



X



Climate Ready Schools

IRMA COULSON PUBLIC SCHOOL
PILOT PROJECT
CASE STUDY

2023

In partnership:



Generously supported by:

BALSAM FOUNDATION



& other key funders

With in-kind support by:

ARUP

Copyright 2023. Evergreen. All rights reserved. Reproduction of small portions of materials (excluding all photographs) for use by charitable and non-profit organizations, or for educational purposes, is permitted and encouraged, provided permission is obtained in writing from Evergreen. For commercial uses, please contact

Evergreen
550 Bayview Avenue,
Toronto, ON; M4W 3X8
(416) 596-7670

TABLE OF CONTENTS

Acknowledgements 3

About Evergreen 5

Preface 6

Introduction 7

The Design 8

Site Challenges 9

Design Layers 9

Child Development 14

Community Use 20

Outdoor Learning 21

Participation 24

Professional Development 26

Evaluation 28

Increasing the Tree Canopy 29

Stormwater Management 29

Triple Bottom Line Analysis 30

Behaviour Mapping 33

Best Practices 42

Looking Ahead 43

ACKNOWLEDGEMENTS: INNOVATION THROUGH COLLABORATION

To realize the vision of a new type of school grounds, risks were taken with the use of typography, rocks, plantings, water, wooden platforms, new uses of materials and the building of a tunnel. This level of innovation required many discussions and numerous approvals were required. This project sprung to life once everyone onboard embraced the vision with a positive spirit of collaboration and a healthy dose of creative problem solving.

Here are the key partners and the roles they played in this project.

HALTON DISTRICT SCHOOL BOARD

The Halton District School Board (HDSB) has partnered with Evergreen for over a decade on school ground greening projects. They were excited to look beyond the creation of small-scale gardens and outdoor learning spaces to embrace the large-scale transformation undertaken by the Irma Coulson Climate Ready Schools Pilot. The encouragement and support from the HDSB throughout the project provided the necessary advice, approvals and guidance on what was needed and possible for the site.

Ian Gaudet – Executive Officer of Facilities Services

Mike Wildfong – Manager, Capital Projects

Tom Hutcheson – Specialist, Capital Projects

Suzanne Burwell – Environmental Sustainability Specialist

Maia Puccetti – Former Executive Officer of Facilities Services (until 2020)

Tanya Woods – Instructional Program Leader

School Selection Committee – Jewel Amoah, John Pennyfather,

Maia Puccetti, Suzanne Burwell, Heidi Campbell, Cam Collyer

IRMA COULSON PUBLIC SCHOOL

The administration and teaching staff at Irma Coulson were exemplary with their visionary leadership, commitment, patience and excitement for the journey.

Brian Slemko – initiating Principal Irma Coulson (2020)

Cheryl Hayles – Principal, Irma Coulson (2021 – 2022)

Adam Finkbeiner and Lori Whitaker – lead teachers on project

STEERING COMMITTEE

A steering committee was created at the beginning of the project to help to navigate through the concept design phase. It provided guidance on the planning and design, communications and engagement with students, the school community and the Milton community more broadly.

Steering Committee members were:

Brian Slemko – Principal (2020), Rasha Balche – Vice Principal (2020)

Lori Whitaker (lead teacher), Adam Finkbeiner (lead teacher)

John Pennyfather – Superintendent of Education

Jewel Amoah – Human Rights and Equity Advisor

Suzanne Burwell – Environmental Sustainability Specialist

Terry Janach – Manager Plant Operations

Meghan MacLennan – Parent

Heidi Campbell – Senior Program Manager, Evergreen

Cam Collyer – Senior Advisor, Evergreen

LANDSCAPE ARCHITECTURE

The project is greatly indebted to Birgit Teichmann for her leadership and design expertise that worked wonders despite not being able to visit the site in person until the ribbon cutting ceremony, due to Covid 19 travel restrictions.

Teichmann Landscape Architecture (Berlin, Germany)

– Lead landscape architects - Birgit Teichman and Boris Dimitrijevic

NewLeaf Landscape Architecture (Cobourg, Ontario) Gina Brouwer

CONSULTANTS

Risk/Benefit Assessment - Grace-Kells Consultant Inc, Peter Kells

Stormwater Engineering - Flora Designs Inc, Chirag Patel

Arup – Arup joined the project after it started to provide advice and support to Evergreen as part of the Community Investment Program.

They provided advice on a range of topics including stormwater management, landscape design, landscape ecology, curriculum design, life cycle analysis and behaviour mapping. Evergreen is grateful for their many contributions. Key contributors included: Elizabeth Dawe,

Matt Humphries, Nureesa LaRose, Daeun Yoon, Cai Lin Yang, Poyani Sheth, Jamie DeWeese, Joshua Battiston, Sara Albouz, Ana Sasic, Paulo Damone
Bottled Media - videographer

CONSTRUCTION

Hawkins Construction Ltd.

PARKOUR

Duncan and Grove

FUNDING

The Climate Ready School Pilot Project at Irma Coulson was made possible by funding contributions from the Balsam Foundation, the Intact Foundation, the LCBO Spirit of Sustainability fund along with an anonymous funder.

EVERGREEN

Heidi Campbell - Project Lead, Project Management, Design Team, Guidelines Lead

Cam Collyer – Partnership Lead, Design Team, Case Study Lead

Sarah Hillyer - Fundraising Lead

Mike Driedger – Project Director

Fatima Ali – Video Producer

Claire McPhee - Educator Toolkit Development, Editing

Hannah Miller – Professional Development Lead,

Educator Toolkit Development

Angela Parillo – Evaluation

Ismail Alimovski - Evaluation



ACKNOWLEDGING THE LAND AND FIRST PEOPLES

The sacred lands upon which we operate, and the built communities and cities across the country, are the traditional territories, homelands and nunangat of the respective First Nations, Métis Nations and Inuit who are the long-time stewards of these lands.

These are occupied lands and subject to inherent rights, covenants, treaties, and self-government agreements to peaceably share and care for the lands and resources across Turtle Island. These regions are still home to diverse Indigenous peoples and we are grateful to have the opportunity to live and work on these lands.

ABOUT EVERGREEN

Evergreen, a national not-for-profit, is a leader in placemaking and urban sustainability. For over 30 years, Evergreen has been facilitating change in communities through connection, innovation, and sustainable actions. We work with community builders and partners across sectors to solve some of the most pressing issues cities face: climate change along with access to nature and public spaces. For more information on Evergreen, visit evergreen.ca.



PREFACE

The Climate Ready School Pilot Project took place at Irma Coulson Public School in Milton, Ontario, Canada. Irma Coulson is a kindergarten to Grade 8 school with 1,000-plus students in the Halton District School Board. The Climate Ready Schools Pilot project was initiated and coordinated by Evergreen, a Canadian charitable non-profit organization. The project began in the spring of 2020 and construction was completed in the fall of 2022.





Introduction

The Climate Ready Schools initiative holds the view that public school grounds are valuable assets with potential to have a positive influence on student development: physical and mental health, as well as learning and social behaviour. Additionally, school grounds represent significant public land holdings that have enormous potential to positively impact education, health and well-being, and to mitigate the impacts of a changing climate by cooling sites with shade and managing stormwater on site. However, there are very few examples of Canadian school grounds that have realized this potential. Climate Ready Schools employs innovations in design, construction, community engagement and professional development to produce a broad suite of benefits for students, communities, and the environment. Climate Ready Schools raises the bar on school ground design, management, and outdoor play and learning in Canada, and sets the stage for change at scale. With public schools in almost every neighbourhood across the country, the potential to positively impact every community is significant.

The Design

The Irma Coulson Climate Ready School Pilot design team paired leading internationally recognized design talent, Birgit Teichmann from Berlin, Germany, with seasoned Canadian landscape architect Gina Brouwer. Key contributions also came from risk consultant Peter Kells, the Halton District School Board's facilities staff and Evergreen's team. Beyond the key professionals, community participation from staff, students and the Milton community was central to the development of the design.

Through a climate-adaptive lens, the concept design drew inspiration from Berlin's Sponge School Strategy, a city-wide effort to create heat-adaptive and water-sensitive school grounds. Through a child development and outdoor learning lens, the concept design drew on numerous school ground greening projects in Canada that Evergreen has supported since the mid 1990's. The environmental impact and the transferability of the design concept were both strong considerations, emphasizing native species of plants, regionally sourced materials and low-tech solutions.



THE DESIGN

Site Challenges

Irma Coulson's school ground faced challenges common to many Canadian school grounds. These included a lack of shade and shelter, heavy compaction leading to seasonal ponding, and a distinct lack of features to support play and learning. The following summarizes key challenges.

- A flat, barren expanse that afforded limited play opportunities
- Very limited shade
- Significant traffic noise from Derry Road
- Considerable ponding of water due to soil compaction, rendering portions of the site unusable for extended periods of time
- Low nutrient soils
- Very few trees, restricted to the perimeter that were in a poor state of health
- A heavily shaded and windy outdoor kindergarten area with no special qualities
- No seating
- Very few features that supported outdoor learning

Design Layers

The design involved a coming together of many priorities and goals. This section is structured so that the reader can get a sense of how design decisions were made in four priority areas, while also discussing the approach to engaging the school community in the design process. The section is divided as follows:

- Resilient infrastructure
- Child development
- Outdoor learning
- Community use
- Participation





THE DESIGN

Resilient Infrastructure

Building resilient infrastructure for Irma Coulson's school ground was a key priority for the Climate Ready Schools design team. There were three main areas including:

1. Restoring Ecological Functions
2. Climate Adaptive Design
3. Sustainability

1. RESTORING ECOLOGICAL FUNCTIONING

Restoring Ecological functioning to the site was largely a product of the soil enhancement and additional vegetation. Care was taken in choosing varieties of plantings that were native to the climactic region and that would therefore enhance habitat for native species of insects and birds. The plantings included 46 trees and 1,164 shrubs that increased the biodiversity of Irma Coulson's school ground. Large applications of mulch will support water retention and soil building over time. In the future, additional extensions could be added to further support local wildlife including bug hotels, bird houses and bat boxes.



THE DESIGN

Resilient Infrastructure

2. CLIMATE ADAPTIVE DESIGN

The Climate Ready Schools project was keen to explore the school ground's potential to support enhanced functions and services to mitigate the effects of a changing climate. Primary objectives included moderating school ground temperature and managing all stormwater on site. Key strategies in the design included topography; a major increase in vegetation; the use of mulch to help build soil and maintain moisture in planted areas; and the deployment of a variety of materials for the pathways that had varying degrees of permeability. One of the challenges the design team faced was sourcing permeable pavers that had a high infiltration rate and that were compliant with accessibility standards.

Topography played an important role in directing the flow of water around the site while also acting as a wind and noise buffer from Derry Road. A vegetated berm was situated along the fence line to create a barrier between the road and the school ground. Topography also acted as a play feature in and of itself that inspires unique play behaviour while also serving as a “lookout” opportunity from the high points on the site.

The ground shaping also contributed to breaking up the large site into a series of “rooms,” bringing unique identities and play opportunities to many areas of the grounds.

Plantings on site included trees and shrubs. The tree count on site was nearly tripled from 24 to 70. Low lying shrubs cover large areas of the bermed areas of the site. The increase in vegetation provided shade and cooling, moderating temperature and humidity, and overall created a more comfortable environment for outdoor play and learning. The focus was on planting hardy, native varieties. Large numbers of willow shrubs were planted because they are fast growing, hardy, and their flexible nature enabled stems to bend rather than break when students play with them. Collectively, the plantings are sequestering carbon at an increasing volume each year as the vegetation grows and matures. While the net amounts are not significant on a single school ground, this same strategy when applied to school grounds across the country would have a substantial impact. This planting strategy could also be successfully applied in parks and public play areas for children as well.

THE DESIGN

Resilient Infrastructure

3. SUSTAINABILITY

From the early stages of planning, there was an intent to reduce the overall environmental impact of the project. This resulted in decisions that would impact design, material choices and construction strategies. For example, strong emphasis was placed on using materials that could be locally sourced. Reuse of materials was also considered and resulted in all imported soil coming from the excavation of a nearby new school build. In addition, the edge walls in the project, because of their mixed material composition, were able to be sourced from remainders that the Board's construction management staff had access to from neighbouring school build projects.

Another consideration in the design process was repairability. The asymmetrical, mixed material construction of the edge walls will enable simple repairs to be done to the edge walls with some mortar and any available stone or brick. Concerns over sourcing future material for colour or style matching or the need to source discontinued product is eliminated. Similarly with the custom decks built for the site, standard sized boards were used along with standard screws, enabling single boards to be easily replaced by school board maintenance staff or even high school students under the guidance of wood working teachers.





THE DESIGN

Child Development

The design team made a great effort to create a landscape that would serve children’s social, emotional, physical and intellectual development. One of the important aims of the process would be to invest the time and energy in the design so that the students would ultimately have an experience of feeling cared for, an insight emphasized in the seminal research written by Wendy Titman in the Learning Through Landscapes publication, *Special Places, Special People*, where she explored what she called the “hidden curriculum of school grounds.” Put differently, considerable effort has been put in to try and create a sense of belonging for students.





THE DESIGN

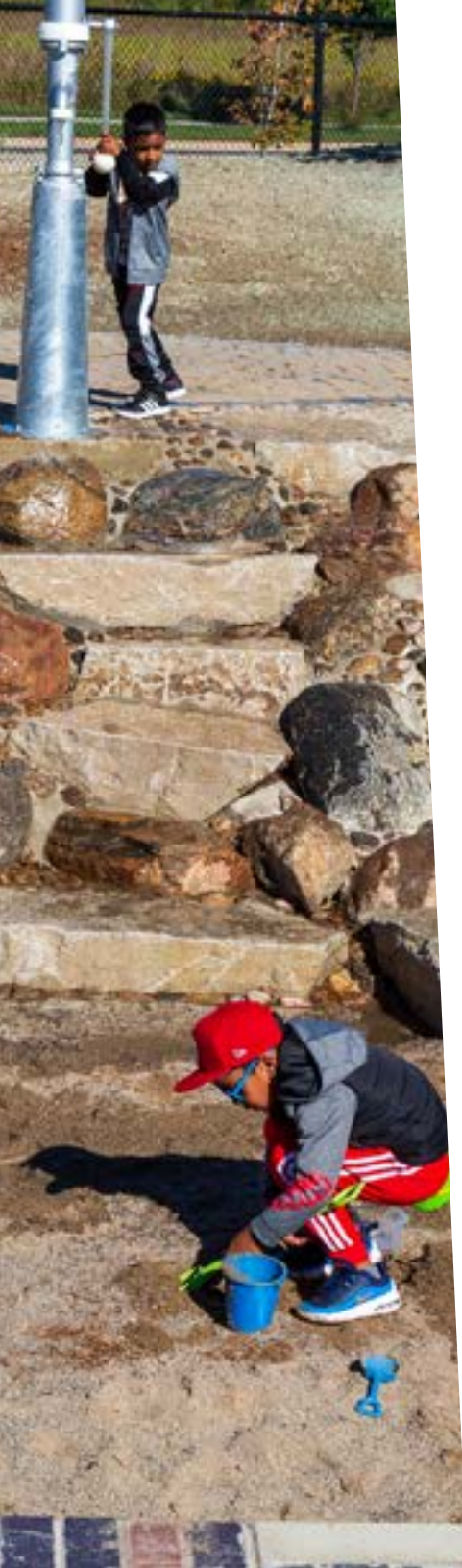
Child Development

1. MULTI-SENSORY STIMULATION

A nature-rich environment greatly enhances the multi-sensory stimulation that children will experience. Buffering the harsh sounds of heavy traffic allows for the more subtle, soothing sounds of wind through leaves, the quiet chatter of the willow stems and even joyful play sounds from around the school ground. One of the unique sound environments on Irma Coulson's school ground is in the tunnel. At once it is quiet from surrounding noise due to it being embedded in a large berm while simultaneously it amplifies sounds and therefore creates an exciting opportunity for little voices to become big ones.

Trees, shrubs, soil and large swaths of mulch all create unique and pleasant smells. Shelter created by the trees and shrubs invites students to spend time low on the ground where they can experience natural smells up close. From a tactile perspective, material choices of wood and stone were mostly left uncut in natural form. This is true in the log and stone edging, the parkour and rock outcroppings. The idea was to create an interaction with these elements in as close to their natural form as possible to spark children's wonder and relationship with the many facets of the natural world.

The site is much more visually appealing. Topography and vegetation combine to soothe the eye while the rolling nature of the site also obstructs some views across the site, which can inspire curiosity and movement – "I wonder what's happening over there? I'm going to go and find out." The organic lines of the edge walls and play decks present themselves with a child's aesthetic. This reinforces a sense of belonging and care while simultaneously piquing curiosity – "maybe I could make something like this!" Variation in ground surface, from grass to crushed limestone to a variety of paving stones, creates visual interest and helps delineate a series of "rooms" around the site, each with a distinct identity.



THE DESIGN

Child Development

2. INCLUSION THROUGH DIVERSITY

In the simplest terms, the design aimed to diversify the play opportunities for students. The goals being to expand the diversity of play opportunities and increase the overall level of activity. What's perhaps not as obvious is that many of the features added to Irma Coulson's school ground were not designed for a single type of use, but instead acted as settings that could provoke and support a good variety of play activities.

For example, the new kindergarten area has edge walls on one side and a rocky slope with a hand powered water pump on the top of the slope for water and sand play. The edge walls have a primary function of retaining the sand in the area and yet, because of their height, construction and aesthetic, they are compelling features for the students to walk, stand, sit and socialize on, jump from, and for teachers to stand on to observe other children playing nearby in a very intimate space. The dimensions and sizing of the entire space, including an adjacent slide and berm, let the children know this space was made just for them.

The play decks are another example. Integrated into the landscape with each one different in size and shape, they present themselves as a funny looking bench, but the unique

look opens the imagination – maybe it's a table, a cave, a bed, a stage? Of course, they are all that and more, only limited by the child's imagination. Functionally, they create distinct landmarks in the landscape for small group work, social gatherings and games.

The field is another example. Rather than placing soccer goals or other dedicated sport infrastructure on the grounds, the staff liked the idea of having a large field that was open ended so that they could use it in more flexible ways. It was also placed toward the edge of the site so that stray balls would interfere less with adjacent play.

Creating a range of play opportunities has a distinct effect on social behaviour. Spreading students out and engaging them in things they are drawn to dramatically reduces social conflict. Many principals have spoken of how boredom is the leading edge of negative behaviour. This has held true at Irma Coulson.

THE DESIGN

Child Development

3. ACCESSIBILITY

Play for all was an important guiding concept for the Climate Ready Schools pilot. While the project complies and/or exceeds the requirements of both the Accessibility for Ontarians with Disabilities Act (AODA) and the Canadian Standards Association for Playground Equipment CSA Z614-20, the key was engaging an accessibility consultant early. The consultant was engaged from the beginning and throughout the design process and this generated creative solutions that neither the landscape architect nor the accessibility consultant first saw.

The design team was guided by the idea of creating play environments where students with varying abilities could play together, in close proximity, trying to minimize the need for distinctly separate play spaces that served various unique abilities.

Some Examples:

Primary Circulation Routes

The main circulation throughout the school ground is made up of a network of accessible pathways on a variety of surfaces. Compacted limestone screenings and permeable pavers provide access to a variety of play opportunities while leading students through an immersive nature-rich learning environment. All entry points are fully accessible helping to welcome the school community and provide a warm invitation to explore and experience the whole school ground.

Parkour and Tunnel

The parkour is designed for accessibility. The Engineered Wood Fibre (EWF) (safety surfacing) enables wheelchair access while maintaining its spongy impact attenuation properties. Low ropes and horizontal bars provided opportunities for building upper body strength and developing coordination. The large framing of the play area around the parkour embraces the parkour, tunnel, slide, and horizontal bars as one space. The result is a play area that makes sense of observation and positive social interaction even when a child is not engaged with any distinct feature.



THE DESIGN

Child Development

The Tunnel has EWF at the entrance that transitions into a smooth rounded concrete surface of the tunnel floor, allowing children to have a full experience of being in this unique space.

Accessible Hill Slide

The slide embedded in the hill in the main play area has an accessible pathway offering a gradual ascent leading to the slide platform where children experience height and a stunning view of the whole school ground. On the platform at the top of the slide, the wooden platform has grab bars for easy transfer out of a wheelchair to the top of the slide. Once a child has slid down the slide, there is an opportunity to use grab bars at a transfer station and on each of the stairs to climb back up to the top of the slide without the use of leg strength or a wheelchair. The log corduroy edging on either side of the slide provides an additional route to climb the slope for a wide range of abilities. The goal is to provide a unique parallel play opportunity that balances challenge with opportunity.

4. GRADUATED RISK TAKING

One of the goals of the design was to support children in building physical literacy, and risk-taking plays an important role in this. Developing strength, balance, coordination, and spatial awareness all require children to be drawn into compelling play opportunities. Making the challenges enticing is one part of the equation. Additionally, considerable effort was made to present a wide variety of challenges so every child could find opportunities that met them at their age and stage. And then as skills and confidence grow, they can easily find new ways to challenge themselves. A guiding principle in this regard was the idea to create a space that was “as safe as necessary” rather than “as safe as possible.” This principle embraces risk taking as inherent in learning, and that there are many benefits afforded from taking risks. These include important emotional outcomes that come with developing confidence as new skills are developed and mastered.





THE DESIGN

Community Use

A key part of the vision for the project was to add value to the students and community outside of school hours. Consultations with the school and neighbouring community highlight the importance of park-like amenities (trees and shade, walking trails, and seating for parents and grandparents to watch their children) in addition to improved play opportunities for children. The response from families has been overwhelmingly positive with particular emphasis on the park-like environment and the variety of play opportunities in the landscape. The school ground will also better serve summer day camps that already are hosted at the school. As the trees and shrubs on the site mature, the increased shade will provide a cool oasis from the summer heat.





THE DESIGN

Outdoor Learning

Supporting the expansion of outdoor learning was central to the improvements of Irma Coulson's grounds. This vision centres on the idea of integrating indoor and outdoor learning. A relevant framing for this idea is the concept of a campus for learning. Had this project also included a new school build or if the project had been supported by a larger budget, numerous additional modifications to the site would have been considered such as the following:

- Building orientation as it relates to the prevailing winds, shade patterns and the school ground
- Location and number of access points
- Covered shelter at entrances to the school
- Mud rooms
- Outdoor storage for loose play and learning materials

Within this project at Irma Coulson, the focus was on how improvements to the grounds could best support outdoor learning.

Professional development was a key part of building the motivation and capacity amongst teachers at Irma Coulson. It is a critical component to realizing the potential of learning outside. The professional development section of this case study elaborates on that aspect of the project.

THE DESIGN

Outdoor Learning

1. NATURE RICH

Creating a nature-rich environment was a key strategy that produced many benefits across the full range of the project's goals. Specific to outdoor learning, one of the most compelling parts of this strategy is the intellectual stimulation of constant change in the natural world – the daily influence of sunlight and weather, season changes and adaptation, and the longer-term development of the site as vegetation grows and matures. It cannot be underestimated how these changes in the landscape create opportunities for formal learning in many subject areas. Additionally, observing these changes, particularly if reinforced by teaching staff in classroom routines, can become a daily habit that stimulates informal learning during recess and after school, which can cultivate observation skills, curiosity, and an appetite for learning.

2. SHADE, SHELTER, SEATING

The combined additions of shade, wind protection and seating all support a more comfortable outdoor space to be in, which is central to motivating teachers and students to be outside regularly. The play decks, all 17 of them, are useful in a variety of ways: stations can be set up for collection and observation; small group work is supported; and many of the decks are big enough to function as tables. The distribution across the site presents the opportunity for students to be spread out and immersed in their learning activities. The stage aspect of the decks support activities such as presentations, dramatic arts and even musical performances, especially on the large deck situated in the amphitheatre.





THE DESIGN

Participation

The Irma Coulson community was involved at multiple points during the design process, but just as the project was about to break ground all in-person activities were cancelled because of COVID 19. As a result, all in-person events were reconceived into a variety of educational media as well as interactive events online.

Evergreen's design approach invited and embraced the input from the school community, including the students. One of the necessary shifts was to guide the teachers (rather than the design team) in the gathering of information from students to influence the design. Walking with students on the site inspired video storytelling as well as drawing and writing exercises that provided valuable input.





THE DESIGN Participation

To engage parents, presentations were recorded, surveys were circulated, and a series of fireside chats (video conferences) were held to capture their input.

One of the benefits of this process was what would have been a single in-person evening workshop, became a series of shorter meetings at different hours of the day, which allowed for a broader range of participants. It also enabled more informal conversation that afforded a broad range of discussion topics.

Other complementary pieces to the design process included regular content in the school newsletter, parent teacher meetings and a four-part podcast series. The podcasts were produced by educational podcaster, Stephen Hurley, who is also a parent of a child at the school. These pieces came together into a regular flow of information and dialogue that were central to creating the conditions for the innovative project on Irma Coulson's school ground.

One of the goals of the project was to engage students in some aspect of site construction. This happened in June of 2022 when students were invited inside the construction hoarding to plant the first of the trees and shrubs on the site.



Professional Development

Professional development for teachers is a key element in the success of school ground greening. Building outdoor routines, lesson plans and a portable kit of materials are all central to shifting teaching practices. A suite of professional development opportunities and resources were produced to enhance the school's outdoor experiential learning approach.

Working with the staff at Irma Coulson Public School, Evergreen provided activities for animating the school grounds and equipped educators with the skills to develop their own experiences and lessons as nature-connected role models. Based on input from the lead teacher and Principal at Irma Coulson Public School, Evergreen supported the creation of a common set of principles and language providing the whole school with a shared understanding of use and care for the space that can be implemented across grades.





PROFESSIONAL DEVELOPMENT

The total suite of professional development for the staff at Irma Coulson and the broader HDSB included:

- 6 division specific virtual lunch & learns (Spring 2021)
- 3 division specific resource packages (Spring 2021)
- 4 half-day workshops for school staff (Fall 2022)
- 1 Climate Ready Schools Educator Toolkit (Winter 2023)
- 1 virtual workshop (Fall 2022)

To facilitate professional development for the planning, design and engineering community, Evergreen joined with engineering firm Arup to host a discussion on climate adaptive design for Canadian school grounds. Sixty attendees from fields such as education, landscape architecture and real estate were hosted at Arup's offices in Toronto. As part of this session, lead landscape architect Birgit Teichmann shared insights learned from Irma Coulson Public School. The presentation focused on the successes and challenges that came with the Canadian school pilot project, as well as learnings from playground redesigns in Germany with the goal of sharing this work with a wide audience of professionals. The panel discussion also included Heidi Campbell, Senior Program Manager at Evergreen, Matt Humphries, Associate Principal, Canada Education Business Leader at Arup, and was moderated by Cam Collyer, Senior Advisor at Evergreen.

“

You can make small changes to the way you design school grounds that have huge impacts on the community, It can be part of an integrated solution to a changing climate.

Matt Humphries, Associate Principal,
Canada Education Business Leader, Arup

Additionally, in September of 2022, Evergreen made a virtual presentation to a group of OASBO members (Ontario Association of School Business Officials) focusing on the design innovations at Irma Coulson.

Overall, professional development was considered a vital component of this project, both to maximize the outdoor learning potential of the new school ground at Irma Coulson and to extend the insights of the project to a broader audience. The importance of in person sessions for teaching staff, outside on their new school ground should be emphasized. The sessions that took place were all exciting, motivating and practical.

Evaluation

Evaluation of the project was a key component to measure and assess the school ground's climate change mitigating impact and the ways in which the students and community benefit from the site. Key tools used in the process included Autocase's Triple Bottom Line assessment tool. It was chosen as an opportunity to expand on the traditional cost assessments of similar projects by monetizing the benefits and looking at the results over the lifetime of the project. Behaviour mapping was chosen to highlight the impacts on the students and particularly on their health and well-being. Additionally, work was completed to assess life cycle costing by Arup and teacher surveys were completed to complement the behaviour mapping.

The evaluation tools for the project were exploratory. We will continue to assess the feasibility, viability and practicality of them over time. We see clear value in each of the chosen tools but are still reflecting on how successful these tools would be deployed at a large scale with limited budgets. The following is a summary of what we found.



EVALUATION

Increasing the Tree Canopy

The Climate Ready Schools pilot project increased the existing 24 young trees at Irma Coulson School to a total of 70 trees on site. This nearly tripled tree cover, leading to enhanced benefits for students. Tree cover and associated benefits increase over time as healthy trees grow. A tree with a 77cm diameter trunk delivers 70x the environmental benefits of a newly planted tree with an 8cm diameter. Canopy cover is a relatively complex measurement of the surface area of the land covered by the combined leaves, branches, and trunks of all standing trees in a given area when viewed from above. For this site, we calculated the estimated increase of tree canopy diameter on the ground plane.

- The canopy will immediately increase from 42 sq m to 123 sq m for the school with the addition of 46 trees.
- In 10-years these trees are anticipated to collectively increase in canopy diameter to cover 490 sq m
- In 40-years the anticipated canopy diameter can increase the area to 1,979 sq m ~ 6% of the total school ground property



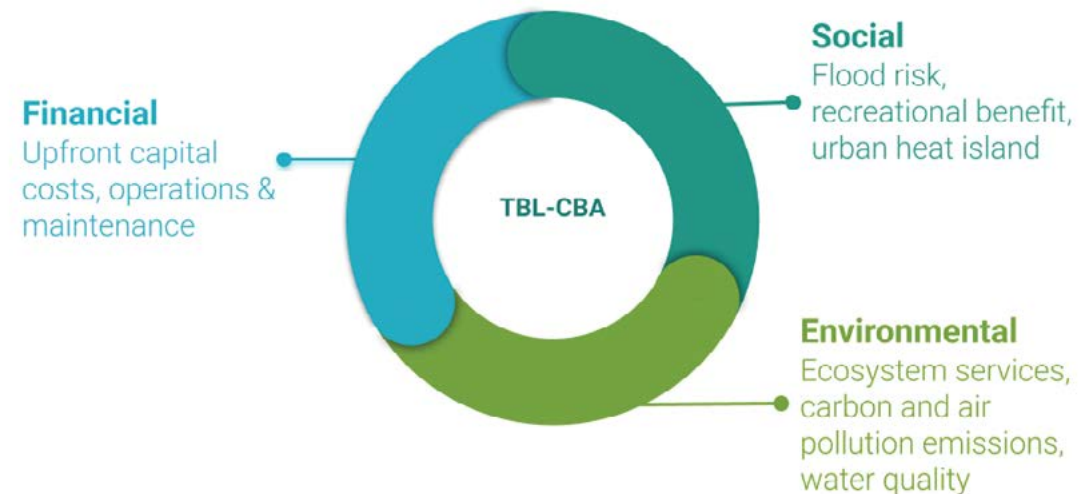
Stormwater Management

The design for Irma Coulson's school ground enhanced stormwater management practices in multiple ways. The most significant improvement was decreasing managed turf areas by nearly a third, from 9,404 sq. m to 2,580 sq. m. Reduced managed turf means less area for rainwater to run off and pool, resulting in more area for water to filter back into the ground and reduce loads on municipal storm infrastructure. Reduced turf areas are replaced with new shrub areas (1991 sq. m.), eco-lawn (814 sq. m.), engineered wood fibre areas (731 sq. m.), mulch areas (134 sq. m.), and sand areas (138 sq. m.); all permeable surfaces, excellent for stormwater management.

EVALUATION

Triple Bottom Line Analysis by Autocase

Economic analysis, specifically Cost Benefit Analysis (CBA) is an established economic approach for comparing the benefits and costs of a given project or activity. CBA involves identifying, quantifying, monetizing, and summing in dollars to the extent possible the value of incremental costs and benefits over the life of a project. It provides a systematic evidence-based economic business case approach to quantify and attribute monetary values to the direct financial impacts, as well as broader social, environmental, and equity impacts resulting from an investment using empirical data and peer-reviewed literature. The approach expands the traditional financial reporting framework (such as capital, and operations and maintenance costs) to take into account social and environmental performance of this enhanced landscape area. Triple Bottom Line Cost Benefit Analysis (TBL-CBA) refers to the integration of Life Cycle Cost Analysis (LCCA) and CBA techniques to quantify and attribute monetary values to the triple bottom line (financial, social, and environmental) impacts of a given project. Both benefits and costs are expressed in monetary units, discounted to Net Present Value (NPV) terms. All values shown in the results reporting are in 2020 Canadian Dollars, representing the net present value of 50 years of site operation after completion of construction.



EVALUATION

Triple Bottom Line Analysis

Irma Coulson School Ground Improvement TBL-NPV		
Net Present Value over a 50-year project lifespan (3% discount rate)		
Category	Factors Considered	Amount
Financial NPV	Avoided Operations and Maintenance - Base Case	\$ (1,686,000)
	Design Capital Expenditure	
	Design Operations and Maintenance	
Social NPV	Flood Risk Avoided	\$ 4,980,300
	Student Education	
	Community Health - Increased Activity	
	Community Health - Green Space Exposure	
	Community Health - Public Health	
	Community Recreation	
	Property Value	
	Urban Heat Island	
Environmental NPV	Carbon Sequestration	\$ 278,000
	Air Pollutant Filtration	
	Water Quality	
	Pollination & Habitat Creation	
Net Benefit (TBL-NPV*)		\$ 3,572,300
Benefit for Every Dollar Invested (TBL-BCR**)		2.19

*TBL-NPV is the present value of benefits net of costs over the project's study period of 50 years, which are discounted into current dollars at the real rate of 3%. TBL-NPV is the principal measure of an investment's economic worth.

**TBL-BCR is estimated as the present value of benefits divided by the present value of costs. TBL-BCR is intended to illustrate the benefits achieved for every dollar invested.



EVALUATION

Triple Bottom Line Analysis

KEY TAKEAWAYS

The Triple Bottom line analysis from Autocase is provocative. It gives a rare glimpse of the costs and benefits of a school ground redesign over a 50-year timespan. Building on the best available research, the analysis illustrates the significant social and environmental benefits of school ground greening to the students and the broader community. One of the valuations that stands out is the benefit to student education, valued at over \$4.5M. Another is the benefit to community recreation, valued at over \$200k. Anecdotally, new and additional uses for recreation from the community are indeed real. Also, the combined impact of the new school ground on both water quality and flood risk mitigation is significant.

When the analysis is looked at all together, there are a few interesting ways to digest it. The net present value (the sum of all the economic valuations put together) reveals that the project returns \$3,572,300 in value to the school and community over the 50-year timeframe. This is based on an initial investment of \$1,500,000 in design and construction and a valuation of \$1,511,000 of maintenance costs over the next 50 years. For every dollar invested in the school ground redesign, more than two dollars is returned in net value. On a per square metre basis, this project returns a benefit of \$221/m².

This holistic valuation of the project underscores the significant benefits of school ground greening to the school and community over the next 50 years. Notably, the environmental benefits are likely to increase over time as trees and shrubs grow, adding canopy for cooling and root structures to absorb rainwater. While the economic research that drives this model is still limited by the existing research into the impact of landscape design on social and environmental outcomes, it nonetheless provides a clear signal that there are tremendous and wide-ranging benefits from these types of projects.



EVALUATION

Behaviour Mapping by Evergreen

The behaviour mapping dimension of the evaluation was originally designed to observe and categorize the changes in self-directed play behaviour influenced by the new school ground. The intension was to have a team of researchers to observe self-directed play behaviour before and after the project. However, due to the COVID 19 pandemic, visitors were not allowed at the school. In addition, Irma Coulson had long periods of online learning, and when students were at school their recess activities were greatly restricted by the necessity of social distancing. As a result, the behaviour mapping had to be reimaged.

The result was a simplified process that mapped the principal's observations of self-directed play behaviour before and after construction of the new school ground. In addition, a post-construction survey was sent to teachers, which significantly increased observations of student play behaviour post-construction. The survey assessed physical, social, imaginative, experimental, individual, and self-regulation activities. For the purposes of understanding student behaviour in relationship to the landscape, the renovated school ground was divided into nine zones.





EVALUATION Behaviour Mapping

ZONE ① Kindergarten Area

The kindergarten area is characterized by slopes that face each other to create a natural bowl. This space includes an in-ground slide, a rocky slope with a water pump at the top, and a large sand play area at the bottom. Multi-material edge walls define the sand pit and provide character to the space. The entire space is scaled to the size of its primary users, kindergarten students.

This area has been a hive of activity, including sand and water play, balancing on logs and edge walls, sliding down the slide, and climbing up the rocky slope. Behaviour in this area has been highly social and cooperative, with senior students regularly helping junior students. The rocky slope provides a challenge that has accelerated development of strength, coordination, and balance. Teachers note that this space has supported the development of self-regulation. It has also developed confidence. The sand and water play has supported highly creative, imaginary play. Seating options around the space have provided nearby spots to rest, socialize, and observe peers at play.

“

Students engage in risk-play and confidence building as they have tested their level of comfort walking up and down the rocks leading to the fountain. Many students have now mastered walking on only their feet quite quickly up/ down. Whereas before they may have been on all fours, or slower.

Teacher



EVALUATION Behaviour Mapping

“

This is a great open space the children utilize. They are able to self-regulate better as well as problem solve small issues quicker.

Teacher

ZONE ② Multi-functional Field

The field is a typical grassy field, but it does not have typical accessory features such as goal posts, backstops or a surrounding track. It is surrounded by tree and shrub plantings as well as a few wooden platforms that act as benches.

The field has been a busy location. Organized sports like soccer, football, and frisbee are common. Junior and intermediate students tend to use large tracts of the field while primary students set up small side games. It has been a popular location for outdoor physical education classes. The field has been a primary area for creative snow play during the winter where competitions for the largest snowballs are common. From a social perspective, the field tends towards large group activities. Seating at the edge facilitates rest, social gathering and an observation platform for activities on the field.

ZONE ③ Periphery Pathway

The periphery pathway winds its way around the site, connecting with a series of pathways that intersect the site and connect its many different zones. The pathway varies in width and materiality, and is primarily composed of limestone screenings or porous paving stones.

The pathways have been used primarily for travelling around the site. They have also been a space for some games like manhunt and tag. The pathways seem to have permissioned moving around the site for students as they have a moderate amount of traffic at any given time. They serve as an opportunity to search for play opportunities and observe what and who are playing around the site. Small social groups are often seen walking and talking together. It was also noted by a special needs teacher that the pathways have helped their students self-regulate.

“

I love the paths as they creatively break up the space and provide distance for students, a chance to meander.

Teacher





EVALUATION Behaviour Mapping

ZONE ④ Tunnel and Land Bridge

The concrete tunnel on site acts as a connector between the field area and the parkour. It is built into a larger hill/land bridge that is the highest location on site.

The tunnel hosts contrasting activities. On one hand, it is a high traffic connector between two areas and is fun to pass through because of its unique shape and the booming sound qualities when inside. It also creates a setting where small groups can socialize and get away from the high activity areas on site – a sort of club house effect. The unique shape and size of the tunnel have also afforded its use for gymnastics. It is also used as a resting area from activities on the parkour. The round shape creates a unique view to the parkour area. On top of the tunnel, on the land bridge, students regularly gather to watch what is going on around the site. The location and height afford some of the best views of the whole site.

“

When taking kindergarten classes out to this area of our yard, we see less people in this space, however those who go are generally using it as a quiet area for problem-solving, playing games, etc. The kindergarten students have also enjoyed using the stages for standing on or collecting snow.

Teacher

ZONE ⑤ Welcome Plaza

The Welcome Plaza is located at the most prominent walking entrance to the school from the neighbourhood. A mix of surfacing, benches and plantings characterize the space.

The dominant physical activity in this area is balancing on the rock sloping walls. However, this area of the site is predominantly used as a social gathering space. The benches/stages provide a space for imaginary play, such as drama, dance and performance. Outdoor classroom sessions regularly use this area for presentations and group activities. This area also acts as a retreat for students seeking alone time in a quieter, less busy area.

EVALUATION Behaviour Mapping

ZONE ⑥ Sand Pit Rock Outcropping

The rock outcropping is significant in size and has a paved stone platform as well as the large sand play area surrounded by the uneven edge walls.

The rock outcropping is a place of movement. The extensive nature of the rock outcrop and the uneven edge walls have created a significant space for climbing and moving over rocks. Here students are challenged to develop strength, balance and agility. Because of the different elevations and the raised stone platform, it is also an area for dramatic play and performance. The nature stones also act as extensive seating so there are typically a good number of small sized social gatherings. This area is particularly popular with primary and junior aged students.



The topography and different elevations are providing them with an opportunity to use their bodies differently.

Teacher



ZONE ⑦ Outdoor Amphitheatre

The outdoor amphitheatre is characterized by a tiered semi-circle of seating bermed into a hillside with a large wood platform facing it. Berms give the feeling of an enclosed, partially sheltered space.

The nature of the tiered seating has created a positive social space for both small and larger group gatherings. The large platform supports a variety of performances including dramatic play and dance. Its elevated location next to the parkour area creates a great lookout area on the busiest area of the school grounds.





EVALUATION Behaviour Mapping

ZONE ⑧ Parkour Area

The parkour area is characterized by a series of vertical and horizontal climbing challenges made up of a natural wood infrastructure along with nets strung in between. A series of three horizontal bars at different heights provide opportunities for lifting, hanging and spinning. A slide built into the edge of the berm provides a sliding opportunity and a lookout. The whole area is surrounded by berms on three sides creates a bowl like atmosphere.

The parkour area is the busiest area for play on site. All ages find ways to play as there are many levels of challenge to take on and grow into. It is a place to test limits and grow in strength, balance, coordination and agility.



The decision to have two nests (towers) of the parkour was a good one. Students are enjoying the tops as a gathering space.

Principal Hayles



ZONE ⑨ Blacktop/Garden Area

The blacktop and garden area constitute the main area to the west of the school that was untouched by the school ground redesign. It is the primary threshold between the school and the school ground. It is characterized by asphalt surfacing with a number of basketball nets.

The use patterns of this area remain similar to before the school ground renovation. Basketball, handball and painted asphalt games are most common. The areas in between the portables also serve as getaways for students to socialize in small groups. The key observation is that this area is used less by students as more are drawn out into the opportunities afforded in the redesigned school ground.

EVALUATION

Overall Observations and Analysis

More activity and more variety

Overall, both the principal and the majority of teachers observed that there are more types of activity taking place on the school ground and students are much more spread out across the site. The creative use of space makes the school ground feel larger with more opportunities for different types of play and rest for students, teachers and community members.



More choices lead students to having more options/variety in the way that students play and engage in the overall site.

Principal Hayles

There was consistent mention of the variance of play styles and activity that students can now engage in on the new playground. Pre-construction, the options were mostly physical or medium to large social groups. Post construction, there are significantly more options for imaginary play and self-regulating activities to occur within the same space. Not only has the new landscape inspired more variety in student play activity, but the design approach to intersperse active and passive play areas has clearly offered more opportunities for rest and observation that students are taking advantage of.



4.5 acres has turned into 8 acres through design – the site seems a lot larger because of the variety of rooms that have been created through the design... the site seems very expansive in that it provides a lot of choice for students – there are multiple ways to engage.

Principal Hayles

Fewer props

Notably, fewer props (i.e., balls and equipment) are needed as the innovative design encourages a more tactile user experience. For example, students use their hands to play in the sand pits and use the benches as temporary stages for imaginative games and dancing.



The choices children have is phenomenal and has a big impact on positive social behaviours.

Principal Hayles



EVALUATION

More opportunities to self-regulate

The parkour and multi-functional field see the highest amount of activity; however, the adjacent play areas offer more variety and opportunities for students to self-regulate, especially on the pathways. Pre-construction, large group play was the most dominant activity, however the new playground has provided for more variance in group sizes and individual activities should students seek a different experience.



The whole space feels healthier – feels like you're in nature – students are more relaxed, less anxious.

Principal Hayles

More pro-social behaviour

Socially, there has been a sizeable impact on behaviour and students' mood. The redesigned school ground has clearly had an impact on pro-social behaviour. One that can be measured by the decreased interventions required by the Principal and supervising teachers.



I've noticed a change in students' confidence and their ability to start at a place that feels comfortable to them, listen and notice what feels good for their bodies, observe other students, and take time to go a little further next time. Also, lots of positive encouragement between peers.

Teacher



I've noticed an overall decline in people lining up outside my office to be disciplined.

Principal Hayles

Happier Students, Happier Teachers

Notably, despite significant changes in supervision patterns for the school ground, teachers have adjusted quickly. It is clear in their comments that the positive impact on student behaviour is tangible. Overall, it means both students and teachers are enjoying themselves more, creating a more positive atmosphere that translates back to the classroom.

When all the observations are considered together, it is clear there are many more options for students that serve a wide range of physical and social behaviours. The interspersed of active and passive areas along with the mix of large group and small group social areas has created a consistent flow of activity and an overall reduction in anxiety and aggressive behaviour. The significant presence of nature and the park like atmosphere area also observed to be thoroughly enjoyed by the students.







Best Practices

The effort that went into the redesign of Irma Coulson's school ground was a combination of Evergreen's experience as well as innovations brought by the team assembled for this project. Some of the key ingredients of a successful project of this type are distilled as follows:

- Developing a strong working relationship with the Facilities Leads at the School Board is foundational
- Great design that simultaneously serves health, education and climate mitigation outcomes is essential
- Design expertise that is skilled in multi-stakeholder participation is crucial
- Place child development at the centre of the conversation
- Embed risk assessment expertise into the design process
- Design innovation requires engineering and construction innovation
- Take a low-tech approach – seek low-cost landscape solutions vs high cost, hard to repair technology
- Construction details matter – crafts people are often required for the finishing details
- Ensure sustainability is a key filter in project decision making including material sources, re-use of materials, life cycle analysis and construction processes
- Highly vegetated landscapes need protection until they are established
- Educate parents and the community about the design goals and opening a dialogue with them is key
- Engage the students in as many ways as possible

Looking Ahead

It is early stages for this pilot project. From a practical standpoint, there are a number of important questions: how will the plantings establish? What will be the new use patterns for outdoor play and learning? How will the HDSB adjust to the new management routines required for the site? The goal now is to continue monitoring the site over time to deepen our understanding of what can be learned for future school ground design.

In the meantime, the early returns on the site are overwhelmingly positive. The addition of trees, shrubs and topography are buffering wind and noise while they will increasingly moderate temperature extremes on site. A comprehensive approach to managing stormwater on site through topography, soil enhancements and plantings will enable greater year-round use of the site while reducing soil erosion and compaction. Students, families and the surrounding community are embracing the site, and using it much more than before. There are strong feelings being expressed by school staff about a calmness on the school ground while at the same time a greater elevation and diversity of activity levels. The park-like atmosphere has

created an oasis for both the school community and the neighbourhood. The potential for learning outdoors is being embraced by both staff and students and this can only mean good things for student learning and more importantly, student motivation for learning.

The Climate Ready Schools pilot project at Irma Coulson has raised the bar on school ground design in Canada. Evergreen intends to expand the Climate Ready Schools program to other jurisdictions to demonstrate how these design principles are adapted to different settings, climate, school type and community. Simultaneously, Evergreen is committed to supporting the growth of the design, engineering and education professions so that the vision of great Canadian school grounds can become a reality.

Evergreen extends a hearty and humble thank you to all involved. The result is so much more rewarding because of the strength of the partnership. Taking the path of innovation is not the easiest way and there were numerous occasions where this project could have been thrown off course. We salute all the courage, conviction and hard work that created such a compelling result.

Let's create more Climate Ready Schools.

Reach out to us at climatereadyschools@evergreen.ca
to discuss how we might work together.

We'd love to hear from you.

