge water quality standards, runoff monitoring requirements, and provision for preparing a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would contain all the elements of a Temporary Erosion and Sediment Control Plan (TESCP) and Spill Prevention Control and Countermeasures Plan (SPCCP) *Turbidity caused by any activity inside the cofferdams would be contained within the cofferdams	NPDES. City of Portland Environmental Zone regulations. City of Vancouver Critical Areas Ordinance. Section 401

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
*Underwater and in-air noise impacts to sea lions may include disturbance and behavioral effects *Temporary in-water construction platforms and work barges could shade a total of 108,000 square feet of the river, providing potential cover for fish species that prey on salmon *Construction-related contaminants could enter the water during this work *Disturbance from construction activities could kill fish, delay migration, or lower reproductive success. *Benthic organisms could be displaced from the river bed during in-water construction work, but are likely to return rapidly once that work is over. *Riparian vegetation, including herbaceous plants, shrubs, and small trees that are present, may be trampled or removed during project construction. *The existing bridge provides habitat for some migratory birds, including peregrine falcons; this habitat would be removed or disturbed during construction of the LPA or the other build alternatives			*Immediately after isolation and dewatering of the in-water work area, isolated fish would be captured and released. Contractor would provide a qualified fishery biologist to conduct and supervise fish capture and release activity to minimize risk of injury to fish, in accordance with ODOT SP 00290.31 (i) or its equivalent and/or the 2006 WSDOT Fish Exclusion Protocols and Standards or its equivalent. *The contractor would prepare a Water Quality Sampling Plan for conducting water quality monitoring for all in-water project activities. *All pumps would employ a fish screen that meets the specifications included in the NMFS fish screen criteria. *To avoid and minimize noise impacts from in-water work, the following measures would be employed during construction: • Use drilled shafts to support the permanent in-water piers. • In waters with depths of more than 0.67 meters, employ a bubble curtain or other attenuation to reduce noise impacts from pile driving. • Establish maximum acceptable sound levels for impact pile driving and monitor for compliance. • Time noise producing activities to minimize impacts to fish. • Establish measures to reduce impacts from temporary pile removal; for example, remove temporary piles with a vibratory hammer rather than intentionally breaking by twisting or bending.	and 404 of the Clean Water Act. Washington Hydraulic Project Approval. Migratory Bird Treaty Act. Federal, state, and local regulations
*Construction noise, lights, and vegetation removal could negatively affect terrestrial species and birds, including negatively affecting wildlife passage. *Vegetation removal is likely along the existing roadway, especially near interchanges where alterations are planned			*Best management practices such as erosion control to protect sensitive riparian and terrestrial habitat and replanting of vegetation. *Revegetate and remove noxious weeds, as determined through the formal permitting process *Time construction activities to minimize impacts to migratory birds. Use exclusionary measures or other methods of preventing active nesting, as-needed.	
*Because the off-site staging and casting site selected would be adjacent to the water, it would have the potential to impact the same species as would bridge construction, as well as other species that may be unique to the particular sites.	T	2	*The development and operations of the assembly/casting yard would be subject to the same federal and state environmental regulations that apply to other aspects of project construction, as well as any other federal, state, or local regulations that may apply to the particular site. All necessary permits would be secured prior to site development and operations.	Federal, state, and local regulations
3.17 Geology and Soils				
Steep slopes, soils and landslide				
*The steep slopes found within the Burnt Bridge Creek area have landslide potential.	L	1	*The LPA would include a number of retaining walls or other techniques to stabilize the existing steep slopes in this area, reducing soil erosion and lowering the potential for slope failure. *Avoid conducting construction activities on steep slopes identified in the Burnt Bridge Creek drainage area, if possible. *Site-specific assessments would include additional	Federal, state, and local building codes or standards.

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
			geotechnical drilling, test pitting, material testing, geophysical techniques and/or inclinometers, and monitoring well installation.	
Geologic resources				
*The LPA will use top soil, fill, aggregate, quarry rock, concrete, and asphalt resources. Some will consist of new mined or quarried materials.	L	3	*To the extent practicable, recycle or reuse aggregate, quarry rock, asphalt, and concrete materials generated by project-related demolition and construction activities.	NEPA
Groundwater resources				
*Subsurface structures may change localized groundwater movement	L	3	*To the extent practicable, locate stormwater treatment facilities away from City of Vancouver well head protection zones for Water Stations 1 and 3.	NPDES. Safe Drinking Water Act. City of Vancouver VMC Chapter 14.25 and 14.26, Water and Sewers.
Ruby Junction expansion-minimal hazard impacts				
*Significant slope adjacent to the Ruby Junction expansion area could pose potential landslide concerns, particularly in the event of an earthquake. However, the Ruby Junction site is located in earthquake Zone D, the lowest relative earthquake hazard	L	3	*Further assess existing geologic hazards such as, but not limited to, faults, ancestral landslides, steep cut slopes, and soil liquefaction during the final engineering stage of the project. Site-specific assessments should include additional geotechnical drilling, test pitting, material testing, geophysical techniques and/or inclinometers, and monitoring well installation	NPDES. City of Gresham stormwater management requirements. Federal, state, and local building codes or standards.
*Expansion is not expected to adversely affect any geologic or groundwater resources	L	3	*The stormwater runoff from all impervious areas in the expansion area would be infiltrated to groundwater, and will protect and/or improve the quality and quantity of existing groundwater flows.	
Indirect Effects				
*The LPA may facilitate and accelerate development particularly near the LPA's light rail stations possibly causing increased development in earthquake hazard areas and a potential improvement to groundwater quality through improved stormwater management. The greatest risk from earthquakes in the project area occurs along the banks of the Columbia River and North Portland Harbor	L	2	*No project mitigation needed. Mitigation by others for indirect effects: New and retrofitted buildings and structures would need to be built to current seismic safety standards, potentially increasing overall public safety and decreasing the likelihood of structural damage and economic disruption.	NPDES. Federal, state, and local building codes or standards.
Temporary Effects				
*The LPA will conduct excavation, fill, drilling and grading during construction. Without mitigation, this would result in temporary soil erosion, sedimentation, and impacts to stormwater, surface water, and groundwater quality within the	T	1	*Implement erosion control and stormwater pollution prevention plans during construction.	NPDES. City of Portland Codes (CPC) Title 10 and Vancouver Municipal Codes (VMC)

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
main project area.				Chapter 14.24.
*Temporary effects from contaminated soils, sediments, and groundwater may occur, including the potential sites for staging and casting.	T	1	*See Hazardous Materials, below, for discussion of mitigation for potential temporary effects related to contaminated soils, sediments, and groundwater.	
3.18 Hazardous Materials				
*Acquisition of property may result in an increased liability for existing hazardous materials in the project area	L	1	*Due diligence before acquiring property, including property transaction screening and Phase I and Phase II Environmental Site Assessments, as appropriate	CERCLA
Stormwater conveyance system and treatment facilities				
*Groundwater and surface water quality can be diminished by petroleum, salts, and other materials contained in stormwater runoff from roadways and bridges. Compared to the No-Build alternative the LPA would have beneficial effects to the environment in regards to stormwater quality.	L	1	*Stormwater would be managed and treated prior to being infiltrated or released to surface water *Stormwater monitoring plan *Stormwater management design	NPDES. Local stormwater management guidelines.
Two legacy hazardous materials sites, the Boise Cascade cleanup site and the Harbor Oil Superfund Site, are located within the main project area. Regulatory agencies may require these sites, or newly identified sites, to conduct long-term cleanup actions, and these actions may affect project operations and maintenance. In special cases, cleanup of hazardous materials sites, independent of the CRC project, could require ongoing access across the highway or transit way, for example, for trucks carrying loads of contaminated soil from the site to an off-site disposal area. Such activities have the potential to have long-term impacts on any of the CRC build alternatives.	L	3	*Construction health and safety plans *Spill control and prevention plans *Contaminated media management plans *Lead and asbestos surveys	NEPA
*The LPA includes the expansion of light rail maintenance infrastructure at the TriMet Ruby Junction Maintenance Facility in Gresham, Oregon. This expansion would include 15 property acquisitions. State regulatory information sources indicate that one of these properties is listed in environmental databases. Potential effects may include cleanup and liability issues related to property acquisitions.	L	2	*Due diligence before acquiring property, including property transaction screening and Phase I and Phase II Environmental Site Assessments, as appropriate	CERCLA
Indirect Effects				
*LPA could indirectly facilitate and accelerate residential and commercial development, the potential for indirect	L	3	No project mitigated needed. Mitigation by others: *New development would be required to remediate known or discovered hazardous materials on-site, indirect land use	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
adverse effects related to contaminated soils during construction of this new development are higher for the LPA than for the No-Build Alternative			changes under the LPA are likely to have long-term beneficial effects on hazardous materials.	
Temporary Effects				
*Potential for accidental exacerbation of existing hazardous materials sites during construction.	T	1	*Construction stormwater pollution prevention plans *NPDES construction general stormwater permits *Stormwater conveyance system and treatment facilities monitoring plan *Construction health and safety plans *Spill control and prevention plans *Contaminated media management plans *Lead and asbestos surveys *Well decommissioning: Identified wells within the project footprint, if any, will be decommissioned prior to construction, consistent with OAR 690-220. *Focused Site Assessments (Phase I ESA, Phase II ESA, property transaction screen)	NPDES. CERCLA. TOSCA. CWA. OAR 340. WAC 173. Safe Drinking Water Act. City of Portland Codes (CPC) Title 10 and Vancouver Municipal Codes (VMC) Chapter 14.24. OAR 690-220, Abandonment of Water Supply Wells and City of Portland Title 21.35, Well Head Protection.
*Potential for accidental release or generation of hazardous materials during construction	T	2	*Construction health and safety plans *Spill control and prevention plans *Contaminated media management plans *Lead and asbestos surveys	NPDES. RCRA. TOSCA. OAR 340. WAC 173.
*Casting and Staging Sites: potential for increased liability for existing hazardous materials in the project area or accidental exacerbation of existing hazmat sites	T	1	*Due diligence before acquiring property--Phase I and, if necessary, Phase II Environmental Site Assessment *See Mitigation measures for Potential for Accidental Exacerbation of Existing Hazardous Materials Sites During Construction	CERCLA
3.19 Cumulative Effects				
Property Acquisitions				
The highest potential for cumulative acquisition-related impacts of concern is on Hayden Island, where the LPA would acquire floating homes and relocate businesses. Effects on the floating home residents may be exacerbated by unrelated future land use changes on Hayden Island and shortages in the supply of available moorage space, as state and federal regulations make it difficult to permit new moorages. Unrelated, future land use changes could also result in business displacements.	L	1	*See discussion under 3.3, Acquisitions, above*	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
The City of Portland recently completed a plan for the island that allows for substantial changes to the island's development, which could result in significant changes in the land use and business mix on the island.				
Neighborhoods				
The LPA would displace businesses, including Hayden Island's only existing grocery store and pharmacy (Safeway). If not replaced, this would be an impact to the neighborhood, as residents would have to travel off of the island to purchase groceries or prescription drugs.	L	1	*See discussion under 3.5, Neighborhoods and Environmental Justice, above*	NEPA
Climate Change				
Although the LPA would have lower overall greenhouse gas (GHG) emissions relative to the No-Build Alternative, vehicle emissions will still contribute to climate change. Scientists anticipate that as atmospheric concentrations of greenhouse gases (GHGs) continue to rise in the coming decades, average global temperatures and sea levels will continue to rise as a result and precipitation patterns will change. These changes may alter the frequency and intensity of storm events that could pose risks to a project.	L	1	No additional GHG reduction is required. Project will reduce emissions compared to No-Build. The project will use the following strategies to adapt to the effects of climate change: *Avoid fragmentation and degradation of floodplain hydrology *Maximize restoration of unused impervious areas to natural, permeable, and vegetated conditions and use infiltration as a stormwater management tool *Bridge design that considers the projected rise in the Columbia River's high water levels.	NEPA, SEPA
Archaeological Resources				
The construction of the CRC project is highly likely to encounter historic and could encounter prehistoric archaeological resources. Recent archaeological investigations demonstrate the potential for encountering archaeological remains associated with early residences, businesses, and industries, as well as Native American use.	L	1	*See discussion under 3.8, Historic and Archaeological Resources, above.*	NEPA
Ecosystems				
The impacts resulting from the project are small, but historic development and expected growth throughout the region will likely continue to have impacts on ecosystems	L	1	*See discussion under 3.16, Ecosystems, above.*	NEPA
Wetlands				
Impacts from the CRC bridge piers would include minor fill to the Columbia River. The transit and highway improvements	L	1	*See discussion under 3.15, Wetlands, above.*	NEPA

Impact from the LPA	L/T	Cert	Mitigation or Compensation	Regulatory Driver
would impact the buffers of three wetlands.				
Irreversible and Irretrievable Commitments of Resources				
*The proposed transportation improvements would involve a long-term conversion of land resources to provide right-of-way for the LPA. *Fossil fuels used to power construction and daily vehicle operation and used in the manufacture of construction materials are the major nonrenewable resources that would be consumed by the construction of the proposed project and the resulting daily vehicle operations. *Construction would also require a substantial one-time expenditure of both state and federal funds that are not retrievable.	L	1	*Although these transportation facilities conceivably could revert to urban land and open space, there is no reason to expect that such a conversion would be necessary or desirable. No mitigation required.	NEPA
Temporary Construction Effects				
Cumulative impacts during construction could result if other projects in the area are constructed at the same time or nearly the same time as CRC project construction. Simultaneous or sequential construction projects can increase congestion, employment and spending, community impacts, and natural resource impacts. The construction of CRC is likely to overlap with construction of many foreseeable future projects.	L	1	Bridge construction activity for this project will be coordinated with other in-water work that could occur simultaneously	NEPA