

FIRST NATIONS MOLD REMEDIATION CASE STUDY

Eel River Bar First Nation



To better assist First Nation communities in managing mold problems, Canada Mortgage and Housing Corporation (CMHC) has prepared a number of mold remediation and repair case studies drawing on the experiences of First Nations communities from across Canada. The case studies highlight current housing operations, key milestones, successes, decisions, changes and experiences of First Nations that have led to effective solutions to mold problems. The communities are diverse, and so, the case studies provide a variety of solutions based on each community's specific circumstances, needs and capacity to deal with the problems. Each case study includes a description of the community's approach to solving mold problems, implications for new housing, outcomes and lessons learned.

The case studies were prepared based on interviews with key members of the community, including housing department staff, councillors and mold remediation and repair contractors. First Nations seeking information on how other communities across Canada have dealt with mold may find the experiences recorded in the case studies to be useful in preparing mold remediation and prevention strategies for their own purposes.

THE COMMUNITY AND HOUSING OVERVIEW

Eel River Bar First Nation is one of seven First Nations that make up the North Shore Micmac District Council in northern New Brunswick. It is located at the mouth of the Eel River on Chaleur Bay, a part of the Gulf of St. Lawrence. The community lies alongside the municipality of Dalhousie and its economy is driven by lobster, crab and shrimp fisheries, forestry, construction, trucking and the First Nation administration. Eel River Bar members

celebrate their culture through Micmac classes, annual ceremonies (powwows) and community events. Community life is good at Eel River Bar, a close-knit First Nation.

The Eel River Bar First Nation is situated in a low-lying geographic area that, like many other seaside communities, faces the ever-present threat of flooding. In Eel River Bar, winters are snowy and cold, and summers are mild and pleasant. The average temperature in January is -13°C , but it can get as cold as -37°C . The average temperature in July is 18°C .

Quick Facts

- The community area is 121 hectares (301 acres).
- There are 653 registered members.
- Of the registered members, 341 live in the community.
- Seventy-three per cent of the members are under 44 years of age.
- Thirty-eight per cent of the members are under 19 years of age.
- There are approximately 191 houses (average 1.78 people per house).

Source: Statistics Canada, 2006 Community Profiles. AANDC as of Dec 31, 2011.

This case study highlights a series of events that began with the First Nation setting out to improve its building methods to prevent moisture and mold. In 2007 the Chief and Council had decided that their members should live in quality, mold-free houses. To that end leadership appointed a strong management team and supported the implementation of a strict building regime using some of the best building practices in the country. But things changed quickly when, on December 6, 2010, an ocean surge caused by a severe storm inundated 23 homes in the community. Eel River Bar's housing story became one of new-found determination and a sense of urgency to change the housing conditions and avoid future flooding.

The housing stock at that time consisted of close to 200 homes. Most homes had been built with financial assistance from Aboriginal Affairs and

Northern Development Canada (AANDC) and CMHC's Section 95¹ housing program. After successfully negotiating the much-needed financing from AANDC for cleanup and remediation after the storm, the First Nation set in place a plan for long-term remediation and community re-development.

In September 2011, the First Nation began housing repairs, renovations and relocations. Through determination and hard work the housing department, working in co-operation with the provincial Department of Municipal Affairs², created an inventory of 40 serviced lots ready for new construction. The housing manager's experience and skills at managing funds, record keeping and tracking procedures effectively streamlined housing operations. Since then, a dike and concrete seawall have been constructed along the Atlantic Ocean shoreline of the community (figure 1).

Figure 1 Dike and concrete seawall along the Atlantic Ocean shoreline of the community built after an ocean surge caused by a severe storm flooded houses in 2010.



¹ Under the National Housing Act Section 95 On-Reserve Non-Profit Housing Program, band councils may have access to financing for the construction, purchase and rehabilitation, and administration of affordable rental housing on-reserve. CMHC subsidies further assist with debt repayment and operations.

² The provincial Department of Municipal Affairs supports a number of initiatives to facilitate and build on capital works. Capital works encompasses a wide range of municipal infrastructure and is necessary to support the long-term economic growth of communities, allowing them to deliver strong municipal services and meet infrastructure needs. Typical projects include water and waste-water treatment, roads and recreational facilities.

MANAGEMENT AND LEADERSHIP

Well before the storm surge of 2010, the Chief and Council had initiated a change in the Housing Department when they recognized the need to manage their housing more effectively. Starting in 2006, their first action was to establish a permanent housing manager position. Mario Lapointe, who had joined the First Nation as a civil technician in 1997, took on the housing portfolio, bringing with him his background in civil engineering. With the support of the Chief and Council, Lapointe built a housing team that consisted of the councilor holding the housing portfolio, the director of operations, the housing manager, Housing Department staff and the community's Housing Committee. The team focused on improving housing conditions in Eel River Bar through a continuous effort to, in the team's words, "better our best."

MOLD ISSUES

The houses in Eel River Bar First Nation were plagued with mold due to high moisture conditions as a result of a number of construction and site issues. Most houses were built on poorly-drained, low-lying land. Improperly attached decks and porches, poor window and door installation, poorly insulated attics, improperly installed roof shingles, foundations built too low and improper grading around houses were among the most common problems that led to moisture and mold problems.

These construction problems were compounded by home occupants who failed to report leaks and other issues in a timely manner. Many homes were poorly maintained and had deteriorated to the point where moisture and mold problems developed. For example leaky toilets, that can be quickly repaired by simply replacing the seals, were often found to be the cause of extensive water damage to the surrounding flooring and subfloor. If the problems had been reported earlier, they could have been addressed sooner, at less disruption, cost and damage. Mold was an ever-present concern in the community's houses.

COMMUNITY'S APPROACH TO SOLVING MOLD PROBLEMS

To address the mold issues, the housing team set a priority list for repairs and renovations. The team members focused on the cause of the moisture problems and methodically went through the housing stock remediating and repairing houses. They installed better mechanical ventilation systems to help prevent future problems. They held education and training sessions for community members and staff to increase knowledge and awareness around housing and mold issues.

After the ocean surge inundated 23 houses, the Housing Department had to approach mold remediation quickly and thoroughly. Three to four feet of salt water flooded many basements. The housing team inspected the houses, pumped the water out and rapidly dried them by means of ventilation and dehumidification. They sorted the contents for cleaning, removed items that could not be quickly dried for disposal and removed building materials that were damaged—all within a two-week time frame. They disposed of wet contents and building materials in portable garbage bins for disposal at the regional waste management facility. With the advice of remediation specialists, they decided to condemn 2 houses on account of the severity of the water damage and their poor general condition.

Two other homes were relocated because of chronic water infiltration and flooding due to site conditions. The houses were placed on insulated concrete form (ICF) foundations on newly prepared sites—at a cost of up to \$100,000 a unit. By careful planning during the renovation, they were able to convert one of the houses into 2 units by using the new basement as living space. Another 10 homes were lifted by a local certified building mover and placed on new ICF foundations. By 2012, all 23 families affected by the storm surge had returned to their cleaned, raised and remediated homes.

NEW APPROACH TO RENOVATIONS

Having already adopted improved building practices to prevent moisture and mold in new houses, the First Nation was able to employ many of the same practices on its emergency response moisture and mold renovation project. The Housing Department began writing new specifications into the renovation contracts; these included detailed scopes of work. “It was time to break the cycle—we needed to do things differently, not repeat what we had been doing for the past 20 years. We kept using the same companies and getting the same work,” said Joe Simonson. “I can tell you, within the terms of the new contracts, those companies won’t qualify to bid on the next round of houses because of past performance—this is how we are dealing with this.”

As a result of the improved renovation practices and specifications, the renovation crews retained by Eel River Bar, now have a planned and disciplined approach to fixing moisture and mold issues. This includes the following tactics:

- Foundations are upgraded for improved ground moisture control:
 - cracks or leaks are repaired using an epoxy injection,
 - foundations with chronic moisture problems are excavated if required,
 - drainage tiles are upgraded,
 - dampproofing or water-proofing membranes are applied, and
 - storm water drainage and sewage backflow preventers are installed.
- Soffit vents are installed and the attic insulation is upgraded to R-40 to prevent ice damming that can lead to moisture damage. An insulation blowing machine was purchased and tradespeople were trained in its proper use.

- ENERGY STAR^{®3}-rated vinyl windows are installed for energy efficiency and condensation resistance.
- Better window and door installation practices are used to prevent water penetration.
- Water-durable floor coverings and water-resistant drywall and fixtures are used in bathrooms to ensure moisture and mold resistance.
- Range hoods and bathroom fans are installed to ensure that moisture and odours exhaust outdoors.
- Heat recovery ventilators (HRVs) are installed in some homes to provide continuous energy efficient ventilation and simultaneously exhaust stale air, manage moisture and introduce fresh air into the homes.
- Mini-split heat pumps are used to supplement existing baseboard heaters, manage moisture and reduce operating costs.

NEW APPROACH TO NEW CONSTRUCTION

Even with the focus the community placed on improving building practices since 2006, the extensive damage caused by the storm surge compelled the housing team to reconsider its approach to building new houses. A special emphasis was placed on building up, not just above the water table, but also up above known storm surge flood levels recorded in previous weather-related incidents. This was the single most important step taken to avoid flooding in the future.

With the help of engineering studies and a new management plan, the team members designed and laid out streets and lots for a new subdivision. Armed with what they learned from their mold remediation and renovation projects, they concentrated on building houses to prevent moisture problems and reduce repairs and maintenance. According to Lapointe, “Our most important decision was to build up the ground. All future

³ An ENERGY STAR[®] designation identifies products as the top high efficiency performer in their category. ENERGY STAR qualified products must meet and exceed minimum Canadian federal energy efficiency standards according to a prescribed performance level for each product area.

building sites in the community must follow the same principles to make sure flooding is a thing of the past.”

New home building practices to prevent moisture and mold in new houses (post-storm) include:

- the budgeting of sufficient funds to prepare new building sites prior to construction— typically \$15,000 to \$20,000 per unit to “build high and dry”;
- the preparation of building sites, including grubbing and excavating organic materials to reach solid ground and more specifically:
 - using and compacting granular fill in lifts to ensure consolidation of the new material— with a typical depth of fill of 2.1 to 2.4 m (7 to 8 ft.),
 - using gravel pads to a depth of 1 m (3 ft.)— raising each house away from the water table and creating a significant drainage layer, and
 - elevating building sites to ensure the compacted fill is no less than 2.5 cm (1 in.) above the height at the centreline of the road, and extends out a minimum of 25 cm (10 in.) beyond the footprint of the house, with the foundations built entirely above these gravel pads.
- the inspection and documentation of the foundation preparation process using a professional inspector, and the staking out of the site to ensure that all footings are level and square and that drainage conforms to code requirements;
- the conversion of all basements to fully livable spaces, with new 102 m² (1,100 sq. ft.) homes effectively having 204 m² (2,200 sq. ft.) of living space when the basement area is included. Basement construction strategies include:
 - limiting basement floor depth to no more than 1.2 m (4 ft.) below grade to allow larger windows to be installed that can bring in lots of light as well as provide for emergency exit from the lower level,
 - using ICF foundations with waterproof membranes for all basements,
 - installing floor drains in the mechanical rooms, close to hot water tanks,
 - installing sump pits with submersible pumps to allow for quick removal of water in the case of a pipe break or flooding incidents,
 - installing backflow preventers on sewers and drain tile lines, and
 - installing insulation under slabs where necessary.
- the installation of HRVs to prevent moisture buildup from cooking, bathing, cleaning and to provide a continuous supply of tempered outdoor air;
- the use of efficient mini-split heat pumps that promote better air movement, even heat and improved moisture management, with two units typically installed—18,000-BTUH unit upstairs and a 12,000-BTUH unit downstairs (see figure 2). Electric baseboards still installed to provide backup heat;

Figure 2 A newly built home with mini-split compressors on the exterior—one for the basement area and the other for the upstairs. Worthy of note is the height of grade built up above the level of the road and the height of the foundation out of the ground to provide natural light to the lower units.



- the installation of ENERGY STAR® windows for energy efficiency, to minimize condensation and improve occupant comfort;
- the installation of windows and doors using sloped sills, FlexWrap™ and StraightFlash™ to complete the water and air-tightness and foaming windows in place to reduce heat loss;
- the installation of asphalt-treated building paper to create a weather barrier helps improve the durability of the exterior walls;
- the use of blown-in attic insulation to a depth of R-40, using the community's own insulation blower, and,
- the selection of interior finishes that are moisture-resistant, especially in the bathroom, such as one-piece surround tubs and water-resistant drywall.

Four separate contractors with a trusted connection to the community do the majority of work. Under the terms of their contracts with Eel River Bar, they are required to provide a one-year warranty for their work and to address any deficiencies. Deficiencies must be corrected before final payments are issued. Joe Simonson, the construction superintendent, oversees the field work, including new construction and renovations. The First Nation hires a housing inspector to confirm compliance with the contract specifications and the National Building Code. He or she completes and files reports on the five formal inspections that are undertaken on each home—one prior to backfill, one at framing, one before the drywall goes on, one at random and one final inspection after the work has been completed.

Training and quality control

Eel River Bar considers itself to be a learning community. Leadership supports staff training and works to retain the knowledge base that staff members

are gaining. The construction and renovation crews participated in the CMHC *Builders Series and Introduction to Ventilation Systems* workshops. Industry trainers were also brought in to provide field training on the installation and maintenance of HRVs, to train contractors on proper asphalt-treated building paper installation, to inform the community on best practices for the application of flashing over and around windows and doors, and, on how to construct ICF foundations. The window supplier provided training on installing windows.

Presently, Eel River Bar has four Red Seal⁴ carpenters in the community. Several of the First Nation's contractors are working toward their Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) certification, and several others are working toward their Red Seal electrical, plumbing and carpentry certifications.

The housing manager also makes a point of participating in the professional development activities such as workshops and seminars that are offered in the region. As Lapointe says, "I also do a tremendous amount of research and self-training and improvement that has enabled me to grow within the position of housing manager."

The Eel River Bar Housing Department strives to control the quality of new construction and renovations first by setting high standards from the beginning of construction to the end. It starts with a rigorous bid and contract process that helps to ensure, through practices such as detailed scopes of work and warranties, that both the contractors and the First Nation understand what is expected. All parties agree that deficiencies must be corrected before final payments are released.

The construction superintendent has complete authority to enforce the contract scope of work and is out in the field on a daily basis overseeing the construction of new units, renovations of existing units and all manner of minor repairs and maintenance. In addition, an

⁴ The Interprovincial Standards Red Seal Program was established more than 50 years ago to provide greater mobility across Canada for skilled workers. Today it represents a standard of excellence for industry. The Interprovincial Standards Red Seal Program acknowledges competence and ensures recognition of certification throughout Canada without further examination.

independent inspector was hired for the 2012 construction season to complete five inspections, file reports and document the work on all the units being built. Wood-frame construction, electrical work, plumbing and workmanship were all under continuous examination.

OUTCOMES AND LESSONS LEARNED

Eel River Bar's experience demonstrates the importance of a team approach to housing. The Chief and Council set in place a new housing management system with highly skilled employees. Leadership continues to support the staff and is always willing to see improvement through the introduction of new ideas, technologies and practices in house construction and renovation. The Eel River leadership has agreed to enforce National Building Code compliance through its contracting process.

The Chief and Council's leadership has provided an atmosphere that fosters positive change and innovative thinking. As a result, staff members are not afraid to try new, well-considered innovative solutions. Most importantly, the Chief and Council allowed their housing manager the freedom to work with other band administration staff and the Housing Committee in the development of new policies, building agreements and tendering processes. The First Nation has set high standards for outside and First Nations contractors. The community adopted an aggressive and professional approach to building and renovating homes to prevent moisture and mold. But it wasn't until witnessing the affects of the storm surge that the community adopted a building practice that many First Nations struggle with—improving site conditions by getting the houses up onto higher, well drained ground and conducting rigorous, numerous, independent site inspections during construction.

Eel River Bar's key message for other communities is to ensure that houses are high and dry, and to:

- put enough money into site preparation;
- think drainage, drainage, drainage;

- ensure that mold and moisture prevention is the way used to tackle the problem—not mold and moisture remediation;
- get to the source of the problems during a remediation, rather than just fix the symptoms;
- use of ICFs and raised foundation construction;
- take advantage of supplier training— for new and existing products such as ICFs, HRVs, windows and doors, mini-split heat pumps, asphalt-treated building paper installation, blown insulation, and so on;
- work with your First Nation, Tribal Council and CMHC to maximize staff training and to develop detailed work specifications and contracts; and
- learn from new building practices.

LOOKING FORWARD

The Eel River Bar First Nation is working to engage the community in its new approach to housing. Eel River Bar has a high level of community engagement already, and the administration is in the process of upgrading the First Nation's website to encourage more community participation and education.

The leadership has committed to continuous improvement, recognizing that there is more work to do. For example, there are plans to provide follow-up visits for home occupants as well as home maintenance workshops that will include checklists to prevent mold. The leadership also intends to implement ongoing training for the maintenance crews— also including seasonal checklists to assist them in keeping an eye on any vulnerable mold and moisture areas.

Using the New Brunswick landlord tenancy agreement as a model, the Housing Department will create their own home occupant—First Nation housing agreement outlining roles and responsibilities in “plain” language.

In order to share information and create a better dialogue around housing, Eel River Bar has recently completed a brainstorming session, sponsored by

CMHC, in Moncton with other North Shore Micmac District Council communities to help create common specifications and building approaches. The District Council is drawing on Eel River Bar’s successes to create a new path forward to housing by working together. It is also collaborating collectively and individually with CMHC on future training initiatives.

Lapointe’s closing thought is that “the Eel River Bar First Nation’s housing has seen noticeable improvements over the past five years and will continue to improve as we maintain this direction in the development of sound policy, capacity development, improved building practices and a steady move toward sustainable First Nation housing.”

Figure 3 Newly built home with improved site conditions - the house is built on higher ground and was completed after conducting site inspections during construction.



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