POLICY BRIEF

Invasive Species Risk: A Railway Through Canada's Most Biodiverse Region

Invasive Species Risk, Any Route Through the Frontenac Arch UNESCO Biosphere Reserve

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PREAMBLE

This policy brief examines the relationship between construction of a high-speed rail line along a route through the ALTO southern corridor and the accelerated spread of invasive species into the Frontenac Arch UNESCO Biosphere Reserve. It draws on peer-reviewed scientific literature, published conservation assessments, and research on existing trail corridors in the Frontenac region. It does not constitute a formal environmental impact assessment — it calls for one to be conducted and publicly disclosed.

Section I — The Science of Railway-Driven Invasive Species Spread

What Railway Construction Does to the Landscape

Before the first invasive seed arrives, railway construction destroys what is already there. A high-speed rail corridor requires the complete removal of native vegetation across the full right-of-way, trees, shrubs, ground cover, and root systems that may have taken decades or centuries to establish. This cleared strip is not just bare ground: it is a permanent wound in the landscape. Native plant communities that once filtered water, stabilised soil, supported pollinators, and provided wildlife habitat are replaced by a maintained, herbicide-treated verge that remains fundamentally unlike the surrounding ecosystem for as long as the railway operates.

1 — Construction Disturbance: The Critical Window

When ground is broken for a railway, vegetation is removed, soil is bared, and drainage is disrupted across the entire right-of-way. This creates precisely the conditions invasive species require for establishment: open ground, disturbed soil chemistry, and elimination of native plant competition. The years immediately following ground-breaking are the highest-risk period. Research confirms that invasive plant richness is consistently highest on plots nearest to roads and railways, regardless of surrounding landscape context.

2 — Equipment and Material as Vectors

Construction equipment carries seeds and soil organisms between sites on tyres, tracks, and undercarriages. Quarries and aggregate pits are perennially disturbed areas and documented sources of invasive plant propagules. On a route through the southern corridor, approximately one million truck journeys would be required to import aggregate; each movement of soil, fill, or equipment

between disturbed and intact sites is an opportunity to introduce invasive propagules into the Biosphere.

3 — The Permanent Verge Corridor

Railway verges — the maintained strips running either side of the track — are regularly mowed and herbicide-treated, creating conditions fundamentally unlike surrounding forest habitat. Invasive generalist species thrive in exactly this environment and can spread uninterrupted for hundreds of kilometres. A 269 km HSR corridor would operate as a permanent maintained invasion highway for over a century.

4 — The Phragmites Problem

Invasive Phragmites australis is already one of Ontario's most damaging invasive species, well documented in the Frontenac Arch region. It spreads quickly, outcompetes native vegetation, releases toxins into the soil, and colonises wetlands, roadsides, and disturbed ground. The railway verge would include drainage ditches — creating linear habitat ideal for Phragmites propagation. A route through the southern corridor crosses terrain rich in wetlands and lakes, precisely the habitat where Phragmites establishes most aggressively.

PEER-REVIEWED FINDING

"Invasive species are a major threat to biodiversity worldwide. Roads, railway networks, green and blue infrastructure, and elements of ecological networks can facilitate the spread of invasive species. Our results show that ecological corridors provide a pathway for the spread of invasive plant species." — Boéré et al. (2021), PMC.

Section II — The Frontenac Arch Biosphere: Specific Vulnerability

The Frontenac Arch Biosphere Reserve sits at a unique ecological crossroads where five separate forest regions converge. Three Key Biodiversity Areas are formally identified within the Biosphere Region Thousand Islands, Charleston Lake, and Frontenac Forests. The Napanee Limestone Plain in the process of being proposed as a fourth. The Thousand Islands KBA is also a nationally designated Important Area for Reptiles and Amphibians.

Invasive Species Already Documented in the Region

Research on the K&P Trail system, a former railway corridor in the Frontenac region, documented the following invasive species within trail corridor quadrants:

- Phragmites australis (European common reed) — highly aggressive wetland and roadside coloniser
- Wild parsnip — causes severe skin burns upon sunlight exposure; roadside and disturbed ground specialist
- Garlic mustard — forest floor invasive that releases allelopathic chemicals inhibiting native plant germination
- Spotted knapweed — open disturbed ground specialist; thrives in railway ballast environments
- Common and alder buckthorn — shade-tolerant shrub invader that outcompetes native understorey
- Dog-strangling vine (black and pale swallowwort) — forms dense monocultures; wind-borne seeds easily germinate in disturbed soil

- White sweet clover — early-coloniser of disturbed ground; appears rapidly after soil disturbance
- Black ash (Fraxinus nigra) — Endangered due to invasive emerald ash borer; research suggests correlation between railways and ash borer spread

The Nature Conservancy of Canada, which manages over 2,760 hectares within the Biosphere Reserve, includes invasive species mapping and removal as a core stewardship activity. Construction of an HSR corridor through or adjacent to NCC-protected lands would actively undermine this long-term conservation investment.

Section III — Risk Assessment: Southern Corridor

Risk Factor	Southern Corridor Assessment
Protected area	Passes through Frontenac Arch UNESCO Biosphere Reserve
Earthworks volume	4–5 million tonnes — high risk of invasive dispersal
Equipment movements	~1 million truck journeys importing aggregate from outside the Biosphere
Terrain sensitivity	Wetland-rich glacial lowlands — ideal Phragmites habitat
Wildlife corridor	New barrier across Algonquin–Adirondacks corridor simultaneously opens invasion pathway
Corridor length	269 km — permanent invasion highway through the most sensitive section
Existing invasive pressure	High; agricultural lowlands already invaded; construction accelerates spread into intact Shield terrain

Section IV — What Must Happen Before a Route Decision

1	**Commission and publish a site-specific invasive species risk assessment before route selection** Any project traversing or adjacent to a UNESCO Biosphere Reserve should include a detailed invasive species risk assessment. This must be publicly disclosed **before a route decision is finalised,** not after.
2	**Include full invasive species management costs in route comparison** Route costing must include the long-term cost of invasive species monitoring, suppression, and management along the 269 km corridor. These costs must be quantified and attributed to the correct route in any cost–benefit analysis.
3	**Require binding, enforceable invasive species mitigation commitments** Binding legal commitments must require: equipment washed and certified free of invasive propagules before entering the Biosphere; invasive-free fill material; post-construction monitoring and rapid-response management for a minimum of 25 years; and a dedicated funding mechanism for Biosphere Network invasive management work.
4	**Formally engage Biosphere and conservation partners** The Frontenac Arch Biosphere Network, Cataraqui Conservation Authority, Nature Conservancy of Canada, and A2A Collaborative must be formally engaged as consultation partners, not treated as stakeholder comment after decisions are made.

Key References

Boéré et al. (2021). Natura 2000 Areas, Road, Railway, Water, and Ecological Networks May Provide Pathways for Biological Invasion. PMC.

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