

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

## POLICY BRIEF

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

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## PREAMBLE

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This policy brief examines the relationship between construction of a high-speed rail (HSR) along a route through the ALTO southern corridor through Eastern Ontario, and the accelerated spread of invasive species into the Frontenac Arch UNESCO Biosphere Reserve. It is addressed to ALTO HSR, federal and provincial decision-makers with oversight responsibility, and the citizens and municipalities affected by the route decision.

The brief is structured in four sections: (I) the science of railway-driven invasive species spread; (II) the specific vulnerability of the Frontenac Arch Biosphere; (III) an invasive species risk assessment of a route through the ALTO southern corridor; and (IV) what must happen before a route decision.

This analysis draws on peer-reviewed scientific literature [6, 7, 8, 9], published conservation assessments [3, 4, 5, 12], and research on existing trail corridors in the Frontenac region [10]. It does not constitute a formal environmental impact assessment — it calls for one to be conducted and publicly disclosed.

A plant is deemed invasive when it is both 1. not native to the area 2. propagates so aggressively that it displaces native plants altering the ecosystem. Examples are: phragmites, wild parsnip, garlic mustard and purple loosestrife. Invasive species pose the greatest threat to biodiversity after habitat loss. They have few natural predators, can grow, and reproduce quickly, and can adapt to new environments faster than native species [1].

## SECTION I · THE SCIENCE OF RAILWAY-DRIVEN INVASIVE SPECIES SPREAD

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### 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, running for hundreds of kilometres, 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.

## How Linear Transportation Infrastructure Creates Invasion Corridors

The relationship between transportation infrastructure and invasive species spread is well established in the scientific literature. Railways, roads, and canals all create conditions that favour invasive species over native ones — through three primary mechanisms that operate simultaneously and cumulatively [6, 8].

### 01 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 the elimination of native plant competition [6]. The years immediately following ground-breaking are the highest-risk period. A route through the ALTO southern corridor would require excavation of millions of tonnes of material — keeping ground disturbed across a 269 km corridor for an extended construction period. Research confirms that invasive plant richness is consistently highest on plots nearest to roads and railways, regardless of surrounding landscape context [7].

### 02 Equipment and Material as Vectors

Construction equipment — graders, excavators, dump trucks — carry seeds and soil organisms between sites on tyres, tracks, and undercarriages [8].

Material - quarries, sand and gravel pits are perennially disturbed areas making them high quality habitat for invasive plants. On these sites, invasive plant seeds land on and contaminate recently mined sand and gravel, collectively known as aggregate. Invasive plant seeds and plant material also arrive to these sites on equipment. When the contaminated aggregate is transferred to a project site, these seeds are distributed, effectively planted, and easily establish [16].

On a route through the southern corridor, the terrain and earthwork requirements would necessitate approximately one million truck journeys to import aggregate from distant quarries, and a similar scale of soil removal. Each movement of soil, fill, or equipment between disturbed and relatively intact sites is an opportunity to introduce invasive propagules into the Biosphere.

### 03 The Permanent Verge Corridor

Railway construction creates a temporary disturbance. Railway operation creates a permanent one. Railway verges — the maintained strips running either side of the track — are regularly mowed and treated with herbicide, creating conditions fundamentally unlike the surrounding forest habitat [6]. Native species from the adjacent ecosystems are not adapted to these open, disturbed conditions. 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 as long as the railway operates — potentially over a century. This is a threat to all the land that the HSR crosses, not just the Frontenac Arch Biosphere — but it is the Biosphere, with its exceptional biodiversity and irreplaceable ecological connectivity, that faces the greatest and least recoverable harm.

### 04 The Connectivity Paradox

The Frontenac Arch is a national priority for ecological corridor conservation precisely because of its connectivity [11]. But connectivity is a double-edged sword: what facilitates native wildlife movement also facilitates invasive species spread [9]. An HSR line would add a new, maintained, disturbance-rich invasion corridor through the Arch — one that would remain active for the entire operational life of the railway.

### 05 The Phragmites Problem: A Case Study in Scale

Invasive *Phragmites australis* (European common reed) is already one of Ontario's most damaging invasive species, well documented in the Frontenac Arch region [5]. It spreads quickly, outcompetes native vegetation, releases toxins into the soil, and colonises wetlands, roadsides, and disturbed ground. Like all road and rail corridors, the railway verge would include drainage ditches and maintained margins — creating linear habitat ideal for *Phragmites* propagation. A route through the southern corridor crosses a terrain rich in wetlands and lakes — precisely the habitat where *Phragmites* establish most aggressively. Construction disturbance and the subsequent permanent verge corridor would function as a *Phragmites* distribution network into wetland systems currently not yet affected.

*“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.”*

— Peer-reviewed research on railways, roads and ecological corridors as invasive species vectors (PMC, 2021) [9]

## SECTION II · THE FRONTENAC ARCH BIOSPHERE: SPECIFIC VULNERABILITY

### Why This Particular Biosphere Is at Exceptional Risk

The Frontenac Arch Biosphere Reserve, designated by UNESCO in 2002, sits at a unique ecological crossroads [2, 3]. The ancient granite ridge of the Frontenac Arch sweeps from the northern Canadian Shield to the Adirondack Mountains, intersecting with the St. Lawrence River to form the Thousand Islands — a landscape First Nations peoples call the “backbone of the mother.”

Five separate forest regions (Great Lakes, Boreal, Carolinian, Atlantic Coast, and Appalachian forests) meet here, creating what is recognised as the most biodiverse terrestrial region in Canada [2]. The Algonquin to Adirondacks Collaborative identifies the Arch as one of the most important north–south wildlife movement and gene flow corridors in eastern North America [12].

The ecological significance of this landscape has been formally recognised through Canada’s Key Biodiversity Areas (KBA) programme. Three KBAs have been identified within the Frontenac Arch Biosphere Region — Thousand Islands, Charleston Lake, and Frontenac Forests — with a fourth, Napanee Limestone Plain, in the process of being proposed [23]. The Thousand Islands KBA is also a nationally designated Important Area for Reptiles and Amphibians (IMPARA). Parks Canada has described the area as a “continentally significant wildlife movement corridor.” The presence of multiple KBAs within a single biosphere region underscores the cumulative ecological value of the landscape through which the southern corridor would pass — and the scale of what invasive species colonisation would threaten.

### Species at Risk — Currently Protected by Intact Habitat

The Biosphere provides critical habitat for nationally threatened and at-risk species that would be directly impacted by construction disturbance and the subsequent severance of the wildlife corridor [3, 4].

#### Fauna:

- Grey ratsnake (*Pantherophis spiloides*) — Canada’s largest reptile, Threatened
- Blanding’s turtle — at-risk species with large home ranges requiring intact corridors
- Cerulean warbler — at-risk migratory species
- Whip-poor-will — listed species of special concern
- Black bear, fisher, moose, and eastern wolf — species with large home ranges requiring uninterrupted corridor
- Least bittern heron (*Ixobrychus exilis*) — smallest heron family member, listed as species of special concern

#### Flora:

- Butternut (*Juglans cinerea*) — Endangered under SARA Schedule 1; approximately 13,000 trees remain in Ontario [22]. Most of its range has been lost to Butternut Canker, a non-native fungal disease. A healthy population, apparently resistant to the canker, was found in the Frontenac Arch [18]. <https://www.rvca.ca/stewardship-grants/butternut-recovery-program>

- Blunt-lobed woodsia (*Woodsia obtusa*) — Endangered; only known Canadian populations are in the Frontenac Arch and western Quebec [19]. <https://www.ontario.ca/page/blunt-lobed-woodsia>
- Black ash (*Fraxinus nigra*) — Endangered due to the invasive emerald ash borer; there may be a correlation between railways and the spread of the emerald ash borer [20]. <https://wildlife.org/are-ash-borers-hopping-trains-to-spread-through-forests/>

### **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 [10]. These are the species that would be directly accelerated by HSR construction:

- 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, negatively impacts reforestation, wind-borne seeds are able to travel long distances and easily germinate in disturbed soil
- White sweet clover — early-coloniser of disturbed ground; appears rapidly after soil disturbance

The Nature Conservancy of Canada (NCC), which manages over 2,760 hectares within the Frontenac Arch Biosphere Reserve, explicitly includes invasive species mapping and removal as a core stewardship activity for every property it protects [4]. Construction of a route through or adjacent to NCC-protected lands would actively undermine this long-term conservation investment.

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## **SECTION III · RISK ASSESSMENT**

### **Southern Route: Summary of Invasive Species Risk**

The following comparison draws on peer-reviewed literature on railway-related invasive species spread. It is not a formal environmental impact assessment — which must be conducted for whatever route is chosen, and publicly disclosed.

RISK FACTOR	X SOUTHERN CORRIDOR: RISK ASSESSMENT
Protected area	Passes through Biosphere
Earthworks volume	4–5M tonnes of earthworks — high risk of invasive dispersal
Equipment movements	~1M 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
Corridor length	269 km — longer permanent invasion highway
Existing inv. pressure	High; agricultural lowlands already invaded

SECTION IV

### What Must Happen Before a Route Decision

The following essential actions are addressed to Alto HSR and to federal decision-makers with oversight responsibility. They are grounded in standard environmental assessment practice and the precautionary principle as applied to UNESCO Biosphere Reserves.

**1. Commission and publish a site-specific invasive species risk assessment for whatever route is chosen**

Any project traversing or adjacent to a UNESCO Biosphere Reserve should include a detailed invasive species risk assessment identifying which species are most likely to be introduced or accelerated by construction, what ecological damage could result, and what mitigation measures would be required. This assessment must be publicly disclosed before a route decision is finalised — not after.

**2. Include full invasive species management costs in decision making prior to selecting a route**

Route costing must include the long-term cost of invasive species monitoring, suppression, and management along the 269 km corridor through Biosphere transition habitat. These costs — which

would fall partly on the Biosphere Network, conservation organisations, and adjacent landowners — must be quantified and attributed to the correct route in any cost–benefit analysis.

### 3. **Require binding, enforceable invasive species mitigation commitments as a condition of any route approved through the Frontenac Arch Biosphere Reserve**

If any route is approved through or adjacent to the Frontenac Arch Biosphere Reserve, invasive species management cannot be left to voluntary best practice. Binding legal commitments must require: use of equipment washed and certified free of invasive propagules before entering the Biosphere; use of 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 triggered by construction.

### 4. **Formally engage the Frontenac Arch Biosphere Network, Cataraqui Conservation Authority [17], Nature Conservancy of Canada, and A2A Collaborative as consultation partners**

These organisations hold the most detailed knowledge of invasive species status, wildlife corridor needs, and ecological sensitivities in the affected region. Their input must be formally sought and publicly documented as part of the environmental assessment process — not treated as stakeholder comment after decisions are made.

**This is not an argument against improved rail service.** It is an argument for choosing the right route and rail speed — transparently, with full environmental costs attributed to each option, and with the biodiversity values of Canada’s most ecologically significant corridor given proper weight in a decision that will last for generations.

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*Submit your consultation response at [altotrain.ca](http://altotrain.ca) by 29 March 2026.*