

D.1 WATER SYSTEM

Hongbing

D.1.1 Drinking Water System

Environmental use guidelines for water include drinking water, recreational water, aquatic life, irrigation water and livestock water.

Furry Creek is one of the drinking water sources for the Britannia Beach Community.

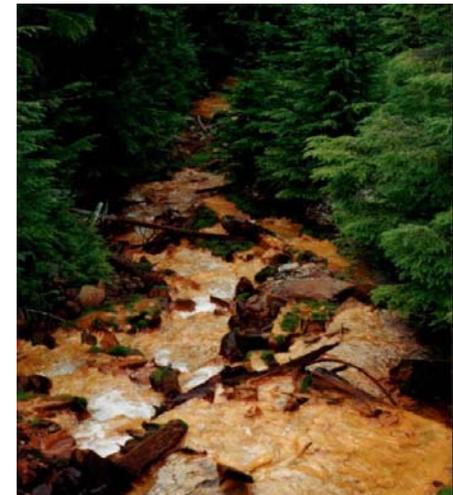
Also, the water supply for the town provide chlorinated water for use in the WTP for reagent make-up as well as for pump seals, emergency eyewash and showers, sinks, toilets and potable uses. Water for the community is treated with chlorine at a water treatment plant.

In recognition of the importance of ensuring the health, safety and integrity of drinking water within the Squamish-Lillooet Regional District, which has adopted the Furry Creek Water Emergency Response Plan.

This plan ensures that, in the event of an emergency, the Regional District will respond in an effective and timely manner, in order to minimize the risk to those people that obtain their drinking water from the Furry Creek Water System.

Copper Beach Estates Ltd. (CBEL) former owner of the Britannia Mine, reported that water quality had improved dramatically in Britannia Creek on December 31, 2001. The company, in association with the Centre for Environmental Research in Minerals Metals, and Materials (CERM3) at UBC, completed construction of a tunnel seal that prevents discharge of acid mine drainage into Britannia Creek from the 2200 Level Tunnel. The water quality in Britannia Creek at the Britannia Beach town site meets federal drinking water health standards. Community leaders are now looking forward to restoring fish populations in Britannia Creek

The Britannia area surface water and groundwater are not currently used for drinking, although the risk assessments completed for the Britannia Area did consider this potential use.



Jane Creek

D.1.2 Sewage System

Sewage disposal is one of human settlement's most important impacts on Britannia drinking-water sources. As well, regulation of sewage disposal is an aspect of human settlement for which the province has a major responsibility.

Human waste can be safely disposed of through municipal sewage treatment plants or through on-site sewage disposal systems. Sewage treatment plants are regulated by the Ministry of Environment, Lands and Parks.

At the development application or rezoning stage, a sewage treatment facility site at Britannia Beach must be secured which meets the following criteria:

1. locations capable of serving the entire community (Britannia North and South);
2. site location as close to sea level elevation as possible;
3. site area of approximately 0.8 hectare, with a configuration such that the treatment plant is located no closer than 300 meters from any residential property;
4. minimum visual impacts from other properties;
5. not within a flood hazard or geotechnical constraint area;
6. ocean outfall, combined with or as close as possible to Britannia Creek ARD outfall, to minimize additional marine impacts.

Land-use planning can reduce sewage impacts on drinking water by encouraging compact settlement patterns that can be cost-effectively served with sewer lines and sewage treatment plants, and by determining acceptable land uses in sensitive areas such as community watersheds and recharge areas.



Howe Sound



Britannia Creek

D.2 STREAMS AND DRAINAGE SYSTEM

Julie Lommerse

The community of Britannia Beach is located at the foot of the Britannia Creek Watershed, which is within the Coast Mountain Range. The watershed is comprised of drainage basins (Marmot, Jane, Mineral Creek and Condor Lake) which affect Britannia Creek as it passes through the village of Britannia Beach. There are also a number of seasonal creeks which also drain into this watershed, a result of the surrounding landscape dominated by several high ridges. Precipitation (both rain and snow) falling in each basin is transported to the creeks via interflow and surface runoff. These various creeks flow into Britannia Creek which then discharges into Howe Sound. Most of the creeks within the watershed are small and steep and are well vegetated. However, as Britannia Creek enters the community of Britannia Beach it flattens out into an alluvial fan. Within this flat fan area the creek has minimal vegetation growing along its banks. The watershed's soil structure consists of granular material, bedrock outcrops and talus materials, all of which are evident within the base of Britannia Creek, which is made up of boulders, cobbles and eroded sand.



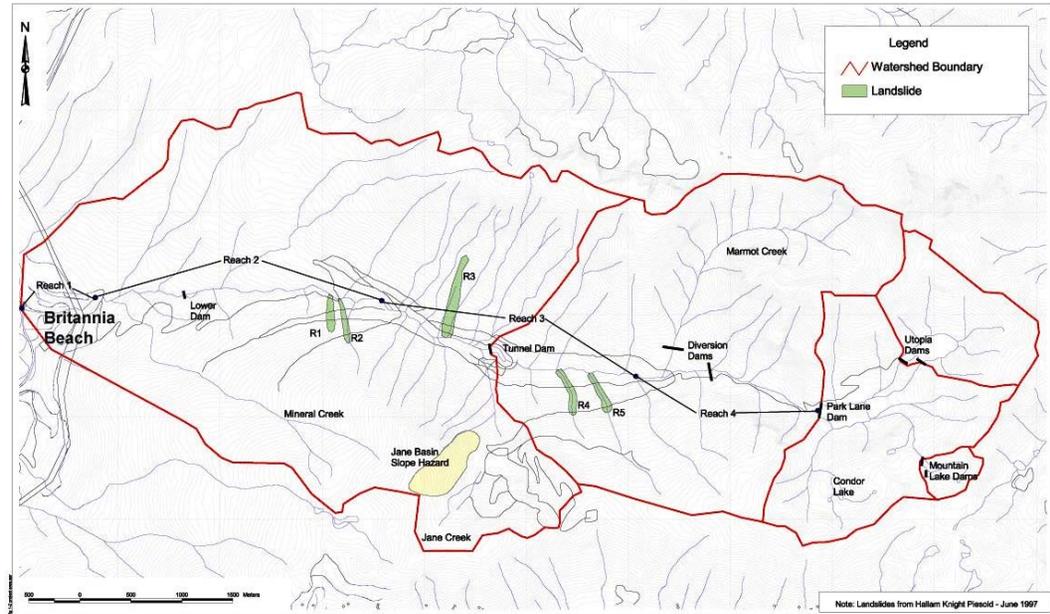
Britannia Creek Alluvial Fan
Photo: J. Lommerse

Housing within the watershed is minimal but the area has been altered by a number of other major human interventions, including mining, dams, logging, bridges and roads. These interventions have contributed to the contamination of the watershed with metals and high sediment loads. As a result of the contaminants, Britannia Creek was recently named one of British Columbia's most endangered rivers.

Approximately 2400 mm of precipitation falls here each year, 89% as rainfall. Snow depths have reached 129 cm. This area also experiences extreme precipitation days that have contributed to community disasters from landslides

WATER
MANAGEMENT
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Figure 1.2 - Britannia Creek Watershed



Britannia Creek Watershed

Sources:
Water Management Consultants & BC Museum of Mining



Mouth of Britannia Creek at Britannia Beach
Photo: J. Lommerse



and flooding. In 1915 a major landslide at the Britannia Mine's Jane Camp killed 56 people, Canada's second worst landslide in terms of loss of life. The slide occurred in the Jane Creek basin at the entrance to the Jane Tunnels where miners and their families were housed. The camp was buried under 15 meters of debris and rock. The slide was caused by a rock slope failure, resulting from rock having been "forced out" by two to three days of snow thaw. The mud, rock and snow travelled approximately 1.5 km down Jane Creek and eventually reached Britannia Creek.

A major flood occurred on October 28, 1921, when a wall of water reported to be 20 m high swept through the village. The flood was triggered by a debris slide which blocked the upper reaches of Britannia Creek. When this debris dam broke, the rush of water caused the failure of a man-made dam and flooded the alluvial fan where the settlement was situated. There had been six days of rain, topped off by a massive 146-mm (5.75-inch) storm which fell in 24 hours. The flood killed 35 people and seriously injured 15. Of the 110 homes in the village, 50 were demolished. A coroner's jury found that the Britannia Mining and Smelting Co. Ltd. was responsible for criminal neglect for allowing the blocking of Britannia Creek. In 1991 another flood caused damage in the community. Approximately 50 mm of rain fell quickly, causing the creek to overflow its banks and carved a new route along what was the old creek bed (fan) through the town. Fifty homes were damaged, but luckily no one was hurt. These events demonstrate how the Britannia Creek Watershed is a dynamic system and that the mine, dams, logging and road construction, have exacerbated the flood risk to Britannia Creek. An extreme flood event is estimated to be a 1 in 200 year event.

Unfortunately alluvial fans, or fan-shaped deposits of sediment laid down by streams at the foot of slopes, are popular development sites as they are relatively flat. However, they pose a high flood risk as the history of this area has shown. Britannia Creek's alluvial fan has an elevated ground water level which contributes to storm water concentrations. This area is also contaminated with leached metals from the mine's waste rock and tailings. The leached materials then seep into the ground and through interflow enter either Howe Sound directly or via Britannia Creek.

Storm water on the site appears to be managed by infiltration and surface run-off along grass strips along the roads. The Regional District plans to implement a more ecological way of managing storm water by incorporating grass swales and directing water through "best management practices" to open area storm water detention sites. Wetlands will be used to help filter the water and run-off will be directed away from the riparian areas to reduce sediment and contaminants from entering the creek.



*Storm Drains are non-existent
Photo: J. Lommerse*



*Before and After 1921 Flood
Source: BC Archives*



*Debris Torrent from 1991 Flood
Source: Natural Resources Canada*

D.3 HYDRO POTENTIAL OF BRITANNIA CREEK

David Tracey

The history of intervention on Britannia Creek is a tragic tale still being told. Experts have grown used to treating the creek as a problem to be solved. But might they also consider it an opportunity to be taken? If conditions are deemed favourable, a solution to the creek clean-up could include an ecologically sound way to provide energy to the new Britannia Beach community.

British Columbia is rich in hydro-power, a resource providing 85 percent of our electricity. Greater understanding of the ecological costs of big, imposing dams has led to their current unpopularity,



but smaller, appropriately-scaled, micro-dams are in favour both with environmentalists and a cost-conscious government eager to diversify energy sources. The area in and around Squamish-Lillooet has generated more applications from IPPs (independent power producers) than any other in the province.

Britannia Creek has the physical capabilities (in short, enough water falling fast) to support the energy needs of a thriving community, and perhaps beyond – any electricity produced above local needs could be sold back to the BC Hydro grid for profit.

Key points to ponder:

1. The creek once provided the Britannia Mine and community with 100 percent of its electricity.
2. An engineered solution is required anyway to remediate the creek. Also, the 1916-built Tunnel Dam, 4 kilometres east of Britannia Beach, is an eroding hazard which must be removed or replaced.
3. A "green energy" dam is being built on the similar-sized Furry Creek.

A model for Britannia Creek’s future as an energy source may be found in Furry Creek, a nearby waterway of similar size and drop.

A North Vancouver energy company partnered with the Squamish Nation is constructing a \$17.3 million run-of-the-river hydropower facility which could earn up to \$2 million per year.

Eaton Power Corporation has a 20-year contract with BC Hydro to provide the utility with 33 gigawatts of power annually – or enough to power about 5,000 homes.

Water from Furry Creek will be diverted to an intake pipe 5 kilometers upstream. It will flow at 3.1 cubic meters per second down a 3-kilometre underground pipe to a powerhouse where a turbine will create electricity. The water will then be returned to the creek at, according to Eaton officials, the same or cooler temperatures than when collected. Fish will not be affected, the company says, as all operations occur above a waterfall which acts as a natural barrier to salmon.

Concerns about fish in Britannia Creek may be lessened by the fact that there are none – even pre-mine metal contamination levels are believed to have been too high to support much life. Reports however point to fish activity in the upper reaches of the creek. This, along with the results of the Furry Creek hydropower project, certainly merit further study.

Conclusion
The history of waterworks on Britannia Creek has been a mixture of success (decades of power generation) and disaster (deadly floods). The prospect of creating another eco-monster may make a do-nothing, all-natural approach seem tempting. However, the creek is already in dire condition. Millions will be spent on its remediation. Perhaps some of that money could go toward making it not only a natural but an economic amenity as well.

*Dams could again power Britannia – if done properly.
Old dam photo: Britannia Mine Museum.*



D.4 IMPACT OF SEA TO SKY HIGHWAY ON BRITANNIA CREEK COMMUNITY Brian Beresford

D.4.1 Existing Conditions

Currently Highway 99 (The Sea to Sky Highway) along the Britannia Beach community is a relatively thin and slow single-lane portion of the Sea to Sky Corridor. Due the roads curving nature, close proximity to the adjacent rail-line, and its narrow nature, vehicular traffic is forced to slow down. Yet besides the deceleration in traffic speed, traffic volume and absence of traffic control measures (lights, turning lanes) result in a very dangerous and difficult exit from and Southbound entrance into the community.

D.4.2 Status of Development Proposals

Because of the current road conditions and the upcoming 2010 Winter Olympics, the majority of Highway 99 from Horseshoe Bay to Whistler is slated for major redevelopment. Although other transportation options such as rail and boat were analyzed, it seems that vehicular traffic will be the primary focus for the Olympic Games. Most of the “highway improvements” will be the result of realignment and widening to increase safety and traffic flow.

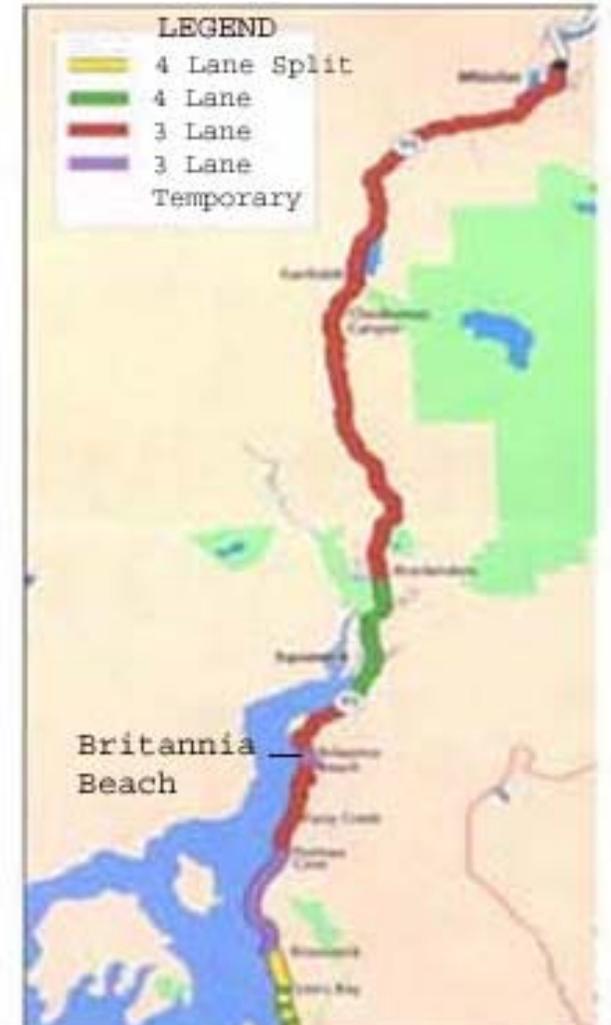
Besides numerous proposals to completely reroute the highway east of Britannia, there have been three primary development designs for the route adjacent to the community. The first proposal is to simply widen and realign the single-lane infrastructure and maintain the existing bridge over Britannia Creek. The second was to squeeze a new three lane corridor with a new bridge by either pushing the rail-line west or encroaching onto museum property. And finally the third, a detour route pushing overflow vehicle traffic onto the railway corridor and then utilizing the existing rail bridge. Although still undetermined, it seems that the new three-lane corridor development will be accepted.

Proposed highway corridor diagrams and schematics available at www.eao.gov.bc.ca.

Photograph: Existing Road
 This picture demonstrates the current highway environment as a windy single-lane road directly adjacent to the rail corridor. Note the difficult and dangerous vehicle crossing.
 Photo by: Sarah Howe



Highway Development Proposal



Sea to Sky Highway proposal showing short temporary 3-lane section at Britannia Beach Community
 Picture from: Sea-to-Sky Highway Improvements

D.4.3 Major Highway Alignment Options

There are two major highway alignment options entering the Britannia Beach community from Horseshoe Bay (Road Alignment Options). The first is a redevelopment of the existing corridor along the waterfront maintaining the majority of the existing developable area. The second is an entirely new corridor east of the existing highway. This new proposal would change the existing open-space structure and developmental areas but would provide easier access to the waterfront for the new community.

D.4.4 Primary Concerns and Issues

The primary concern regarding the highway redevelopment is the issue of traffic control through the Britannia Beach community. As two lanes become three, and alignment straightened, traffic speed will increase. These conditions further accentuate the need for proper measures to be made regarding exit and entrance into the community. Furthermore, these entrances/exits will become the primary gateways of the new community and should therefore be treated as important design conditions. Listed are the major concerns stated by the Britannia Beach Community Advisory Group:

- Concerns of ‘place’ deterioration with larger 3-lane corridor providing less opportunity to enter community directly affected business opportunities and visitors.
- A controlled T-Intersection at the Shaughnessy (Main St...) entrance. Most likely a “Smart” traffic signal allowing pedestrian and vehicular access to highway and across to waterfront.
- Some form of speed controls using signage, lighting, etc.
- Left-turn entrances and exits to Ninety-Niner and Makin Property
- Emphasis on the creation of an ‘urban setting’ while entering community through signage, curbs, lighting, etc.
- Need for a frontage road east of highway servicing community and commercial businesses
- Concerns of increased noise due to traffic changes
- Restoration of BC Mining Museum site and existing buildings

Road Alignment Options

This map displays the two major highway options entering the Britannia Beach community from Vancouver. The new Eastern bypass (in red) would take the highway traffic away from the waterfront and allow for easier access to the shoreline as well provide interesting development opportunities.

Picture from: Ministry of Transportation
www.eao.gov.bc.ca

