

Company: Spectra Energy Transmission (Westcoast)
Project Name: Wyndwood Expansion Project

Interactions Table

Element	Interaction	Description of Interaction(s)	Status of Element-specific study or survey	Description of Potential Effects	Mitigation will be implemented to resolve potential adverse effect	Specify the Mitigation	Residual Effects after Mitigation	Description of the Cumulative Effects	Monitoring Plan/Details
Physical and Meteorological Environment	Y	Construction could result in localized soil loss, altered terrain, and altered drainage patterns from wind and water erosion. The Project will not affect the meteorological environment. Extreme weather events may affect the Project and are discussed under Effects of the Environment on the Project.	Complete	Effects to the physical environment are addressed in Soil and Soil Productivity. Potential effects of extreme weather events are covered in Effects of the Environment on the Project.	Y	See Soil and Soil Productivity for mitigations (Section 7.4, Wyndwood) and the Geotechnical Report	Y	None	See Soil and Soil Productivity and the Environmental Protection Plan (EPP) for monitoring plans
Soil and Soil Productivity	Y	The Project is located within both privately-owned agricultural land on Agricultural Land Reserve (ALR), and outside ALR, under pasture and hayland cultivation; and forested Crown land (non-agricultural). The soils in the Project Development Area (PDA) are primarily moderately well to well-drained, moderately calcareous, medium-textured Brunisols, with gleyed variants in imperfectly drained areas. Gravelly soils and bedrock within trench depth was encountered on colluvial slopes and till in forested areas. Project interactions that may alter soil productivity will occur during: stripping, grading and trenching, vehicle and equipment movement, trench dewatering or release of hydrostatic test fluid onto land, diversion of surface waters, backfilling, recontouring and reclamation, integrity digs, and accidental spills or discovery of existing contamination.	Complete	Changes in agricultural capability on agricultural land and soil productivity on forested Crown lands may occur due to: <ul style="list-style-type: none">Admixing of surface soils during soil salvage, trenching and backfillingRutting or compaction of soils from vehicle and equipment trafficWind or water erosion of soils that are cleared of vegetation, stockpiled during construction, or due to alterations in drainage patternsChanges in soil moisture due to alteration in groundwater flow due to the pipe, mud disposal site excavation, or in surface flows following regradingContamination due to fuel leaks from equipment and vehicles or accidental drilling mud release or spills, or due to movement of previously contaminated soil from existing disturbances to uncontaminated areas.	Y	To mitigate admixing where practical: <ul style="list-style-type: none">In agricultural lands, topsoil will be stripped to the depth indicated on alignment sheets and stored along the right-of-way (ROW)Trench-width stripping will be used on well-sodded pastureWhere grading is required in non-ALR land, the upper surface material (10-20 cm) consisting of approximately 50% organic matter (duff layer) and 50% mineral soil, will be stripped and stored along the ROW. To mitigate erosion, compaction or rutting where practical: <ul style="list-style-type: none">Topsoil stripping and/or replacement will be suspended during excessive wet weather or high winds to prevent loss of topsoil, per the Extreme Weather Contingency Plan.Traffic will be confined to work space areas, access roads, and trails identified and marked by surveyors in order to reduce compaction.Working during and immediately after intense rainfall events or spring thaw will be avoided.Initial clean-up activities including soil stabilization and erosion protection measures will commence as soon as possible after backfilling.Revegetation will be initiated as soon as possible after machine clean up.	Y	None	Monitoring/ inspection for soil erosion, topsoil replacement and soil capability will occur during construction and operations according to the specific measures in the environmental protection plan (EPP).

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Soil and Soil Productivity (cont'd)						<p>To mitigate changes in soil moisture where practical:</p> <ul style="list-style-type: none"> The trench will be backfilled and compacted in a manner that limits any below grade settlement. Trench plugs and/or sealing of the trench bottom will be implemented as necessary. Mud disposal, site decommissioning, backfilling and grading will be conducted in such a manner that subsidence does not result in a depression that may collect surface water (per BC OGC 2012) At clean up, surface drainage will be restored across the work area while maintaining the integrity of the trench and surface erosion control. <p>To mitigate contamination where practical:</p> <ul style="list-style-type: none"> The Contaminated Soils Contingency Plan will be implemented in the event contaminated soils are suspected during construction. Refueling of equipment will occur only at designated sites using shut-off valves and drip trays. The Spill Prevention and Response Plan will be implemented. No desiccants or drying agents will be used in pipeline test water. 			
Vegetation	Y	<p>Land cover in the local assessment area (LAA) includes disturbed and undisturbed forests, wetlands, riparian areas and agricultural lands. Deciduous forests and herb communities are the dominant land cover types in the LAA with coniferous, low shrub and wetland communities a minor component.</p> <p>Approximately 160.4 hectares (ha) of vegetation will be cleared.</p> <p>The Project has the potential to interact with plant species and ecological communities of interest through vegetation clearing and soil disturbance.</p>	Complete	<p>Potential Project effects to vegetation include: i) change in abundance of plant species of interest ii) change in the abundance or condition of ecological communities of interest and iii) change in wetland functions.</p> <p>Direct effects on vegetation species and ecological communities of interest have the potential to affect plant species and ecosystem diversity across the landscape and to affect wetland functions.</p> <p>Indirect effects on vegetation and plant communities may also occur through changes in surface and subsurface hydrology, or soil conditions. These indirect effects have the potential to alter plant species assemblages and ecological communities.</p>	Y	<p>To mitigate change in abundance of plant species of interest where practical:</p> <ul style="list-style-type: none"> Stake and flag locations of plant species at-risk if found. Avoid unnecessary vegetation loss in areas around the PDA by adhering closely to construction plans and limiting off-site machine use to defined areas. Limit the extent of grubbing and clearing of shrubs and herbaceous species where practical. Maintain populations of plants of cultural, economic or social importance where practical. Topsoil will be stripped from ROW or other work areas, stored and returned during clean-up in accordance with mitigation measures outlined in Table 7-2, Table 7-10, and 7-16 of the EPP. All heavy equipment will arrive on site clean and free of soil or vegetative debris to reduce the spread of invasive plant propagules and seeds. Signs will be posted at areas identified as having noxious weed infestations prior to start of construction. Noxious weeds will be managed as required. 	Y	<p>Project will result in a minor contribution to a decrease in plant species and ecological communities of interest in the regional assessment area (RAA) due to vegetation clearing.</p> <p>There is no reasonable expectation that the Projects incremental contribution to cumulative effects will affect the sustainability of plant species, ecological communities of interest within the RAA</p>	<p>Monitoring for invasive plant species infestations will occur during construction, operations and post-construction as per the Environmental Manual for Construction Projects in Canada (EMCPC) (2014), and the project EPP Table 6-3.</p> <p>Post construction monitoring of Pyrolla elliptica population as per ESA Section 9.4.1 and post-construction monitoring of wetlands as per ESA Section 9.3 Table 9-11 and EPP Table 6-3.</p>

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Vegetation (cont'd)						<ul style="list-style-type: none">• Topsoil piles will be monitored for weed growth during the course of construction and corrective measures implemented to avoid infestation as required.• If seed mixes are used, use Certified No. 1 seed where practical, unless for a chosen reclamation seed species.• If practical, native species will be used in seed mixes. To mitigate change in the abundance or condition of ecological communities where practical: <ul style="list-style-type: none">• Wetlands will be avoided where practical.• Work site dimensions will be reduced to limit disturbance to vegetation in riparian communities where practical.• Clearly delineate the boundaries of wetlands where practical in proximity of planned disturbances to facilitate avoidance during construction.• Confirm presence/absence of ecosystems at risk within clearing areas, stake boundaries and limit disturbance to these ecosystems where practical.• Where practical, maintain buffers at wetlands and riparian ecosystems as prescribed in Section 8.0 Fish and Fish Habitat and in Sections 6 and 7 of the EPP.• Removal of trees and land clearing or disturbance will be limited to the PDA.• Limit the extent of grubbing and clearing of shrubs and herbaceous species where practical.• Topsoil will be stripped from ROW or other work areas, stored and returned during clean-up in accordance with mitigation measures outlined in Table 7-2, Table 7-10, and 7-16 of the EPP.			

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Water Quality and Quantity	Y	<p>The Project is located in the Peace River Regional District (PRRD), within the Pine River watershed. The proposed route crosses 31 watercourses.</p> <p>The Project has the potential to interact with water quality through the following Project construction and operation activities: clearing, grubbing, grading and trenching near watercourses, construction of vehicle and pipeline watercourse crossings, trench backfilling, reclamation and vegetation maintenance near watercourses, and hydrostatic testing of pipeline.</p> <p>The Project has the potential to interact with water quantity through hydrostatic testing of pipeline.</p>	Complete	<p>Soil erosion from in-stream, riparian and upland construction sources may adversely affect water quality through introduction of sediment, resulting in increased turbidity. Discharge of water used for hydrostatic testing may also cause erosion and sedimentation. This water may also degrade water quality due to the presence of residual hydrocarbons and metals in test water.</p> <p>Hydrocarbon spills from construction equipment may affect water quality if they occur near watercourses.</p> <p>Water withdrawal for hydrostatic testing may alter water levels.</p>	Y	<p>The following measures will be implemented to mitigate changes to water quality where practical:</p> <ul style="list-style-type: none"> • Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. • Inspect measures regularly during construction and make necessary repairs if any damage occurs. • Implement a water quality monitoring program during instream works and Horizontal Directional Drilling (HDD). If monitoring reveals total suspended solids (TSS) and/or nephelometric turbidity units (NTU) are approaching threshold values, the Environmental Inspector (EI) and construction personnel will work to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until environmentally effective solutions can be identified and the EI indicates that work can continue. • If spoil is likely to be highly saturated, a pit will be excavated or berms of packed earth will be constructed to prevent spoil from flowing back into the watercourse. Containment berms and spoil will be located outside the riparian buffer zone. • Parking or stationing vehicles or equipment that contain petroleum, oil, or lubricants in a watercourse will be avoided at all times, except for equipment that is required for that immediate phase of construction. • Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water. 	Y	Project will make a minor contribution to the alteration of water quality in the RAA.	Monitoring /inspection will occur during construction as specified in the mitigations.

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Fish and Fish Habitat	Y	<p>The Project is located in the PRRD, within the Pine River watershed. The proposed route crosses 31 watercourses, 12 of which are fish-bearing.</p> <p>The Project has the potential to interact with fish and fish habitat through the following Project construction and operation activities: clearing, grubbing, grading and trenching near watercourses, construction of vehicle and pipeline watercourse crossings, trench backfilling, reclamation and vegetation maintenance near watercourses, and hydrostatic testing of pipeline.</p>	Complete	<p>One potential effect on fish and fish habitat is on fish habitat. Instream works may affect fish habitat through removal of cover such as large woody debris (LWD), boulders, undercut banks or instream vegetation. Clearing of riparian vegetation during pipeline installation and operation can also adversely affect fish by:</p> <ul style="list-style-type: none"> Reducing available cover from predators Eliminating temperature-regulating shade from streamside vegetation Decreasing nutrient inputs to the stream from insect and leaf litter drop. <p>The second potential effect on fish and fish habitat is a change in fish health or mortality risk. Direct effects to fish health and mortality may result from disruption of flows during instream works. Increased turbidity during instream works may affect mortality risk through: gill membrane irritation or damage; reduced feeding efficiency, reduced predator avoidance, reduced growth rate; and impaired alevin development. Effects to fish health and mortality may also result from:</p> <ul style="list-style-type: none"> Incidental entrainment of fish in pumps or impingement on pump intake screens Damage to swim bladders by use of explosives in or near water. 	Y	<p>To mitigate changes in fish habitat due to reduction of cover where practical:</p> <ul style="list-style-type: none"> Grubbing, stripping, and grading on approach slopes of watercourses will be limited to the amount required for safe passage of equipment, excavation of the trench, and installation of the pipeline. Grading of the primary banks of watercourses will be delayed until immediately before construction of the crossing, where practical. Disturbed banks and riparian areas will be seeded with a cover crop or native seed mix where practical. The EI will determine onsite whether other restoration methods need to be applied to stabilize banks (e.g., soil wraps, brush layers, matting). The bed and banks of each watercourse will be returned as close as possible to their original pre-construction contours and hydraulic characteristics. Contractors will weld, coat, and weight the watercourse crossing portion of pipe prior to starting instream ditching activities. To reduce the length of time of instream activity, contractors will make every effort to ditch, lower-in, and backfill watercourse crossings during the same working day (Spectra 2014; CAPP, CEPA, and CGA 2012). The upper 0.5 m (minimum) of granular material will be salvaged, if present. Salvaged, native granular material will be used to cap the upper portion of the trench. Existing road access will be used where available, and appropriate vehicle or equipment access (e.g., temporary clear span bridges) will be constructed across watercourses. The pipeline footprint will be narrowed through the riparian area, where possible. If the stream banks are unstable, clearing equipment will not be permitted within the riparian buffer, as directed by the EI. Trees, shrubs, or herbaceous vegetation will not be removed within the stream bank area unless necessary during construction. Wind firm trees with roots embedded in the bank will be retained, where practical. At sites where blasting occurs within the stream channel, the stream channel and bed will be restored to the same specifications as for other trenched crossings. 	Y	<p>Cumulative effects to instream habitats from pipeline watercourse crossings are anticipated to be low in magnitude. Residual effects of the Project on riparian habitats may act cumulatively with other Project activities in the RAA. Although incremental riparian habitat alteration associated with past, current and future developments will occur, the relatively small losses of riparian vegetation is not anticipated to reduce the long-term productivity of fisheries in the RAA.</p>	<p>Monitoring /inspection will occur during construction as specified in the water quality and quantity section. Revegetation monitoring will occur during operations.</p>

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Fish and Fish Habitat (cont'd)						<p>To mitigate changes in fish habitat due to changes in water quality where practical:</p> <ul style="list-style-type: none">• Water quality will be monitored during instream works and trenchless method (i.e., HDD or Direct Pipe™) installation. If monitoring reveals TSS/NTU values are approaching threshold values, the EI and construction personnel will work to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until environmentally effective solutions can be identified and the EI indicates that work can continue.• If spoil is likely to be highly saturated, a pit will be excavated or berms of packed earth will be constructed to prevent spoil from flowing back into the watercourse. Containment berms and spoil will be located outside the riparian management area.• Parking of stationing vehicles or equipment that contain petroleum, oil, or lubricants in a watercourse will be avoided at all times, except for equipment that is required for that immediate phase of construction.• Washing, refueling and servicing of machinery and storing of fuel and other materials for the machinery will be done in such a way as to prevent any deleterious substances from entering the water (DFO 2013c). <p>To mitigate changes in fish health and mortality where practical:</p> <ul style="list-style-type: none">• The intakes of pumps required for dewatering will be operated in a way that prevents streambed disturbance and screened in fish-bearing waters as per DFO's Freshwater Intake End-of-Pipe Fish Screen Guidelines (DFO 1995).• Fish salvage will be conducted, where appropriate, before construction activities commence.• In fish-bearing streams where spawning habitat is present, construction will occur within windows of least risk for instream works, and will be planned in a manner that limits the duration of instream work.			

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Fish and Fish Habitat (cont'd)						<ul style="list-style-type: none">• Construction within or adjacent to fish-bearing streams will be avoided during unusually wet, rainy or winter thaw conditions, where practical. During blasting near water, the following measures will be implemented (DFO 2013c):<ul style="list-style-type: none">– Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows (BC OGC 2015).– Isolate the work site to exclude fish from within the blast area by using cofferdams or aqua dams.– Backfill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.– Place blasting mats over top of holes to reduce scattering of blast debris around the area.– Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products.– Remove all blasting debris and other associated equipment/products from the blast area.– Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting.– Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations.– Backfill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.– Place blasting mats over top of holes to limit scattering of blast debris around the area.– Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products.– Remove all blasting debris and other associated equipment/products from the blast area.			

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Wetlands	Y	The Project has the potential to interact with 1.4 ha of wetlands through vegetation clearing and soil disturbance.	Complete	The potential Project effect on wetlands is a change in wetland function. Direct effects on wetlands result from vegetation clearing and soil disturbance. Indirect effects on wetland function may result through changes in surface and subsurface hydrology, or soil conditions. Direct and indirect effects on wetlands have the potential to alter the hydrologic, biochemical and habitat function of wetlands.	Y	<ul style="list-style-type: none"> Wetlands will be avoided where practical. Clearly delineate the boundaries of wetlands in proximity of planned disturbances to facilitate avoidance during construction. Where practical, maintain and protect the integrity of areas within a 20 m buffer of wetlands and riparian areas. Avoid unnecessary vegetation loss in areas around the PDA by adhering closely to construction plans and limiting off-site machine use to defined areas. Limit the extent of grubbing and clearing of shrubs and herbaceous species where practical. Topsoil will be stripped from ROW or other work areas, stored and returned during clean-up in accordance with mitigation measures outlined in Table 7-2, 7-10, and 7-16 of the EPP. Refueling and lubrication of equipment will be conducted a minimum of 100 m away from any wetlands where practical. Extra work areas (such as staging areas and additional spoil storage) will be avoided in wetlands. Any additional working area, if required, will be located a minimum of 20 m away from wetland boundaries. Bell holes will be pumped onto stable well-vegetated areas or constructed containment areas in a manner that does not cause erosion or sedimentation of a wetland. Discharge locations will be pre-determined and monitored by the EI to limit the potential for flooding or erosion. 	N	<p>Project will make a minor contribution to a decrease in wetland area in the regional assessment area (RAA) due to vegetation clearing.</p> <p>There is no reasonable expectation that the Project's incremental contribution to cumulative effects will affect the sustainability wetlands within the RAA.</p>	Post-construction monitoring will be conducted to verify that identified wetlands are restored to typical baseline conditions and function.

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Wildlife and Wildlife Habitat	Y	<p>The LAA contains a mix of industrial and forestry development, the existing T-North pipeline system and its associated CSs, and undisturbed forests and wetlands. The dominant land cover types within the LAA are herb, broadleaf open and coniferous open, comprising 71% of the total area of the LAA. The Project will result in the direct loss of habitat ranging from 1 to 140 ha, depending on the focus species.</p> <ul style="list-style-type: none"> The following construction and operation activities could have an effect on wildlife and wildlife habitat: surveying, clearing and grubbing, topsoil salvage and grading, vehicle and pipeline stream crossings, stringing and trenching, lowering-in and tie-in, backfilling, clean-up and reclamation, ROW inspection, and vegetation maintenance. 	Complete	<p>Change in habitat availability as a result of:</p> <ul style="list-style-type: none"> Direct loss, alteration, and fragmentation of wildlife habitat Indirect loss of habitat due to sensory disturbance. <p>Change in mortality risk as a result of:</p> <ul style="list-style-type: none"> Vegetation clearing Increased traffic Attraction to facilities and other human activities Encounters with vehicles, equipment, or Project components (e.g., trenching). <p>Change in movement patterns due to the potential creation of impermeable or semi-permeable barriers across wildlife movement corridors.</p>	Y	<p>To mitigate changes to habitat availability where practical:</p> <ul style="list-style-type: none"> ROW will be aligned to follow and share space with existing disturbances as much as possible. All construction activities will be restricted to the designated ROW and approved work space and access roads. The extent of clearing will be limited and existing habitat conditions preserved wherever and whenever practical. Environmentally sensitive features (e.g., nests, mineral licks, dens, wetlands) will be flagged or fenced off in the field before clearing and construction. Major game trails will be cleared of brush piles and felled trees where practical. To avoid effects to mineral licks, maintain 100 m buffer, where practical, from April to October (BC OGC 2016b). If it is not possible to maintain 100 m buffer during this period, additional mitigation measures, such as maintaining trees to provide a buffer, or snow fencing erected between ROW and mineral lick to prevent encroachment by construction crews. Previously unidentified sensitive habitat features will be reported and appropriate mitigation implemented. Equipment used for construction and operation activities will be maintained in good working order and properly muffled to reduce air pollution and unnecessary noise. Intermittent temporary workspaces will be allowed to regenerate. Blasting will not occur when caribou, or other larger mammal (e.g., grizzly bear), are seen in the immediate blast area. As a general rule, areas to be blasted will be monitored and if large mammals are present, blasting will be delayed. Westcoast has developed a Caribou Habitat Restoration Plan (CHRP) (Appendix I of EPP) that will include construction and post-construction mitigation measures to avoid and/or limit habitat loss, and restore on-site conditions when working within caribou herd range. Westcoast will develop a monitoring program using an adaptive management framework to monitor the implementation and effectiveness of the mitigation measures. 	Y	<p>Project will make a minor contribution to the ongoing alteration of habitat in the RAA. There is no reasonable expectation that the Project's incremental contribution to cumulative effects will affect the long term persistence or viability of any wildlife species within the RAA.</p>	<p>Monitoring /inspection of identified wildlife and wildlife habitat will occur during construction activities.</p>

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Wildlife and Wildlife Habitat (cont'd)						<ul style="list-style-type: none">• A phased construction schedule approach will be implemented to limit construction activities during the late winter and calving critical period identified for caribou (January 15 to July 15, BC MFLNRO 2014)• An EI will be on-site during construction.• Periodic reviews of the caribou telemetry locations provided by BC MFLNRO will occur prior to and during Project activities to avoid conducting activities when and where caribou are present. Where telemetry data suggest caribou are within 1 km of planned Project activities, the activities will be rescheduled to avoid disturbing caribou during the identified critical period.• Avoid routing and disturbance within 250 m of a caribou mineral lick and wildlife trails connecting to mineral licks, where practical (BC MFLNRO 2014).• Avoid routing and disturbance, including aerial activities, within 500 m of designated caribou habitat areas where practical (e.g., HEWR).• Provide gaps and breaks along the ROW facilitating caribou movement.• Shrubs (non-preferred browse for moose and deer) and trees at least 1.2 m tall will be planted in strategic locations where the Project creates line-of-sight >500 m (Appendix I of EPP).• Cement (jersey) barriers will be used to enhance access control at locations because rollback or berm material (e.g., rock) is not available.• If caribou are encountered, staff will follow best practices for avoiding disturbance to caribou (Appendix I of EPP) (BC MOE 2013; BC MFLNRO 2014).			

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Wildlife and Wildlife Habitat (cont'd)						<p>To mitigate changes to mortality risk where practical:</p> <ul style="list-style-type: none">• Clearing activities will be conducted outside of the breeding bird window (April 25 to August 8) (Environment Canada 2014b), where practical. For any clearing required during the breeding bird window, a nest survey will be done prior to clearing to identify, buffer, and monitor active nests until chicks have fledged. If nest searches are required, active nests identified prior to clearing will be flagged and/or fenced off in the field and a buffer will be maintained until the nest is no longer active. Buffer distances will be based on direction from provincial and federal best management practices.• Construction will be avoided during the critical period identified for trumpeter swan (April 1 to August 31, BC MFLNRO 2014) within 200 m of active trumpeter swan breeding sites (BC OGC 2016b).• Where practical, construction will be avoided in wetlands containing western toad egg masses and tadpoles during the breeding period for western toad (early May to mid-August in the Peace Region)• Temporary fencing will be erected around hazards such as trenches, boreholes, entry/exit pits, and sump pit excavations when conditions warrant.• Recreational use of all-terrain vehicles along ROW and other construction areas will be prohibited.• Unauthorized entry will be discouraged using signs and gates at appropriate locations.• Project-related wildlife deaths and nuisance animals will be immediately reported as outlined in the EPP.• Amphibian survey will be conducted prior to construction within previously identified breeding wetlands to identify the presence of western toad individuals, eggs or tadpoles.• During the pre-construction survey if western toad breeding habitat is identified within 30 m of the Project footprint, Project activities are likely to affect western toad juvenile dispersal. Silt fencing will be used to prevent dispersing juvenile toads from moving into Project clearing or construction areas from nearby wetlands.			

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						<ul style="list-style-type: none">During the pre-construction survey if avoidance of western toad breeding habitat is identified as not practical, western toad egg, tadpole, juvenile, and/or adult salvage will be implemented to mitigate mortality risk. Westcoast will contact the appropriate regulator, acquire the necessary permits, and use best practices for salvage and relocation.Intermittent temporary workspaces will be located to avoid the identified wetlands.Maintain a 60 m buffer on active bear dens during construction (between November 15 and May 1, depending on the season)Clearing of trees identified as potentially supporting a fisher den will be avoided during the critical period identified for fisher natal denning and early rearing (March 15 to June 30; BC MFLNRO 2014). If clearing of identified potential fisher den trees cannot be avoided during the critical period, a qualified biologist will conduct an assessment of the potential fisher dens prior to clearing, early on in the denning season to determine if the dens identified within the PDA are active and whether or not they are confirmed as used by fisher. If the dens are determined to be fisher dens and they are active (i.e., in use), a setback will be established in consultation with the appropriate regulatory agency (MFLNRO) where clearing will be avoided until the young and adults have left the den site.Feeding or harassment of wildlife will be prohibited.No food waste will be disposed of on-site. Waste will be taken into the main office yard for disposal each night. It will be stored in a bear-proof container for disposal at an approved facility.Low vehicle speeds on roads will be enforced.Recreational use of all-terrain vehicles along ROW and other construction areas will be prohibited.Unauthorized entry will be discouraged using signs and gates at appropriate locations.Project-related wildlife deaths and nuisance animals will be reported to appropriate authorities without undue delay.			

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Wildlife and Wildlife Habitat (cont'd)						<ul style="list-style-type: none">As described above, Westcoast will develop and implement a CHRP that will include construction and post-construction mitigation measures to avoid and/or limit mortality risk to caribou when working within caribou herd range. Westcoast will develop a monitoring program using an adaptive management framework to monitor the implementation and effectiveness of the mitigation measures. To mitigate changes to movement patterns where practical: <ul style="list-style-type: none">ROW will be aligned to follow and share space with existing disturbances as much as possible. All construction activities will be restricted to the designated ROW and approved work space and access roads.The extent of clearing will be limited and existing habitat conditions preserved whenever practical.To facilitate the movement of wildlife, trenching operations will be followed as closely as practical by backfill operations. Gaps will be created in windrows, strung pipe and open trenches to allow for the potential movement of wildlife across the ROW at well-defined wildlife trails.			

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Species at Risk, or Species of Special Status, and related habitat	Y	<p>The Project will result in the direct loss of habitat ranging from 0 to 124 ha, depending on the focus species.</p> <ul style="list-style-type: none"> Construction and operation of the Project could have an effect on species at risk or species of special status and related habitat due to the following Project activities: surveying, clearing and grubbing, topsoil salvage and grading, vehicle and pipeline stream crossings, stringing and trenching, lowering-in and tie-in, backfilling, clean-up and reclamation, ROW inspection, and vegetation maintenance. 	Complete	<p>Change in habitat availability for species at risk and species of special status as a result of:</p> <ul style="list-style-type: none"> Direct loss, alteration and fragmentation of habitat Indirect loss of habitat due to sensory disturbance. <p>Change in mortality risk to species at risk and species of special status as a result:</p> <ul style="list-style-type: none"> Vegetation clearing Increased traffic Attraction to facilities and other human activities Encounters with equipment or Project components (e.g., trenching). <p>Change in movement patterns due to the potential creation of impermeable or semi-permeable barriers across wildlife movement corridors.</p>	Y	<p>See mitigation measures for Wildlife and Wildlife habitat, Vegetation and Wetlands, and Fish and Fish Habitat. Specifically, where practical:</p> <ul style="list-style-type: none"> Westcoast will develop and implement a CHRP that will include construction and post-construction mitigation measures to avoid and/or limit mortality risk to caribou when working within caribou herd range. Westcoast will develop a monitoring program using an adaptive management framework to monitor the implementation and effectiveness of the mitigation measures. Where practical, construction will be avoided in wetlands containing western toad egg masses and tadpoles during the breeding period for western toad (early May to mid-August in the Peace Region). If construction cannot be avoided during the breeding period for western toad, an amphibian survey will be conducted prior to construction within previously identified breeding wetlands to identify the presence of western toad individuals, eggs or tadpoles. During the pre-construction survey if breeding habitat is identified within 30 m of the Project footprint, Project activities are likely to affect western toad juvenile dispersal. Silt fencing will be used to prevent dispersing juvenile toads from moving into Project clearing or construction areas from nearby wetlands. A qualified biologist will inspect Project ROW 5 to 7 days in advance of construction activities for presence of adult western toads. The EI will conduct daily toad sweeps prior to start of daily construction activities. Capture and relocation (if applicable) will be conducted under the supervision of a qualified biologist and based on the requirements of Permit under the BC Wildlife Act. During the pre-construction survey if avoidance of western toad breeding habitat is identified as not practical, western toad egg, tadpole, juvenile, and/or adult salvage will be implemented to mitigate mortality risk. Westcoast will contact the appropriate regulator, acquire the necessary permits, and use best practices for salvage and relocation. 	Y	<p>Project will make a minor contribution to the ongoing alteration of habitat for species at risk and species of special status in the RAA.</p> <p>There is no reasonable expectation that the Project's incremental contribution to cumulative effects will affect the long term persistence or viability of habitat associated with species at risk and species of special status within the RAA.</p>	Monitoring /inspection of identified species at risk and related habitat will occur during construction activities.

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Species at Risk, or Species of Special Status, and related habitat (cont'd)						<ul style="list-style-type: none"> Intermittent temporary workspaces will be located to avoid the identified wetland. <ul style="list-style-type: none"> Stake and flag known locations of plant species at-risk. Specific mitigation measures for Sprengel's sedge include: <ul style="list-style-type: none"> Limiting soil disturbance by: <ul style="list-style-type: none"> Reducing workspace to 20 m width, to the extent possible Marking boundaries Limiting grubbing and avoiding grading, where possible Use of swamp maps or work on frozen ground to limit soil compaction and damage to roots Topsoil salvage using minimum blade width technique, stockpiling topsoil, and replacement where practical Post-construction habitat re-creation by planting species associated with the Sprengel's sedge habitat such as aspen trees to provide shade if possible. Post-construction monitoring of remaining Sprengel's sedge colonies and its preferred habitat to assess health and viability of the population and to implement additional management practices within sedge colonies and its habitat if the health of the species or its habitat declines post construction. 			

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Sensitive Habitat for Migratory Birds	Y	<p>The Project will result in the direct loss of habitat ranging from 1 to 33 ha, depending on the migratory bird focus species.</p> <p>Construction and operation of the Project could interact with sensitive habitat for migratory birds through the following Project activities:</p> <ul style="list-style-type: none"> • Surveying • Clearing and grubbing • Topsoil salvage and grading • Vehicle and pipeline stream crossings • Stringing and trenching • Lowering-in and tie-in • Backfilling • Clean-up and reclamation • ROW inspection • Vegetation maintenance. 	Complete	<p>Change in habitat availability as a result of:</p> <ul style="list-style-type: none"> • Direct loss, alteration and fragmentation of migratory bird habitat • Indirect loss of migratory bird habitat due to sensory disturbance. 	Y	<p>To mitigate changes to migratory bird habitat availability where practical:</p> <ul style="list-style-type: none"> • ROW will be aligned to follow and share space with existing disturbances as much as possible. Construction activities will be restricted to the designated ROW and approved work space and access roads. • The extent of clearing will be limited and existing habitat conditions preserved wherever and whenever practical. • Environmentally sensitive features (e.g., nests,) will be flagged or fenced off in the field before clearing and construction. • Intermittent temporary workspaces will be allowed to regenerate. • Equipment used for construction and operation activities will be maintained in good working order and properly muffled to reduce air pollution and unnecessary noise. • Clearing activities will be conducted outside of the breeding bird window (April 25 to August 8) (Environment Canada 2014c), where practical. For any clearing required during the breeding bird window, a nest survey will be conducted prior to clearing to identify, buffer, and monitor any active nests until chicks have fledged. Active nests identified prior to clearing will be flagged and/or fenced off in the field and a buffer will be maintained until the nest is no longer active. Buffer distances will be based on direction from provincial and federal best management practices. 	Y	<p>Project will make a minor contribution to the ongoing alteration of habitat for migratory birds in the RAA.</p> <p>There is no reasonable expectation that the Project's incremental contribution to cumulative effects will affect the long term persistence or viability of any species of migratory birds within the RAA.</p>	Monitoring /inspection of identified migratory bird habitat will occur during construction activities.

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Air Emissions and Greenhouse gas (GHG) Emissions	Y	The operation and construction of the Project will result in the emissions of criteria air contaminants (CACs) and GHGs.	Complete	Project activities will cause a change in air quality during construction and operation. Project construction activities will emit GHG emissions.	Y	<p>To mitigate changes to emissions during construction the following will be applied or implemented where practical:</p> <ul style="list-style-type: none"> Codified practices Best management practices Equipment meeting the minimum size requirements will be used to reduce unnecessary fuel consumption. Speed limits will be enforced at all times to reduce unnecessary fuel consumption. Construction equipment will be maintained in good working order. Newer and more efficient equipment will be used where practical to reduce fuel consumption. Company and construction personnel will avoid excess idling of vehicles. Vehicles or equipment will be turned off when not in use unless required for effective operation. Provincially accepted guidelines will be followed for controlled open burning to increase burning efficiency. These guidelines may include the Open Burning Smoke Control Regulation of the <i>Environmental Management Act</i>, the <i>Wildfire Act</i>, and the Wildfire Regulation. As well, burning of biomass will be conducted during periods of low forest fire risk. The ROW and intermittent temporary workspace will be seeded while leaving space for maintenance and safety activities. Tenure holders will be consulted on the disposition of the salvaged biomass. 	Y	<p>The increase in CAC emissions as a result of pipeline construction activities will be short-term; therefore, the interaction of these emissions with current and reasonably foreseeable in the RAA will be limited. Additionally, given the current air quality baseline for the RAA, ambient air concentrations of measurable parameters are not reasonably expected to exceed air quality objectives as a result of the addition of this Project to the airshed.</p> <p>Intergovernmental Panel on Climate Change (IPCC) forecasts global GHG emissions in various scenarios and determines the impacts of the forecasts. The assessment of cumulative GHG effects is beyond the scope of this Project.</p>	N/A

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Acoustic Environment	Y	The Project will emit noise during construction that may affect noise sensitive receptors within the LAA.	Complete	The Project will affect the existing acoustic environment as a result of increased noise levels during construction and operation.	Y	<p>To mitigate increases in noise levels during construction where practical:</p> <ul style="list-style-type: none">• Maintain minimum buffer distances for noise-generating construction activities, where practical. Minimum buffer distance is determined through noise modelling.• Schedule construction activities during the daytime only to the extent practical.• Establish a procedure or protocol to address concerns in a timely manner.• Maintain machinery and noise-abatement equipment in good working order.• Maintain construction equipment in good working order, properly muffled.• Keep equipment enclosure doors closed as much as possible.• Avoid excessive idling of company and construction vehicles and turn off vehicles and equipment when not in use unless required for effective operation.• Restrict construction traffic to and from the site to approved access routes or consider alternative routes to reduce travelling near residences.• Temporarily relocate the residents if requested through stakeholder engagement at whose locations where the construction noise effects may exceed the EPA recommended noise threshold.• Temporary noise barriers may be installed at HDD sites if practical.• The ground vibration level at receptors due to blasting will be limited to a peak particle velocity of 10 millimeters per second, which represents the maximum velocity to which the ground is subjected as a result of the blast.• The air overpressure at receptors will be limited to 120 dB, which represents the additional pressure above normal atmospheric pressure that is generated from a blast.• Blast designs (i.e. blast hole diameter, maximum explosive mass) will be developed to meet the ground vibration and air overpressure limits at the receptor locations.	Y	N/A	N/A

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Acoustic Environment (cont'd)						<ul style="list-style-type: none"> Apply proper field planning and engineering controls during blast activities, such as: <ol style="list-style-type: none"> Vibration test monitoring for a sample blast Correlate blast design parameter with monitoring data to determine best practice in reducing blast effects Manage and revise the controllable blast design parameters (i.e. confinement, charge length and diameter), charge decoupling, direction of initiation, and total shot duration on an ongoing basis during the construction phase. 			
Land and Resource Use	Y	The Project is located in the PRRD District near Chetwynd, British Columbia (BC). Project construction and operation will affect access and use of tenured and non-tenured land. The Project also crosses private property.	Complete	<p>Change in tenured land use and private property may occur due to:</p> <ul style="list-style-type: none"> Overlapping use of ALR, range tenure, forestry tenure (cutblocks, tree farm and managed license), mining tenure, oil and gas tenure, and transmission tenure Overlapping use of trapline and guide outfitting tenure Overlap with protected sites, parks, and other tenured recreational sites and trails. <p>Change in non-tenured land use may occur due to:</p> <ul style="list-style-type: none"> Overlapping use of Wildlife Management Units (WMU) where hunting occurs Changes in access to watercourses and changes in the abundance of fish affecting recreational fisheries Overlap with recreational sites and trails 	Y	<p>To mitigate changes in tenured land use and private property where practical:</p> <ul style="list-style-type: none"> Westcoast will establish land use agreements and where appropriate compensate private property holders Westcoast will work with overlapping tenure holders to limit interference with existing uses. Westcoast will develop a Stakeholder Engagement Plan. The plan will facilitate communication channels with affected stakeholders over the operational life of the Project to resolve any issues that may arise. A Traffic and Access Management Plan will be developed to support safe driving practices and limit impacts to landowners, residents and local communities and to communicate and manage changes in access. The Plan will require that appropriate signage be posted in advance and during construction, indicating access restrictions. A Worker Management Strategy (inclusive of a Project-specific orientation) will be developed to establish guidelines for Project workers to follow while on site. During working hours, and while housed in Project sponsored accommodations (including Project-dedicated accommodation camps and commercial accommodations), Project personnel will be prohibited from hunting, fishing, and using recreational vehicles within a buffer zone to be determined prior to construction. A Timber Salvage Plan will be developed. Scheduling of construction activities will consider appropriate timing to limit disruption of wildlife during sensitive periods. 	Y	Project contributions to cumulative effects are minor in comparison to the regional context. Considering the small spatial extent of residual effects (largely confined to the PDA), the PDA being in an area largely disturbed by existing industrial land uses, the Project's short construction duration (e.g., 12 months), and implementation of appropriate mitigation measures, cumulative effects are considered to be adverse but low in magnitude.	N/A

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Land and Resource Use (cont'd)						<ul style="list-style-type: none"> Registered outfitters and trapline holders will be notified prior to construction. Trapline holders will be compensated, where appropriate, in accordance with BC Registered Trapper and Petroleum Industry Agreement on Notification and Compensation. Waste and debris will be removed from the PDA following Project construction. <p>To mitigate changes in non-tenured land use where practical:</p> <ul style="list-style-type: none"> A Stakeholder Engagement Plan will be developed A Traffic and Access Management Plan will be developed A Worker Management Strategy will be developed Scheduling of construction activities will consider appropriate timing to limit disruption of wildlife during sensitive periods. Existing disturbed areas (e.g., roads, logged areas) will be used to the extent possible to reduce the area of new clearing required. Natural regeneration, to the extent practical, will be allowed to occur within the PDA following Project construction. <p>To mitigate changes in park or protected area where practical:</p> <ul style="list-style-type: none"> Westcoast will develop a Stakeholder Engagement Plan. The plan will facilitate communication channels with affected stakeholders over the operational life of the Project to resolve issues that may arise. 			

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Heritage Resources	Y	<p>The Project is located on Crown land holdings within Treaty No. 8 (1899), British Columbia.</p> <p>No culturally modified trees were identified during the Archaeological Impact Assessment (AIA).</p> <p>Five previously recorded archaeological sites were determined to be of sufficient distance from the Project to avoid inadvertent impact during construction. Ten previously unrecorded sites were identified during the AIA.</p> <p>Project interactions that may impact on archaeological sites include:</p> <ul style="list-style-type: none"> All construction activities 	Complete	<p>Construction of the Project could cause:</p> <ul style="list-style-type: none"> A loss of heritage resources found along the proposed ROW 	Y	<ul style="list-style-type: none"> Mitigation actions will follow the Spectra EMCPC, 3rd edition (March 2015) published by Spectra Energy, in accordance with Environmental Protection and Management Guide, Version 1.9 (June, 2013) published by the BC OGC. Six of the identified sites during the AIA will be avoided during construction through reroute. One site will require a Section 12 permit under the <i>Heritage Conservation Act</i> to remove it prior to construction. Three sites are located within 10 m of the pipeline ROW, and installation of pre-construction fencing is required. The fencing will be removed post-construction and the sites reflagged as required. A qualified archaeologist will oversee the installation and removal of the fencing. 	N	None	Chance find protocols can be found in the EPP.

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Navigation and Navigation Safety	Y	Trenched and aerial crossing methods (contingency) of watercourses during Project construction have the potential to temporarily affect the safe use and navigation of waterways.	N/A	<p>Proposed watercourse crossing methods are summarized below. Based on the method used adverse effects on navigation and navigation safety could occur.</p> <ul style="list-style-type: none"> Trenchless crossing methods (HDD) is the preferred method to cross the Pine River at P-29 and P-32. Because it avoids in-stream works the trenchless crossing method precludes Project interactions with navigation. A trenched (open cut) crossing method is being considered as contingency at P-29. As contingency trenchless (direct bore) and aerial crossing methods are being considered at P-32. The trenchless (direct bore) crossing method, like the HDD, avoids in-stream works and precludes interactions with navigation. The open cut crossing method at P-29 involves the temporary presence of instream obstructions (e.g., construction equipment, dams and flumes) and therefore has the potential to affect existing navigation and navigation safety of the Pine River within the LAA. Current users of the Pine River could therefore be adversely affected. The aerial crossing at P-32 introduces overhead obstructions (construction equipment and line pipe) and could adversely affect navigation and navigation safety. Current users of the Pine River could therefore be adversely affected. 	Y	<p>These measures, where practical, will be applied only if watercourses are still navigable during the construction period (i.e., will not be needed if the watercourses have frozen up):</p> <ul style="list-style-type: none"> Notifications will be provided to potentially affected users of the navigable waterway at least two weeks prior to construction. If directed by the regulatory agency responsible for navigation, install warning signs to caution users. Signs will be legible from at least 50 m upstream and downstream from the work site. The signs will have statements in dark lettering such as "Warning – Construction Ahead" against a light (such as white or yellow) background advising waterway users of the construction or obstruction within the or over watercourse. Instream temporary works will be marked with yellow flashing lights if necessary from dusk to dawn, or during restricted visibility, and will be completely removed upon completion of construction. 	Y	Adverse effects on navigation associated with the existing aerial crossings at P-32 and future maintenance and repair works associated with pipeline and electric power lines currently crossing the Pine River at P-29 and P-32 (as well as the bridge at P-32) will interact cumulatively with adverse effects of the Project during construction (at P-29 and P-32) and operation (at P-32). The use of regulated mitigation measures such as overhead obstruction warning signs by proponents of other projects and works within the RAA will lower incremental adverse effects on navigation and navigation safety along the Pine River. With the adoption of the mitigation and management measures the Project's contribution to cumulative effects on Navigable Waters in the RAA will be adverse, of low magnitude, long-term in duration, and reversible.	N/A
Aboriginal Traditional Land and Resource Use	Y	The Project is located on private land and Crown Land within Treaty No. 8 (1899) BC and may affect current traditional land uses.	Complete	<p>Construction of the Project could cause:</p> <ul style="list-style-type: none"> A loss of traditional land uses found along the proposed ROW 	Y	<ul style="list-style-type: none"> Game trails will be kept clear of debris during construction. Impacts to identified TLU sites will be limited. Mitigations identified in wildlife and the traditional land use study will be implemented. 	N	None	N/ A

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Social and Cultural Well-Being	N	No interactions are predicted based on the Project's limited scope, small workforce requirements (200 PYs) and short construction period (11 months with an average workforce of 200 people and 1 month with a peak workforce of 400 people).	N/A	None	N	N/A	N	None	N/A
Human Health and Aesthetics	N	The Project has limited scope and no anticipated effects on water quality and quantity or sensory conditions. Air contaminant emissions and noise are covered under Air Emissions and GHG Emissions, and Acoustic Environment.	Complete	Effects to human health or aesthetics are addressed in Air Quality, Acoustic, and Land and Resource Use.	Y	See Section 5.4, 7.4, and 13.4 of the ESA for mitigation measures relevant to human health and aesthetics.	Y	None	N/A

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Infrastructure and Services	Y	<p>The Project is located in the PRRD near Chetwynd, BC.</p> <p>Project construction and operation could increase demand for accommodations, community infrastructure and services and on transportation infrastructure.</p>	Complete	<p>Change in demand for accommodations could occur due to:</p> <ul style="list-style-type: none"> The Project's construction workforce utilizing commercial accommodation. <p>Change in demand for community infrastructure and services could occur due to:</p> <ul style="list-style-type: none"> The Project's construction workforce may use health, emergency, and policing services Project-related work and traffic accidents, if any, could also require use of regional emergency service providers. <p>Change in demand on transportation infrastructure could occur due to:</p> <ul style="list-style-type: none"> The transport of construction materials Equipment and workers will increases traffic volumes on local road networks, potentially increasing travel times and affecting road safety. 	Y	<p>To mitigate changes in demand for accommodations:</p> <ul style="list-style-type: none"> Peak construction activities will be timed so that use of commercial accommodation for workers who permanently reside outside the LAA will occur during seasons with low occupancy, where practical. This timing also coincides with several environmental restrictions (such as fish and nesting bird timing windows). <p>To mitigate changes in demand for community infrastructure and services:</p> <ul style="list-style-type: none"> An Emergency Response Plan will be developed and implemented to address field health services, emergency call-out procedures, fire response plans, and other concerns. Personnel trained in first response will be employed to provide emergency first aid onsite and will have vehicles suitable for the transport of injured workers. A construction safety program will be established that addresses applicable laws and regulations related to health, safety and environmental (HSE) performance. Workers will be aware of Work Safe BC's Regulations and Guidelines for Oil and Gas Industry—Construction (Pipelines, Facilities, Roads) (WorkSafe BC 2015) Personnel will adhere to the contractor's Fit for Duty policy. <p>To mitigate changes in demand on transportation infrastructure:</p> <ul style="list-style-type: none"> The Project construction schedule and road crossing procedures will be confirmed with local authorities and required permits will be obtained prior to the start of construction activities. A traffic and access management plan will be developed to support safe driving practices and limit impacts to landowners, residents and local communities and to communicate and manage changes in access. The Plan will require that appropriate signage be posted in advance and during construction, indicating access restrictions. 	Y	<p>In combination with the Project, reasonably foreseeable projects will place increased demands on Infrastructure and Services in excess of available supply. However, With the adoption of identified mitigation and management measures the Project's contribution to cumulative effects on Infrastructure and Services in the RAA can be characterized as adverse, low in magnitude, short-term in duration and reversible.</p>	N/A

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Employment and Economy	Y	The Project is located in the PRRD near and Chetwynd, BC. Project construction and operation will create employment and business opportunities, as well as generate revenue for governments.	Complete	Change in employment and economy will occur as the Project will generate employment and business opportunities, potentially contributing to labour shortages that could lead to wage inflation.	Y	<p>To mitigate changes to employment and economy:</p> <ul style="list-style-type: none"> Westcoast will procure goods and services from local and Aboriginal businesses in accordance with its Local and Aboriginal Content Strategy. Westcoast will follow its existing practice of encouraging local and Aboriginal content based on its Local and Aboriginal Content Strategy, its previous experience from operating in the area, and through engagement with Aboriginal communities, local municipalities, residents and the general public. Westcoast has an Aboriginal contractors' database which will be used by the company and shared with its prime contractors. 	Y	Within the context of future economic and employment conditions in the RAA, the predicted effects of the Project will be small; the 200 PYs of Project employment represents 5% of peak overlapping demand for labour by identified reasonably foreseeable projects. With adoption of the mitigation and management measures, the Project's contribution to cumulative effects on Employment and Economy in the RAA will be adverse, low, short-term in duration, and reversible.	N/A
Accidents and Malfunctions	Y	Accidents, malfunctions or unplanned events may occur and have the potential to interact with the biophysical and social environments. These could occur as a result of abnormal operating conditions, depreciation, acts of nature, extreme weather events, human error, equipment failure, and other possible causes.	Complete	<p>Drilling Fluid Inadvertent Release: the potential effect of an inadvertent release of drilling fluid during direct drilling resulting in contamination of surface water and loss of habitat for wildlife and fish, where permeable soils absorb drilling fluid circulation losses or where fractured bedrock substrates act as a conduit to the surface, resulting in surface discharge.</p> <p>Pipeline Leaks or Ruptures: the potential effect associated with pipeline leaks or ruptures is a change in air quality (elevated emissions to the atmosphere), resulting in an increase in the release of CACs and volatile organic compounds as well as GHG and possibly natural gas into the atmosphere.</p> <p>Fire: the potential effects associated with an accidental fire are a change in air quality resulting from the release of particulate matter into the local airshed, and the loss of vegetation and wildlife habitat.</p>	Y	<p>To mitigate the potential for a Drilling Fluid Inadvertent Release:</p> <ul style="list-style-type: none"> A trenchless crossing method (i.e. HDD drilling and Direct Pipe contingency) will be used for the Pine River crossing. The contractor will be made aware of the spill contingency plan (EPP Appendix F.2). The appropriate agencies will be notified prior to commencement of a drill, in accordance with the permit conditions. The contractor will also maintain the appropriate equipment and material on-site that could sufficiently manage and contain any inadvertent drilling fluid releases. In the case of a spill, the contractor will notify the Chief Inspector, who will notify the appropriate regulatory agencies. 	Y	The potential cumulative environmental effects of all Project-related accidents, malfunctions and unplanned events on all VCs, during all phases of the Project, are rated as not significant.	Monitoring/ inspection will occur during construction and operations to verify compliance with the mitigation measures and EPP.

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Accidents and Malfunctions (cont'd)				<p>Hazardous Materials Spill: the potential effect associated with a hazardous materials spill is the contamination of soils and groundwater. There are no large surface waterbodies that could be contaminated from an on-site spill.</p> <p>Vehicle Accident: a vehicle accident has the potential to result in the release of hazardous materials to soils and groundwater, and has the potential to result in injury (to humans and wildlife).</p>		<ul style="list-style-type: none">• The response strategy employed will depend on the size and extent of the inadvertent release. This will include, but is not limited to, water monitoring up and downstream of the inadvertent release; development of a fissure/fracture plug composed of a sealing agent; downhole cementing; drilling location realignment to a more secure path; and reporting. <p>To mitigate the potential for Pipeline Leaks or Rupture:</p> <ul style="list-style-type: none">• Conducting geotechnical evaluations when selecting the facility sites and route options for pipeline projects.• Pipeline will be buried to a minimum of cover in accordance with the Canadian Standards Association (CSA) standards. Greater depths of cover will be employed for site specific instances like at water, road, or rail line crossing, areas of deep tillage, heavy equipment crossings.• Designing pipelines and facilities according to appropriate specifications (e.g., CSA Z662).• Use of third party inspection during manufacturing, testing, coating, and shipping of the pipe.• Following welding specifications and conducting inspections during pipeline construction• Using cathodic protection to prevent corrosion.• Using specified coatings and pipe materials to avoid stress, corrosion, and cracking.• Verifying gas composition and quality meet operational specifications.• Scheduling pipeline integrity investigations (including excavations).• Placing signage, vehicle barricades, and controlled crossing structures to protect operating pipelines. <p>To mitigate the potential for Fire:</p> <ul style="list-style-type: none">• Contractors working on construction of the Project will receive orientation and training in fire prevention in order to mitigate the risk.• Flammable material will be either piled or stored for winter burning or will be burned inside containers in order to mitigate the potential of fire from spreading.• The equipment used on site will meet applicable codes and standards designed to prevent fires and explosions.			

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Accidents and Malfunctions (cont'd)						<ul style="list-style-type: none">Westcoast will implement the EPP for the Project; this includes waste management practices, wildfire prevention, containment, and control, a spill response plan, an access plan, and a regular equipment inspection and maintenance program.Westcoast has a Field Emergency Response Plan in place. <p>To mitigate the potential for Hazardous Materials Spills:</p> <ul style="list-style-type: none">Contractors working on the construction of the Project will be aware of spill response procedures and be required to have Workplace Hazardous Materials Information System training.All equipment along the ROW will meet applicable codes, and equipment operators will follow recommended operational practices.Westcoast will implement the EPP for the Project; this includes a spill contingency plan (Section 7.7 of the EPP), an access plan (Appendix H of the EPP), and a wet soils contingency plan (Appendix F.7 of the EPP).Westcoast will develop a site-specific ERP in conjunction with its construction contractors. <p>To mitigate the potential for Vehicle Accidents:</p> <ul style="list-style-type: none">Project-related vehicles will observe all traffic rules and provincial and federal highway regulations.The prime contractor will create and implement a traffic management plan for the construction period. This plan will be reviewed and approved by Westcoast.Trucking activity for construction of the Project will take place on designated truck routes and all trucks will observe speed limits and weight restrictions.Westcoast requires that contractors and subcontractors have a drug and alcohol program in place. Individual companies are accountable for their own personnel and testing will take place where a supervisor or other official has reasonable grounds to suspect that an employee is or may be unable to work in a safe manner because of the use of alcohol and/or drugs.			

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Effects of the Environment on the Project	Y	<p>The environment may interact with the Project through:</p> <ul style="list-style-type: none"> Low temperatures, wind and ice Extreme precipitation Watercourse migration Earthquakes Forest Fire Corrosion. 	N/A	<p>The environment has the potential to affect the Project such that interruption in service or damage to infrastructure results. Potential effects of the environment on the Project include:</p> <ul style="list-style-type: none"> Low Temperatures and Wind: have the potential to reduce the ductility of the materials used to construct Project components and increase their susceptibility to brittle fracture Extreme Precipitation: Extreme rain can result in work stoppages and difficult working conditions, particularly during Project construction Watercourse Migration: Bank instability and the alteration of watercourses due to a rapid snowmelt or heavy runoff have the potential to adversely affect pipeline integrity Earthquakes: Seismic events can result in pipeline leaks, ruptures and/or pressure loss. Forest Fire: Forest fire has the potential to interrupt construction and/or operation. Corrosion: Interaction of steel with air, soil and groundwater can result in corrosion of pipelines and related steel infrastructure. 	Y	<p>To mitigate for Low Temperatures and Wind:</p> <ul style="list-style-type: none"> The materials specified for the Project will be designed to the CSA Z662 design standard for pipelines for the anticipated minimum ambient temperatures in the Project area to reduce adverse environmental effects on those materials. In addition, the buried pipelines are protected from temperature extremes by the overlying soil. Typically, soil temperatures at the proposed burial depth (e.g., 1.8 m) would seldom drop below freezing. <p>To mitigate for Extreme Precipitation:</p> <ul style="list-style-type: none"> The Project will be designed, constructed, and tested in accordance with the provisions of the latest revision of the CSA Z662, the <i>National Energy Board Act</i> (NEB Act), the Onshore Pipeline Regulations (NEB 2013), Westcoast's specifications, and the National Building Code of Canada. Measures that will be used to mitigate potential effects of rain and run-off from the rain include maintaining surface and subsurface drainage and installing drainage and erosion controls, such as silt fencing, check dams, and sediment barriers. See the EPP (Appendix A) for more details on contingency planning. <p>To mitigate for Watercourse Migration:</p> <ul style="list-style-type: none"> Parallel routing has been altered to mitigate areas where bank instability, scour, or lateral erosion could occur and crossings will be engineered using armouring and crossing techniques to reduce scour or erosion, as required. In addition, the profile of the crossing will be such that sag bends are set back far enough to prevent pipe exposure resulting from lateral erosion. The pipeline will be installed at sufficient depth below the scour depth of watercourses to limit or avoid pipe exposure in the event of down-cutting by a stream during natural high flow periods. 	N	None	N/A

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Effects of the Environment on the Project (cont'd)				<ul style="list-style-type: none">Corrosion: The natural elements, particularly the interaction of steel with air, soil, and groundwater, can result in corrosion of pipelines and related steel infrastructure. There is also risk that corrosion can affect the integrity of the existing and new pipeline		<p>To mitigate for Earthquakes:</p> <ul style="list-style-type: none">The pipeline will be designed and constructed according to CSA Z662. The intention of these design standards is to maintain pipeline integrity based on the level of risk for earthquakes in the area. Modern steel pipelines built to these standards are the safest means of moving petroleum products in earthquake prone areas. They are resilient and flexible, which helps them withstand the effects of an earthquake.Seismic effects will be considered in the design of the buried pipelines. Data on geology, seismology and geotechnical conditions will be investigated. Loads due to ground stress wave propagation, permanent ground deformation, fault movements and coupled dynamic loads and deformations with connected infrastructure will be determined in accordance with the most recent version of CSA Z662.In the unlikely event a pipeline should leak, rupture and otherwise lose pressure, line break valves installed on the pipeline system will shut in and isolate the pipeline segment until inspection and repair is completed. <p>To mitigate for Forest Fire:</p> <ul style="list-style-type: none">The Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) has forest fire control programs in place to identify and control fires, minimizing the potential magnitude and extent of forest fires, as well as their environmental effect on the Project. In addition, Westcoast has established procedures to be followed in the event of forest fire (EPP, Appendix F.1 – Fire Contingency Plan).			

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Effects of the Environment on the Project (cont'd)						<p>To mitigate for Corrosion:</p> <ul style="list-style-type: none">• The pipeline and associated appurtenances will be designed and constructed according to CSA Z662 to avoid or limit corrosion potential.• Westcoast has systems in place to manage the safe operation and long-term integrity of its existing facilities and pipelines. The proposed pipeline and facilities will have specific integrity management procedures to verify that the ongoing requirements of the pipeline and facilities are met throughout their service lives. Westcoast performs corrosion and condition monitoring on its pipeline(s) to identify areas of reduced integrity and a regular schedule will be developed for the proposed pipeline system.• The pipeline will have cathodic protection and external coating to prevent or reduce external corrosion of the pipeline. In the event that an actual or suspected pipeline integrity problem is identified, the integrity problem will be investigated following the Westcoast Integrity Management Plan. Repairs will be made, if warranted.• Maintenance digs will be conducted in a manner similar to the pipeline construction activities (i.e., ground disturbance procedures will be implemented, topsoil will be salvaged and replaced, subsoil will be stockpiled separately, backfilled and feathered-out, salvaged soils will be replaced and reseeded).			