

LESSONS LEARNED

Representatives from Alberta Infrastructure, Alberta Parks, the Boreal Centre and the design team participated in a one-day “Lessons Learned” Workshop, as a full circle extension of the integrated design process. The intent of the workshop was to capture a full range of subjective experiences and perceptions of the building with a focus on building operation. The workshop provided the design team and owner with an excellent opportunity to reflect on the project and assist the occupants with any outstanding issues they may have encountered.

COMMUNITY ACCEPTANCE

The building was designed to be a research, tourist and educational centre. In practice, however, the building is primarily used for education and visitation has exceeded expectations.

Almost 10,000 visitors, including 6500 children, have passed through the doors of the Centre in the last few years since it opened. The Centre was showcased at the Slave Lake Home Energy Alternative Trade Show in March 2008 and has become a clearinghouse for questions related to sustainable design and construction.

COMPOSTING TOILETS

As the building’s focus changed from research to education, the occupancy load for the composting system became larger than designed. To meet the increased demand on the system, the building operator removed the four original composting toilets and replaced them with an Alberta system that utilizes a larger tank, is more insulated, and works with less airflow.

DURABILITY OF EXTERIOR WOOD FINISHES

The use of water-based protector on the posts of building has stripped the poles clean. In a two-year period, the poles have been refinished four times. The building operator had thought using an alternate exterior finish would affect the LEED rating of the building. The choice of finishes should be driven by what is durable and appropriate.

WATER TREATMENT SYSTEM

Rainwater treatment to potable standards is not common in Alberta. A permit from Alberta Environment is needed and current regulations would require a very skilled operator for this facility. At this time, the permit has not yet been secured, and negotiations between government departments continue to try to address this.

GEOTHERMAL SYSTEMS & CONTROLS

Overall, geothermal systems are working well. In the event of a power outage, the controls for the system are erased, setting off an alarm each time. The system cannot be reconfigured remotely. A control system was installed but the operator was never given a program to maintain the system. In future projects using a geothermal system, especially in remote locations, remote-monitoring systems should be specified and the program be given to the operator.



GOING FORWARD

Good green buildings build on the experience of earlier successes and mistakes. Post occupancy evaluations are increasingly a fundamental part of meeting sustainable design objectives. The willingness of designers and clients to share experiences and findings will enable lessons to be learned more quickly and applied more broadly, furthering the importance of post occupancy evaluations of sustainable buildings.

DESIGN TEAM

Architect	Manasc Isaac
Structural Engineer	BP Tech, Fast + Epp
Mechanical & Electrical Engineer	Keen Engineering
Landscape & Civil Engineer	ISL Butler Krebs & Associates Inc
Client	Alberta Infrastructure Lesser Slave Lake Boreal Observatory Alberta Parks & Protected Areas



LESSER SLAVE LAKE BOREAL CENTRE FOR BIRD CONSERVATION POST OCCUPANCY EVALUATION



The Boreal Centre for Bird Conservation, Canada’s most northerly bird observatory, was commissioned by the Lesser Slave Lake Bird Observatory and Alberta Parks & Protected Areas to monitor and research boreal and migrating neo-tropical birds. Together with Alberta infrastructure, Manasc Isaac Architects and their engineering team created a sustainable, economical and architecturally outstanding visitor centre that houses researchers, administrative staff and volunteers. The result is a building with very low operating costs, superior comfort for occupants, and reduced impact on the local environment. Up to 20 staff and 60 visitors are accommodated within the flexible 725 m² building. For both client and the design team it was important that the Boreal Centre for Bird Conservation be energy efficient and environmentally responsible.

POST OCCUPANCY EVALUATION

Post Occupancy Evaluation (POE) is a formal way of evaluating the actual performance of an occupied building compared to the design goals. The results of post occupancy evaluations are used to inform the design of future buildings. New buildings may be designed with a greater understanding of how comparable sustainable buildings perform in use, avoiding mistakes and taking advantage of successful design features and strategies. Manasc Isaac has made post occupancy evaluations a standard practice in its sustainable building design.

This report examines the actual performance of the Boreal Centre for Bird Conservation and highlights the satisfaction of the client two years into the building’s occupancy. Representatives from the Boreal Centre and the design team participated in a one-day “Lessons Learned” workshop to discuss successes, and opportunities for improvement in building operation. Energy usage and water consumption is based on data compiled directly from utility bills.



DESIGN ACHIEVEMENTS

SITE AND SITTING

- Building orientation along an east-west axis to optimize daylight and views while minimizing energy costs.
- Storm water management system minimize water run-off.
- Heat-reducing landscape and reflective exterior materials limit internal and external heat gain.
- Exterior lighting fixtures designed to minimize light pollution across the property boundary and especially into the night sky.

MATERIALS

- 95% of construction waste was diverted from landfill.
- Sourcing of materials that have greater-than-average recycled content.
- Whenever possible, locally-harvested materials such as local river rock and wood were used.

BUILDING ENVELOPE

- Wall insulation (Average RSI of 5.0 ° cm²/W).
- High performance. Windows are triple-glazed, argon filled with a low-E coating and fibreglass frames with an average U-value of 1.08 W/m²C.

HEATING AND COOLING

- Five ground source heat pumps are used to provide zone heating and cooling.
- Custom-designed exterior sunshade system controls the amount of natural light entering the building and minimizes the glare inside.
- Air-to-air heat recovery uses two Heat Recovery Ventilators to capture heat from return air.

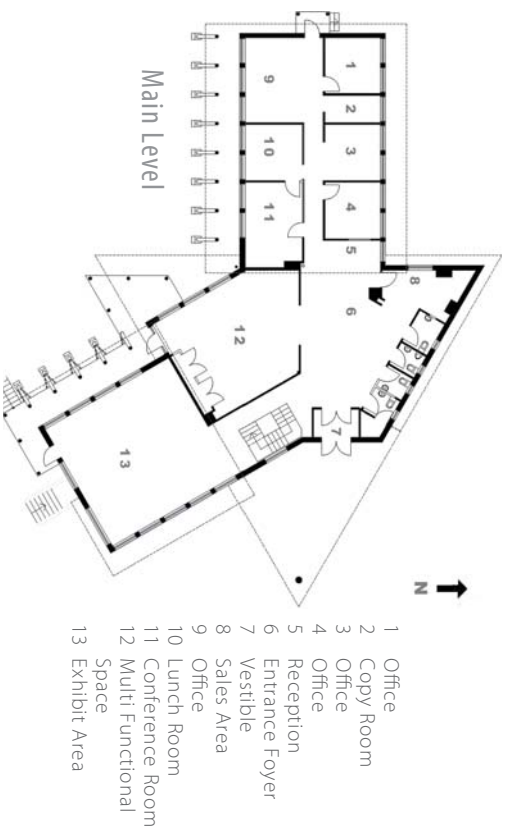
WATER

- Roof collects rainwater to a cistern in the basement for treatment to be used as potable water. For every 2.5 cm of rain, more than 14,000 litres of water are collected.
- Low-flow metering lavatories (1.9 L/min) and low-flow sinks (1.9 L/min) designed to reduce hot and cold water consumption. Potable water use reduced by an estimated 46%.
- Domestic hot water generated by heat pump desuperheaters (waste heat).

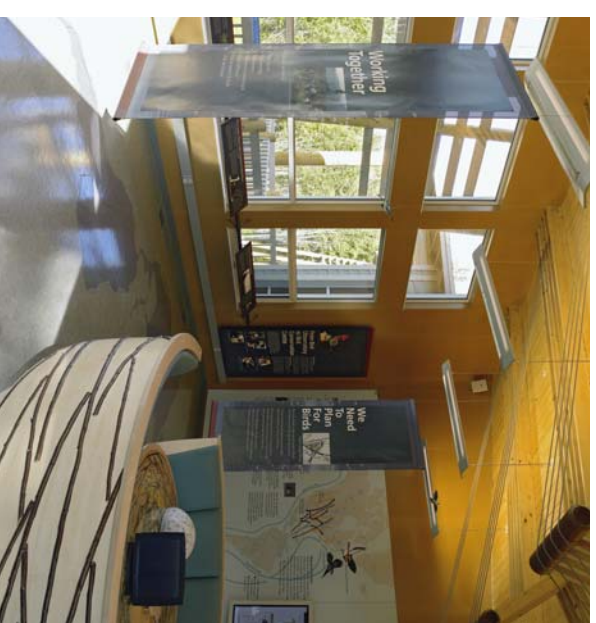
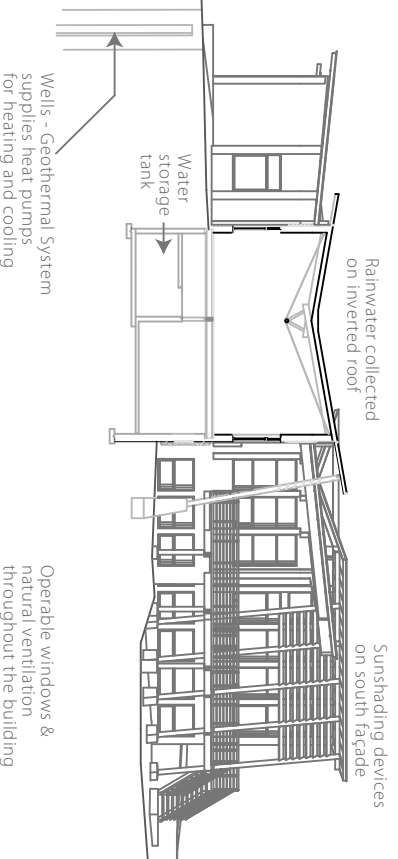
INDOOR ENVIRONMENTAL QUALITY

- Naturally ventilated with fully operable windows controlled by the building occupants.
- Finish underlays chosen for their natural beauty and no- or low- Volatile Organic Compound content

MAIN FLOOR PLAN



SECTION



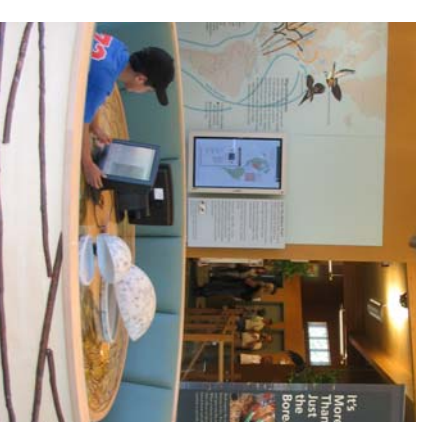
"When you are watching people walk out the door, they walk out smiling... I am eternally grateful that when we sat down to pick an architectural firm we picked [Manasc Isaac]. We would not have had this building if we had not chosen you."

Bob Deacon, Chair of Lesser Slave Lake Bird Observatory Board of Directors



"One of the best projects I've ever worked on... the special features [of the building] capture people's imagination."

Pete Chapman, Project Manager, Site and Environmental Services, Alberta Infrastructure

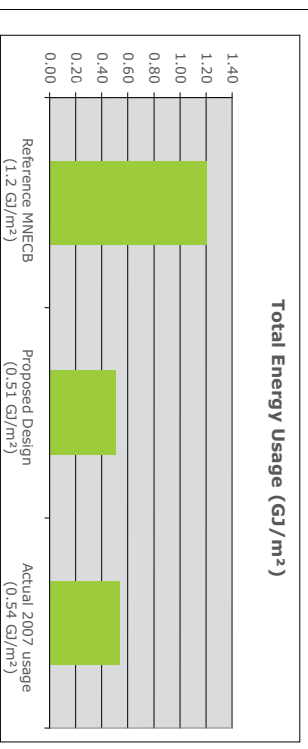


ENERGY PERFORMANCE

The proposed building design was modelled at 57.8% less energy than the MNECB equivalent building or 0.51 GJ/m². Based on electricity utility invoices from January to December 2007, the actual total annual energy consumption of the Boreal Centre is 0.54 GJ/m².

It is important to note that LEED® Reference and Design models are intended to estimate the value of the building's energy efficiency measures and not necessarily to accurately predict the absolute level of total utility usage in a building. The models do not include non-regulated components such as plug loads, process energy, garage ventilation, exterior lighting, elevators and other miscellaneous energy uses, which, if applicable, are included in the total actual energy consumption of the Boreal Centre.

The figure below shows the Reference, Design and Actual annual energy consumption for the Boreal Centre for Bird Conservation.



BOREAL CENTRE AND LEED®

Sustainable building design and building performance, including occupant comfort and satisfaction go hand in hand. The Leadership in Energy and Environmental Design (LEED®) Canada rating system is an important part of the post occupancy evaluation process.

Manasc Isaac is currently in the process of applying for LEED® certification for the Boreal Centre. In order for the project to receive the LEED® Silver Certification, at least 33 points must be achieved.

WATER CONSUMPTION

In the design of the building, every effort was made to minimize the consumption of water and water heating energy. There is no municipal water service to this remote site. Rainwater collection serves most of the needs of the Boreal Centre and the nearby hostel-style accommodation. However, potable water is trucked in when necessary.

The roof was designed to evoke a bird in flight, but its inverted shape serves another purpose – rainwater is collected in a cistern in the basement for treatment. For every 2.5 cm of rain, more than 14,000 litres of water are collected. The washrooms have composting toilets and low-flow metering faucets. Domestic hot water is generated by heat pump desuperheaters that capture waste heat.

Water is treated on site to potable standards. The figure on the right shows that water was trucked in for only 4 of the last 12 months, with sufficient on site water collection to minimize trucked water for the rest of the year.

Water Usage - Boreal Centre
(includes The Nest Eco Cabin usage)

