



Living with Lakes Centre

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Photo: Laurentian University

Cover Photo: Terence Hayes Photography

Table of Contents

3	The Vale Living with Lakes Centre	8	The Use of Local Products
4	Project Description	9	Meeting Building Code Requirements
7	A Model of Environmental Sustainability	9	More Reasons for Using Wood
8	Design Process	10	Conclusion

The Vale Living with Lakes Centre for Freshwater Restoration

Sudbury, Ontario, located at the edge of a large geological structure known as the Sudbury Basin (a 1.85-billion-year-old meteorite impact crater), is home to Canada's largest mining and smelting complex. By the 1970s, decades of mining and smelting nickel, copper and iron had reduced some 10,000 hectares of the surrounding area to desolation and had damaged watercourses for miles around. Sudbury is still a rich mining centre, but, as a result of a 90 % reduction in emissions and aggressive land reclamation, it has become a world centre for environmental science issues related to mining.

Working for years from four cabins, the Cooperative Freshwater Ecology Unit – a research joint venture involving Laurentian University, the Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources - needed a new home to expand its specialized research into the protection, remediation, and restoration of freshwater lakes and ecosystems.

The resulting Vale Living with Lakes Centre for Freshwater Restoration vastly increases the Cooperative's research capabilities. The major funders of the project included Industry Canada (Knowledge and Infrastructure Program), Ministry of Training Colleges and Universities, Vale - a global mining company, FedNor, Canada Foundation for Innovation, Ontario Research Fund, and the Northern Ontario Heritage Fund Corporation.

The Centre provides researchers and technicians access to laboratories, classrooms, offices, environmental bays and a watershed restoration facility. At the Centre, researchers examine long-term effectiveness of pollution reduction, and how a damaged lake ecosystem is able to dynamically heal itself over time.

Photo: John Burrows

As well as being a centre of excellence for critically important ecological research, the Vale Living with Lakes Centre is an extraordinary building with an exceptionally low environmental footprint. The project makes extensive use of wood products harvested and manufactured close to Sudbury, including structural, framing and decorative wood products.



Project Description

The Living with Lakes Centre consists of two buildings (Figure 1), both located on the shore of Ramsey Lake on the Laurentian University campus. The Watershed Building is a one-storey building used for sample collection and cleaning, equipment storage and for launching and receiving field crews. This case study focuses on the main building, the two-storey Living with Lakes Centre.

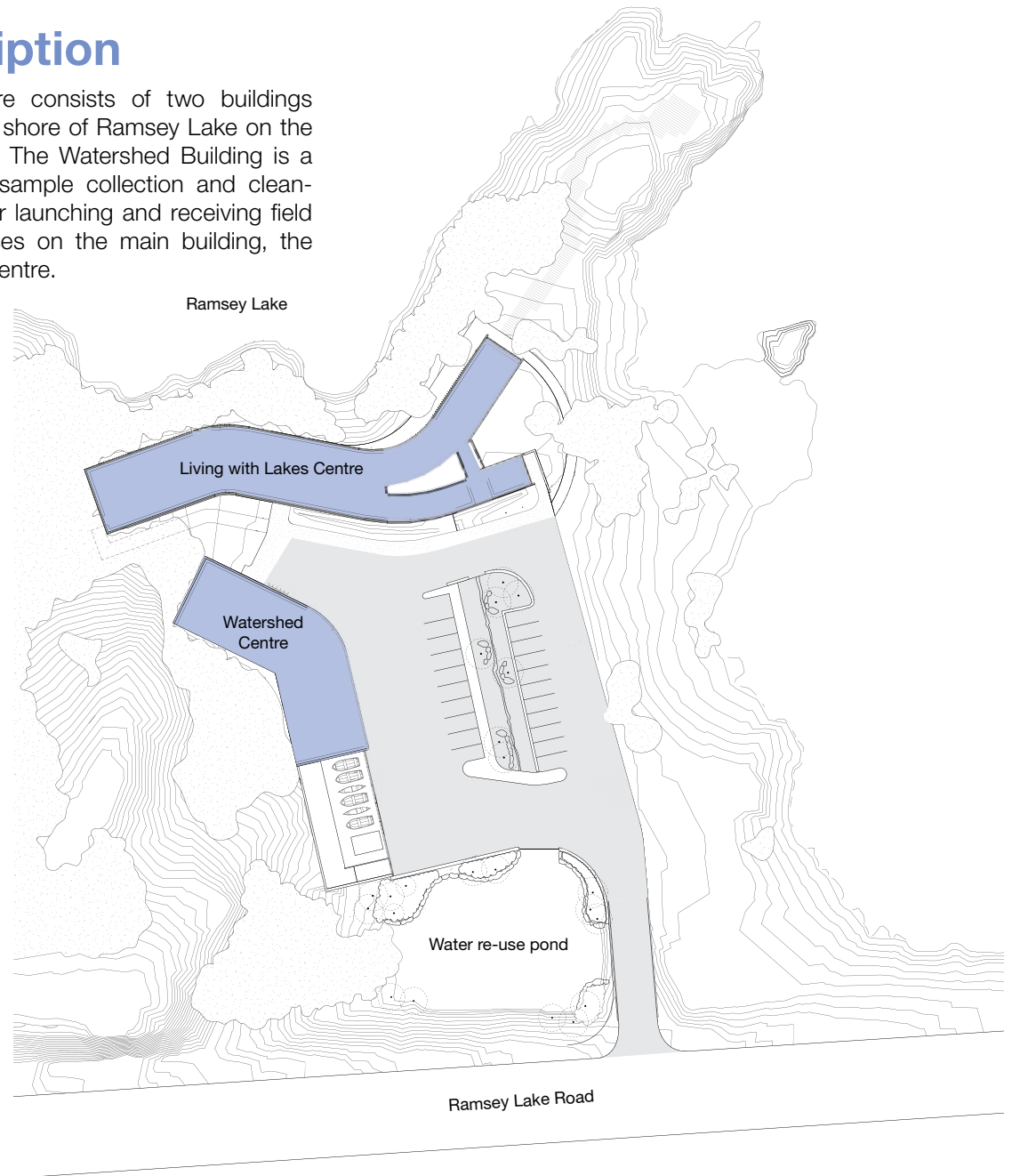


FIGURE 1 Site Plan

The design of the Living with Lakes building responds to the topography and shoreline of the site. It houses offices and laboratories and has room for approximately 80 faculty members, staff and students in 2,600 m² (28,000 ft.²). Mechanical and custodial spaces are located on the parking lot side of the building, and the laboratory area and offices face the lake (Figure 2).

Second Floor



- | | | |
|---------------------|-----------------------|---------------------------|
| 1 Conference | 6 Laboratories | 10 Storage |
| 2 Elevator | 7 Lounge | 11 Waste recycling |
| 3 Fumehood | 8 Meeting | 12 Mechanical |
| 4 Janitor | 9 Office | 13 Photocopying |
| 5 Kitchen | | |

Main Floor

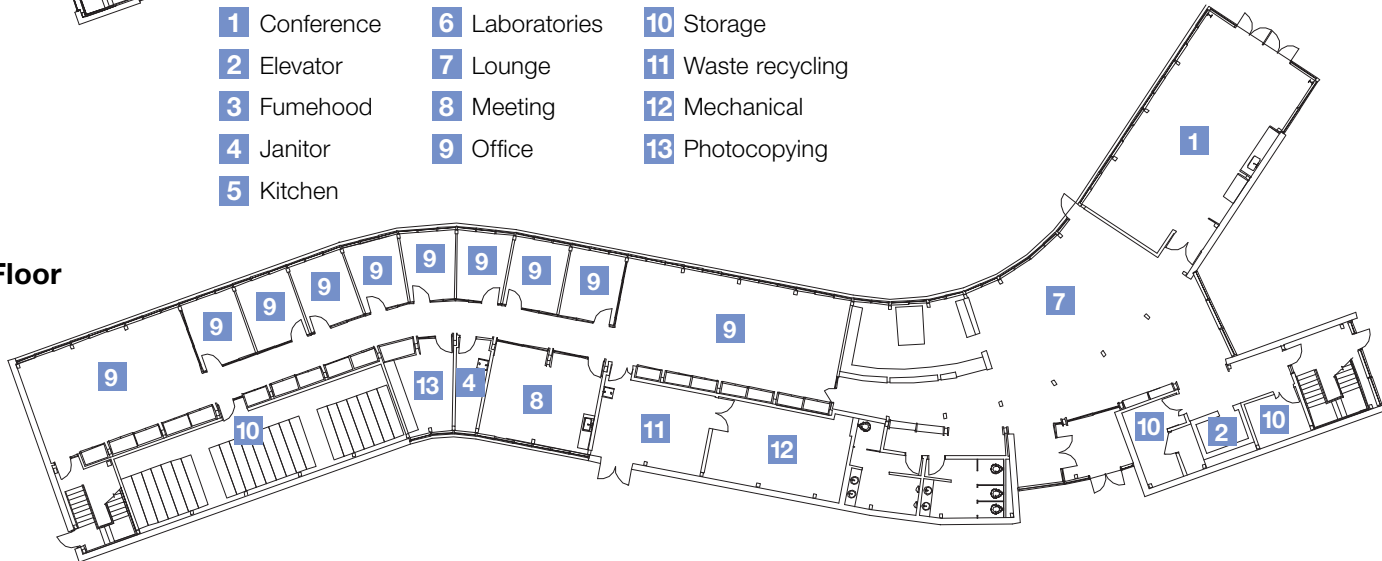


FIGURE 2 Living with Lakes Centre floor plans

The structure of the Living with Lakes Centre is glulam post-and-beam construction with wood-framed infill walls and solid wood floor and roof decking. The glulam beams and columns were factory-finished with a clear, protective coating. The wood frame walls have infill batt insulation, and exterior rigid insulation, and the upper portions are clad with eastern white cedar siding positioned to provide a drainage plane behind it (Figure 3). The cedar was left to weather naturally.

The columns on the outer walls extend from floor to floor. The interior Spruce-Pine glulam columns extend the full height of the building and the columns on the exterior extend floor-to-floor. The column spacing is 3300 mm and reduces in the

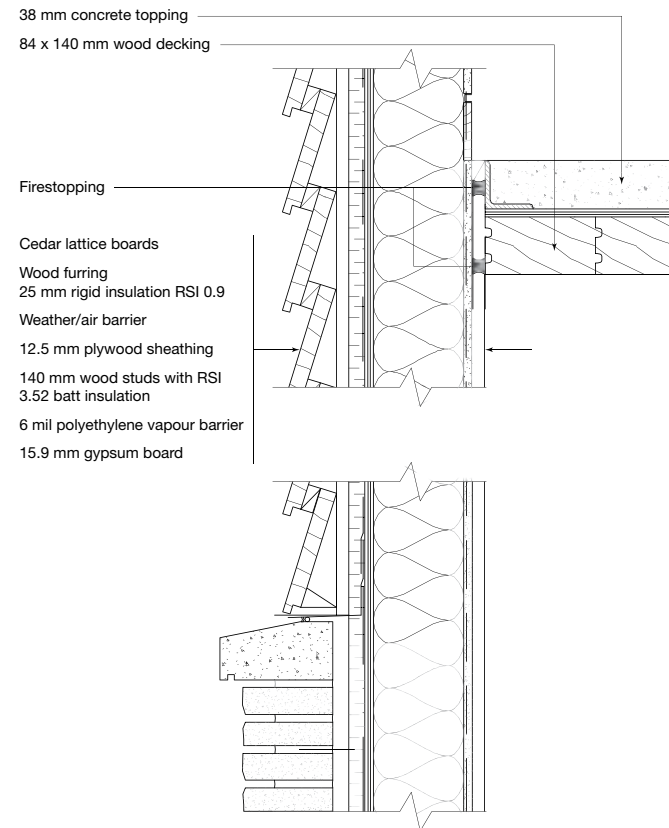


FIGURE 3 Wall detail

inside curves. The columns vary in size with most in the range of 175 x 305 mm and support floor and roof beams that are 175 x 456 mm and larger.

Efforts were made to minimize the quantity of steel required for the connections. Many of the column-to-beam connections used glued-in rebar. This allowed the embedment of the rebar in the members to take place at the glulam plant. The connection was completed on-site using epoxy adhesives. In cases where the loads were too high for this type of connection, a steel plate connection was hidden in the beam ends. The foundation-to-column connections were accomplished by a steel plate embedded in the concrete and extending up through the centre of the columns and bolted to the glulam.

The roofs of both buildings have been designed as “green” roofs (Figure 4). Blueberry shrubs, which are native to the area, will be planted in the spring of 2012.

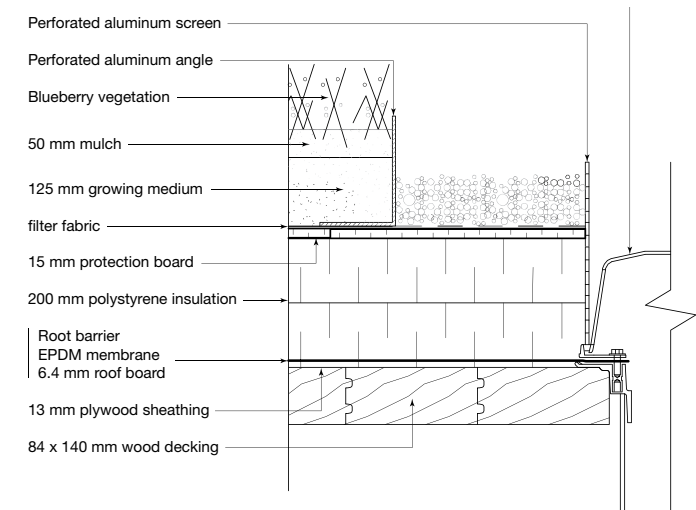


FIGURE 4 Roof detail

A Model of Environmental Sustainability

The Vale Living with Lakes Centre project received the Holcim Award Bronze Prize from the Holcim Foundation for Sustainable Construction. The Foundation's mission is to select and support initiatives that combine sustainable construction solutions with architectural excellence.

The Living with Lakes Centre was designed to surpass LEED Platinum standards and to follow the Co-op's rigorous environmental goals. The major energy and conservation features are as follows:

Heating and cooling energy: The majority of space heating and cooling is obtained from 40 geo-exchange wells drilled beneath the parking lot and heat pumps — a significant achievement given a climate that can dip below -30°C in winter. (It was decided not to use the lake as a geothermal source). Domestic water is partly heated by means of solar panels. The buildings are designed to be at least 66% more efficient than the requirements of the Model National Energy Code for Buildings (MNECB) 1997, resulting in an annual heating and cooling cost of about \$1 per square foot. Minimizing operating costs means maximizing research funding. Over the next 25 years, the predicted energy savings amount to more than one million dollars.

Stormwater treatment: The vegetated roofs on both buildings slow and filter stormwater runoff, which is directed to the water re-use pond (Figure 1). The use of Manitoulin Island limestone building and paving materials helps neutralize the residual acidity of stormwater from past smelting activities. Porous pavers in the parking area allow for some runoff filtration and the remainder is diverted to the settling pond. Water from the water re-use pond is used for non-potable purposes in both buildings, reducing potable water use by 80%. Excess water from the water re-use pond is filtered through wet-land before introduction into Ramsey Lake.

Photo: Scott Savarie



Building design and composition: The building has a high-performance thermal envelope, hydronic radiant floor heating, natural daylighting combined with daylight sensors on light fixtures, passive heating and cooling, and zero or low-emitting finishes. The building also makes extensive use of locally sourced materials.

The project had very strict controls for containing construction activity and preventing runoff to the adjacent Ramsey Lake, which is a reservoir for Sudbury's drinking water system. With 2011 being a good growing summer and fall, the natural groundcover species used for landscaping soon blurred the boundary between disturbed and undisturbed areas.

Design Process

Several design charrettes were held that engaged diverse user groups. The resulting goals stated that the Centre should:

- Be a working laboratory rather than a showcase of environmental technologies;
- Demonstrate the rehabilitation of mining and industrial lands;
- Provide education and outreach programs;
- Minimize operating costs and generate research scholarship funding from energy savings;
- Have an annual operating budget of less than \$42,000;
- Minimize the ecological footprint and contribute to the rehabilitation of Sudbury, including the health of people and fauna;
- Generate net-zero air and water pollutants, with monitored proof; and, in so doing
- Achieve Platinum level LEED certification.

Construction began in June 2009. Erection of the wood superstructure began in January 2010 and in February, the framing for the second floor was completed. Pre-fabricated exterior shear wall panels were installed in two weeks. Wood siding was installed in April. The Centre was ready for occupation in March 2011 and was officially opened August 25, 2011.



Photo: J. L. Richards and Associates Limited

The Use of Local Products

The LEED credit for having at least 20% of the materials sourced within a radius of 500 miles was easily met because of the quality of the local materials that were available. Examples are:

- The glulam members and framing lumber were FSC-certified materials from northern Ontario and Quebec.
- The eastern white cedar used for the louvered cladding was sourced and milled on nearby Manitoulin Island.
- The cabinetry and millwork is maple veneer on a particleboard substrate. The urea formaldehyde-free and FSC-certified particleboard came from Quebec. The panels were laminated in Thessalon, ON, close to Sudbury.
- The 140-mm-thick red pine FSC-certified decking used for the second floor and roof was also milled in Thessalon.

“ We are very proud of this cutting edge centre of excellence. As scientists and educators, we are proud to be able to pursue our work in a building that embodies stewardship and sustainability in every way. ”

John Gunn, Laurentian University,
Canada Research Chair in Stressed Aquatic Systems

- The limestone used for the patios and for the stone veneer cladding on the lower portion of the buildings was sourced from Manitoulin Island.

Meeting Building Code Requirements

Based on the Ontario Building Code (2006), the Living with Lakes Centre's major occupancy is Group A, Division 2. For this occupancy type, it fell into the following category of building: up to 2 storeys, increased area, sprinklered. It was permitted, under the prescriptive requirements of the Code, to be of combustible or noncombustible construction. It has a building area of 1,077 m² (11,588 ft.²), less than the maximum area of 2,400 m² (25,824 ft.²) permitted by the Code.

With the provision of automatic sprinklers, it was not necessary to design and construct the roof assembly and its supports to provide a fire-resistance rating of 45 minutes, nor for the heavy timber elements to conform to the minimum sizes specified in the Code for 'heavy timber construction.' For the same reason, janitor rooms were not required to have rated fire separations. The floor is a fire separation with a fire-resistance rating of 45 min.

The design occupancy loads are 95 persons for the first floor and 104 persons for the second floor. An emergency power supply was provided even though it is not required by the Code.

The laboratory area is classified Biohazard Level 1, the lowest level. It was designed to be easily reconfigured to accommodate a work force that peaks during the summer and varies from year to year.



Photo: Terence Hayes Photography

More Reasons for Using Wood

Sustainable Forest Management

Canada's resource managers practise sustainable forest management to maintain and enhance the long-term health of natural forest ecosystems while providing environmental, economic, social and cultural opportunities for present and future generations. Canada has more than 401 million hectares of forest and other wooded land, representing 10% of the world's forest cover and 30% of the world's boreal forest. Less than one half of one per cent of Canada's managed forest is harvested each year, and by law all public lands that are harvested must be successfully regenerated.

Sustainable forest management requires that today's decisions strike a balance between social, economic, and environmental values. Ontario, like other provinces, has a flexible, adaptive and comprehensive system of legislation, regulations, policies and technical guides for forest management that promotes public consultation and sustainable resource management.



Photo: Terence Hayes Photography

Forest Certification

Forest certification is an important tool used by forest companies, governments and buyers around the globe to ensure that forest products come from sustainable and legal sources. In third-party certification, independent auditors review forest operations for compliance with a standard that addresses environmental, social and economic concerns. No other construction material has the same rigorous review of its

extractive processes as wood. In January 2011, 149.8 million hectares of Canada's forests were certified and 25.6 million hectares were in Ontario.

Wood and Life Cycle Assessment

Life cycle assessment is a scientific measure of the environmental impact of a product throughout its entire life—from resource extraction through to product manufacturing, on-site building construction, occupancy, and eventual demolition, as well as disposal, reuse, or recycling. Numerous life cycle assessment studies worldwide have shown that wood products yield clear environmental advantages over other building materials at every stage.

As environmental awareness grows, building professionals are finding wood is an excellent choice for green construction designs, which minimize the use of energy, water and materials, and reduce impacts on human health and the environment. Wood is a high-performance and versatile choice for any new construction or renovation. Wood is light in weight, yet strong. It has excellent load-bearing and thermal properties, is easy to work with, and is well suited for large or small projects. Wood adds warmth and beauty to any building, enhancing the well-being of occupants.

Conclusion

The Vale Living with Lakes Centre vastly increases the capability of Laurentian University to champion the protection, remediation and restoration of freshwater lakes and ecosystems. The Centre reduces energy and water consumption significantly compared to conventional modern buildings. Wood products are used extensively to meet or exceed all building code requirements and provide a warm, congenial working environment.



Photo: Terence Hayes Photography

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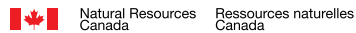
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