ENVIRONMENTAL IMPACT ASSESSMENT

Potential Impacts on the Salmon River Watershed

Alto High-Speed Rail Project — Northern and Southern Route Options

Prepared for: Friends of the Salmon River

Based on: *The Salmon River Habitat Strategy* (Green, 2005) and current Alto HSR consultation materials (2025–2026)

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KEY FINDING

Both routes pose risks to the Salmon River watershed, but they differ significantly in character. The Northern route threatens the watershed's most ecologically intact areas on the Precambrian Shield — areas that currently provide critical ecological services downstream. The Southern route threatens already-stressed riparian and wetland habitats in the limestone bedrock portion of the watershed where the greatest restoration needs have been identified.

1. Executive Summary

This assessment evaluates the potential environmental impacts of the two proposed Alto High-Speed Rail (HSR) route options on the Salmon River watershed in eastern Ontario. The Alto project, announced in February 2025, proposes a 1,000-kilometre high-speed rail corridor connecting Toronto to Quebec City. Between Peterborough and Ottawa, two route scenarios are under study: a Northern option crossing the Canadian Shield through Lanark, Frontenac, and Hastings Counties, and a Southern option passing closer to the Highway 401 corridor through more populated agricultural lands in Lennox & Addington and South Frontenac.

Drawing on data from *The Salmon River Habitat Strategy* (Green, 2005) — a comprehensive GIS-based study of wetland, riparian, and forest habitat within the 921 km² Salmon River watershed — this assessment identifies how each route option could affect the watershed's ecological integrity, endangered and threatened species, and ongoing restoration priorities. The assessment also considers the broader context of the UNESCO-designated Frontenac Arch Biosphere Reserve, which overlaps with much of the watershed's territory.

2. Background: The Alto HSR Project

Alto is a federal Crown corporation mandated to build Canada's first high-speed rail network. The project envisions trains travelling at speeds up to 300 km/h on approximately 1,000 km of new, dedicated, electrified track connecting Toronto, Peterborough, Ottawa, Montreal, Laval, Trois-Rivières, and Quebec City. The project's private development partner, Cadence, was announced in February 2025. The estimated cost ranges from $60 to $90 billion.

The only segment of the proposed rail line where two alternative corridors are being considered is between Perth and Peterborough — the segment that passes through the counties of Lanark, Frontenac, Lennox & Addington, and Hastings. This is precisely the region encompassing the Salmon River watershed. The study corridor is approximately 10 km wide; the final right-of-way

would be approximately 60 metres wide, but high-speed rail requires curve radii of 7 km or more, which severely limits alignment flexibility.

2.1 Northern Corridor

The Northern Corridor follows a more direct line between Ottawa and Peterborough, crossing the Canadian Shield through Lanark, Frontenac, and Hastings Counties. This route crosses approximately 85 km of uneven Precambrian Shield granite terrain. Construction would require extensive “cut and fill” operations — blasting through rock ridges and using excavated material to fill wetlands and low-lying areas.

2.2 Southern Corridor

The Southern Corridor swings closer to the Highway 401 corridor, passing through eastern Ontario’s agricultural and park/conservation areas with higher population density. While Alto's website suggests construction may be technically simpler, the route crosses more valuable farmland, the UNESCO designated Frontenac Arch Biosphere Reservie and more densely settled areas.

3. The Salmon River Watershed: Ecological Profile

The Salmon River originates near Cloyne, south of Bon Echo Provincial Park, and flows through Lennox & Addington, Frontenac, and Hastings Counties before emptying into the Bay of Quinte near Shannonville. The watershed spans 921 km² and is part of the larger Bay of Quinte Area of Concern, one of 43 Great Lakes Basin areas identified by the International Joint Commission in 1985 as requiring remedial action.

A critical feature of the watershed is its geological division. The northern 57% sits on the Precambrian Shield, while the southern 43% rests on limestone bedrock. These two zones present dramatically different ecological conditions, as documented in the 2005 Habitat Strategy:

Habitat Indicator	Guideline	Whole Watershed	Shield (North)	Limestone (South)
Wetland area	>10%	11.7%	12.1%	11.1%
Vegetation near wetlands	100%	92.3%	99.7%	**64.3%** ⚠
Stream length vegetated	>75%	78.9%	89.1%	**52.5%** ⚠
Riparian vegetation (30m)	100%	80.7%	98.4%	**38.1%** ⚠
Forest cover	>30%	70.3%	85.6%	49.5%
Interior forest habitat	>5%	27.8%	38.6%	**13.4%** ⚠

⚠ *Values marked with a warning symbol fall well below Environment Canada guidelines. Source: Green (2005), The Salmon River Habitat Strategy.*

The data reveals a watershed of two halves. The Precambrian Shield portion is rich with intact forest, wetlands, and riparian vegetation providing high-quality habitat and essential ecological services to downstream communities. The limestone bedrock portion is ecologically stressed, with critically low levels of streamside vegetation — only 38.1% of lands within 30 metres of streams have forest cover, and only 52.5% of stream length is naturally vegetated. These southern areas were identified as the watershed’s highest restoration priorities.

4. Impact Assessment: Northern Corridor

A route through the Northern Corridor would cross through or near the Precambrian Shield portion of the Salmon River watershed — the portion currently providing the highest quality habitat in the entire watershed. This assessment identifies several categories of concern.

4.1 Destruction of Intact Habitat

The Precambrian Shield portion of the watershed contains 85.6% forest cover, 38.6% interior forest habitat, and 98.4% riparian vegetation within 30 metres of streams. These are exceptional ecological indicators that far exceed Environment Canada's minimum guidelines. High-speed rail construction through this terrain would require blasting through granite ridges and filling wetlands, directly destroying habitat that is among the most intact in southeastern Ontario. The 60-metre right-of-way, combined with construction staging areas and access roads, would fragment what is currently continuous forest cover.

4.2 Wetland Loss and Hydrological Disruption

The Shield portion contains 12.1% wetland coverage, narrowly exceeding the 10% minimum. The Kennebec Wetland Complex alone is a vast network of hundreds of small wetlands that serves as a critical reservoir for the Salmon River, providing flood attenuation and drought moderation for downstream communities. Cut-and-fill construction — using blasted rock to fill swamps — would directly eliminate wetlands and alter the hydrological patterns that sustain them. Even small disruptions to this interconnected wetland system could cascade downstream, affecting water quality and flow regimes throughout the watershed.

4.4 Threat to Provincial and National Natural Heritage Sites

The Salmon River watershed's Precambrian Shield portion contains multiple Areas of Natural and Scientific Interest that could be affected by a route through the Northern Corridor:

- **Hungry Lake Barrens (4,953 ha) —** Possibly the largest undisturbed granite bedrock barrens area in southern Ontario, home to the provincially rare Polygonum careyi
- **Puzzle Lake ANSI (2,138 ha within the watershed) —** Contains the highest known number of provincially rare species in any such area in eastern or southern Ontario, including nationally rare Bear Oak and the endangered Toothcup
- **Westplain Mud Lake ANSI (941 ha) —** The largest extent of open and treed fen in the district
- **Harlowe Bog (478 ha) —** A very large peat bog with the uncommon Eastern Chain-fern

4.5 Endangered and Threatened Species

Six endangered species are documented within the Salmon River watershed, several of which depend on Shield habitat that a route through the Northern Corridor could disturb:

- **Toothcup (Rotala ramosior) — Endangered:** Exists at only two lakes in Lennox & Addington County; threatened by potential development and water level changes
- **Butternut (Juglans cinerea) — Endangered:** A native tree species already threatened by canker disease; construction-related disturbance would compound existing threats
- **Juniper Sedge (Carex juniperorum) — Endangered:** Globally rare, with the world's largest known population at the Salmon River Alvar; fewer than 20 populations exist worldwide
- **Blanding's Turtle (Emydoidea blandingii) — Threatened:** Regularly moves between wetlands, overwintering sites, nesting sites, and thermoregulation sites, migrating several kilometres within its home range annually

4.6 Downstream Ecological Services

The 2005 Habitat Strategy's conclusion emphasized that the expansive wetland and forest areas of the Precambrian Shield provide essential ecological services to downstream residents, including flood attenuation and drought moderation. Damage to the Shield's hydrological integrity from HSR construction could undermine these services, with consequences for agricultural communities and municipalities in the watershed's southern portion and ultimately for water quality in the Bay of Quinte.

5. Impact Assessment: Southern Corridor

A route through the Southern Corridor would pass through or near the limestone bedrock portion of the Salmon River watershed — the area already identified as the watershed's greatest restoration priority. This route presents a different but equally concerning set of environmental risks.

5.1 Compounding Existing Ecological Stress

The limestone bedrock portion of the watershed already fails to meet several Environment Canada habitat guidelines. Only 38.1% of adjacent lands within 30 metres of streams have forest cover (the guideline is 100%), and only 64.3% of uplands within 100 metres of wetlands are vegetated (compared to 99.7% on the Shield). The 2005 Habitat Strategy identified stream bank reforestation in this area as the watershed's most important restoration priority. Construction of a high-speed rail corridor through this zone would directly destroy riparian vegetation and wetland buffers in an area where restoration — not further degradation — is urgently needed. Two decades of stewardship work by the Friends of the Salmon River and partner organizations could be undermined.

5.2 Agricultural Land and Riparian Buffer Loss

The Southern route passes through agricultural landscapes where soils are predominantly loam, clay loam, and clay — among the most productive in the region. The 60-metre right-of-way would permanently remove farmland from production. More critically for watershed health, the corridor would cut through riparian zones adjacent to streams and wetlands, further reducing the already-deficient vegetated buffers that filter agricultural runoff before it enters waterways.

5.3 Impacts on Provincially Significant Wetlands

Several Provincially Significant Wetlands in the southern watershed could be affected by the Southern route:

- **Mud Creek Wetland (329 ha) —** Home to four provincially significant species including Least Bittern and Northern Harrier
- **Pennell's Creek Wetland (220 ha) —** Notable for Brook Trout spawning and rearing; already experiencing disturbance from cattle grazing
- **Otter Creek Wetland (146 ha) —** Habitat for the endangered Loggerhead Shrike and five provincially significant species
- **Big Marsh Wetland (125 ha) —** A Bay of Quinte coastal wetland with traditional significance for the Mohawks of the Bay of Quinte; traditional habitat for endangered Bald and Golden Eagles

5.4 Endangered Species at Risk

The Southern route zone contains critical habitat for several endangered species documented in the watershed:

- **Loggerhead Shrike — Endangered:** Requires open areas with short grass for foraging; estimated at only about 40 pairs in Ontario. Particularly sensitive to habitat fragmentation and fencing
- **Henslow's Sparrow — Endangered:** Occupies open grassland fields; the Canadian population is critically small at an estimated 2–3 pairs. Any disturbance to undisturbed grassland areas could be catastrophic
- **King Rail — Endangered:** Requires large freshwater marshes; fewer than 30 calling birds were counted in an extensive 1999 survey. Main threat is habitat loss through pollution and water level changes
- **Juniper Sedge — Endangered:** The Salmon River Alvar, in the southern watershed, hosts potentially the world's largest population; threatened by quarrying and grazing
- **Blanding's Turtle — Threatened:** Most significant threats include road and rail mortality as well as habitat loss and fragmentation

5.5 Disruption of the Cataraqui Trail and Recreational Corridors

The Southern route parallels much of the Cataraqui Trail, a 104-km recreational rail trail that is part of the Trans Canada Trail. The trail crosses sensitive wetlands and the Frontenac Arch Biosphere Reserve. A fenced high-speed rail corridor would sever this recreational and ecological corridor, affecting both community recreation and wildlife connectivity. The trail runs through Frontenac and Lennox & Addington Counties — the same counties through which the Salmon River flows.

5.6 Water Quality Implications for the Bay of Quinte

The Salmon River drains into the Bay of Quinte, a Great Lakes Area of Concern already impaired by eutrophication, degraded fish and wildlife populations, and loss of habitat. Construction in the southern watershed — through areas with inadequate riparian buffers — would increase sediment and nutrient loading into the river system. This runs directly counter to the Bay of Quinte Remedial Action Plan's objectives of restoring beneficial uses, and could set back decades of collaborative restoration work.

6. Comparative Impact Summary

Impact Category	Northern Corridor	Southern Corridor
Primary habitat at risk	Intact Shield forests, wetlands, and rock barrens	Already-degraded riparian zones and agricultural buffers
Forest cover impact	Loss of 85.6% forested area; fragmentation of 15,122 ha contiguous forest	Further reduction of 49.5% forest cover in area needing reforestation
Wetland risk	Direct filling of Shield wetlands; disruption of Kennebec Complex hydrology	Loss of buffers around PSWs already at 64.3% vegetation
Riparian impact	Loss of near-pristine (98.4%) Shield riparian habitat	Further degradation of critically low (38.1%) limestone riparian cover
Endangered species	Toothcup, Butternut, Juniper Sedge	Loggerhead Shrike, Henslow's Sparrow, King Rail, Juniper Sedge

Construction method	Cut-and-fill through granite; blasting ridges, filling swamps	Standard grading through agricultural land and clay soils
Downstream consequences	Loss of flood attenuation and drought buffering for downstream communities	Increased sediment/nutrient loading into Bay of Quinte
Restoration impact	Damages the ecological “bank” that supports the whole watershed	Directly undermines priority restoration areas identified in 2005

7. Regulatory and Policy Concerns

Several regulatory and policy dimensions intensify the environmental concerns associated with either route option through the Salmon River watershed:

- **Federal Bill C-15 (fall 2025 budget)** grants the Alto project enhanced expropriation powers and development holds along the proposed corridor. Combined with Bill C-5 (2024), the Minister of Transport may exempt the project from some environmental protections, raising concern that standard environmental assessment processes may be weakened
- **The Bay of Quinte Remedial Action Plan,** a commitment under the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, requires active restoration of the Salmon River watershed — not further degradation
- **The Frontenac Arch Biosphere Reserve’s UNESCO designation** obligates Canada to conserve biodiversity and promote sustainable development within the region
- **The Salmon River Alvar’s status as a Provincially Significant ANSI** affords it protection under Ontario’s Provincial Policy Statement, which directs that development not be permitted in significant natural heritage features
- **Multiple Provincially Significant Wetlands** carry protections under Ontario’s Wetlands Policy, requiring no net loss of wetland function

8. Recommendations

Based on this assessment, the following recommendations are offered to Alto, Cadence, and the relevant federal and provincial authorities:

- Conduct a comprehensive, independent environmental impact assessment for both route options that specifically addresses the Salmon River watershed’s documented ecological conditions, using the 2005 Habitat Strategy as a baseline
- Engage directly with the Friends of the Salmon River, Quinte Conservation, the Frontenac Arch Biosphere Network, the Nature Conservancy of Canada, and the Stewardship Councils of Lennox & Addington, Frontenac, and Hastings Counties in corridor planning
- Ensure that federal environmental exemption provisions in Bills C-5 and C-15 are not used to bypass assessment of impacts on the Salmon River watershed’s designated natural heritage features
- If either route proceeds, require binding commitments to avoid, minimize, and offset impacts on Provincially Significant Wetlands, endangered species habitat, and the Frontenac Arch wildlife corridor — with net-positive habitat outcomes
- Consider whether the significant ecological costs of routing through this sensitive region justify re-examining alternative alignments that avoid the Salmon River watershed and Frontenac Arch entirely
- Update the *2005 Salmon River Habitat Strategy* with current spatial data and remote sensing to establish a contemporary baseline before any construction approvals are granted

9. Conclusion

The Salmon River watershed sits squarely in the path of both proposed Alto HSR route options through eastern Ontario. Neither route can be considered benign from an environmental perspective. The Northern route threatens to damage the ecological engine of the watershed — the intact Shield forests and wetlands that regulate water flow, support biodiversity, and provide resilience against climate change. The Southern route threatens to compound existing ecological stress in the very areas where restoration has been identified as most urgently needed.

"Appreciation, conservation and restoration of the Salmon River watershed's natural wealth will ensure that it remains a healthy watershed home for a rich diversity of living things, including people." — The Salmon River Habitat Strategy, Green (2005)

Twenty years after those words were written, this counsel is more relevant than ever. Any infrastructure project of the scale of Alto HSR must be held to the highest environmental standards, and the Salmon River watershed — with its documented ecological significance, endangered species, and role within the Bay of Quinte remediation framework — deserves nothing less.

Sources

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