From Shell to School

How Adaptive Reuse Delivered Carbon, Cost, and Time Savings in Toronto

52% Carbon Reduction · $10M+ Saved · 9-Month Delivery

By Powers Brown Architecture — Contributors: Jesse Hunt and Lars Moeller

This case study explores the transformation of a 37,000-square-foot industrial warehouse into the new campus for MacLachlan College in Oakville, Ontario. Completed in just nine months, the project exemplifies how adaptive reuse can deliver measurable benefits across three metrics: carbon, cost, and time.

The Case for Adaptive Reuse

Adaptive reuse is not nostalgia—it's pragmatism. In a construction economy constrained by cost, schedule, and carbon, the smartest projects often begin with what already exists. By treating non-heritage buildings as valuable resources rather than disposable assets, architects can achieve measurable sustainability while accelerating delivery.

MacLachlan College needed a new middle and high school campus near its current site to maintain its student catchment area. Rather than pursue a costly ground-up solution, the team identified a former industrial/office building with the right bones—30-foot warehouse ceilings, open spans, and flexible plates—well-suited for a gymnasium, auditorium, and collaborative learning spaces.

The Economics of Reuse

New construction was estimated at $15–18 million. Instead, the school secured a competitive lease with a $1.5 million landlord allowance covering roughly 25% of construction. The total project cost was $5.9 million—an immediate savings of more than $10 million compared to a ground-up alternative—while also meeting the school's timeline to open in 2024.

Time compounded those savings. A 9-month delivery (2-month permitting, 7-month Phase 1 construction to occupancy) versus roughly 16 months for new construction enabled the academic calendar to proceed without interruption.

Quantifying Sustainability

A comparative Life Cycle Assessment (LCA) using TRACI v2.1, modeled in Revit and One Click LCA, measured six categories: global warming potential, ozone depletion, acidification, eutrophication, tropospheric ozone formation, and non-renewable energy depletion. Reuse delivered a 52% reduction in whole-life carbon—avoiding over 930 metric tonnes of CO_2—primarily by retaining the steel frame, concrete foundations/slabs, decking, and envelope.

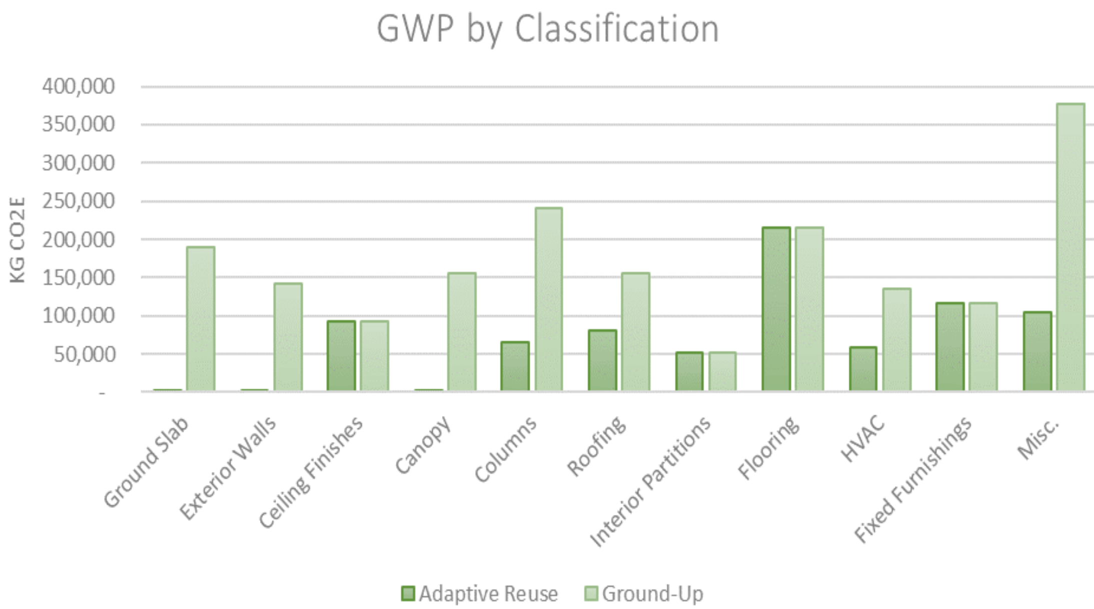

Figure 1. LCA comparison overview.

Impact category	Units	New Construction	Adaptive Reuse	Change %
Global Warming Potential	kg CO_2e	1,776,777	847,303	-52%
Stratospheric Ozone Depletion	kg CFC-11e	0.22	0.06	-73%
Acidification Potential	kg SO_2e	36,243	26,430	-27%
Eutrophication Potential	kg Ne*	4,886	3,249	-34%
Formation of Tropospheric Ozone	kg O_3e	97,716	55,221	-43%
Non-Renewable Energy Depletion	MJ	15,688,217	7,366,316	-53%

Figure 2. Global Warming Potential comparison across classifications.

Impact category	Global Warming Potential	Stratospheric Ozone Depletion	Acidification Potential	Eutrophication Potential	Formation of Tro-pospheric Ozone	Non-Renewable Energy Depletion
Unit for impacts	kg CO_2e	kg CFC-11e	kg SO_2e	kg Ne*	kg O_3e	MJ
A1-A3 Materials	300,869	0	5,432	2,478	26,364	2,807,476
A4 Transport	8,136	0	45	6	1,260	230,283
B3-B5 Repair & replacement	454,818	0	19,470	723	26,890	4,259,537
C1-C4 End of Life	83,480	0	1,483	41	707	69,020
Total, whole lifecycle	**847,303**	**0**	**26,430**	**3,249**	**55,221**	**7,366,316**

Figure 3. Lifecycle category deltas with reuse vs. new.

Impact category	Global Warming Potential	Stratospheric Ozone Depletion	Acidification Potential	Eutrophication Potential	Formation of Tro-pospheric Ozone	Non-Renewable Energy Depletion
Unit for impacts	kg CO_2e	kg CFC-11e	kg SO_2e	kg Ne*	kg O_3e	MJ
A1-A3 Materials	1,139,978	0	15,092	4,052	66,707	9,742,791
A4 Transport	98,500	0	199	69	3,412	1,616,869
B3-B5 Repair & replacement	454,818	0	19,470	723	26,890	4,259,537
C1-C4 End of Life	83,480	0	1,483	41	707	69,020
Total, whole lifecycle	**1,776,777**	**0**	**36,243**	**4,886**	**97,716**	**15,688,217**

Figure 4. Whole-building impact tables .

Execution and Lessons Learned

Permitting was achieved in just two months, followed by a 7-month construction period for core learning spaces. General Contractor insights were central: reusing 12 rooftop HVAC units eliminated 12-week equipment delays and saved hundreds of thousands of dollars. Approximately 30% of insulation and ceiling tiles were repurposed, reinforcing that adaptive reuse is as much logistics as design.

Not all materials could be reused. Outdated ductwork and non-compliant doors were replaced, while unforeseen challenges like floor leveling underscored the importance of early due diligence. The project's success was built on strong relationships—with the City, inspectors, and subcontractors—and a shared commitment to speed, efficiency, and ingenuity.

> "Adaptive reuse is not nostalgia—it's pragmatism."

The Future of Sustainable Development

The success of MacLachlan College has catalyzed a second phase: the acquisition of an adjacent 30,000-square-foot building for expansion. The new plan includes replacing asphalt with mature trees and landscape improvements—a continuation of the project's environmental ethic.

For Powers Brown Architecture, adaptive reuse is no longer an exception—it is a methodology. Every existing structure represents both embodied energy and opportunity. The MacLachlan College project demonstrates that design intelligence, when aligned with economic and ecological pragmatism, can deliver architecture that is faster, cleaner, and more sustainable—by design.