

BRITANNIA BEACH ENVIRONMENTAL MINING RESEARCH CENTRE **Community Design Charrette | Goals & Objectives**

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GOALS & OBJECTIVES

Introduction

The University of British Columbia, through its new Centre for Environmental Research in Minerals, Metals, and Materials (CERM3) is preparing a submission to the Canada Foundation for Innovation and the BC Knowledge Development Fund to build a Research Centre at Britannia Beach. The Britannia Beach Environmental Mining Research Centre (BBEMRC) will conduct innovative research to address past, present and future impacts of mining activities on both the global and local environments in Canada and around the world.

Goal

The Britannia Beach Environmental Mining Research Centre community design charrette is an effort to create a process for the development of a research facility of international stature that:

- supports and enhances environmental remediation efforts at the Britannia Mine site;
- supports and extends the research and educational goals of UBC;
- contributes to the vision for Britannia Beach as a sustainable community;
- enhances and expands the image of mining in both a local and global context;
- reflects international, national, provincial, regional, and local contexts for environmentally responsible mining in the 21st century; and
- contributes to the environmental, social and economic sustainability of other mining communities.

Initiated by UBC-CERM3, this effort involves representatives from groups affected by or working at Britannia Beach in the development of goals, principles, and specific guidelines for the eventual design of the research centre.

Process Objectives

Flowing from the above goal, CERM3 has a number of different, yet complementary objectives in initiating this process. These are:

1. To provide a process that generates a wide range of ideas that can serve as the basis for future planning and design of the CERM3 Research Centre.
2. To illustrate the results of applying design and environmental engineering best practices to satisfy local, regional, provincial, national and international policies and standards for mining and sustainable development.
3. To provide a means to translate community goals and objectives for the site into specific criteria for site selection and building design as a component of project planning and development.
4. To explore opportunities for synergies between existing and proposed projects, facilities, and capital investment on and around the site, and to identify areas of possible conflict and mutual benefit prior to project planning and design.
5. To use this process as a catalyst to explore the potential for a more comprehensive approach to community and environmental revitalization at Britannia Beach.

Purpose of the Research Centre

The BBEMRC will conduct research on all aspects of mining and the environment. Long-term, our goal is for the BBEMRC to become the mining industry's premier research centre dedicated to protecting the environment. The on-going research will be sponsored by industry and relevant government agencies under collaborative research agreements. Employees from industry can be seconded to the site to conduct research of direct relevance to their employer and for which they can obtain a post-graduate degree.

The BBEMRC will also work with NRCan and the BC Museum of Mining to establish public exhibitions on methods being used and developed by Canadian mining companies to protect the environment. These exhibits will focus initially on different ways to deal with Acid-Rock-Drainage. Additional exhibitions will include a range of topics such as:

- Sub-aqueous Waste Disposal;
- Mine Reclamation and Revegetation;
- Open Pit Mines for Aquaculture Development;
- Mining and Communities; and
- Safe Practices in Underground Mining.

Much of the initial research to be conducted in the BBEMRC will focus on the new water treatment plant planned for installation by the Ministry of Water, Land and Air Protection in 2004. The annual cost to operate this plant is estimated to be about 1.7 million dollars. Our research will attempt to reduce this cost by investigating modifications to the process such as:

- adding a process to recover copper and zinc in the effluent to create revenue;
- reducing the quantity of lime sludge produced and its associated disposal costs; using other agents such as fly-ash and pulp-mill waste (cheaper pH modifiers);
- immobilizing the metals contained in the sludge (alternative storage possibilities);
- recovering energy from the ARD to heat the townsite and produce electricity; and
- studying methods to seal open-pits and glory holes at the top of the mountain.

Why Britannia Beach?

The BBEMRC will capitalize on the unique opportunities afforded by the site, including the Ministry of Water Land and Air Protection (MWALP) remediation program, the pending improvements to the Sea to Sky Highway, an active and involved community, and the presence of the BC Museum of Mining, all of which taken together will intensify research activities into sustainable mining and build awareness of innovations in mining and the role of this industry today and in the future. Other factors that influence the choice of Britannia Beach as an ideal site for the centre include:

1. Direct access to real mine effluent pollution to support ARD research.

2. Reclamation and revegetation research opportunities (passive systems, phyto-reclamation, bio-treatment, etc.)
3. Direct access to a real water treatment plant dealing with pollution (successful R&D can be implemented almost immediately)
4. Availability of the mine provides opportunities for other field research stations – geomechanics, automation, U/G communication, drilling and blasting, ARD, etc.
5. Location is a major attraction for high-quality researchers (Howe Sound is spectacularly beautiful, housing costs lower than Vancouver, 10-min. to schools and hospitals, 1-hour to Whistler, 40-min. to Vancouver)
6. Operating costs of the facility will be significantly lower than elsewhere (reduced HVAC costs through use of geothermal energy).
7. The historic nature of mining at Britannia Beach provides a focus for the public and industry to share in the research results.
8. Technology-transfer of research to industry and to society is enhanced with the presence of the NR-Can Interpretive Centre and the BC Museum of Mining.
9. The role of universities and Canadian research funding agencies can be shown to be extremely positive with the transformation of this site from an eye-sore into something of which all Canadians can be proud.
10. The Centre can serve to show how research can help change a polluted site into something of benefit. Similar to the Millennium Plug project, the Centre can help to solve certain immediate problems and generate opportunities to solve future ones.

The centre will house about 60 researchers from a variety of organizations including universities, mining companies, mine suppliers, engineering firms, and government organizations. Funding is expected from these sources, not only to build the facility, but also to support the on-going research.

CERM3 Research at Britannia Beach

UBC has had a presence at Britannia Beach since the summer of 2001 when CERM3 began to construct a research field station at the 2200 Level of the mine under a collaborative project with the landowner, Britannia Mine and Reclamation Corporation (BMARC). The station was completed in Dec. 2001 allowing UBC to conduct research on a project called The Millennium Plug.

The Millennium Plug is a new approach to close mine tunnels in which the seal is designed to last 1000 years. Constructed with bulk materials that include sand, gravel and rip-rap together with an impervious bentonite clay core to prevent water flow, the plug is highly acid resistant and can withstand considerable seismic loading. Installation of this facility has had the added benefit of stopping acidic pollution flowing into Britannia Creek. For the first time in 25 years (and perhaps longer), Britannia Creek is no longer polluted and metallic pollutants are not directly entering the surface waters of Howe Sound.

From this initial effort, BMARC has continued its reclamation work on the Jane Portal, which has also been sealed, and on sludge pond residue which is being buried and covered.

With the encouragement of UBC-CERM3, NRCan-CANMET, the Government of Canada's research laboratory for the mining and metallurgical industries, has opened an office at Britannia Beach with the intention of conducting research on mining and the environment. CANMET has committed funds to CERM3 to build a pilot plant to demonstrate how geothermal heat from the Britannia Mine effluent can be extracted to provide space-heating for the local community at Britannia Beach. This plant will provide proof-of-concept and allow CERM3 to study how to reduce the estimated payback of the system from 6-9 years to 3-4 years.

Why a Design Charrette?

Establishing a research centre at Britannia Beach represents a significant investment and can serve as a catalyst to explore the potential for a more comprehensive approach to community and environmental revitalization. Development of a sustainable community at Britannia Beach is today closer to a reality than at any time in the past. Other major investments proposed for Britannia Beach in addition to the research centre include the treatment plant to handle mine waste and improvements to the Sea-to-Sky highway. These projects (and perhaps, others) should be considered in planning for the Research Centre. A design charrette process allows for synergies to emerge from among these individual projects as well as the exploration of areas of possible conflict and mutual benefit.

Participants bring a wide spectrum of expertise and experience to the process. These include residents of Britannia Beach and surrounding communities, representatives of organizations with an interest in the Britannia Mine site and its wider physical context and experts from a wide field of technical and environmental knowledge related to mining and the environment.

In the first phase of the process, participants work together to translate existing local, provincial, and national land use, environmental, community planning, and mining policy into a set of objectives for the research facility. These provide the

basis for consensus-driven design guidelines, performance standards, and specific spatial requirements for a cross-disciplinary group of designers, planners, environmental experts and community stakeholders to design the building(s) and integrate them into the overall site.

Siting Opportunities and Constraints

Since there is some uncertainty at Britannia related to property ownership and accountability for long-term remediation, a specific site for the Research Centre has not yet been determined. However, in the expectation that these outstanding issues will be resolved in due time, it is fully appropriate for this design exercise to identify one or more suitable sites for the Research Centre based on the design criteria, guidelines and performance targets that emerge from the process.

BMARC has generously offered to donate about half an acre of its land to establish a site for the centre. The exact location has not yet been determined and other sites may actually be more appropriate.

Currently, there are several potential sites being considered by UBC-CERM3. These include:

- beside the museum (Britannia Beach Historical Society)
- on the ball diamond (both BMARC and BBHS)
- behind the post-office beside the community centre (BMARC)
- on LWBC parking lot (LWBC)
- others?

Research Centre Design Objectives

The following design objectives were derived from existing local, regional, provincial and federal planning and policy initiatives. They were significantly modified during the First Working Session by a multi-stakeholder group. Deriving design objectives from this previously adjudicated policy base ensures that the products emerging from the process follow public will. The objectives are organized into four interlinked categories:

- A) Research and Education;
- B) Environmental Stewardship and Design;
- C) Economic Development; and
- D) Community Design.

A) Research and Education

1. Integrate multi-lateral mining research interests into a single complex at Britannia Beach.

2. Provide a venue to integrate industry, government and university research activities into site remediation and sustainable mining in context with the local communities and both local and global environmental consequences.
3. Create an educational resource for UBC students and researchers, as well as residents of the Britannia Beach community and beyond.
4. Create a venue to encourage mining industry cooperation and development (e.g., provide an incubator for small business enterprise in the mining sector).
5. Provide a venue to showcase sustainable mining practices and innovations to a local and international audience.
6. Integrate research, education, site history and interpretation into the siting and building design.
7. Enhance interpretive dimensions of the mine and the history of Britannia Beach through appropriate relationships with the Mining Museum, the proposed interpretive centre and heritage park, and historic mine structures.
8. Design the building and landscape to communicate its important instructional and civic role within the larger community.
9. Develop an operating plan for the Centre that will maintain close links between this new facility and the UBC campus on Point Grey.

B) Environmental Stewardship and Design

10. Locate and design the building and landscape to help repair and enhance the site's environmental health and sustainability while harmonizing with other environmental initiatives on the site.
11. Devise strategies to address the management and bioremediation of surface runoff – recognizing the need to prevent infiltration into the fan area – through appropriate building and site design.
12. Capitalize on the site's inherent natural and cultural features in siting and building design, avoiding hazardous areas (i.e., flood plain, riparian areas, and steep slopes).
13. Design buildings and landscapes to minimize (embodied and non-renewable) energy use and water consumption.
14. Demonstrate opportunities for material and resource reuse and recycling (i.e., building materials, grey/black water, mine waste) in building and site design.
15. Explore methods to reduce immediate and life cycle costs of site infrastructure that work with, not against, the natural capacity of the site and assist the residents and landowners to reduce the costs of energy and other services.
16. Where appropriate, and where it does not compromise other environmental objectives (i.e., minimizing groundwater infiltration), demonstrate the application of “green” building technologies and landscape architecture best management practices (using a modified LEED rating system as a reference point).

17. Represent environmental mining processes, materials, and systems in the building and site design.
18. Consider the use of mine waste materials in the design to promote research into the reuse of these materials.
19. Demonstrate the environmental benefits of sustainable mining practices and promote public awareness of environmentally responsible mining.

C) Economic Development

20. Design the Research Centre to build economic capacity for Britannia Beach (i.e., by fostering and enhancing compatible and complementary industries, such as tourism, R & D, recreation, and the film industry).
21. Provide local jobs for the community.
22. Consider siting and design strategies that foster future development and growth of the surrounding community (i.e., be a catalyst to deal with flood control and to attract future markets for housing and other development).
23. Create a locus for knowledge sharing and technology transfer in BC's mining industry (through the incubation of start-up businesses) and thereby strengthen the industry's position in the local and international marketplace.
24. Ensure that the Research Centre shares in both the costs and the benefits of development, particularly as it relates to additional infrastructure.
25. Explore ways that the Research Centre can generate revenue to support other environmental remediation efforts on the site.

D) Community Design

26. Design the Centre to respect and reflect the local history and culture of Britannia Mine, the Britannia Beach community and coastal First Nations.
27. Use an architectural language sensitive to the historic context while ensuring that the building reads as a contemporary structure.
28. Develop design strategies and other mechanisms that foster synergy between the existing community stakeholders and the new population.
 - a. Consider the use of historic structures as part of the design (i.e., existing bunk houses as temporary or short-term housing for students, researchers and visitors);
 - b. Incorporate shared community space within the design;
 - c. Create shared parking facilities among separate facilities; and
 - d. Leverage funding and support for additional investment in the community, infrastructure upgrades and, potentially, insurance premiums related to the historic mine structures.
29. Design a complex that enriches the public realm and reflects user needs.
30. Consider the prominence of the building within the community and the landscape.

Policy / Regulatory Resources (organized by scale)

National

- **Fisheries Act** (Compliance to Metal Mining Liquid Effluent Regulations (MMLERs). Dept. of Fisheries and Oceans
- **Environmental Protection Act.** (Pollution Prevention Planning [under Part 4 of the EPA]). Environment Canada. 1999.
- **Minerals and Metals Policy of the Government of Canada: Partnerships for Sustainable Development.** NRCAN. 1996.
- **Cultural Resource Management Policy, Parks Canada** (re. long-term preservation of Concentrator Building)

Provincial

- **Action Plan for a Feasibility Study of the Britannia Mine Remediation Project.** BCMWALP. 2001.
- **Britannia Contaminated Site investigation: Fan Area.** URS Norecol Dames and Moore Inc. 2002.
- **British Columbia Waste Management Act**, currently under review (Contaminated Sites Regulation)
- **British Columbia Mines Act**
- **Heritage Conservation Act.** 1997.
- **BC Heritage Trust Service Plan 2002 - 2005**

Regional

- **Area D Official Community Plan Bylaw No. 692.** 1999. Squamish Lillooet Regional District.
- **Fraser Basin Council Charter for Sustainability.** Fraser Basin Council. 1997.
- **Fraser Basin Council 1998-2002 Action Plan.** Fraser Basin Council. 1998.
- **Fraser Basin Council Sustainability Indicators for the Fraser Basin, Consultation Report.** Fraser Basin Council. 1998.

Local

- **Britannia Mine Stakeholders' Sustainable Reclamation Plan.** Copper Beach Estates. Feb.4, 2002.
- **Britannia Beach Historical Society Statement of Intent and Purpose.** Britannia Beach Historical Society. 1999.
- **Work Plan for the Britannia Mine Remediation Project, Britannia, BC,** Ministry of Water, Land and Air Protection, December 14, 2001.