1 Summary of Residual Effects

This Appendix summarizes all predicted residual effects of the Wheeler River Project (the Project) and their significance by each Valued Component (VC) considered to inform the assessment. This is intended to provide the context of the residual effects in a transparent, concise approach to show the fulsome, rigorous analysis undertaken for the environmental assessment (EA) of the Project.

Using accepted approaches and best practices, the EA of the Project focuses on the VCs that were determined in consultation with Indigenous communities. The previous VC-specific sections in Parts II and III of this Environmental Impact Statement (EIS) identified current baseline conditions, potential effects, and appropriate mitigation measures, characterized the residual effects on each of the Key Indicators (KIs), and then rolled up the ratings of the characteristics to determine the significance of the effect on receptor VC as a result of the Project. Significance determination is not completed on intermediate VCs, but integrated into the residual effect evaluation, residual effect characterization, and significance determination for related receptor VCs. A summary of the assessment outcomes, predicted residual effect, and significance determination (where applicable) for each VC are summarized in the following tables.

Atmospheric and Acoustic Environment – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Atmospheric and Acoustic	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations and deposition rates of total suspended particulate (TSP) compared to the most appropriate air quality criterion.	• On-site and off-site operation of vehicles and transport of materials. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area.	Construction	• Watering of unpaved roads and surfaces. • Limiting equipment and vehicle speeds to <40 km/h.	Exceedances of 24-hour TSP criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations and deposition rates of TSP compared to the most appropriate air quality criteria.	• Operation of the in situ recovery (ISR) wellfield. • Operation of the processing plant and production of uranium concentrate. • On-site and off-site operation of vehicles and transport of materials.	Operation	• Watering of unpaved roads and surfaces. • Limiting equipment and vehicle speeds to <40 km/h. • Equip the dryer, calciner, and hygiene exhausts with scrubber systems. • Dryer, calciner, and hygiene exhaust stacks are appropriate height from the building height to eliminate building downwash effects.	Exceedances of 24-hour TSP criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations and deposition rates of TSP compared to the most appropriate air quality criterion.	• Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area). • On-site and off-site operation of vehicles and transport of materials.	Decommissioning	• Watering of unpaved roads and surfaces. • Limiting equipment and vehicle speeds to <40 km/h.	Exceedances of 24-hour TSP criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations and deposition rates of inhalable particulate matter (PM10) compared to the most appropriate air quality criterion.	• On-site and off-site operation of vehicles and transport of materials. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area.	Construction	• Watering of unpaved roads and surfaces. • Limiting equipment and vehicle speeds to <40 km/h.	Exceedances of 24-hour PM10 criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations and deposition rates of PM10 compared to the most appropriate air quality criterion.	• Operation of the ISR wellfield. • Operation of the processing plant and production of uranium concentrate. • On-site and off-site operation of vehicles and transport of materials.	Operation	• Watering of unpaved roads and surfaces. • Limiting equipment and vehicle speeds to <40 km/h. • Equip the dryer, calciner, and hygiene exhausts with scrubber systems. • Dryer, calciner, and hygiene exhaust stacks are appropriate height from the building height to eliminate building downwash effects.	Exceedances of 24-hour PM10 criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations of nitrogen dioxide (NO_2) compared to the most appropriate air quality criterion.	• On-site and off-site operation of vehicles and transport of materials. • Power generation – generators. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area.	Construction	• Planning vehicle and equipment routes to minimize travel distances, where possible. • Employ standard operating procedures and complete regular inspections of equipment machinery to make sure it is in good working order.	Exceedances of 1-hour NO_2 criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations of NO_2 compared to the most appropriate air quality criterion.	• Operation of the ISR wellfield. • Operation of the processing plant and production of uranium concentrate. • On-site and off-site operation of vehicles and transport of materials. • Power generation – generators (emergency).	Operation	• Planning vehicle and equipment routes to minimize travel distances, where possible. • Employ standard operating procedures and complete regular inspections of equipment machinery to make sure it is in good working order.	Exceedances of 1-hour NO_2 criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations of NO_2 compared to the most appropriate air quality criterion.	• Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area). • Power generation – generators. • On-site and off-site operation of vehicles and transport of materials.	Decommissioning	• Planning vehicle and equipment routes to minimize travel distances, where possible. • Employ standard operating procedures and complete regular inspections of equipment machinery to make sure it is in good working order.	Exceedances of 1-hour NO_2 criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Air Quality (levels of dust, combustion products, uranium, metals, and/or radionuclides)	Change in concentrations and deposition rates of uranium compared to the most appropriate air quality criterion.	• Operation of the ISR wellfield. • Operation of the processing plant and production of uranium concentrate.	Operation	• Equip the dryer, calciner, and hygiene exhausts with scrubber systems. • Dryer, calciner, and hygiene exhaust stacks are appropriate height from the building height to eliminate building downwash effects..	Exceedances of 24-hour uranium criterion.	Intermediate VC (residual effects carried forward to Aquatic, Terrestrial and Human Health)
	Noise	Change in daytime sound level (Ld).	• Power generation – generators. • Wellfield and freeze hole drilling; ground freezing. • Batch plant operation (concrete); crusher at borrow area.	Construction	• Locate the concrete batching operation as far away from sensitive locations as possible. • Direct the generator discharge openings away from sensitive locations. • Make use of available on-site obstructions to control sound exposure at sensitive areas (i.e., locate sources behind buildings).	Moderate increase in Ld.	Intermediate VC (residual effects carried forward to Terrestrial, Land and Resource Use)

Geology and Groundwater – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Geology and Groundwater	Geology (terrain morphology and stability)	Vertical displacement (i.e., subsidence at the ground surface).	• ISR operations affecting subsidence at the ground surface associated with consolidation of rock mass (ore) at significant depth (approximately 400 m) below ground.	Operation	• Incorporation of specific Project design components and practices, including: 1. Site Monitoring: pre- and post-elevation measurements will be taken at the well collars to account for any vertical movement between Construction and Decommissioning. 2. Development of contingency plans, including cementing wells in place, which will act to stabilize the geological environment.	Maximum subsidence at the ground surface is predicted to be between 5.0 to 7.5 cm.	Intermediate VC (Residual effects carried forward to aquatic environment)
	Groundwater Quantity (groundwater flow patterns and discharge rates to local surface water; groundwater elevation changes)	Change in shallow and deep ground levels measured in monitoring wells (m) and baseflow to surface water bodies (L/sec).	• Site preparation; site clearing and grading. • Development of surface infrastructure. • Ground freezing. • Water supply and surface water releases.	Construction	• Incorporation of specific Project design components and practices, including: 1. Limit construction footprint (i.e., PSA) to the extent possible to reduce the potential for reductions in groundwater recharge and limit the number of watersheds overprinted by the PSA. 2. Project design to limit water use and water recycling. 3. Water management best practices to reduce site runoff and recharge to aquifers. • Commitment to follow-up ongoing hydrogeological evaluations, as well as monitoring and adaptive management, including: 1. Groundwater elevations in the groundwater well network. 2. Water elevations in local surface waters.	No residual effect predicted with mitigation measures.	Intermediate VC (Residual effects carried forward to aquatic environment)
	Groundwater Quality (focus on changes to groundwater discharge to local surface water bodies [i.e., Whitefish Lake])	Changes in concentrations of physical and chemical parameters in groundwater (mg/L or µg/L) compared to appropriate risk-based surface water environmental quality criteria.	• Water management. • Fuel management; refuelling of equipment; general site construction activities.	Construction	• Incorporate best management practices to avoid effects on groundwater. • Develop environmental management plans, programs, and procedures to provide consistent and responsible practices. • Make sure employee training programs and procedures are in place.	No residual effect predicted with mitigation measures.	Intermediate VC (Residual effects carried forward to aquatic environment)
	Groundwater Quality (focus on changes to groundwater discharge to local surface water bodies [i.e., Whitefish Lake])	Changes in concentrations of physical and chemical parameters in groundwater (mg/L or µg/L) compared to appropriate risk-based surface water	ISR operations effecting groundwater, in particular constituent concentrations.	Operation	• Incorporation of specific Project design components, including: 1. Establish freeze wall before mining operations to create the mining chamber, effectively isolating the area with mining solution (area inside the mining chamber) from the surrounding groundwater environment. 2. Create hydraulic controls that will limit vertical migration to the area 50 m above the ore zone.	No residual effect predicted with mitigation measures.	Intermediate VC (Residual effects carried forward to aquatic environment)

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
		environmental quality criteria.			3. Design injection and recovery wells to have secondary containment, or adequate containment. 4. Recognize option to drill additional wells to recover mining solution excursions. 5. Design pipelines to have secondary containment or catchment. 6. Establish a leak detection system for wells and pipelines. 7. Implement site monitoring within and exterior to freeze wall chambers. 8. Develop contingency plans, including drilling additional wells into any potentially contaminated areas for recovery of the mining solution back to surface. 9. Develop emergency response plans to respond to unplanned incidents and implement timely response (e.g., timely response for clean-up surface spills).		
	Groundwater Quality (focus on changes to groundwater discharge to local surface water bodies [i.e., Whitefish Lake])	Changes in concentrations of physical and chemical parameters in groundwater (mg/L or µg/L) compared to appropriate risk-based surface water environmental quality criteria.	Site infrastructure such as landfills and pads effecting groundwater, in particular constituent concentrations.	Operation	• Incorporation of Project design components, including: 1. Landfill and pads designed with geomembrane liner protective systems; double lining system with leak detection; and leachate collection systems depending on infrastructure and design. 2. Hazardous substances stored in approved storage areas with secondary containment as required. 3. Implementation of appropriate monitoring and management plans: • Groundwater monitoring plan with wells established near the processing plant terrace, landfill, and fuel and hazardous waste storage area to allow for detection of any changes in groundwater quality. • Environment, health, and safety management plans, programs, and procedures. • Waste management plans, programs, and procedures. • Employee training programs and procedures.	No residual effect predicted with mitigation measures.	Intermediate VC (Residual effects carried forward to aquatic environment)
	Groundwater Quality (focus on changes to groundwater discharge to local surface water bodies [i.e., Whitefish Lake])	Changes in concentrations of physical and chemical parameters in groundwater (mg/L or µg/L) compared to appropriate risk-based surface water	Concentrations of constituents greater than expected may be present during the horizontal groundwater remediation, flushing, and thawing of the freeze wall.	Decommissioning – ISR wellfield and operations.	• Incorporation of Project design components, including: 1. Mining horizon remediation – water will be injected into the mining horizon via injection wells and then recovered through the recovery wells to flush residual mass post mining. 2. Groundwater remediation with flushing of residual constituents of concern will be completed until the concentrations meet predetermined end points that are protective of the environment over the long term (i.e., future centuries period[1]).	No residual effect predicted with mitigation measures.	Intermediate VC (Residual effects carried forward to aquatic environment)

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
		environmental quality criteria.			3. Site monitoring (levels and quality) within and exterior to the former freeze wall chambers will be completed to evaluate site conditions. 4. Contingency plans will be developed, including drilling additional wells into any potentially contaminated areas for recovery of the mining solution back to surface. 5. Emergency response plans will be developed to respond to unplanned incidents and implement timely response (e.g., timely response for clean-up surface spills).		

1 **Future Centuries Period:** The temporal scope of the assessment for Groundwater included consideration of the period during which the highest constituent concentrations in groundwater are predicted to interact with surface water based on groundwater modeling. Due to the relatively low groundwater velocities between the proposed Project site and the surface water environment where groundwater/surface water interactions are expected, as well as the potential for chemical reactions along the groundwater flow pathway, such a "Future Centuries Period" scenario was deemed appropriate to fully assess potential future effects beyond the Project timeline (i.e., 0 to 38 years).

In this context, the Future Centuries Period scenario is considered with respect to the interaction of groundwater migration from the Project site and its potential influence on surface water in local water bodies. The Future Centuries Period projection encompasses the long-term period during which slow migration of groundwater from the Phoenix Ore Zone area to the surface water environment is anticipated and constitutes a bounding scenario of maximum concentrations of constituents of potential concern. For this assessment, groundwater flow and reactive transport modelling tools were constructed to help understand the migration and attenuation of constituents from the Phoenix Ore Zone area toward Whitefish Lake, the primary surface water receptor.

Based on the base case modelling results, the simulated concentrations of dissolved constituents emanating from the Phoenix Ore Zone were below the thresholds for protection of freshwater aquatic life in Whitefish Lake. A sensitivity analysis was performed to evaluate key uncertainties. All scenarios indicated that concentrations would not exceed Fresh Water Aquatic, maximum acceptable concentrations (FAL MAC) thresholds, except for modest (5%) exceedances of aluminum, which is attributed to existing elevated background conditions. All other constituents are simulated to remain below FAL MAC thresholds when they reach Whitefish Lake. The simulated conditions indicate that the natural setting has a large assimilative capacity, and reflects transport processes that include dispersion, sorption, and other geochemical reactions. The sorption and geochemical reactions evaluated are constituent-specific and were derived from well-established literature and findings at other in situ recovery (ISR) projects.

The residual effects assessment was evaluated for this time period. In addition to being a VC, Groundwater is also an intermediate component as changes to Groundwater must be understood to assess other Project interactions, such as changes to surface water quality. Residual effects characterizations for the Groundwater VC link to other VCs and do not have significance determination on their own. No residual effects were assessed based on the modelling that will cause a change in the Surface Water VC, including altering its status or integrity beyond an acceptable level.

As part of Post-Decommissioning, remediation Groundwater evaluations, and site SOPS, the following activities will be completed into the future to assess trends and compliance with model predictions:

- site monitoring of water levels to evaluate groundwater flow and comparison to model results; and
- groundwater quality sampling and analysis.

Post-Decommissioning and remediation monitoring will be completed to verify modelling results and predictions.

Aquatic Environment – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Aquatic Environment	Surface Water Quantity	• Average monthly discharge (flow; m^3/s). Percentage change to average monthly discharge (%). • 5th percentile monthly discharge (flow; m^3/s). Percentage change to 5th percentile monthly discharge (%). • Change in surface water body water level (water level in metres).	• Project overprinting of drainage areas and implementation of site water management. • Surface water taking. • Discharge to surface water.	Construction, Operation, Decommissioning	• Limit and stage construction of the Project footprint. • Maximize recycling of contact and process water for re-use to minimize water taking. • Attenuate peak discharges and augment baseflows to the environment using Project water management/storage features (i.e., runoff, process water, contact water, monitoring/effluent ponds). • Maintain existing drainage patterns with the use of culverts were applicable. • Maintain access roads by periodically regrading and ditching to improve water flow, reduce erosion, and manage vegetation growth.	Changes in flows and/or water levels are well below criteria identifying a residual effect for all phases of the mine life.	Intermediate VC (Residual effects carried forward to Fish and Fish Habitat and Benthic Invertebrates)
	Surface Water Quality	• Change in the concentration of constituents that are directly related to Project activities, measured as a mass of a chemical per unit volume in water (e.g., mg/L).	• Land disturbance and clearing resulting in the mobilization of suspended material into natural surface water features. • Direct discharge of treated effluent to the natural environment.	Construction, Operation, Decommissioning	• Develop and implement a site-wide water management plan that includes an integrated framework to manage water quality. • Maximize recycling and re-use of contact and process water to reduce freshwater intake and release to Whitefish Lake. • Design the discharge diffuser/outfall to provide effective and rapid mixing of treated effluent to minimize the mixing zone. • Develop a site-specific effluent treatment system to treat effluent to appropriate release limits in accordance with provincial standards and licence/permit conditions.	Change in water quality (constituent concentrations) from baseline conditions.	Intermediate VC (Residual effects carried forward to Sediment Quality, Benthic Invertebrates, Fish and Fish Habitat, and Fish Health.
	Sediment Quality	• Change in the concentration of constituents that are directly related to Project activities, measured as a mass of a chemical per unit mass in sediment (e.g., µg/g).	• Land disturbance and clearing resulting in the mobilization of suspended material into natural surface water features. • Direct discharge of treated effluent to the natural environment.	Construction, Operation, Decommissioning	• Develop and implement a site-wide water management plan that includes an integrated framework to manage water quality. • Maximize recycling and re-use of contact and process water to reduce freshwater intake and release to Whitefish Lake. • Design the discharge diffuser/outfall to occupy the smallest footprint possible while providing effective and rapid mixing of treated effluent, thereby minimizing the mixing	Change in sediment quality (constituent concentrations and/or physical quality) from baseline conditions.	Not Significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
		• Change in the physical quality (grain size) of sediments.			zone and preventing the mobilization of sediments around the discharge zone via scouring from discharge flows. • Develop a site-specific effluent treatment system to treat effluent to appropriate release limits in accordance with provincial standards and licence/permit conditions.		
	Benthic Invertebrates	• Change in sediment quantity and physical quality (particle size). • Change in sediment quality (chemical). • Alteration and/or loss of aquatic habitat (area). • Change in water level or flow.	• Land disturbance and clearing resulting in the mobilization of suspended material into natural surface water features. • Direct discharge of treated effluent to the natural environment. • Pipeline and diffuser construction overprinting benthic substrates. • Construction of access road crossings.	Construction, Operation, Decommissioning	• Develop and implement a site-wide water management plan that includes an integrated framework to manage water quality • Maximize recycling and re-use of contact and process water to reduce freshwater intake and release to Whitefish Lake. • Design the discharge diffuser/outfall to occupy the smallest footprint possible while providing effective and rapid mixing of treated effluent, thereby minimizing the mixing zone and preventing the mobilization of sediments around the discharge zone via scouring from discharge flows. • Design access road crossings as clear-span structures to avoid instream works and disturbance of aquatic habitat.	The assessment predicted residual effects on benthic invertebrates due to change in sediment quantity and physical quality (particle size), change in sediment quality (chemical), change in aquatic habitat (area), and change in water level or flow.	Not Significant
	Fish and Fish Habitat	• Change in water quality (i.e., chemical, thermal). • Change in sediment quality (i.e., chemical, physical). • Alteration and/or loss of aquatic habitat (area) • Change in water level or flow.	• Land disturbance and clearing resulting in the mobilization of suspended material into natural surface water features. • Direct discharge of treated effluent to the natural environment. • Pipeline and diffuser construction overprinting substrates. • Construction of access road crossings.	Construction, Operation, Decommissioning	• Develop and implement a site-wide water management plan that includes an integrated framework to manage water quality. • Maximize recycling and re-use of contact and process water to reduce freshwater intake and release to Whitefish Lake. • Design the discharge diffuser/outfall to occupy the smallest footprint possible while providing effective and rapid mixing of treated effluent, thereby minimizing the mixing zone and preventing the mobilization of sediments around the discharge zone via scouring from discharge flows so as not to detrimentally affect fish habitat. • Design access road crossings as clear-span structures to avoid instream work and disturbance of aquatic habitat.	The assessment predicted residual effects on fish habitat due to change in water quality, change in sediment quality, alteration of aquatic habitat, and change in water level or flow.	Not Significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
	Fish Health	• Change in water quality (i.e., chemical, thermal). • Change in sediment quality (i.e., chemical, physical). • Change in fish tissue concentrations.	• Land disturbance and clearing resulting in the mobilization of suspended material into natural surface water features. • Direct discharge of treated effluent to the natural environment.	Construction, Operation, Decommissioning	• Develop and implement a site-wide water management plan that includes the collection and monitoring of contact water to determine whether treatment is required prior to release to the environment and inform optimal levels of treatment. • Monitor and manage effluent, including contingency for effluent treatment as may be required, so that water discharge objectives are achieved as defined in applicable provincial and federal regulatory instruments.	The assessment predicted residual effects on fish health due to change in water quality, change in sediment quality, and change in fish tissue concentrations.	Not Significant

Terrestrial Environment – Summary of the Environmental Assessment Considerations and Significance Determinations for Predicted Residual Effects

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Terrestrial Environment	Terrain (terrain morphology, terrain stability)	• Change in slope grade, aspect; change in topographical contours and drainage patterns. • Change in the stability of landform attributes; increase in erosion potential; acceleration of erosional processes.	• Development of access roads and air strip. • Site preparation and earthworks. • Development of surface infrastructure.	Construction	• Project design, Project siting and sequencing. • Environmental management planning and follow-up. • Commitment to progressive and final reclamation.	Effects are predicted to result in a change in terrain morphology and terrain stability from baseline condition(s). Change in terrain morphology is anticipated to be within the range of natural variation; no anticipated change in terrain stability.	Not significant
			• Expansion of ponds and pads. • Progressive decommissioning and reclamation.	Operation			
			• Reclamation of disturbed areas.	Decommissioning			
	Soil (soil quantity, soil quality)	• Change (i.e., net loss) of soil volume. • Degradation in soil physical properties (particle size/texture, structure, and aggregation). • Increase in concentration of constituents of potential concern (COPCs) in soil.	• Development of access roads and air strip. • Site preparation and earthworks. • Development of surface infrastructure.	Construction	• Project design, Project siting and sequencing. • Environmental management planning and follow-up. • Commitment to progressive and final reclamation.	Potential effects are predicted to result in a change in soil quantity and soil quality from baseline condition(s). Potential change in soil quality and soil quantity is anticipated to be within or at the limits of the range of natural variation; no anticipated change in land use capability.	Not significant
			• Expansion of ponds and pads. • Progressive decommissioning and reclamation.	Operation			
			• Reclamation of disturbed areas.	Decommissioning			
	Organic Matter/Peat (organic matter/ peat quantity)	• Change (i.e., net loss) in percentage of area extent of organic matter.	• Development of access roads and air strip. • Site preparation and earthworks. • Development of surface infrastructure.	Construction	• Project design, Project siting and sequencing. • Environmental management planning and follow-up. • Commitment to progressive and final reclamation.	Potential effects are predicted to result in a change in organic matter/peat from baseline condition(s). Potential change in organic matter/peat quantity is anticipated to	Not significant
			• Expansion of ponds and pads. • Progressive decommissioning and reclamation.	Operation			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• Development of access roads and air strip. • Site preparation and earthworks. • Development of surface infrastructure.	Construction		be within or at the limits of the range of natural variation; no anticipated change in land use capability.	
Terrestrial Environment	Vegetation and Ecosystems (vegetation abundance)	• Change in areal extent of habitat types.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Water management (including treatment and site runoff). • Surface water withdrawal.	Construction	• Potential adverse effects on the Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs will be avoided or minimized to the extent possible through Project design measures. • Additional mitigation measures specific to the Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs are tailored to Project features and will be incorporated into the various Project management plans. • Disturbance to vegetation and soils will be avoided by clearly delineating Project Area boundaries (e.g., with the use of fencing, staking, or flagging), adhering to construction plans and schedules, and restricting off-site machine use. • Wetland boundaries in the proximity of planned disturbances will be clearly delineated (e.g., with the use of fencing, staking, or flagging) to facilitate avoidance to the extent practicable. • In areas requiring clearing only, grubbing will be avoided, and roots and groundcover will be retained to the extent feasible. • Pre-construction listed plant surveys will be completed within the Project Area. • Listed plants located adjacent to planned disturbances will be clearly delineated (e.g., with the use of fencing, staking, or flagging) to avoid and reduce the potential for accidental encroachment outside of the Project footprint.	Change in areal extent of habitat types.	Not significant
			• Water withdrawal from groundwater or surface water body. • Management of surface water (including seepage and site runoff). • Water release to surface water body.	Operation			
			• Site water management, treatment, and release. • Process water treatment and release. • Reclamation of disturbed areas.	Decommissioning			
	Vegetation and Ecosystems (constituent concentrations in vegetation)	• Change in level of COPCs in plant tissue.	• On-site and off-site operation of vehicles and transportation of materials.	Construction		Change in level of constituents of concern in plant tissue.	Not significant
			• Hazardous waste management (temporary storage, handling, and off-site transportation). • Storage and disposal of drill waste rock, process precipitates, and industrial wastewater treatment plant precipitates.	Operation			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• On-site and off-site operation of vehicles and transport of materials.		• Herbicide use will be avoided within 100 m of any known listed plant occurrences. Where herbicide use is unavoidable, use will be restricted to direct application instead of broadcast spraying and will be completed by qualified personnel. • Progressive reclamation and ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable with the use of suitable native species. • Sediment and erosion control measures will be implemented. • Surface water management features (e.g., culverts and ditches) will be constructed and maintained (as per Project design specification) along access roads and facility sites to facilitate surface drainage continuity and hydrologic connectivity, especially in proximity to wetlands, water crossings, and waterbodies. • Equipment and vehicles will arrive at the Project Area clean, will be inspected for soil, plant material, and seeds, and will be cleaned as appropriate to limit the potential for the introduction of invasive plants and noxious weeds. • Areas with a high risk for the potential spread of invasive plants and noxious weeds (i.e., within or adjacent to existing infestations) will be avoided to the extent practicable. If work must occur in these areas, invasive plant management will be implemented before starting work.		
			• Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area). • Decommissioning of landfills; hazardous materials management (temporary storage and off-site disposal). • On-site and off-site operation of vehicles and transportation of materials.	Decommissioning			
	Listed Plant Species (listed plant species)	• Change in number of listed plants.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Water management (including treatment and site runoff). • Surface water withdrawal.	Construction		Change in number of listed plants.	Not significant
			• Water withdrawal from groundwater or surface water body. • Management of surface water (including seepage and site runoff). • Water release to surface water body.	Operation			
			• Site water management, treatment, and release. • Process water treatment and release. • Reclamation of disturbed areas.	Decommissioning			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
	Wetlands (wetlands)	• Change in areal extent of wetlands.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Water management (including treatment and site runoff). • Surface water withdrawal.	Construction	• Gravel, fill, straw matting, or similar materials to be used for erosion control will be inspected to minimize the potential for seeds or propagules of invasive plants being brought to site. • Seed used during re-vegetation will be certified weed free, with a valid "Certificate of Seed Analysis". • Dust deposition on soil, vegetation, and waterbodies (including wetlands) will be reduced by controlling access and travel during peak construction and (if/where necessary) applying dust suppression measures. • Hazardous materials will be handled, stored, and disposed of appropriately and in accordance with a Waste Management Plan to avoid attracting avian scavengers (e.g., in wildlife-proof containers). • A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. • Vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits. • Mitigation measures to reduce the potential for dispersion of radiological contaminants of potential concern to vegetation will be implemented in accordance with the Radiation Protection Plan. • A vegetation and soil sampling program—comprising scheduled collection of soil and plant tissues from permanent sampling locations for analysis of constituents of concern—will be conducted to identify if plants	Change in areal extent of wetlands.	Not significant
			• Water withdrawal from groundwater or surface water body. • Management of surface water (including seepage and site runoff). • Water release to surface water body.	Operation			
			• Site water management, treatment, and release. • Process water treatment and release. • Reclamation of disturbed areas.	Decommissioning			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
					within the Vegetation LSA are accumulating constituents of concern within their tissues.		
Terrestrial Environment	Ungulates (moose)	• Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Construction		Alteration and/or loss of habitat	Not significant
			• On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			
			• Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas. • On-site and off-site operation of vehicles and transport of materials.	Decommissioning			
		• Moose mortalities directly or indirectly attributable to the Project.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • On-site and off-site operation of vehicles and transport of materials.	Construction		Change in mortality.	Not significant
			• On-site and off-site operation of vehicles and transport of materials.	Operation			
			• On-site and off-site operation of vehicles and transport of materials.	Decommissioning			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
	Furbearers (wolverine, pine marten, mink, muskrat)	• Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Waste management (composting, domestic and industrial landfill operation, recycling). • Water management (including treatment and site runoff). • Surface water withdrawal. • On-site and off-site operation of vehicles and transport of materials.	Construction	• Potential adverse effects on the Ungulates, Furbearers, and Woodland Caribou VCs will be avoided or minimized to the extent possible through Project design measures. • Additional mitigation measures specific to the Ungulates, Furbearers, and Woodland Caribou VCs, and tailored to Project features, will be incorporated into the various Project management plans. • Employees and contractors will be provided with wildlife education and awareness training, including education about potential wildlife issues on site and training on the mitigation measures. Plan to avoid or minimize potential Project effects on wildlife and wildlife habitat. • Wildlife and habitat protection measures will be implemented to avoid or minimize wildlife harassment. • Project activities will be assessed for their potential to disturb wildlife and/or affect wildlife habitat during sensitive time periods (to minimize sensory disturbance of wildlife. • To deter wildlife from potentially becoming entrapped, secure fencing will be installed around all radiological areas, and buildings and other Project components will be designed and maintained to exclude wildlife from entering. • Road and traffic management measures will be implemented to avoid or reduce sensory disturbance of wildlife and wildlife-vehicle collisions. • Waste and hazardous materials management measures will be implements to avoid or reduce the potential of wildlife exposure and wildlife conflicts.	Alteration and/or loss of habitat.	Not significant
			• Water withdrawal from groundwater or surface water body. • Management of surface water (including seepage and site runoff). • Water treatment, both domestic and industrial. • Water release to groundwater and/or surface water body. • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials.	Operation			
			• Site water management, treatment and release. • Process water treatment and release. • Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas.	Decommissioning			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• On-site and off-site operation of vehicles and transport of materials. • Waste management (composting, domestic and industrial landfill operation, recycling).				
		• Furbearer mortalities directly or indirectly attributable to the Project.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials.	Construction		Change in mortality.	Not significant
			• Waste management (composting and landfill operation). • On-site and off-site operation of vehicles and transport of materials.	Operation			
			• On-site and off-site operation of vehicles and transport of materials. • Waste management (composting and landfill operation).	Decommissioning			
	Woodland Caribou (woodland caribou)	• Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Construction		Alteration and/or loss of habitat.	Not significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			
			• Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas. • On-site and off-site operation of vehicles and transport of materials.	Decommissioning			
		• Woodland caribou mortalities directly or indirectly attributable to the Project.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • On-site and off-site operation of vehicles and transport of materials.	Construction		Change in mortality.	Not significant
			• On-site and off-site operation of vehicles and transport of materials.	Operation			
			• On-site and off-site operation of vehicles and transport of materials.	Decommissioning			
Terrestrial Environment	Raptors (Bald Eagle, Osprey)	• Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Waste management (composting, domestic and industrial landfill operation, recycling). • Water management (including treatment and site runoff). • Surface water withdrawal.	Construction	• Potential adverse effects on the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs will be avoided or minimized to the extent possible through Project design measures. • Additional mitigation measures specific to the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs, in accordance with the *Migratory Birds Convention Act* and tailored to Project features, will be incorporated into the various Project management plans.	Alteration and/or loss of habitat.	Not significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.		• Employees and contractors will be provided with wildlife education and awareness training, including education about potential wildlife issues on site and training on the mitigation measures to avoid or minimize potential Project effects on avian species and their habitat. • Site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, whenever practicable. • Active nests and suspected nest locations will be protected with a no-disturbance setback buffer consistent with regulatory guidelines. • Avian species and habitat protection measures will be implemented to avoid or minimize adverse effects. • Buildings and other Project infrastructure will be designed and maintained to exclude birds as much as possible. Physical, visual, and/or auditory deterrents will be used to discourage avian use of buildings and other Project infrastructure for refuge, shelter, or nesting, and to deter birds from potentially becoming entrapped. • Deflectors will be used on Project power transmission lines leading to the Project components, if appropriate. • Measures will be taken to discourage birds, particularly raptors, from nesting on utility poles. • Road and traffic management measures will be implemented to avoid or reduce sensory disturbance of avian species and vehicle collisions.		
			• Management of surface water (including seepage and site runoff). • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			
			• Process water treatment and release. • Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas. • Site water management, treatment, and release. • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials.	Decommissioning			
		• Raptor mortalities directly or indirectly attributable to the Project.	• Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Construction		Change in mortality.	Not significant
			• On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• On-site and off-site operation of vehicles and transport of materials.	Decommissioning	• Waste and hazardous materials management measures will be implements to avoid or reduce the potential of avian exposure and associated conflicts.		
	Migratory Breeding Birds (waterbirds and waterfowl, upland game birds, migratory songbirds)	• Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA.	• Development of access roads and air strip. • Clearing, levelling, and grading of the Project site and laydown area. • Waste management (composting, domestic and industrial landfill operation, recycling). • Water management (including treatment and site runoff). • Surface water withdrawal. • On-site and off-site operation of vehicles and transportation of materials. • Air transportation for workers.	Construction		Alteration and/or loss of habitat.	Not significant
			• Water withdrawal from groundwater or surface water body. • Management of surface water (including seepage and site runoff). • Water treatment, both domestic and industrial. • Water release to surface water body. • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• Process water treatment and release. • Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas. • Site water management, treatment, and release. • On-site and off-site operation of vehicles and transport of materials. • Waste management (composting, domestic and industrial landfill operation, recycling).	Decommissioning			
		• Migratory Breeding Bird mortalities directly or indirectly attributable to the Project.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project site and laydown area. • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Construction		Change in mortality.	Not significant
			• Water withdrawal from groundwater or surface water body. • Management of surface water (including seepage and site runoff). • Water treatment, both domestic and industrial. • Water release to surface water body. • Waste management (composting, domestic and industrial landfill operation).	Operation			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.				
			• Site water management, treatment, and release. • Process water treatment and release. • Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas. • Waste management (composting, domestic and industrial landfill operation, recycling). • On-site and off-site operation of vehicles and transport of materials.	Decommissioning			
	Bird Species at Risk (Common Nighthawk, Short-eared Owl, Yellow Rail, Rusty Blackbird, Olive-sided Flycatcher)	• Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Water management (including treatment and site runoff). • Surface water withdrawal. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Construction		Alteration and/or loss of habitat.	Not significant
			• Management of surface water (including seepage and site runoff). • Water release to surface water body. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• Process water treatment and release. • Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas (site, roads, camp, and airstrip). • Site water management, treatment, and release. • On-site and off-site operation of vehicles and transport of materials.	Decommissioning			
		• Bird Species at Risk mortalities directly or indirectly attributable to the Project.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Construction		Change in mortality.	Not significant
			• On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers.	Operation			
			• Demolition and disposal of non-salvageable surface infrastructure and materials. • Reclamation of disturbed areas. • On-site and off-site operation of vehicles and transport of materials.	Decommissioning			

Human Health – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Residual Effect	Mitigation Measures	Significance
Human Health	Human Health and Safety (public health)	• Evaluation of the risk of exposure to constituents of potential concern using hazard quotient, incremental lifetime cancer risk, and radiation dose.	<u>Construction</u> • Development of access roads and air strip. • Site preparation and earthworks; clearing, levelling, and grading of the Project Area. • Power generation – generators. • Wellfield and freeze hole drilling; ground freezing. • Batch plant operation (concrete); crusher at borrow area. • Development of surface infrastructure (camp, operations centre, plants, ponds, pads, and support facilities). • On-site and off-site operation of vehicles and transport of materials. <u>Operation</u> • Operation of the ISR wellfield. • Wellfield and freeze wall drilling. • Batch plant operation (grout and cement); crusher in borrow area. • Operation of the processing plant and production of uranium concentrate. • Water release to surface water body. • Waste management (composting, domestic and industrial landfill operation, recycling). • Storage and disposal of drill waste rock, process precipitates, and industrial wastewater treatment plant precipitates. • On-site and off-site operation of vehicles and transport of materials.	Construction Operation Decommissioning	• The Human Health Risk Assessment (HHRA) indicated residual effects on the fisher/trapper (one of the human receptors evaluated) from eating fish due to selenium concentrations in the inlet to Russell Lake. • No other residual effects were identified in the HHRA.	• Develop site-wide water management plan. • Develop site-specific effluent treatment to treat constituents of potential concern to appropriate release limits. • Monitor and manage effluent. • Create and implement a dust management plan.	Not significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Residual Effect	Mitigation Measures	Significance
			• Power supply – primarily power from the grid; also generators and back-up generators. <u>Decommissioning</u> • Site water management, treatment, and release. • Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area). • Power generation – generators. • On-site and off-site operation of vehicles and transport of materials. • Reclamation of disturbed areas.				
	Worker Health and Safety (employee health)	• Change in the risk of exposure to constituents of concern. • Radiological exposure values.	<u>Operation</u> • Operation of the ISR wellfield. • Wellfield and freeze wall drilling. • Operation of the processing plant and production of uranium concentrate. • Storage and disposal of drill waste rock, process precipitates, and industrial wastewater treatment plant precipitates. • Package and transport of nuclear substances. <u>Decommissioning</u> • Site water management, treatment, and release. • Mining horizon remediation and thawing of freeze wall. • Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area).	Operation Decommissioning	• No residual effect predicted with implementation of mitigation measures and the Radiation Protection Plan.	• Maximize distance from radiation sources; minimize time near radiation sources. • Berm around Special Waste Pad for shielding. • Use powered air purifying respirators for the drying and packaging/loading areas of the ISR Plant. • Monitor dust levels, radon, and worker dose. • Implement the Radiation Protection Plan. • Implement a conventional Health and Safety Plan.	N/A

Land and Resource Use – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Land and Resource Use	Indigenous Land and Resource Use (ILRU)[1] (perceived suitability of land and resources therein)	Perceived suitability of land and resources for safe use.	• Waste management. • Water management. • Groundwater supply. • Surface water withdrawal. • Water release to surface water body. • Hazardous waste management. • Storage and disposal of drill waste rock, process precipitates, and industrial wastewater treatment plant precipitates. • Package and transport of nuclear substances. • Remediation of contaminated areas. • Decommissioning of landfills; hazardous materials management.	Construction Operation Decommissioning	• Mitigation measures for the perceived suitability of lands and resources are required to reduce the potential effects of traffic, noise, dust dispersion, and air emissions, and the potential for constituents of potential concern from entering the environment. The ISR mining method is new to Canada, and despite the exercise of due diligence, trust will need to be built with those who have little experience with this mining method. • Traffic mitigations include air transportation to site and pick-up/drop-off points, driver training, emergency response plans, and maintenance of site roads and access roads. • Noise mitigations include use of high-quality, low-sound emission equipment, situating noise-generating equipment behind on-site obstructions, using industry best practices, and monitoring noise. • Air quality mitigations include dust suppressants for roads and speed limitations to reduce road dust. • Waste management mitigations include features to prevent release of any harmful substances into the environment. • An environmental monitoring program will be developed. • Agreements will be negotiated between Denison and the Indigenous Communities of Interest.	Change in the perception of suitability of lands and resources resulting in avoidance of areas and selection of alternate areas to carry out land use activities. While it is difficult to predict individual perceptions on the suitability of land proximal to the Project for ILRU, resource users may experience disturbances from traffic, noise, and air quality changes, changes related to the relationship to the land, and increased competition for resources. Resource users may also be concerned about personal exposure to contamination of surface water and groundwater, soils, and sources of waste. Some perceptions may be strong enough to cause some individuals to avoid practicing ILRU in areas proximal to the Project.	Not significant
Land and Resource Use	Other Land and Resource Use (OLRU)[2] (perceived suitability of land and resources therein)	Perceived suitability of resources for safe use.	• Waste management. • Water management. • Groundwater supply. • Surface water withdrawal. • Water release to surface water body.	Construction Operation Decommissioning	• Mitigation measures for the perceived suitability of lands and resources therein KI are required to reduce the potential effects of traffic, noise, dust dispersion, air emissions, and the potential for constituents of potential concern to enter the environment. The ISR mining method is new to Canada and, despite the exercise of due diligence, trust will also need to be built	Change in the perception of suitability of lands and resources resulting in avoidance of areas and selection of alternate areas to carry out land use activities.	Not significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• Hazardous waste management. • Storage and disposal of drill waste rock, process precipitates, and industrial wastewater treatment plant precipitates. • Package and transport of nuclear substances. • Remediation of contaminated areas. • Decommissioning of landfills; hazardous materials management.		with those who have little experience with this mining method. • Traffic mitigations include air transportation to site and pick-up/drop-off points, driver training, emergency response plans, and maintenance of site roads and access road. • Noise mitigations include use of high-quality, low sound emission equipment, locate noise-generating equipment behind on-site obstructions, use of industry best practices, and monitoring noise. • Air quality mitigations include dust suppressants for roads and speed limitations to reduce road dust. • Waste management mitigations include features to prevent release of any harmful substances into the environment. • An environmental monitoring program will be developed. • Agreements will be negotiated between Denison and any future trapper, if appropriate.	While it is difficult to predict individual perceptions on the suitability of land proximal to the Project for OLRU, resource users may experience disturbances from traffic, noise, air quality changes, a loss of a 'wilderness experience', and increased competition for resources. Some perceptions may be strong enough to cause them to avoid practicing commercial and recreational use in areas proximal to the Project.	
Land and Resource Use	Heritage Resources (archaeological sites)	Change in the number of known archaeological resources directly or indirectly altered/lost as a result of Project activities.	• Development of access roads and air strip. • Site preparation and earthworks; clearing, leveling and grading of the project area. • Wellfield and freeze hole drilling; ground freezing. • Development of surface infrastructure (camp, operations centre, plants, ponds, pads, and support facilities). • On-site and off-site operation of vehicles and transport of materials. • Expansion of pond and pads • Asset removal (including site power transmission lines and electrical infrastructure).	Construction Operation Post-Decommissioning	• Mitigation includes avoidance, testing, excavation, and monitoring of any new heritage sites	Decrease in number of archaeological sites	Not significant

Component	Valued Components (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area). • Reclamation of disturbed areas.				

Notes:

1 Indigenous Land and Resource Use key indicators, changes to resource availability (including terrestrial and aquatic resource availability and the health of the resources), lands/waters available for traditional practices (including availability/accessibility of land and waterways), and changes to the perceived suitability of land and resources therein (including aesthetic experience and quality of resources for consumption) were not carried forward for a residual effects assessment. The only key indicator for Indigenous Land and Resource Use carried forward for a residual effects assessment include perceived suitability of land and resource use and measurable parameter perceived suitability for safe use.

2 Other Land and Resource Use key indicators, changes to resource availability (including terrestrial and aquatic resource availability and the health of the resources), lands available to conduct recreational and commercial harvests (including availability/accessibility of land and waterways), and changes to the perceived suitability of land and resources therein (including aesthetic of resource use) were not carried forward for a residual effects assessment. The only key indicator for Other Land and Resource Use carried forward for a residual effects assessment include perceived suitability of land and resource use and measurable parameter perceived suitability of resources for safe use.

Quality of Life – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Component (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Quality of Life	Cultural expression[1] (traditional diet)	Changes in availability of country foods included in a traditional diet.	• Development of access roads and air strip. • Site preparation and earthworks. • Waste management. • Surface water withdrawal. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers. • Water treatment • Water release to surface water body. • Hazardous waste management. • Storage and disposal of drill waste rock, process precipitates and industrial wastewater treatment plant precipitates. • Package and transport of nuclear substances. • Remediation of contaminated areas.	Construction Operation Decommissioning	• To minimize land disturbed by the Project, the Project Area has been reduced to the extent practicable and much of the proposed Project footprint has been developed within previously disturbed areas. • Denison will implement an Environmental Monitoring Program consistent with Canadian Standards Association for nuclear facilities and mines. • Denison is currently working with communities to make sure Project outcomes include the development of mutually beneficial relationships and minimized Project effects.	The Project's effects on the availability and abundance of species that are important to a traditional diet are expected to be low. The area where Project effects are anticipated for traditional diet species are not areas with intensive use by English River First Nation or Kineepik Métis Local #9 (Pinehouse). Those effects are anticipated in the Local Study Area (LSA) for Indigenous Land and Resource Use (ILRU), north of the Key Lake gate.	Not significant
		Changes in the perceived suitability of country foods in a traditional diet.	• Development of access roads and air strip. • Ste preparation and earthworks. • Waste management. • Surface water withdrawal. • On-site and off-site operation of vehicles and transport of materials. • Air transportation for workers. • Water treatment. • Water release to surface water body. • Hazardous waste management.	Construction Operation Decommissioning	• Mitigation measures will be applied to reduce the effects of traffic, noise, dust dispersion, air emissions, and the potential for COPCs to enter the environment. • Denison will implement an Environmental Monitoring Program consistent with Canadian Standards Association for nuclear facilities and mines. • Denison is currently working with communities to make sure Project outcomes include the development of mutually beneficial relationships and minimized Project effects.	The perceived suitability of country foods may be adversely affected by the Project. The predicted exceedance of the benchmark for selenium from eating a large quantity of fish in Russell Lake, although based on conservative assumptions and monitored throughout the life of the Project, may cause some residents of the LSA to avoid country foods harvested close to the Project footprint. As noted, these areas are not intensively used now. Therefore, a change in perceived suitability and safety of country foods may change some behaviour but is not expected to cause a large reduction in the	Not significant

Component	Valued Component (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
			• Storage and disposal of drill waste rock, process precipitates and industrial wastewater treatment plant precipitates. • Package and transport of nuclear substances. • Remediation of contaminated areas.			amount of country foods included in the traditional diet of the English River First Nation and Kineepik Métis Local #9 (Pinehouse).	
Quality of Life	Community Well-being[2] (income of local workers)	Change in income of local workers	• Employment and expenditures[3]	Construction Operations Decommissioning Post-Decommissioning	Mitigation measures relating to this potential residual effect include: • health and wellness programming; • health promotion and on-site health care; • life skills programming; • employee and family assistance programs (EFAPs) to assist workers and their families; • culturally sensitive employment policies; • policy for no drugs and alcohol on site; • workforce transition plan prior to Decommissioning; • continued liaison with LSA communities and relevant authorities; and • supports for communities as identified in any agreements entered into with communities.	Increased income because of the Project can be beneficial to households in communities in the LSA and Regional Study Area (RSA). Adverse effects may also result (e.g., work rotations can limit the amount of time families have together). Increased cash income, while also having positive effects, may result in misspending. Employment may reduce participation in traditional economy. Loss of employment following decommissioning may contribute to individual stress.	Not significant
	Community Well-being[2] (community cohesion)	Change in community cohesions as understood by community members through Key Person Interviews.	Employment and expenditures[3]	Construction Operation Decommissioning Post-Decommissioning	Mitigation measures relating to this potential residual effect include: • health and wellness programming; • health promotion and onsite health care; • life skills programming • EFAPs to assist workers and their families; • policy for no drug and alcohol on site; • pick up and drop off points; • culturally sensitive employment policies;	Participation in worker rotation may result in family tensions, use of alcohol/substances, increased violence and crime	Not significant

Component	Valued Component (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
					• continued liaison with LSA communities and relevant authorities; and • supports for communities as identified in any agreements entered into with communities.		
Quality of Life	Infrastructure and services (traffic)	Change in traffic volumes and types and risk of accident.	On-site and off-site operation of vehicles and transport of materials.	Construction Operation	Mitigation measures relating to this potential residual effect include: • air transportation for workers between drop off locations and communities; • compliance with highway weight restrictions/permits; • spring road restrictions; • appropriate driver training; • vehicles transporting dangerous goods or hazardous products will display required placards; • development of an Emergency Response Plan in case there is a spill; and • maintenance by Denison of roads within the Project site and the main access road to the Project site.	The movement of equipment, materials, supplies, and personnel to and from the site has the potential to result in increased traffic volumes and associated concerns regarding wear and tear of highway infrastructure, along with risks and collisions.	Not significant
	Infrastructure and services (community infrastructure and services)	Change in access to and capacity of community infrastructure and services.	Employment and expenditures[3]	Construction Operation Decommissioning	Mitigation measures relating to this potential residual effect include: • services and programs provided on site and accessible to workers, including health and wellness programming, health promotion, immunization programs, and life skills development programming; • workforce education to encourage healthy lifestyles; • EFAPs; and • ongoing communication between Denison and LSA communities and relevant authorities.	The Project has the potential to cause increased stress on community infrastructure and services because of increased income and lifestyle changes that can result from large projects (e.g., additional support services for community members). Participation in employment and the commuter rotation system may cause increased stress for individuals and families. This may result in an increased demand on social services at the community level and for those services associated with the	Not significant

Component	Valued Component (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
						potential change, such as childcare and mental health services.	
		Change in emergency services capacity.	• Employment and expenditures[3] • On-site and off-site operation of vehicles and transport of materials.	Construction Operation Decommissioning	Mitigation measures relating to this potential residual effect include: • first aid facilities and the appropriate amount of first aid training; • primary care paramedic on site through all Project phases; • mandatory safety orientations for employees; • health and safety management plans; • training of workers in fuel handling, equipment maintenance, and fire prevention and response; • enforcement of Denison's Environment, Health, Safety, and Sustainability policy; • emergency response and spill prevention plans, and support and/or training to local emergency services; • ongoing communication between Denison and LSA communities and relevant authorities; and • support and/or training provided by Denison to local emergency staff to make sure staff are adequately prepared in the event of an accident/malfunction or spill on Highway 914 or 165.	The Project has the potential to cause increased stress on health and emergency services. Increased pressure on emergency services is most likely to stem from an accident or malfunction on Highways 914 or 165. The extent to which these changes could affect any given community would depend on the nature of the accident or malfunction. If such an event were to occur, local resources may be called upon to provide support.	Not significant

Notes:

1 Cultural expression key indicator knowledge transmission (including measurable parameters changes to cultural practices that support knowledge transmission and changes in the location of cultural practices that support knowledge transmission) were not carried forward to the discussion of residual effects.

2 Community well-being key indicator population and demographics was not material enough to measure and was not carried through to discussion of residual effects.

3 Project employment and expenditures are generated by most Project activities and components throughout the phases of the Project. Hence, Project employment and expenditures have been added into the table as a separate column for each Project phase instead of acknowledging these individually by component or activity.

Economics – Summary of the Environmental Assessment Considerations and Significance Determination for Predicted Residual Effects

Component	Valued Component (Key Indicators)	Measurable Parameters	Project Activities Resulting in Primary Interactions	Project Phase	Mitigation Measures	Residual Effect	Significance
Economics	Economy (traditional economy)	Change in participation in the traditional economy due to the Project and its activities.	• Changes to the biophysical environment stemming from the Project and its activities. • Employment and Expenditures[2]	Construction Operation Decommissioning Post-Decommissioning	Mitigation measures relating to this potential residual effect include: • culturally sensitive employment policies; • agreements with appropriate Indigenous communities that will reflect each community's interests and objectives relative to Project opportunities; and • a trapper's compensation agreement may be entered into by Denison if a future trapper becomes active in proximity to the site.	The physical presence of the Project and its activities, including participation in the commuter rotation may limit some traditional land and resource activity. Regarding the physical presence of the Project and its activities, it is anticipated that most effects will occur close to the Project site, although the Project may displace some individual activities relating to land and resource use within the LSA. Regarding participation in the wage economy limiting the ability of individuals to participate in the traditional economy, effects may be more widespread to communities in the LSA.	Not significant

Notes:

1 Economic valued components employment and training, income, business opportunities, and government revenues are expected to have mostly positive residual effects, as a result they were not carried through to the residual effects assessment.

2 Project employment and expenditures are generated by most Project activities and components throughout the phases of the Project. Hence, Project employment and expenditures have been added into the table as a separate column for each Project phase instead of acknowledging these individually by component or activity.