TORONTO TURF PROS · RESEARCH SERIES

Artificial Grass & the Environment in Toronto: An Evidence Review

Surface temperatures, microplastics, water savings and biodiversity trade-offs — a sourced analysis for Toronto homeowners

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COVERAGE	City of Toronto, Greater Toronto Area, Ontario
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Toronto Turf Pros Research publishes data-driven local studies on residential landscaping, water use and outdoor surfaces in Toronto and the Greater Toronto Area. This report is provided free for information purposes.

ABSTRACT

This report reviews the published environmental evidence for and against residential artificial grass, drawing on peer-reviewed studies, government science reviews, and Environment and Climate Change Canada climate normals for Toronto. It examines surface temperature data, microplastic and infill findings, the water and chemical inputs that turf eliminates, and the biodiversity functions that natural grass retains. Every claim is sourced; where the evidence is contested, both sides are reported.

We find that synthetic turf runs **20–48 °C hotter** than natural grass under summer sun (multiple studies), that crumb-rubber infill and turf fibres are documented microplastic sources, and that a 500 sq ft Toronto lawn converted to turf eliminates roughly **27.9 m³ of seasonal irrigation** — saving about **$136 per year** at Toronto Water's 2026 combined rate. The evidence does not support declaring either surface unambiguously greener; the choice is a multi-factor trade-off that this report lays out for homeowner decision-making.

KEY FINDINGS AT A GLANCE

20–30 °C	27.9 m³	$136/yr	16,000 t
typical surface temperature excess of synthetic turf over natural grass (Penn State, NJDEP)	seasonal irrigation water avoided per 500 sq ft lawn (24-week model)	Toronto water-bill savings at 2026 combined rate of $4.86/m³	annual microplastic infill loss estimated by EU/ECHA across European turf

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1 The debate in brief

The environmental case for and against artificial grass is genuinely contested. Critics cite elevated surface temperatures, microplastic shedding from fibres and crumb-rubber infill, and the permanent loss of a photosynthetic surface. Proponents point to the elimination of irrigation, fertilizer and pesticide inputs, the avoidance of gas-powered mowing emissions, and a service life measured in decades rather than seasons.

This report reviews the published evidence on both sides, using Toronto-specific data where available. The finding that recurs across every dimension is that neither surface is unambiguously greener — each carries environmental costs the other does not, and the right choice depends on which impacts a homeowner weighs most heavily.

2 Surface temperature evidence

The strongest and most consistent finding in the peer-reviewed literature is that synthetic turf runs substantially hotter than natural grass under identical conditions. The mechanism is straightforward: synthetic fibres and dark infill absorb solar radiation, and the surface lacks the evaporative cooling that transpiring grass provides. Multiple studies across different climates report the same direction and a broadly similar magnitude (Table 1).

Table 1 — Published surface temperature findings for synthetic turf vs natural grass. *Sources: [2][3][4][5].*

Study	Setting	Finding
Penn State, McNitt et al. (2008)	Central PA, hot sunny days	20–30 °C hotter; surfaces 60–77 °C
Cumberbatch et al. (2025)	Verona NJ, mid-day June	24.1 °C hotter than natural grass
Williams & Pulley (2002)	U.S. site, 37 °C day	48 °C hotter than grass; peak 93 °C
Petrass et al. (2014)	Field comparison	12–22 °C hotter, incl. "cool" products
NJDEP state review (2025)	Literature synthesis	Confirms heat-island concern

Penn State recorded that irrigating synthetic turf cooled it only temporarily — temperatures rebounded to prior levels within 30–120 minutes [3]. For Toronto context, the city's July average daily high is 27.1 °C with a recorded extreme maximum of 38.3 °C at Pearson [1]; on the hottest days, the published findings indicate a synthetic surface could plausibly reach 60–80 °C.

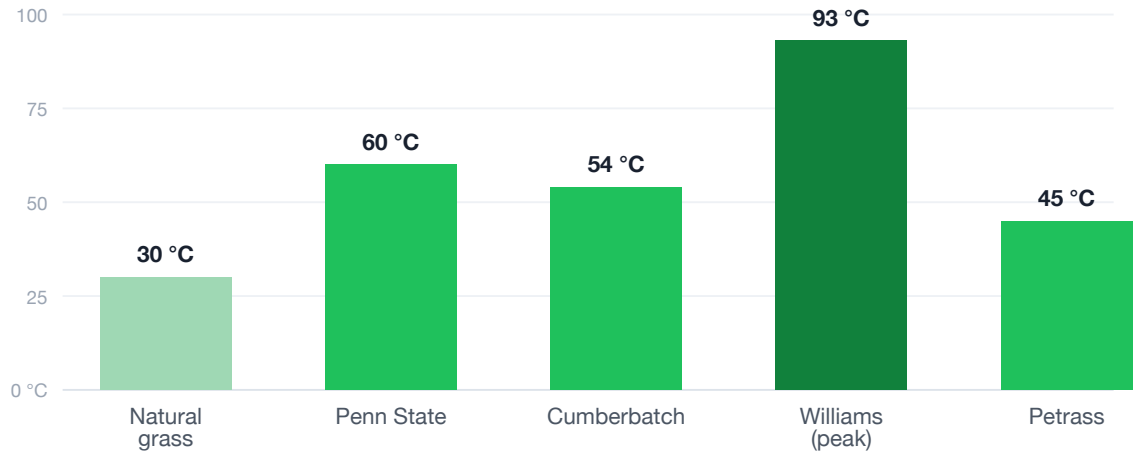

Figure 1 — Recorded surface temperatures on synthetic turf vs natural grass from four peer-reviewed studies and one government review. Natural grass baseline set at approximately 30 °C for comparison. *Sources: [2][3][4][5].*

3 Microplastics and infill

The infill layer — typically crumb rubber from recycled tires, coated sand, or natural minerals — is the most scrutinized component from an environmental-health perspective. Canada's NCCEH (2025) evidence review found that SBR crumb rubber contains metals (zinc, lead, cadmium), PAHs, VOCs, phthalates, and 6PPD-quinone, a chemical toxic to salmonids [6]. Most well-conducted health risk assessments between 2014 and 2025 concluded that average crumb-rubber exposures were below levels of concern for cancer and non-cancer endpoints, though the review noted further evidence is needed on environmental leaching [6].

The EU will ban the sale of granular infill for synthetic sports surfaces from 2031; ECHA estimates roughly **16,000 tonnes per year** of microplastics are lost from European turf [6]. Residential lawns more commonly use silica sand or coated sand rather than crumb rubber, narrowing the chemical exposure concern — but turf fibres themselves also shed microplastics. Nordic studies identify artificial turf as the second-largest microplastic source in Norway and Sweden after tire wear, and turf fibres accounted for more than 15% of larger plastic particles in Mediterranean seawater samples [12].

Environment and Climate Change Canada's 2020 Federal Science Assessment of Plastic Pollution found plastic pollution ubiquitous in land, water, soil and air, and invoked the precautionary principle to recommend reducing microplastics entering the environment while noting that human-health effects remain unclear [7]. Mitigations available to homeowners include infill-free turf products, natural-mineral infills such as zeolite, and acrylic-coated sand infills that encapsulate the granule.

4 Inputs avoided: water, fertilizer, pesticides

The most quantifiable environmental benefit of artificial turf is the elimination of lawn irrigation. Using the growing-season model described in §M (2.5 cm per week over 24 weeks), three representative Toronto lawns require the volumes and costs shown in Figure 2. At Toronto Water's 2026 combined rate of **$4.8629/m³** — which covers both drinking water and wastewater treatment — a 500 sq ft lawn eliminates roughly 27.9 m³ of irrigation per season, saving approximately **$136 per year** [8][9].

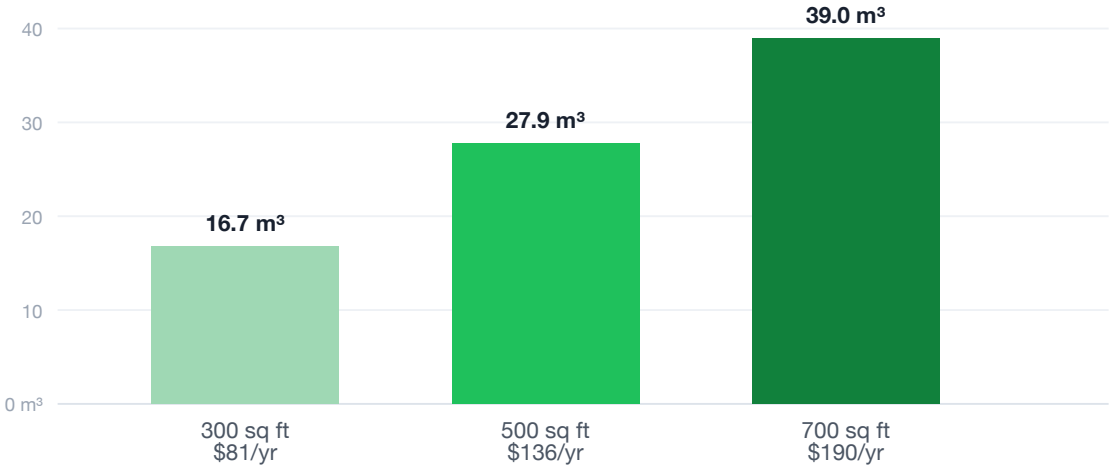

Figure 2 — Seasonal irrigation volume and Toronto water-bill cost avoided by converting a natural lawn to artificial turf, by project size. Derived using 2.5 cm/week over 24 weeks at Toronto Water's 2026 combined rate of $4.8629/m³. *Sources: [8][9][10]; assumptions in §M.*

Toronto is unusual among GTA municipalities for having no standing mandatory watering schedule. Under Municipal Code Chapter 851, the General Manager of Toronto Water may issue restriction orders only during declared shortages — none are active as of 2026 — while the city otherwise relies on voluntary once-per-week guidance [11]. Fertilizer and pesticide inputs also cease on artificial turf; Ontario's Cosmetic Pesticides Ban already restricts most lawn chemicals, but fertilizer runoff from natural lawns still contributes to nutrient loading in the Lake Ontario watershed.

TORONTO'S RECORD 2024 FLOOD SUMMER

Two extreme storms in summer 2024 — July 16 (97.8 mm) and August 17 (128.3 mm, the rainiest single day in Pearson's recorded history) — caused over $1 billion in combined insured damage across the GTA [13][14]. Artificial turf is unaffected by watering restrictions during drought periods, but it is equally unaffected by the intense rainfall events that are becoming more frequent in Toronto's climate record.

5 Biodiversity trade-offs

A natural lawn, even a monoculture one, supports some soil biology, captures modest carbon, and provides minimal habitat for ground-dwelling invertebrates. Artificial turf eliminates these functions entirely for its footprint, and the sealed surface prevents soil fauna from accessing the ground beneath.

The honest counterpoint is that a typical urban Toronto lawn is already ecologically thin: Kentucky bluegrass monocultures mowed weekly offer limited biodiversity value. Where homeowners replace lawn with native plantings or mixed perennial beds rather than artificial turf, the biodiversity outcome is clearly better. Where the alternative is heavily irrigated, chemically treated grass on a small urban lot, the net ecological difference is modest in either direction.

Toronto's zoning by-law complicates front-yard decisions: Chapter 569-2013 requires soft- landscaping minimums — typically 50% for lots with 6–15 m of frontage — which permits artificial turf within the soft-landscaping allowance but constrains fully paved alternatives [15].

6 A balanced decision framework for Toronto

No single surface is environmentally optimal in every dimension. Table 2 summarizes the trade-offs the published evidence points to. The framework this report suggests is that the choice depends on which impacts a homeowner weighs most heavily.

Table 2 — Environmental trade-off summary for a Toronto residential lawn. *Sources: [2][3][4][5][6][7][8][12].*

Factor	Artificial turf	Natural lawn
Surface temperature	20–30 °C hotter in summer sun	Baseline (evaporative cooling)
Irrigation water	None required	~27.9 m³/season (500 sq ft)
Chemical inputs	None	Fertilizer; pesticides restricted in ON
Microplastic shedding	Fibre + infill loss; mitigable	None
Carbon sequestration	None	Modest (soil + grass biomass)
Biodiversity	None on installed area	Low (monoculture) to moderate
Restriction resilience	Unaffected by watering bans	Vulnerable if orders declared

For Toronto homeowners whose priority is reducing water consumption, eliminating chemical inputs, and securing a usable surface through drought or restriction periods, artificial turf offers measurable benefits. For those whose priority is surface temperature moderation, biodiversity, or avoiding plastic materials entirely, natural grass or mixed plantings remain the better choice. A 2022 lifecycle study found that over ten years a natural soccer field contributed roughly twice as much to global warming as an artificial one, while artificial turf caused more of other pollution types [12] — a finding consistent with the trade-off pattern this report documents.

M Methodology & data sources

This is a desk-research evidence review. Published figures were collected in August 2026 from the sources listed under References: peer-reviewed journal articles, a New Jersey state science review, the Canadian NCCEH evidence review, the ECCC/Health Canada Federal Science Assessment of Plastic Pollution, City of Toronto water-rate and bylaw pages, Environment and Climate Change Canada climate normals (Toronto Pearson Int'l A, 1981–2010), and industry reference pages. No primary research was conducted for this report.

Stated assumptions (not sourced facts): (i) irrigation model — an actively maintained lawn receives 2.5 cm of water per week over a 24-week southern Ontario growing season (a widely used horticultural guideline endorsed by the Region of Waterloo); (ii) project sizes of 300, 500 and 700 sq ft are representative of Toronto backyards based on published installer guides and Census lot-size data; (iii) Toronto Water's 2026 Block 1 combined rate of $4.8629/m³ applies to residential irrigation volumes. Derived figures combine these assumptions with the cited rates; changing any assumption changes the results.

Limitations

Surface temperature findings come from studies conducted in warmer U.S. climates; Toronto's shorter, cooler summer season may moderate the absolute temperatures, though the differential between synthetic and natural surfaces is expected to persist. Microplastic evidence is drawn from sports-field and Nordic studies; Canadian residential turf installations may differ in infill type and shedding rate. The irrigation model is a guideline-based estimate — real households water differently, and Toronto's 785.9 mm of well-distributed annual precipitation reduces irrigation need in normal summers. This report is not an engineering, agronomic, or environmental assessment of any specific property.

R References

1. Environment and Climate Change Canada — Canadian Climate Normals 1981–2010, Toronto Pearson Int'l A. https://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnProx&txtRadius=25&optProxType=station&coordsStn=43.666667%7C-79.4%7CTORONTO&climate_id=6158733 (accessed August 2026).
2. Cumberbatch et al. (2025) — Artificial Turf Versus Natural Grass: A Case Study. *Sustainability* (MDPI) 17(14). https://www.mdpi.com/2071-1050/17/14/6292 (accessed August 2026).
3. Penn State Center for Sports Surface Research, McNitt et al. (2008) — Surface Temperature of Synthetic Turf. https://plantscience.psu.edu/research/centers/ssrc/documents/temperature.pdf (accessed August 2026).
4. New Jersey Department of Environmental Protection (2025) — Synthetic Turf: A Review of the Current Science. https://dep.nj.gov/wp-content/uploads/dsr/synthetic-turf-report-2025.pdf (accessed August 2026).
5. Petrass et al. (2014) — Journal of Sports Engineering and Technology, as compiled in [4]. (accessed August 2026).
6. National Collaborating Centre for Environmental Health (2025) — Artificial turf playing fields: evidence review. https://ncceh.ca/resources/evidence-reviews/artificial-turf-playing-fields-review-evidence-health-risks-and (accessed August 2026).
7. Environment and Climate Change Canada / Health Canada (2020) — Federal Science Assessment of Plastic Pollution. https://science.gc.ca/site/science/en/blogs/science-behind-scenes/how-does-science-assessment-help-plastic-pollution-reduction (accessed August 2026).
8. City of Toronto — Water Rates & Fees (2026). https://www.toronto.ca/services-payments/property-taxes-utilities/utility-bill/water-rates-fees/ (accessed August 2026).
9. City of Toronto — 2026 interim rates and fees for Toronto Water approved. https://www.toronto.ca/news/city-of-toronto-approves-2026-interim-rates-and-fees-for-toronto-water-and-solid-waste-management-services/ (accessed August 2026).
10. Ontario Water Works Association — Outdoor Water Use Reduction Manual. https://owwa.ca/app/uploads/2025/08/Outdoor-Water-Use-Manual-July_08-Final.pdf (accessed August 2026).
11. Toronto Municipal Code Chapter 851, Water Supply (s. 851-14 restriction orders). https://www.toronto.ca/legdocs/municode/1184_851.pdf (accessed August 2026).
12. Wikipedia — Artificial turf (lifecycle studies, Nordic microplastic findings). https://en.wikipedia.org/wiki/Artificial_turf (accessed August 2026).
13. The Weather Network — One year later: How a billion-dollar flood exposed Toronto's climate risk (July 16, 2024). https://www.theweathernetwork.com/en/news/weather/severe/one-year-later-how-a-billion-dollar-flood-exposed-torontos-climate-risk-july-16-2024 (accessed August 2026).
14. TRCA — July 16, August 17 and August 18, 2024 Severe Storm Events report. https://pub-trca.escribemeetings.com/filestream.ashx?DocumentId=17893 (accessed August 2026).
15. City of Toronto — Zoning By-law 569-2013, Chapter 10.5 Residential Zone Regulations. https://www.toronto.ca/zoning/bylaw_amendments/ZBL_NewProvision_Chapter10.htm (accessed August 2026).

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