

B.C. Crown Contaminated Sites Program

2024 Biennial Report

**Protecting Human Health and the Environment
Through Contaminated Land Remediation**

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List of Abbreviations

Abbreviation	Definition/Description
AMB	Abandoned Mines Branch
BC TRCR	BC Technical and Resource Committee on Reclamation
CCSP	Crown Contaminated Sites Program
CRD	Capital Regional District
DHHERA	Detailed Human Health and Ecological Risk Assessment
DQRA	Detailed Quantitative Risk Assessment
DSI	Detailed Site Investigation
ENV	Ministry of Environment and Parks
ICARD	International Conference on Acid Rock Drainage
LTMM	Long Term Monitoring and Maintenance
MCM	Ministry of Mines and Critical Minerals
MEND	BC Mine Environmental Neutral Drainage
ML/ARD	Metal Leaching/Acid Rock Drainage
ModPSI	Modified Preliminary Site Investigation
PSI	Preliminary Site Investigation
RRM	Risk Ranking Methodology
SSI	Supplemental Site Investigation
Ministry	Ministry of Water, Land and Resource Stewardship
WTP	Water Treatment Plant

Crown Contaminated Sites Program

Introduction

British Columbia's (B.C.) diverse geography and landscapes are unparalleled in Canada. From the rugged fjords of the Pacific Ocean to the awe-inspiring Rocky Mountains, B.C. is dominated by broad plateaus, heavily forested mountain ranges and an extensive network of lakes and rivers. This unique geography is rich in natural resources, supporting industries such as forestry, mining, natural gas and oil, hydroelectric energy, agriculture and seafood.

This unique geography has been the heart and soul of B.C.'s economic and industrial history. However, past environmental practices and the potential for impacts to human health and the environment were not well understood and have left a legacy of contaminated sites requiring investigation and remediation, particularly at historical mine site locations.

In 2003, the B.C. government established the Crown Contaminated Sites Program (CCSP), which currently resides in the Ministry of Water, Land and Resource Stewardship (the ministry) with the Crown Land Opportunities and Restoration Branch. The branch was transferred from the Ministry of Forests on October 19, 2023. CCSP has direct accountability for specific sites that are high-risk, historical, unpermitted and typically polymetallic mine sites. CCSP sites include contaminated sites where responsibility has defaulted to the Crown because the persons or companies responsible for the contamination cannot be found or no longer exist. The B.C. government may also initiate remediation on Crown land where responsibility is unclear and where site conditions pose an immediate and unacceptable high risk to human health or the environment based on regulatory standards and guidance.

CCSP follows a risk-based scientific approach to prioritizing its inventory of contaminated sites and ensuring the sites that pose the highest risk are addressed first. Contaminants of concern and thresholds that have potential risks to human health or the environment are identified under the Environmental Management Act, Contaminated Sites Regulation. Remediation approaches include excavation and consolidation of contaminated soils, engineered or natural cover systems, on-site water treatment, erosion barriers and surface water diversions, as well as revegetation to create or support ecological habitat.

Since 2006, CCSP has produced a biennial report documenting the progress of its work to ensure transparency and accountability of its efforts. This biennial report details the work CCSP has completed over the past two years to investigate and clean up contaminated sites resulting from historical industrial activities where responsibility has defaulted to the Province.

Highlights at a Glance

- This biennial report reflects 20 years of operational success. Throughout the years, CCSP has continued to work with First Nations and communities.
- Atlin Ruffner site: A revegetation plan consisting of seed collection, propagation and planting of native species has been implemented at the mill and tailings site along with ongoing long-term monitoring and maintenance activities. Staff from the Taku River Tlingit First Nation continue to be involved in the on-site activities.
- Bralorne-Takla site: Members of Takla Nation continue to be involved in monitoring and maintenance activities, including water quality monitoring, removal and disposal of invasive plants, and geotechnical inspections. In 2023, fish tissue monitoring and a limnology study were completed. Additional data was acquired to support understanding of the site and respond to questions from the local community.
- Iron Crown site: 'Namgis First Nation has been involved with an Archaeological Impact Assessment of the proposed remediation and seasonal water sampling.
- Molly Gibson site: A detailed human health and ecological risk assessment was completed for the site in 2023 with input from the Ktunaxa Nation Council, and the site has progressed to the remedial planning phase.
- Toquaht Bay site: The asphalt cover remedial option to allow for redevelopment of the Toquaht Bay Marina and Campground for commercial land use is currently at a conceptual design level.
- Pacific Place site: Three land parcels have recently been sold to the City of Vancouver for social housing development, which B.C. Housing is also supporting. CCSP will work with the developers to ensure remediation is completed appropriately when development activity occurs at each individual site.
- Britannia Creek 2200 Level and Mount Sheer site: Remedial planning, site permitting and consultation for road upgrades occurred, along with initiation of wide-scale remedial operations with additional site investigations, including groundwater and surface water monitoring activities.
- A Britannia Beach fan area Crown parcel was reprioritized for earlier remediation to accommodate an adjacent development for mixed commercial and residential use.
- Britannia Water Treatment Plant (WTP) condition and performance inspections occurred and procurement planning is underway. Emergency demolition was carried out at the sludge storage facility to address a concrete overhang safety hazard due to slope undercutting

Ministry Vision, Mission and Goals

The Ministry of Water, Land and Resource Stewardship is accountable for integrated land and natural resource management, including objective setting for land and marine environments, effectively managing cumulative effects, and advancing reconciliation with Indigenous Peoples, environmental sustainability, and economic growth.

The CCSP mandate aligns with current ministry goals, which includes stewardship of B.C.'s diverse ecosystems based on best available information, diverse knowledge systems and cross-sector collaboration through an integrated, holistic and solutions-oriented approach. CCSP supports these goals and the ministry vision through stewardship and remediation of contaminated provincial lands, protecting water and ecosystems that people, communities and industry rely on.

CCSP work supports ministry priorities and the mission of ensuring safer communities and sustainability for future generations. This is achieved by working through collaborative partnerships and engagement with First Nations, other ministries, industry, local communities and interested partners. CCSP endeavors to ensure effective stewardship of the environment and that there is no undue risk to human health through seeking and developing solutions to historically contaminated sites on Crown land.

CCSP Strategy

CCSP aims to remediate prioritized high-risk, Crown contaminated sites to ensure clean land and water for the protection of human health and the environment. These sites meet criteria for recognizing a financial liability for a contaminated site under the Public Sector Accounting Board Standard Section 3260 (PS3260).

CCSP Commitment

CCSP is committed to providing leadership across government and has a direct accountability role for specific sites. CCSP prioritizes historical, unpermitted contaminated sites on Crown land, using a consistent science-based approach to rank sites according to risks to human health and the environment. CCSP is also committed to improving the information available on contaminated sites and instituting regular reporting to ensure transparency and accountability for liabilities and work progress.

Management of Provincial Contaminated Sites Policy

The Management of Provincial Contaminated Sites Policy defines the guiding principles that underlie all actions to manage contaminated sites on Crown lands:

- Reduce and eliminate risks to human health and the environment, and minimize liabilities
- Apply standards that are cost effective, consistent and in keeping with the legislation
- Apply the “polluter pays” principle
- Work co-operatively among ministries and confer with rights holders and interested partners
- Consult with First Nations
- Act consistently and fairly
- Act with accountability and transparency
- Use innovative strategies for managing contaminated sites, such as public-private partnerships
- Minimize the creation of future contaminated sites
- Apply sound science and technology to guide management decisions

Provincial Contaminated Sites Secretariat

Formed in 2003, the Provincial Contaminated Sites Secretariat (the secretariat) is a committee of representatives from B.C. government ministries that are responsible for the management of contaminated and potentially contaminated sites. CCSP is a member of the secretariat. The secretariat provides a coordinating function to help:

- Foster information sharing among ministries
- Promote best practices in the management of contaminated and potentially contaminated sites
- Ensure ministries are aware of issues related to regulatory compliance, government policy and standards

In addition, the secretariat serves as a forum for members to discuss the Public Sector 3260 financial reporting requirements to ensure a consistent approach to reporting a liability associated with the remediation of contaminated sites.

Secretariat Membership

The secretariat has representatives from the following ministries and includes individuals in both oversight and management roles related to provincial contaminated sites:

- Ministry of Environment and Parks
- Ministry of Citizens' Services
- Ministry of Transportation and Transit
- Ministry of Agriculture and Food
- Ministry of Mines and Critical Minerals
- Ministry of Water, Land and Resource Stewardship
- Ministry of Finance – Treasury Board Staff (Performance Budgeting Office)
- Ministry of Finance – Office of the Comptroller General

Innovative Leadership and Professional Development

CCSP staff are committed to providing innovative leadership in the management of contaminated sites on Crown land and as such, have maintained their awareness of current practice and standards regarding contaminated sites.

In 2023 several CCSP staff attended a Metal Leaching/Acid Rock Drainage (ML/ARD) Field School led by Dr. Bill Price and the Bulkley Valley Research Centre. This five-day course offered an opportunity for CCSP to increase their understanding and awareness of ML/ARD and best management practices currently being implemented across industry. In addition to in-person field training, CCSP staff have contributed to and attended the annual BC Mine Environmental Neutral Drainage (MEND) Annual ML/ARD Workshop held in person in Vancouver. Staff also attended BC Technical and Research Committee on Reclamation (BC TRCR) during which CCSP's project sites were showcased as industry examples of successful revegetation and remediation projects. CCSP's project sites were also highlighted at an international level with project case studies presented by CCSP's consultants at the International Conference on Acid Rock Drainage (ICARD) held every three years.

These in-person training and networking opportunities allow CCSP staff to keep up to date with the latest innovations and challenges faced by the contaminated sites industry and other government agencies responsible for abandoned mine sites. Attendance at these events allow CCSP staff to demonstrate leadership within and across government as a key agency responsible for the remediation of contaminated sites.

Remediation Timeline

Remediation of a contaminated site typically takes several years to complete. Once a site is identified, there are investigations, assessments, planning, regulatory requirements and consultations that must be completed before construction can begin. In addition, CCSP sites are often at high elevations with limited weather work-windows and may have access limitations that contribute to the length of time required to assess and remediate a site.

The initial step is to identify Potential Candidate Sites. A site is researched to understand the history of use and ownership. Every few years, multiple Potential Candidate Sites that meet selection criteria (see Figure 2, page 14, Coarse Screening) are physically inspected by CCSP staff to look for signs of disturbance and contamination. Information obtained is used to determine whether contamination at the site needs to be characterized with further investigations.

Characterizing contamination and its associated risk at a site can take several years due to the iterative nature of conducting field investigations for contaminant delineation. Investigations are designed to identify the extent and magnitude of contamination; however, multiple investigations may be required to follow or delineate a contaminant source. Data and information collected from these investigations or from risk assessment analysis are used to inform remedial options and prioritize projects.

Remedial planning can also take several years to complete. Remedial options are identified and evaluated based on criteria such as estimated effectiveness, cost, sustainability, risks, feasibility and community acceptance. First Nations, regulators, local governments, neighbouring property owners, tenure holders and other engagement groups are consulted about contamination and potential remedial options at the site and to get feedback. In some cases, First Nations and other groups are actively involved in the remedial planning process. Information sharing and engagement with First Nations is important to ensure that First Nations knowledge and interests are considered.

Once a preferred remedial option is selected, next steps include remedial design, obtaining regulatory approvals or permits, and procurement of contractors. Narrow weather windows can impact physical remediation and engineering system construction timelines. Timelines for investigation and remediation can also be extended by non-technical challenges such as complex land ownership and negotiated responsibilities, as well as access restrictions such as failed bridges/roads to the sites, weather and fires. Finally, once the remedial works are complete, long-term monitoring and maintenance (LTMM) is initiated to ensure the remedial solution is performing as expected and to ensure the long-term protection of human health and the environment. This may be required for decades.

Risk Ranking Methodology

CCSP developed an internationally recognized science-based Risk Ranking Methodology (RRM) for assessing and prioritizing sites based on ecological and human health risks. Management Actions are assigned to higher risk sites. The process consists of two components:

- A risk ranking support tool (RRM Tool)
- A risk ranking workshop (RRM Workshop)

RRM Tool

The RRM Tool is an automated processing tool that evaluates information collected about contaminants in soil, water and sediment and generates an output that describes various measures of potential risk. Data is collected from contaminant sources, as well as possible pathways and receptors, to provide inputs to the RRM Tool and allow scientists to better predict risk (see Figure 1: Conceptual Model of Abandoned Mine Site.)

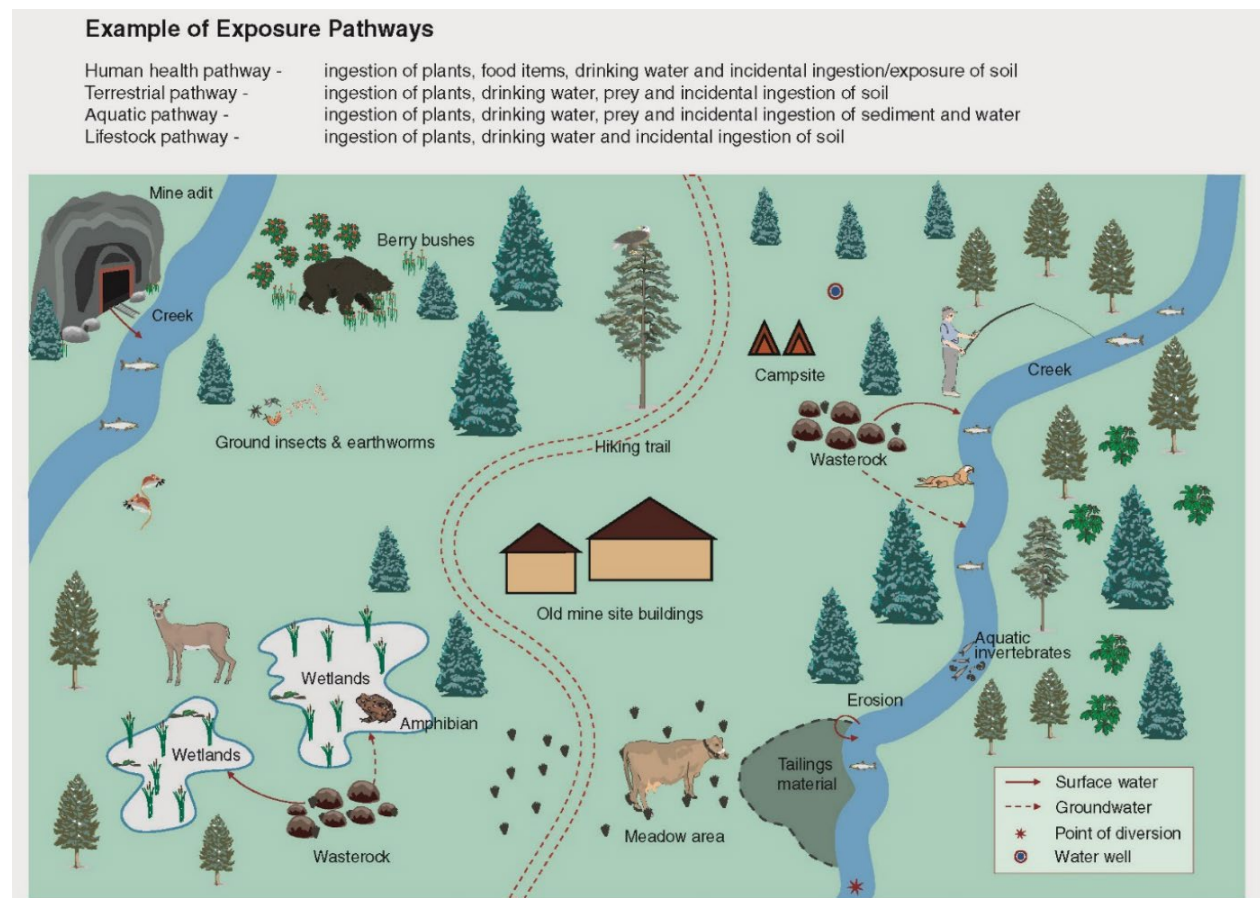


Figure 1: Conceptual Model of Abandoned Mine Site.

The RRM Tool receives periodic updates to reflect changing science and regulations. In 2023, several minor changes were made to improve the clarity and evaluation of the Tool outputs. Those improvements include additional screening data for human health risks from aquatic pathways, notations for when background concentrations exceed screening values, changes to how risk associated with elevated cadmium concentrations are presented, and flags for scenarios when a residential dwelling is immediately adjacent to a site.

RRM Workshop

The RRM Workshop brings together internal and external experts on contaminated sites, including geologists, engineers, biologists and toxicologists, to review and assess data collected during preliminary and detailed site investigations. The RRM Tool outputs allow workshop participants to rank sites and make recommendations on appropriate Management Actions for sites identified as High Priority, based upon group consensus.

High Priority Sites are those identified to pose an unacceptable risk to human health or have a magnitude of ecological risks considered on par with the human health risks at other sites. Recommendations from the RRM Workshop guide CCSP in planning the allocation of program resources. As site remediation takes many years to complete, CCSP balances resources between investigation of new sites and advancement of remediation at the highest priority sites.

RRM Workshops are generally held biennially, and the last workshop was conducted virtually in April 2023. Several sites with new or updated information collected since the previous workshop in 2021 were added to the RRM Tool and run to provide new outputs, highlighting changes to human health and ecological screening values. Workshop participants ranked the new and updated sites against all sites in the RRM Tool to determine how the 2023 RRM Tool outputs impacted site prioritization.

Management Actions

RRM Workshop outcomes may include recommendations for any of the following possible Management Actions:

- Immediate Action: For situations where health or safety risks require urgent attention.
- Detailed Site Investigation (DSI): Full site investigation used to delineate the extent and magnitude of contamination.

- Supplemental Site Investigation (SSI): Specific, targeted study to assess a particular data gap--such as an unknown pathway, receptor, missing seasonal or other data--and recommended when additional information is needed to determine next steps.
- Reduce Uncertainty: Specific information-gathering or analyses to obtain additional information required to reduce uncertainty and allow ranking of a site.
- Remedial Planning: Option analysis, development and review of technical specifications to support the design and build of a contaminated site remedial solution. Some additional investigation or risk assessment to support this planning phase may also be required.
- Risk Assessment: Evaluation of actual or potential adverse effects of site-specific contaminants on humans or the environment. This Management Action can be recommended for preliminary (e.g., for screening purposes) or detailed risk assessment for human health and/or ecological risks.
- Lower Priority: Classification as a Lower Priority Site where ranking and assignment of a Management Action can be deferred. Lower Priority Sites remain in the RRM Tool for future ranking.

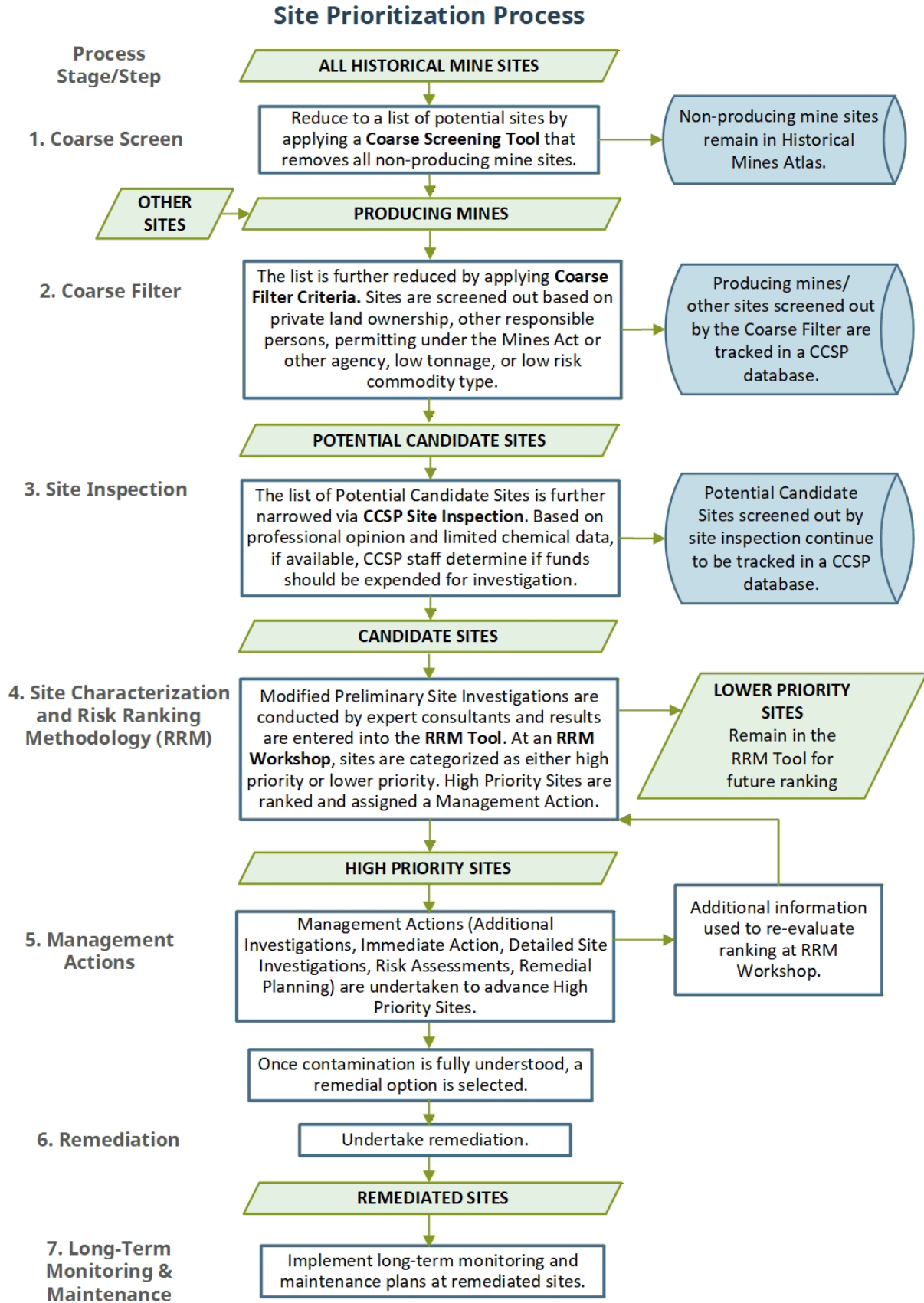
Once remedial planning is underway, sites are no longer ranked in the RRM Workshop. Remediation is undertaken and LTMM is initiated following remedial activities.

Contaminated Sites Assessment

The process of assessing contaminated sites, and the actions required, follows the steps below. These steps are also illustrated in the Site Prioritization Process diagram in Figure 2: Site Prioritization Process Flow Chart:

- Identify sites through Coarse Screening and other sources
- Determine land ownership and responsibility for cleanup (and other Coarse Filter Criteria)
- Develop a list of Potential Candidate Sites
- Complete CCSP site inspections
- Develop a list of Candidate Sites
- Hire expert consultants to conduct investigations
- Enter data into the RRM Tool
- Hold an RRM Workshop to rank sites and assign Management Actions to High Priority Sites
- Undertake actions at highest ranked sites
- Update the RRM Tool with any new data resulting from Management Actions to re-rank at next RRM Workshop

Figure 2: Site Prioritization Process Flow Chart.



Program Site Summary

When CCSP was first established, it inherited a legacy of contaminated sites that had not been previously investigated. During those early years, the program focused its efforts upon identifying and investigating Potential Candidate Sites (see Site Prioritization Process Figure 2, page 14). Between 10 and 20 Potential Candidate Sites were investigated annually. As CCSP's sites progressed across the remedial timeframe and through to physical remediation, the focus increased on the more time-intensive stages of DSI, risk assessment and engineered remedial construction. Potential Candidate Sites continue to be identified and investigated, but to a lesser extent than in the early program years. This trend continues with much of CCSP's resources spent working on existing sites that are at later stages of the remedial process.

Active Program Sites Fall into One of Four Categories

- Candidate:** Crown sites inspected by CCSP scientists and identified as requiring a Modified Preliminary Site Investigation (ModPSI) to further understand if the site poses any risk.
- Priority:** Crown sites prioritized for action based on site investigation results and potential risk to human health and the environment.
- Remediated:** Crown sites where cleanup activities are complete and long-term monitoring and maintenance is required to ensure performance of the remedial solution.
- Other:** Sites managed by the B.C. government to fulfil obligations established under legal agreements or other commitments.

Program Site Numbers as of March 31, 2024

87 - Priority Sites Investigated
39 - High Priority Sites
26 - Lower Priority Sites
19 - Remediated Sites

In total, CCSP has investigated 87 Priority Sites, of which 39 have been identified as High Priority, 26 as Lower Priority and 19 that have been remediated. Other sites have come into the program through legal agreements, and two sites are no longer identified as CCSP responsibility.

Map: Active Program Sites by Remedial Status



Site Investigation and Risk Assessment

American Boy

55° 18' 51" N, 127° 34' 41" W

The former American Boy Mine and associated infrastructure is located approximately 10 km northeast of the Village of Hazelton, on the west flank of Nine Mile Mountain and at the valley bottom along Two Mile Creek. The property is underlain by clastic sedimentary rocks of the Middle Jurassic to Lower Cretaceous Bower Lake Group. The mine was active intermittently from 1913 to 1955 with production at 348 tonnes consisting of: 495,097 grams of silver; 528 grams of gold; 38,232 kilograms of lead; and 10,543 kilograms of zinc.

There are four First Nations villages (Gitanmaax, Hagwilget, Glen Vowell and Kispiox) in this area, and a portion of the site is located in the traditional territory of the Lax Andaatxw. The Wilps Woosim Laxha (Wilp) have expressed interest in this work.

CCSP completed field work for a ModPSI during the summer of 2023, engaging the local Indigenous Wilp. The results of this site investigation will be incorporated into the next RRM Workshop. The RRM will determine if any Management Actions are required and if this site will be prioritized for remediation or will be identified as a Lower Priority Site.

French Mine Mill

49° 21' 03" N, 120° 04' 25" W

The former French Mine Mill site is located in the Similkameen River Valley near Hedley. Elevated concentrations of arsenic were identified in shallow mine tailings at the mill site.

CCSP is in communication with the Abandoned Mines Branch (AMB) with Ministry of Mines and Critical Minerals (MCM). AMB holds responsibility for nearby mining features including a mine, historical tailings deposits and the Candorado heap leach facility. It is conceived to be appropriate to transfer the remaining booked liability and responsibility for the French Mine Mill site to MCM for addressing the larger Hedley area encompassing all mine contamination hazards within District Lot 2900 (DL2900).

The larger area contains tailings from both historical and permitted mining activities. Tailings from various sources have been relocated and mixed both naturally (e.g., windblown dust) and purposefully (e.g., tailings from the heap leach facility and feedstock piles). Given the overlapping issues, a comprehensive unified approach would create efficiencies in assessment, options analysis and remediation.

Hewitt

49° 55' 42" N, 117° 19' 18" W

The Hewitt site was a silver, lead and zinc mine located near Silverton, adjacent to Slocan Lake. Mining and ore milling activities occurred intermittently between approximately 1893 and 1977. Site features include mine openings, mills, adits, waste rock piles and tailings deposits. A Preliminary Site Investigation (PSI) was conducted in 2017 where contamination in mine wastes, soil, sediment, surface waters and pore waters were characterized. DSI and preliminary human health risk assessment were completed in 2020 and 2021. The majority of mine wastes sampled are considered potentially acid generating and highly leachable. The primary contaminants of concern are metals including arsenic, cadmium, lead and zinc. Metals concentrations in soil are considered high-risk to human and ecological health. In 2024, CCSP completed several land surveys to confirm the location of the former mining infrastructure and to determine the extent of the contamination between private and public lands. A DSI is currently in progress to confirm the nature and extent of the contamination. Future land management decisions will be based on the risks the site contamination presents to human health and the environment.

Pilot Bay

49° 38' 38" N, 116° 53' 00" W

The former Pilot Bay smelter operated on the eastern shore of Kootenay Lake, near the end of the 19th century. Refining and concentrating operations began in 1895, when 52,000 tonnes of ore mined from the nearby Bluebell Mine and 2,500 tonnes from other local mining operations were transported to the site for processing. The refining infrastructure was shut down in 1896 due to difficulties processing ore. The concentrator continued to operate intermittently until 1906. The site remained dormant for decades, and the infrastructure was eventually dismantled and left to deteriorate. By 1952, approximately 32,000 tonnes of silver-, lead- and zinc-rich ore remained at the site. Most of the former milling and smelting buildings were located upland from the foreshore on private lands, while mine wastes generated from site operations were deposited along the foreshore and into Kootenay Lake (primarily Crown land). In 2024, CCSP completed a site inspection to ensure several caution signs restricting public access to the foreshore area were still in place. PSI reports were submitted to the Ministry of Environment and Parks (ENV) for review and consideration. Future work at the site may include a DSI and a detailed risk assessment.

Ymir Protection

49° 18' 47" N, 117° 10' 21" W

The former Ymir Protection mines are located in the West Kootenay region south of Nelson, 4.5 km east of the Town of Ymir and next to Wildhorse (Ymir) Creek. Most of the mining operations were conducted between 1900 and 1942 and targeted a sulphide ore deposit containing commodities such as gold, silver, lead and zinc. The main tailings deposit from the milling operations is situated next to the Wildhorse (Ymir) Creek with a smaller tailings deposit and a former crusher located upgradient to the northeast. The former mill location and underground mine workings were located on a former private property to the east. A ModPSI was completed in 2008, and a limited DSI and ecological and human health risk assessment were completed in 2009. Environmental site investigations were not conducted at the formerly privately owned portions of the crusher area and the main tailings deposit. Primary contaminants of concern identified include arsenic, cadmium, lead and zinc. Additional site inspections and groundwater investigations were completed in 2010, 2014, 2021 and 2024. Juvenile salmonids were observed in some side channels of Ymir Creek in 2021, as well as a western toad observed in the open tailings area. Some other wildlife tracks, including moose, deer and coyote were observed in the area in 2021 as well.

In 2024, an SSI included groundwater monitoring well installations, surface water and soil sampling, groundwater sampling and sediment sampling at the previously privately owned portions of the main tailings area. Future work will include a DSI, Detailed Human Health and Ecological Risk Assessment (DHERA) and selection of viable remediation options.

Remedial Planning

Cronin

54 ° 55' 30" N, 126° 48' 56" W

The Cronin Mine site is located approximately 30 km northeast of Smithers, within and surrounding the eastern Babine Mountain Provincial Park. The former Cronin mine was first explored for minerals in 1909, with mill and road construction occurring in 1952. Mining operations predominantly occurred between 1952 and 1971.

In 2006, Stage I and limited Stage II PSIs were completed at the site by CCSP. Two main areas of contamination were identified at the upper mine area as well as the lower mine and former mill site area. The lower mine and mill area was identified as being higher risk and prioritized for further investigation. In 2007, a limited DSI was undertaken, to support the completion of a risk-based assessment of the site. In 2011, a Detailed Quantitative Risk Assessment (DQRA) was completed for the lower mine and mill area. The DQRA noted minimal risks to recreational users, and signs were installed in 2017 to alert the public and recreational users of these potential risks. Evidence of ecological risk and/or potential risks were noted for various receptors requiring additional work.

In 2022, a second data gap analysis was completed by WSP Global Inc. This was done to review the current information available for the site and compare it to updated guideline values under the Contaminated Sites Regulation. The data gap report recommended additional sampling be completed, and an additional site investigation was conducted at the site in 2022. The 2022 additional site investigation collected water and sediment samples from the creek and tailings runoff. Based on this information, an updated DQRA was completed for the lower mine site area. The results of the updated DQRA were similar to the 2011 study. CCSP also completed a drone survey of the site.

In 2022, BC Parks rerouted the Moricetown-Cronin Trail away from the lower mine area. This further reduced access to the site and its potential for recreational use. CCSP has also received a Section 16 Land Act reserve for the site to further restrict access to the Crown land areas and will continue to work with BC Parks regarding management of the park lands.

Since 2022, CCSP has been working with Lake Babine Nation and BC Parks to ensure all partners have input into the remedial planning being considered for the site. This has included Lake Babine Nation staff participating in field investigations.

In 2023, further DSI work was completed for the upper mine area, and CCSP installed additional large caution signs across the upper mine site area to warn the public of the potential health hazards associated with the site from historical contamination.

Iron Crown

50° 15' 29" N, 126° 50' 59" W

Iron Crown is a former mill, concentrate storage and loading area located approximately 17 km west-northwest of Woss, on the north side of the Nimpkish River. Contamination at the site is associated primarily with mine tailings within and around Canyon Lake. No impacts to the nearby Nimpkish River have been identified. In 2023, DSI and DHERAs were completed. Staff from the 'Namgis First Nation have been involved with the project, including on an Archaeological Impact Assessment of the proposed remediation and seasonal water sampling. Remedial Options Analysis and remediation planning are currently in progress with support from ENV and 'Namgis First Nation.

Island Mountain

53° 06' 04" N, 121° 35' 02" W

The Island Mountain Tailings project (former Island Mountain and Cariboo Gold Quartz underground mines), including Jack of Clubs Lake, is located in the District of Wells. Historical operations between 1933 and 1967 left waste rock and tailings on Crown land, private land and the Jack of Clubs Lake. Arsenic is the most prevalent contaminant of concern in soil and sediment, followed by cadmium, cobalt, iron and lead. The most prevalent contaminants of concern in groundwater are arsenic, cobalt, manganese, iron, nickel and sulfate. Previous iterations of MCM and ENV conducted investigation and some remediation work in the early 1990s for a number of residential properties within the District of Wells and for selected public use areas on the tailings delta itself. A fish consumption advisory for mercury was placed on Jack of Clubs Lake in 1989, as a human health precaution, and is still in effect. The advisory is for lake trout more than 45 cm long.

Since 2008, CCSP has completed several environmental investigations in support of remedial planning for the Crown-owned portions of the site. In general, the contamination is largely delineated, and several rounds of groundwater, surface water, and porewater monitoring were completed over the past years. Based on arsenic concentrations in shallow soil and sediment within Jack of Clubs Lake and Willow River, and in accordance with B.C.'s Protocol 12 for Contaminated Sites, the site is considered high risk. SSI and DHERA investigations are currently in progress. Following completion of the DHERA, risk-based remedial options for the site will be prepared and evaluated. The District of Wells, Northern Health Authority, Lhtako Dené First Nation, Xat'süll First Nation, Williams Lake First Nation, Osisko Development Corporation, residents of Wells, ENV, and other groups will be consulted on approaches to manage and remediate the contamination at the site.

Millstream Meadows

48° 28' 52" N, 123° 30' 32" W

The Millstream Meadows site, located just outside of Victoria in the District of Highlands, operated as a disposal facility for septage waste between the early 1940s and 1985. It received material such as waste from septic systems and other trucked liquid wastes, including oily wastes. The liquid wastes were discharged with few controls into a series of three lagoons at the site. The Capital Regional District (CRD) acquired the property in 1984 and closed the site in 1985. In the late 1980s, two of the lagoons were filled with construction debris materials and covered with soil, forming the meadows. The B.C. government and the CRD have conducted environmental investigations and remediation since 1995. The CRD, with the support of the B.C. government, began work to clean up the site in 2008, when it excavated the worst of the contaminated soils from Lagoon 1 and a portion of Lagoon 2. In 2011, the excavation was filled with clean gravel. Since the remedial excavation in 2009, the CRD has continued to monitor groundwater, surface water and soil gas quality. Between 2016 and 2020, the CRD implemented a multi-phase DSI to delineate the degree and extent of contamination. Remedial capping activities were completed between 2020 and 2021. The B.C. government and the CRD are working toward obtaining a risk-based Certificate of Compliance for the site.

Molly Gibson

49° 43' 49" N, 117° 09' 08" W

The former Molly Gibson mine, located approximately 15 km northeast of Nelson in Kokanee Glacier Park, operated from 1899 to 1950 and produced silver, lead, zinc, gold and copper. The mine consisted of an upper and lower workings area and included mill and ore unloading operations. A mine access road, Kokanee Glacier Road, connected the highway with the mine workings. The mill area is approximately one km south of Gibson Lake and was built beside Kokanee Creek. The mill area was connected to the workings areas by an aerial tramline. Production between 1899 and 1950 totaled 55,860 tonnes mined and 47,556 tonnes milled with 90% of the production completed by 1913.

A PSI in 2012 found high levels of lead, arsenic and cadmium in soil between the parking lot, creek and groundwater seeps. Based on the RRM Workshop results, a limited DSI was initiated in 2017, and an SSI was undertaken in 2019 and 2020. A DHHERA was completed in 2023. Remedial planning activities are in progress, in co-ordination with BC Parks and engagement with First Nations.

Toquaht Bay

49° 01' 20" N, 125° 21' 40" W

The former Toquaht Bay Marina and Campground (the Campground) is located approximately 16 km northeast of Ucluelet, off the Maggie Lake Forest Service Road on the shore of Barkley Sound. During the 1960s, ore from the Brynnor Iron Mine was milled on the property located immediately north of the Campground. Fine sand wastes (tailings) containing high concentrations of metals – primarily iron, arsenic and cobalt – were deposited along the shoreline on what became the Campground property.

Under the terms of the Maa-Nulth Treaty, the B.C. government is responsible to remediate the Campground. Initial studies in 2013 identified high concentrations of metals in the tailings sand, resulting in the closure of the campground and restricted use of the marina. Further study has included pre-remediation site characterization, contaminated site risk assessments and development of conceptual remedial options. Former campground and marina structures were decommissioned in preparation for remedial activities. The B.C. government and Toquaht Nation have agreed to proceed with implementation of an asphalt cover remedial option to allow for redevelopment of the Campground for commercial land use. This remedial option is currently at a conceptual design level where next steps include completion of a detailed remedial design and regulatory submissions.

Union Bay

49° 35' 33" N, 124° 53' 04" W

The Union Bay Waste Coal Pile is located south of Courtenay, in the town of Union Bay. Canadian Collieries (Dunsmuir) Ltd. used the site for coal washing and shipping from the Cumberland mines. Approximately one million cubic metres of low-grade coal and rock were piled on the shoreline, forming a 13-hectare point. The Crown land is currently leased to West Fraser Mills Ltd.

The waste coal releases metal-laden drainage into Baynes Sound. West Fraser Mills Ltd. has designed an engineered cover to reduce the impacts of ongoing discharges and improve water and sediment quality. In late 2023, all required site permits were secured and procurement of the remediation contractor occurred in early 2024. Installation of the engineered cover is scheduled for 2024 and 2025. Following construction, native grasses will be planted over the engineered cover. The B.C. government will continue to monitor and maintain the site in the long term, including monitoring improvements to intertidal porewater quality and benthic ecology.

Remediation

Britannia

49° 36' 40" N, 123° 08' 28" W

The former Britannia Mine site, located 45 km north of Vancouver and next to Howe Sound, was once considered one of the largest point sources of metal pollution discharging to surface water in North America. Prior to remediation, the majority of the contaminated discharge originated when surface water (in the form of precipitation and melting snow) flowed through the mine and reacted with mineralized rock in the mine workings. The reaction between exposed ore, air and water creates acid rock drainage, which contains elevated levels of heavy metals, including copper, zinc and cadmium, and is highly acidic.

Britannia Creek 2200 Level and Mount Sheer

In 2022, detailed field and desktop evaluations were completed by the company AECOM for the Britannia Creek 2200 Level area (2200 Level) to confirm the preferred remedial approach and to initiate the planning phase for the upcoming remediation program.

In 2023, planning for the Phase 1 remedial works event at the 2200 Level and Mount Sheer continued as CCSP and AECOM initiated the site permitting and consultation process for required road upgrades, wide-scale remedial operations and the disposal of soils at the permitted Jane Basin Facility. Additional site investigations were completed to confirm and characterize site borrow material sources, as groundwater and surface water monitoring continued prior to and during the remediation activities.

The following milestones were completed during the 2023 season:

- Development and execution of the early remediation works plan, vegetation clearing plan, Environmental Management Plan, Invasive Species Management Plan, road design package and Archaeological Chance Find procedures.
- Secured all required permits to work, completed site surveying, procured remedial contractor, completed required road upgrades to the 2200 Level remediation area.
- Successfully removed approximately 3,000 m³ of contaminated soils from the former Mount Sheer Copper Launderers area and transported them to the permitted Jane Basin Facility.
- Backfilled and graded site to eliminate the terrestrial risks at this location.

Completion of in-house drone surveys to confirm remedial limits, plan for future remediation works and confirm the existing storage capacity at the Jane Basin Facility.

The completion of the remedial excavation at the 2200 Level was scheduled for 2024 and the installation of a groundwater interception trench (Phase 2 remedial works) is scheduled for 2025.

Britannia Mine Water Treatment Plant – Inspections and Procurement Planning

In 2005, the B.C. government entered into a Project Agreement with EPCOR to design, build, finance and operate the Britannia Mine WTP for 20 years.

With the Project Agreement expiring in January 2026, the B.C. government has been developing and implementing the contract closure plan, which outlines end-of-term requirements. This closure process includes five, three and one-year inspections of the WTP to ensure the plant is handed back to the B.C. government in good working order. Integrated Sustainability has led these inspections on behalf of the B.C. government and is producing detailed summary reports on current asset conditions, with the final (one-year) inspection scheduled for September 2024. In general, the plant has been well maintained by EPCOR and is considered to be in excellent condition for its age.

CCSP has retained the services of Infrastructure BC to support the end-of-term scopes of work and to plan for the next round of procurement, with technical support from Stantec consulting. The following scopes of work are scheduled for 2024/25:

- Contract performance assessment
- Lessons learned interviews and reporting
- Service delivery options analysis and technology assessment
- Scope of work development for the next contract
- Business case development
- Execution of procurement plan

Britannia Mine Water Treatment Plant – Emergency Demolition at Sludge Storage Facility

The current WTP sludge storage facility was originally constructed during historical mining operations for use as a sedimentation pond. In the development of the remediation plan at Britannia Mine, the sedimentation pond was repurposed and determined to be sufficient for use as a temporary storage facility for the sludge produced during WTP operations.

Due to the age and nature of this structure, ongoing monitoring had been conducted by WSP Global Inc. since 2017 to detect any movement, as one corner of the facility was of particular concern. In late 2023, the area of concern was identified as being at risk of failure due to historical undercutting of a supporting slope and signs of accelerated

movement. This prompted CCSP to take action to remove the overhanging piece of the facility.

In February and March 2024, Pacific Demolition, WSP Global Inc. and EPCOR collaborated to successfully remove the overhanging structure by utilizing a specialized team of demolition experts and a carefully engineered plan. The concrete structure was cut into large pieces that were secured and hoisted to safe locations using heavy-duty cranes. The demolition debris was then taken to a permitted facility for disposal.

Crown Parcel Remediation – Britannia Beach Fan Area

In 2022/23, the B.C. government completed the remediation of a parcel of Crown land directly adjacent to a newly developed residential and commercial community in Britannia Beach. The site contained soil and groundwater impacts from former mining activities and was confirmed to have unacceptable risks. The selected remedial strategy was to protect the impacted area with a compacted impermeable engineered soil cover, to prevent the downward migration of contaminants in soils to groundwater. This strategy was designed to protect from any exposure to contamination at surface and to improve groundwater quality at the site over time.

The engineered cover was successfully completed in July 2023 as designed by WSP Global Inc. and constructed by the Miller Capilano Maintenance Corporation. CCSP is currently working on the surface finishing plans. The installation of a perimeter drainage berm is planned for late 2024 to manage surface water runoff, and the surface finishing work is scheduled for completion in 2025. Groundwater at the site will continue to be monitored to ensure that the engineered cover is operating as designed and groundwater conditions continue to improve at the site. The completion of this work is considered a major milestone for remediation efforts in the Britannia Mine fan area.

Summary of Remediation Efforts

Tremendous progress has been made at the Britannia Mine site since its closure in 1974, and the improvement of the local ecosystem is a direct result of the remediation work completed to date.

The success of the remediation work at Britannia is clearly visible, both in the creeks and along the shoreline. In recent years, trout have returned to Britannia Creek and nearby Thistle Creek, and pink salmon have been observed in the lower reaches of Britannia Creek. The historically impacted ecological communities continue to rebound, as the abundance and diversity of shoreline organisms improves. The Britannia Beach

community is also enjoying an economic resurgence from a recent increase in residential and commercial developments.

CCSP is committed to the ongoing investigation and remediation of the site in accordance with the Overall Closure Plan and continues to work towards a risk-managed closure of the Britannia Mine.

Pacific Place

49° 16' 24" N, 123° 06' 54" W

Pacific Place lands are located along False Creek at the former Expo 86 site in Vancouver. Under an agreement with Concord Pacific Developments Ltd. (Concord), the B.C. government manages historical contamination at the site. The False Creek neighborhood continues to transform from its former industrial uses to parks, community centres and mixed commercial residential use. CCSP will continue to manage provincial interests and responsibilities during the ongoing remediation. In 2024, Concord sold parcels to the City of Vancouver for the development of social housing. CCSP continues to work with developers of the site to ensure remediation is completed appropriately. The B.C. government co-ordinates remediation when development activity occurs at each individual site.

Generally, this entails overseeing the excavation of contaminated soils at each lot as it is developed, thus eliminating the need to backfill and re-excavate each lot. A Confirmation of Compliance is issued following the completion of remedial activities.

In addition to remedial activities, the B.C. government manages a groundwater treatment plant that treats groundwater prior to discharge into False Creek and maintains groundwater levels at the site. The B.C. government also co-ordinates the long-term monitoring of management facilities constructed across the site.

Long-Term Monitoring and Maintenance

Atlin Ruffner

59° 44' 22" N, 133° 30' 50" W

The Atlin Ruffner mine site is located about 28 km northeast of Atlin, on the northwest slope of Mount Vaughan. Mining operations commenced in 1900 and continued intermittently until 1981.

Following receipt of a Hazardous Waste Regulation approval from ENV, the first phase of remedial works was undertaken in 2012 at the mill and tailings site and included building demolition and capping of the metals-contaminated soils with a one metre thick cover of sand and gravel.

The second phase of remedial works involved establishment of permanent road access to the site, construction of water diversion works, and placement of a bituminous geomembrane liner over the tailings and sedimentation ponds. This work was completed in 2017 and 2018.

In 2019, a confirmation of remediation report for the mill and tailings site was submitted to ENV, and an LTMM manual was developed. LTMM activities are ongoing and include site inspection and geotechnical, groundwater and surface water monitoring. In 2020 and 2021, revegetation activities at the mill and tailings included native species seed collection and off-site propagation. Planting activities were completed in 2022, 2023 and 2024.

Additional investigations of the mine workings area surrounding the mill and tailings site were completed in 2022, and a DHHERA is in progress for this area. Future Management Actions will be based on the risks that site contamination presents to human health and the environment and based on engagement with the Taku River Tlingit First Nation.

Bralorne Takla

55° 34' 01" N, 125° 23' 17" W

The Bralorne-Takla mine is a former mercury mine located within the Takla Nation traditional territory, approximately 180 km north of Fort St. James and approximately 37 km east-northeast of the community of Takla Landing. The mine operated for 11 months during World War II (November 1943-September 1944). The primary contaminants of concern included mercury, antimony, arsenic and cadmium. Environmental investigations commenced in 2005 and culminated in the removal of all hazardous wastes (liquid mercury, asbestos and soils with leachable metals) and construction of two covered landfills for the remaining contaminated material in 2016. The two mine openings were capped with concrete covers, and the site was planted with native species. An LTMM program was initiated in the summer of 2017. It included a comprehensive water sampling program, vegetation monitoring and geotechnical inspections of the mine site and associated borrow pits.

LTMM activities were completed in 2020, 2021, 2022 and 2023. These activities included water sampling, landfill gas monitoring, engineering inspections and engagement with Takla Nation. Monitoring showed that native vegetation is re-establishing, and the vegetation is decreasing erosion. Results indicate sediments are not a significant source of mercury and methylmercury to lake water, and mercury concentrations along the flow path from the former mine are decreasing. In 2021, some repairs were made to the resource road running through the site, and the Mines Act permits for the two borrow areas were closed. In 2023, mercury concentrations were measured in Peamouth chub (a fish species) in two nearby lakes. Tissue mercury concentrations were lower compared to 2007 and 2019 samples in one of the lakes. Annual LTMM activities continue at the site with results reported to ENV.

Cork-Province

49° 54' 29" N, 117° 04' 36" W

The former Cork-Province mine produced zinc, cadmium, gold and silver from 1900 to 1966, which left a mass of mine tailings near Keen Creek, a secondary potable water source for the nearby town of Kaslo, north of Nelson. The tailings impoundment was at risk of failing and endangering Keen Creek. In 2008 and 2009, the tailings were moved to a new location upland and away from the creek. The new and former tailings impoundments were covered with about a metre of soil, and the entire site was replanted.

LTMM following the work continues to show that the remedial program has removed the risk of tailings release. Field observations showed some disturbance of the tailings

impoundment by people using the general area (e.g. road work, all-terrain vehicles). To address this issue, repairs were made and new signage was installed in the fall of 2017, with additional signage and fencing installed in 2018. In 2022, a site inspection and water quality monitoring were completed. The results of this monitoring were compared to historical results to determine long-term trends following the remedial works. Due to continued positive monitoring results, the monitoring frequency has been reduced to a five-year schedule.

Howard

49° 15' 46" N, 117° 12' 31" W

The former Howard Mine is located about 30 km south of Nelson, near Ymir, and operated primarily from 1937 to 1938. Remedial works focused on the location of a former ore processing mill that processed 20,000 tonnes before key ore reserves were exhausted. Tailings from the mill processing were historically deposited into the Salmo River and covered much of the floodplain area. To address the potential human health and ecological risks associated with the mine wastes, a remediation plan was developed and executed in 2014. Remediation work consisted of excavating and consolidating approximately 6,000 m³ of mine wastes into an upland regulatory approved landfill within the former footprint of the mine milling operations. The landfill was covered with an engineered liner and one metre of clean soil then shaped to prevent erosion and surface water ponding. The excavated areas were backfilled with clean soil and protected with an engineered erosion barrier, which included fish habitat enhancement features.

An LTMM program was initiated in 2015 and includes a comprehensive water sampling program, vegetation monitoring and geotechnical and environmental inspections of all engineering features. Annual monitoring is ongoing to ensure the remedial works continue to operate as intended and to observe long-term trends and seasonal variations in groundwater, surface water and porewater. In 2020, pocket gophers were observed at the site for the first time. An integrated pest management plan is implemented and ongoing to minimize impact of gophers on the engineered works. Based on groundwater monitoring results at the Crown tailings area, dissolved metals concentrations have decreased below the Aquatic Life Protocol 11 for Contaminated Sites, Upper Cap Concentrations for multiple years, and as a result, the Crown tailings area will be reclassified as a non-high risk exposure unit.

Ocean Falls

52° 21' 01" N, 127° 41' 36" W

Ocean Falls is located approximately 64 km west of Bella Coola and 480 km north of Vancouver on the central coast of B.C. Demolition of a former pulp and paper mill in Ocean Falls was completed in 2010. Two landfills were constructed for demolition waste. The Demolition, Land Clearing and Construction Landfill has non-contaminated, non-hazardous waste, and the Asbestos Landfill has asbestos-containing materials. A recent inspection of the landfills conducted by CCSP staff and SLR Consulting in 2023 found the covers to be in good condition. Future site inspections are planned.

Pitt River Landfill

49° 36' 51" N, 122° 38' 38" W

The Pitt River Landfill is located on the eastern bank of the Upper Pitt River, approximately 9.5 km upstream of the river's confluence with Pitt Lake. Originally a former logging camp and municipal landfill from 1978 to 1991, the landfill was set back a significant distance upland from the river. Over time, the river changed course and began to erode the western edge of the waste fill. In 2005, the waste contents were excavated and removed offsite, and the site was backfilled and revegetated. A riprap erosion barrier was constructed to protect the land and a nearby salmon hatchery from further erosion. Continued changes in the meandering of the high energy Upper Pitt River resulted in recommended enhancements to the riprap erosion barrier, which were completed in 2019.

With the waste materials excavated and removed off-site, LTMM at the site has focused on the geotechnical stability of the erosion barrier. Since 2020, inspections have included an annual review of satellite imagery to observe changes to the river morphology, and biennial physical site inspections of the erosion barrier and site. Drone surveys will be completed about every five years with the next survey scheduled for 2025.

Port Alice

50° 22' 57" N, 127° 26' 57" W

CCSP is managing two historical waste disposal areas, including a landfill at the location of a former spill and a fenced drum disposal area near Port Alice. They are related to historical activities associated with the former Neucel Specialty Cellulose Mill. The two disposal areas are located adjacent to the Pump House Mill Access Road in wooded areas.

Remedial activities were initiated in 2010, and additional waste removal activities were completed in 2021. LTMM activities, including groundwater and surface water sampling, have been ongoing since 2011, with seasonal sampling most recently completed in 2023.

Two Mile Creek

55° 17' 34" N, 127° 35' 25" W

The former Two Mile Creek tailings site is located along Two Mile Creek, a few kilometres from Hazelton. An environmental investigation of the tailings and associated sediment and surface water in the creek indicated elevated concentrations of several metals and metalloids. Two Mile Creek was also observed to be flowing over areas of exposed tailings and potentially eroding these contaminated materials into the creek. Downstream of the site, Two Mile Creek is used as a source of drinking water and irrigation water for the Village of Hazelton and Gitanmaax Band communities.

Remediation, completed in 2008, involved removing tailings materials from the creek floodplain and placing it into an adjacent quarry with a geotextile cover. The creek bed was restored and the area replanted.

Post construction monitoring of the site was completed most recently in 2023 and 2024, with water quality monitoring being completed at different times of the year and a comparison of water quality to historical trends completed.

Yankee Girl Tailings

49° 17' 09" N, 117° 12' 50" W

Located south of Nelson and immediately adjacent to the community of Ymir is the former Yankee Girl Mine, which operated from the late 1800s until the 1950s. Ore produced from the mine workings was shipped to nearby smelters for further processing until 1934, when a 100-tonnes per-day mill was constructed. On-site milling of ore took place from 1935 to 1942. Tailings from the milling operations were deposited on the banks of Salmo River and Ymir Creek and contained elevated concentrations of heavy metals including arsenic, cadmium, lead and zinc. In 2007, CCSP initiated a remedial program that consolidated the tailings into a single area and mixed them with lime to reduce acidity. An impermeable bentonite cover was placed over the tailings, followed by an additional metre of clean fill. Remedial works also included construction of a riprap erosion barrier, an engineered wetland that reduces metal concentrations through natural processes, and site-wide revegetation.

Remediation of the Yankee Girl Tailings site represented the largest physical remedial program completed by CCSP at that time and was the result of five years of concerted effort by the program, its consultants and the local community. Following remediation completion in 2009, an LTMM program was initiated to ensure the remedial works continue to perform as designed. Results from the monitoring program continue to demonstrate that the remedial works provide a safe recreational area for the local community and that the environmental improvements have been maintained. In 2019, after ten years of post-remedial monitoring and continual improvement in groundwater and surface water quality across the site, the monitoring and maintenance program was changed by reducing the number of sampling locations and sampling frequency, focusing on areas with residual contamination. The revised monitoring and maintenance program has been conducted annually and continues today. Like the Howard mine site, pocket gophers have been identified at Yankee Girl, and an integrated pest management plan has been implemented.

Reflections on 20 years of operation

The CCSP has been operating for two decades. Looking through the program area's history of achievements and trends, we see the realization of:

- Successfully supporting and responding to government priorities through undertaking management and bringing to closure unique assigned priority projects.
- Growth and development of clear program policy guidelines for CCSP work and creation of specific scientific risk-based strategies for site selection and prioritization within CCSP program mandate. Through innovation of the RRM starting in 2006, CCSP has achieved the goal of developing a scientifically based, defensible and systematic methodology for the evaluation and ranking of priority Crown contaminated sites based on potential risk to human health and the environment. Continual improvement since inception through refinement and updating the RRM has enabled CCSP to keep up with regulatory and industry changes.
- Operational integration of Public Sector Accounting Standard PS3260, which became effective on April 1, 2014, providing standards for reporting and accounting for liability associated with remediation of contaminated sites.
- Investing in staff professional development to ensure continued innovation and progress in accordance with changing industry standards, challenges, best management practices and technology advancements.

- Progressively moving sites from preliminary investigation through remedial planning and remedial activities to long-term monitoring and maintenance.
- Engaging with First Nations throughout the history of the program area, including relationship building, seeking requests for input and engagement, ensuring First Nations and local communities are aware of potential risks, and working in partnership to create educational opportunities for Indigenous youth through the Reclamation and Prospecting Program.
- Working with the Tse Keh Nay (TKN) Alliance to address cleanup of current and historical mining sites through the TKN-B.C. Protocol Agreement for Reclamation, Remediation and Monitoring of Mine Sites agreement signed in 2008. The CCSP, Tse Keh Nay community members and the TKN-B.C. working group completed a multi-step process to prioritize historical mine sites for reclamation within TKN traditional territory. Ten sites were selected, and work plans were developed to return them to a reclaimed and safe state. As part of the cleanup work, the old buildings were demolished or burned, garbage was removed, and dangerous areas were either filled in or marked so visitors will know to take care. Finally, the sites were replanted with local native plants to blend in with the natural surroundings. Results of the program were reported at three community meetings to inform local residents of the work that had taken place on their lands.
- Relationship building and engagement began with Takla Lake First Nation in 2009 on the Bralorne-Takla site through several community meetings and workshops. From 2012 onward, each field visit included one or more members of the Takla Lake First Nation. After extensive investigations and joint remedial planning incorporating traditional knowledge, the remedial option was jointly selected by the Takla Lake First Nation and the B.C. government. In 2015, construction for two covered landfills began and was overseen by professional environmental monitors, including two members of Takla Lake First Nation. Additionally, the remediation contractor hired local community members and equipment for the project. Following completion of remediation, the site was revegetated with native species during spring of 2017. Takla Lake First Nation hosted a closure ceremony with activities and speeches onsite and a traditional potlach to mark the celebration with the whole community in July 2017. Bralorne-Takla is currently in the LTMM phase since 2017, and members of Takla Lake First Nation have regularly participated in annual monitoring and maintenance activities (water quality monitoring, vegetation inspections, removal and disposal of invasive plants etc.) and we maintain the decades old partnership.
- CCSP is currently working with the 'Namgis First Nation and consultants to select a preferred remedial option for the Iron Crown site, a former open pit iron mine and milling operation located approximately 17 km west-northwest of Woss, on the north side of the Nimpkish River. Engagement with the 'Namgis First Nation was initiated in 2016 with an intent to develop an understanding of the traditional land use and

culture, and to discuss future remediation plans for the site. During the remediation planning stage for the project, the 'Namgis First Nation and an archeology consultant were engaged to perform Archeological Impact Assessments at the proposed borrow area and within the proposed remediation footprint areas. These studies were completed in 2021 and 2023, respectively. Select areas of archeological potential and features of archeological significance were identified. A geotechnical investigation to inform feasibility of select remedial options and an update to the Canyon Lake water quality model were completed in 2024.

- Enhancing understanding through an international collaborative information exchange with Brisbane, Australia; participation in the National Orphaned and Abandoned Mines Initiative Advisory Committee for Canada; piloting a new approach for watershed assessment, and ongoing co-ordination with other government agencies supporting abandoned mine sites.
- Steering development strategies for Brownfield renewal and redevelopment, capacity building, raising awareness of redevelopment opportunities, enhancing knowledge and implementing the Brownfield renewal funding program for investigation of sites in B.C.
- CCSP has received recognition for site remediation projects including:
 - ❖ Britannia Mine: 2006 Fraser Basin Council Caring for Ecosystems Award; 2006 Gold Award for Infrastructure for Britannia Mine Water Treatment Plant Project; 2006 National Award for Innovation and Excellence in Public Private Partnerships; and 2007 Premier's Award for Innovation and Excellence.
 - ❖ Bralorne Takla Mercury Mine: 2018 Premier's Award nomination for Partnership Category Finalist.
 - ❖ Atlin-Ruffner Mine: 2013 BC TRCR Metal Mine Reclamation Award for remediation and reclamation of the Atlin Ruffner Mill and Tailings site; 2018 BC TRCR Mine Reclamation Award for Outstanding Reclamation Achievement in 2018 for Metal Mine Category; and 2019 BC TRCR Metal Mining Award recipient for the innovative passive water treatment system installation at the historical Atlin Ruffner Mine site.



Appendix 1: Site Prioritization Process Flow Chart in Plain Text

1. Process Step 1, Coarse Screening. List of all historical mine sites is reduced to a list of potential sites by applying a Coarse Screening Tool that removes all non-producing mine sites. All non-producing mine sites remain in Historical Mines Atlas database. All producing mine sites proceed to Step 2.
2. Process Step 2, Coarse Filter. List of historical producing mine sites is further reduced by applying Coarse Filter Criteria. Sites are screened out based on private land ownership, other responsible persons, permitting under the Mines Act or other agency, low tonnage or low risk commodity type. Producing mines or other sites screened out by the Coarse Filter are tracked in a CCSP database. Remaining list are identified as Potential Candidate Sites which then proceed to Step 3.
3. Process Step 3, Site Inspection. The Potential Candidate Sites list is further narrowed via CCSP Site Inspection. Based on professional opinion and limited chemical data, if available, CCSP staff determine if funds should be expended for investigation. The potential candidate sites screened out by site inspection continue to be tracked in a CCSP database. The list of Candidate Sites for inspection proceed to Step 4.
4. Process Step 4, Site Characterization and Risk Ranking Methodology (RRM). List of Candidate Sites proceed to Modified Preliminary Site Investigations which are conducted by expert consultants and results are entered into the RRM Tool. At a RRM Workshop, sites are categorized as either high priority or lower priority. High Priority Sites are ranked and assigned a Management Action. Lower Priority Sites remain in the RRM Tool for future ranking. High Priority Sites proceed to Step 5.
5. Process Step 5, Management Actions. High Priority Sites proceed to Management Actions (such as Additional Investigations, Immediate Action, Detailed Site Investigations, Risk Assessments, and Remedial Planning) which are undertaken to advance High Priority Sites. Additional information acquired may be used to re-evaluate ranking of sites at RRM Workshop.
6. Process Step 6, Remediation. Once contamination is fully understood a remedial option is selected and undertaken. Remediated Sites proceed to Step 7.
7. Process Step 7, Long-Term Monitoring & Maintenance. Once remediation is complete, Long-term monitoring and maintenance plans are implemented at remediated sites. End of process flow chart.