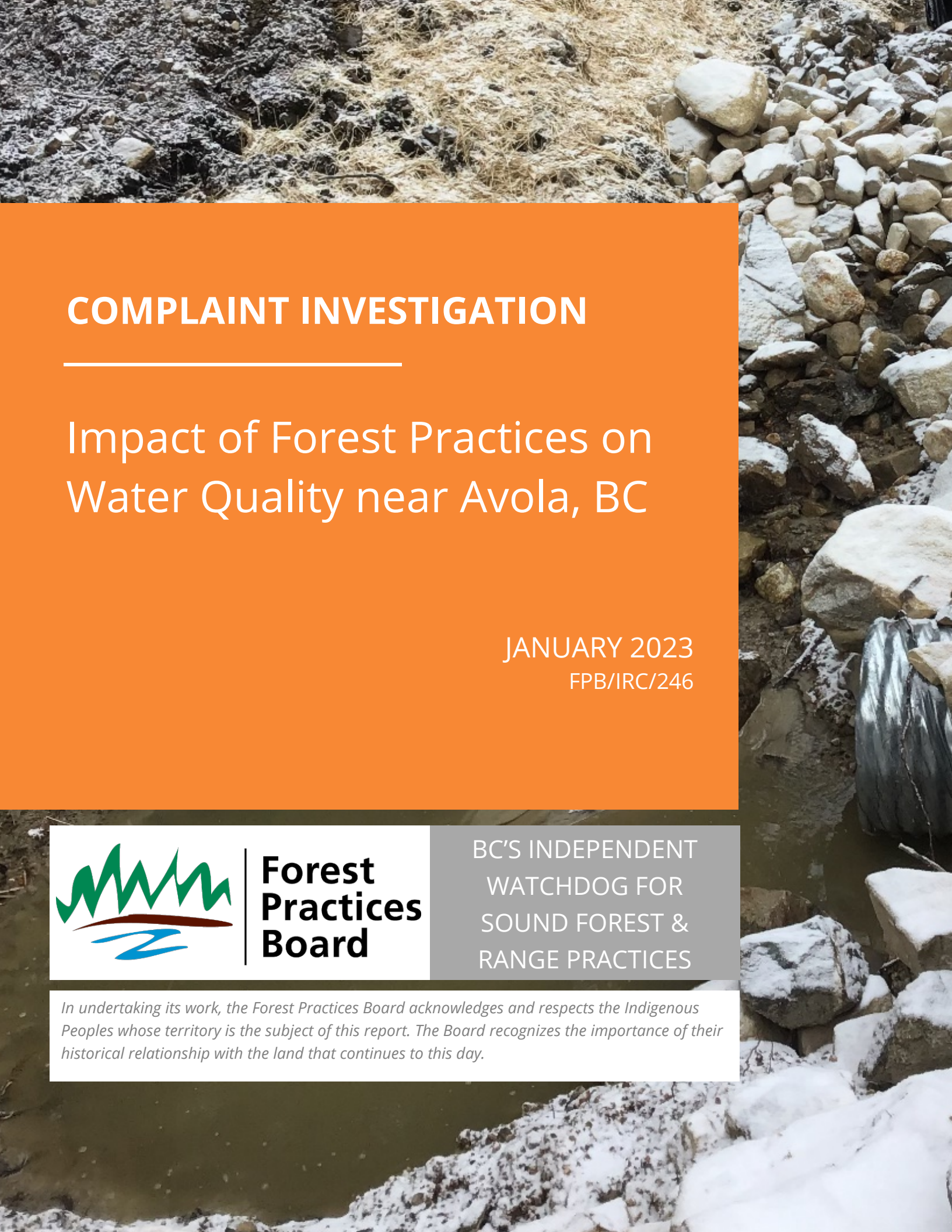

COMPLAINT INVESTIGATION

Impact of Forest Practices on Water Quality near Avola, BC

JANUARY 2023

FPB/IRC/246

Forest Practices Board

BC'S INDEPENDENT WATCHDOG FOR SOUND FOREST & RANGE PRACTICES

In undertaking its work, the Forest Practices Board acknowledges and respects the Indigenous Peoples whose territory is the subject of this report. The Board recognizes the importance of their historical relationship with the land that continues to this day.

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Introduction

The Complaint

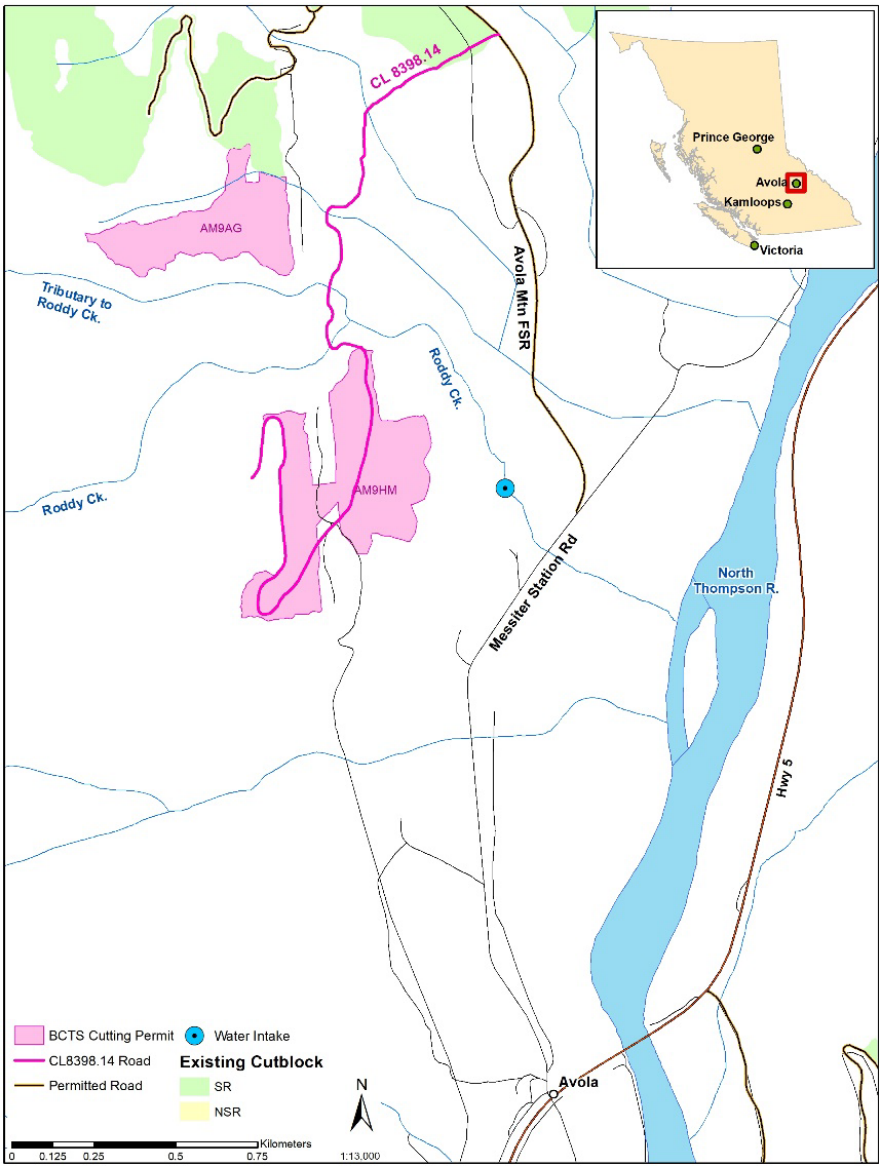
On November 6, 2021, the Forest Practices Board (the Board) received a complaint from the owners of a property near Avola, BC. The complainants are concerned that:

- given a history of landslides in the area, planned harvesting by BC Timber Sales (BCTS) will cause landslides that could cause harm or loss of life, and damage their house, property and licensed waterworks;
- a road being constructed by BCTS caused sediment and heavy metals to enter the groundwater and surface water that they divert for human consumption, irrigation and farm animals; and,
- sediment from BCTS's road damaged their licensed waterworks.

For relief, the complainants want BCTS to be held accountable for its actions and ensure that they have an uninterrupted supply of clean drinking water in the future.

Background

Avola is a small community adjacent to the North Thompson River and Highway 5, midway between Clearwater and Blue River (refer to Map 1). The complainants purchased their property in July 2021, which includes a home, several outbuildings and land that they use for cultivation and raising farm animals.



MAP 1. Map of Avola

The Water System

The complainants divert water from the alluvial fan[1] of Roddy Creek into a small primary settling pond (about two metres wide by three metres long) and then to a secondary pond (about three metres wide by five metres long) from which water is piped to the home. The ponds are referred to in this report as the 'water intake.' There is also a diversion ditch from the secondary pond to two additional ponds on the property that provide water for irrigation. The water intake and diversion ditch are part of the complainants' 'licensed waterworks' authorized under the *Water Sustainability Act*.[2]

The complainants' water licence authorizes them to divert a specified volume of water but it does not guarantee water quality. Treatment of water diverted for human consumption is regulated under the *Drinking Water Protection Act* and administered by provincial health authorities. Because the complainants' water system provides water for a single-family residence, there are no legal requirements under the Act to treat the water. Provincial health authorities strongly recommend that water used for human consumption be treated if it potentially contains harmful bacteria, sediment or heavy metals, etc. Currently, the complainants do not treat their water.

FRPA's Requirements

Three sections of the *Forest Planning and Practices Regulation* (FPPR)—a regulation under the *Forest and Range Practices Act*—are directly relevant to the complaint (see Table 1). Although not part of the complaint, during the investigation the Board became aware of the presence of fish in Roddy Creek at the water intake. As a result, the Board decided to include FPPR's requirements for the protection of fish and fish habitat within the scope of its investigation.

TABLE 1. FPPR Requirements Directly Related to the Scope of the Complaint

SUBJECT	FPPR REQUIREMENTS[3]
Landslides	**Section 37**: An authorized person who carries out a primary forest activity must ensure that the primary forest activity does not cause a landslide that has a material adverse effect in relation to one or more of the subjects listed in section 149 (1) of the Act.[i]
Fish and Fish Habitat	**Section 57**: An authorized person who carries out a primary forest activity must conduct the primary forest activity at a time and in a manner that is unlikely to harm fish or destroy, damage or harmfully alter fish habitat.[4]
Water Quality	**Section 59**: An authorized person who carries out a primary forest activity must ensure that the primary forest activity does not cause material that is harmful to human health to be deposited in, or transported to, water that is diverted for human consumption by a licensed waterworks.
Licensed Waterworks	**Section 60(1)**: An authorized person who carries out a primary forest activity must ensure that the primary forest activity does not damage a licensed waterworks.

[1] Alluvial fans are low-gradient deposits of sediment formed where stream channels leave the confines of mountain valleys. Alluvial fans are areas of active erosion and deposition and sediments deposited can be remobilized during high flow events.
[2] In accordance to the complainant's water licence, the licensed waterworks includes the stream diversion to the intake, the intake structure and the water diversion from the intake structure to the exterior of the complainant's home.
[3] The requirements apply to an 'authorized person' and a 'primary forest activity'. In this complaint, BCTS is the authorized person and road construction is a primary forest activity.
[4] The Forest Appeals Commission has established that compliance with section 57 of the FPPR does not require evidence that an authorized person's activities harmed fish or fish habitat. Rather it is whether a reasonable, authorized person believes that harm is not likely to occur if its activities are undertaken at an appropriate time (e.g., the window of least risk to fish) and manner (e.g., the precautions taken to protect fish and fish habitat).

The Investigation

Board investigators reviewed the complainant's licensed waterworks and BCTS's road on November 18, 2021, with the complainants, BCTS staff, a project monitor, an environmental monitor, and a hydrologist. During the field visit, the complainants raised concerns about a milky-white substance that appeared to be seeping from a bedrock cut on BCTS's road and also appeared at their water intake. The presence of the milky white substance was not part of the original complaint but is discussed below.

BCTS's Planning

In 2018, BCTS began planning timber sales and access roads north of Avola on the west side of Highway 5. Early in its planning process, BCTS identified that part of the development had the potential to affect the complainant's drinking water as the intake is located approximately 800 metres downstream of a planned culvert on Roddy Creek and a bridge over a tributary to Roddy Creek.

BCTS retained three professionals to conduct pre-development assessments, including:

- a biologist to determine the presence or absence of fish in Roddy Creek;
- a geoscientist to assess terrain stability at the two stream crossings and two planned cutblocks;[5] and,
- a hydrologist to assess watershed hydrology and potential risks to drinking water.

The biologist reported that the upper limit of fish presence in Roddy Creek is 500 metres downstream of the planned road. The biologist observed a bull trout in the complainant's intake pond and reported that coho and chinook salmon are known to occur further downstream in Roddy Creek.

The geoscientist assessed terrain stability and determined that both Roddy Creek and its tributaries are prone to debris flows, but did not identify a landslide risk from the proposed road construction. On the approach to the crossing of the tributary to Roddy Creek, the geoscientist identified a low-lying, poorly drained area, with standing water in local depressions (referred to in this report as the 'seepage site'). To ensure the protection of downstream water quality, the geoscientist made multiple recommendations for the design and construction of each of the two stream crossings.

For the planned cutblocks, the geoscientist identified a low likelihood of post-harvesting landslide initiation and provided a supporting rationale. The geoscientist made four drainage-related recommendations to reduce the likelihood of a landslide and three recommendations to reduce the likelihood of sediment deposition into streams.

The hydrologist determined that road construction would likely result in measurable increases in stream sedimentation, especially during and immediately after construction, but also chronic sedimentation as a result of ongoing road use. They also determined that sedimentation would impair downstream drinking water quality, requiring ongoing maintenance of the intake, and could damage the intake and water distribution infrastructure (e.g., water lines, hot water tank). The hydrologist cautioned that, if construction of the road proceeded, BCTS must be prepared to maintain the intake for the life of the road or build a new sediment-robust intake, such as a groundwater well. Their report included six recommendations for road construction and the use of construction materials that would reduce the likelihood of impacting water quality and causing damage to the licensed waterworks.

[5] BCTS's planning documents refer to Roddy Creek as stream 'S6-L 2' and the tributary to Roddy Creek as 'S6-L 1'. The planned cutblocks include AM9AG, which is 11 hectares, and AM9HM, which is 20 hectares.

At the same time, BCTS began communicating with the previous property owner and, in 2020, shared its detailed plans and discussed intended strategies to mitigate the potential impacts of road construction on water quality. BCTS told the previous property owner that, during the construction of the road, sediment would likely affect their drinking water, and offered to construct a well so they would not have to draw potentially turbid surface water from Roddy Creek. The previous property owner decided not to have the well built, opting instead to wait and see if road construction affected the water supply and infrastructure. BCTS—on behalf of the previous property owner—submitted an amendment to the water licence to enable the construction of a well, but a well has never been built.[6]

In June 2021, the previous property owner informed BCTS that they had sold their property. They provided BCTS with the names of the new property owners and the date of possession of July 28, 2021. BCTS made several unsuccessful attempts to visit the new property owners at their home. BCTS did not send the new property owners any information about the planned development.

Road Construction

BCTS awarded a road construction contract in 2021. The contract identified downstream domestic water users and required the contractor to take all necessary precautions to protect fish, fish habitat, and water quality, including adherence to directions and regulatory requirements of Fisheries and Oceans Canada and the BC Ministry of Environment and Climate Change. Before constructing the two stream crossings, the contractor was required to hire an environmental monitor to prepare erosion and sediment control plans to protect downstream drinking water quality and to be on-site during the installation of the crossing structures to ensure the contractor followed the plans.

BCTS also hired a project monitor to assess construction progress and to ensure that the contract specifications were met. The project monitor was required to report their observations directly to BCTS which, in turn, would discuss any necessary actions with the contractor.

Road construction began on May 15, 2021, and continued until June 15th when it was shut down due to the risk of wildfire. The contractor resumed construction on August 10th before the environmental monitor had prepared and submitted the environmental monitoring plans (the plans were submitted on August 16). The environmental monitor completed a site inspection on August 27.

Rainfall Event

Over the weekend of August 21-22, 2021, heavy rain fell in the Blue River and surrounding area (including Avola) with daily precipitation in the 35-40 millimetre range.

On Saturday, August 21st, the complainants discovered dark brown, sediment-laden water at various taps through their home and at outbuildings. They immediately contacted the project monitor who instructed the contractor to stop work until BCTS could be contacted for further direction. The complainants walked upstream on the tributary to Roddy Creek to investigate the source of the sediment and observed sediment from BCTS's road being deposited into the stream.

[6] BCTS extended the same offer to build a well to the new property owners.

Response

The project monitor notified BCTS about the issue on August 23rd. BCTS staff, the project monitor and the road construction contractor reviewed the area and discussed a plan to mitigate the sediment related to the road construction.

As part of its environmental management system, BCTS completed an 'incident report form' and undertook a root cause analysis. The incident report form stated that "heavy rainfall washed all fine sediment from exposed [soil] surfaces and an unknown amount ended up in Roddy Creek and in the [licensed waterworks] downstream."

The root cause analysis identified the following issues:

- the construction of the road was rated as 'high risk' as an engineering project but did not specify additional inspections around riparian features or the licensed waterworks;
- rain was expected over the August 21-22 weekend and no water control measures were in place;
- the contractor started work on the crossings before the environmental monitoring plan and sediment management plan were prepared. Once the contractor started work, it did not follow the plans; and
- BCTS staff had difficulty reaching the new property owners immediately after they took possession of their property.

After the rainfall event, BCTS instructed its contractor to immediately take steps to reduce further sedimentation into the tributary to Roddy Creek. The contractor installed water bars to divert water from the running surface of the road onto the forest floor and capped the running surface of the road with coarse rock to reduce surface erosion. Sediment control measures, including silt fences, were installed near the bridge abutments, within ditches and at the outlet of cross drains.

The environmental monitor completed his first post-rainfall event site inspection on August 27 and reinstalled and enhanced erosion and sediment control measures implemented by the contractor. BCTS began providing bottled water to the complainants and arranged for the cleaning of the intake pond and flushing of the water lines in the home and irrigation system.

After the rainfall event, the complainants filed a complaint with the Compliance and Enforcement Branch (CEB). CEB inspected the road on August 25th and determined it to be in good condition with functioning culverts. CEB saw no evidence of sediment being deposited into streams. CEB did not inspect the complainant's licensed waterworks. At the request of BCTS, CEB completed a follow-up inspection on December 11—under snow conditions—and did not identify any issues with the road.

The complainants contacted BCTS after subsequent, less severe rainfall events and reported that sediment continued to be present at their intake. After a rainfall event on November 2nd, the complainants collected a water sample from their intake and sent it to a laboratory to be tested for turbidity, coliforms and heavy metals.

On November 7th, BCTS suspended road construction activities and installed additional erosion and sediment control measures.

Issue 1: Landslides

Did BCTS comply with section 37 of the FPPR?

A landslide must occur in order to determine whether or not a person is in compliance with section 37 of the FPPR. To date, no harvesting has occurred and there have been no landslides as a result of BCTS's activities.

Licensees cannot control natural factors, but they can try to manage risk associated with forestry activities by conducting appropriate assessments and implementing resulting recommendations. Under FRPA's professional-reliance regime, licensees rely on advice from professionals to identify the resource values potentially affected by their operations and determine when, where, and what type of assessment is needed to address potential risks, what level of risk is acceptable and how those risks will be managed.

BCTS retained a professional geoscientist to examine the risks of naturally-induced debris flows upstream of the two stream crossings and the risks of harvesting-induced landslides for two planned cutblocks in the Roddy Creek drainage. The professional made recommendations to mitigate the risks and BCTS told investigators it fully intends to implement those recommendations.

Finding

BCTS complied with section 37 of the FPPR as no landslides have occurred.

Issue 2: Protection of fish habitat, drinking water and licensed waterworks

Assessing compliance with these sections of the FPPR requires determining:

a) the nature and source of the milky-white substance in water seeping from the bedrock cut and within the complainant's water intake;

b) whether sediment observed at the complainant's water intake originated from BCTS's road and whether it is harmful to human health; and,

c) whether BCTS ensured that its activities would protect fish habitat, drinking water and the licensed waterworks.

a) Nature and source of the milky-white substance in water

The geoscientist sampled rock blasted at the bedrock cut adjacent to Roddy Creek to determine if the milky-white substance was associated with heavy metals in the rock. The same rock was also used to armour the tributary to Roddy Creek stream crossing, therefore, it was also included in the sample. Although the geoscientist stated several limitations in their assessment, they concluded that the blast rock is unlikely to be acid generating and therefore, there is a low likelihood of metal leaching into the water.[ii]

On November 22nd and December 2, 2021, BCTS collected water samples upstream and downstream from seven sites around the road and the complainant's licensed waterworks. Along with the sample collected by the complainants on November 2nd, all were tested for turbidity, coliforms and heavy metals. Some water samples detected heavy metal concentrations that exceed Canadian Drinking Water Quality Standards. However, the geoscientist determined there was no linkage between the rock samples and the heavy metals detected in the water samples.[7]

[7] BCTS also collected water samples March 31 and May 31 2022 but the data were not examined by investigators.

After reviewing the laboratory results, investigators determined there were a number of limitations that did not enable inferences or conclusions to be drawn about:

- whether turbidity, coliforms or heavy metals exist in water at levels that could be harmful to human health;
- the identification of the milky-white substance; and,
- if there is a causal relationship between the presence of substances identified in the water samples and BCTS's activities (see endnote iii for further explanation)

The nature and source of the milky-white substance observed at the bedrock cut and at the intake were not identified through rock or water sampling. There is no conclusive evidence linking BCTS's activities to the presence of potentially harmful substances in water.

b) The source of sediment that was deposited into Roddy Creek and whether it is harmful to human health

BCTS's root cause analysis states that the August 20-21 rainfall event caused sediment from its road to enter the tributary to Roddy Creek. During the Board's November 18 field assessment, BCTS staff, the project monitor, the environmental monitor and the hydrologist acknowledged to investigators that the rainfall event—as well as subsequent but less severe rainfall events through September and early November—caused sediment from the road to be deposited into the tributary to Roddy Creek.

During the field assessment, the hydrologist walked the channel of Roddy Creek and the tributary to Roddy Creek from the complainant's water intake upstream to the road. The hydrologist observed the extent of natural channel erosion and deposition processes and suggested that natural channel erosion processes likely contributed to the majority of sediment deposition that was identified at the intake following the August 21-22 rainfall event.

All participants agreed that BCTS's road contributed sediment that was deposited into the tributary to Roddy Creek and accumulated at the water intake. The source of sediment was from the running surface of the road, the bridge approaches and a watercourse from the seepage site that enters the road.

Sediment is known to impact water quality for human consumption. However, the Board, in consultation with provincial health authorities, has established that sediment on its own is not necessarily harmful to human health. Rather, it is the potential for harmful viruses, bacteria and heavy metals that can adhere to sediment particles, increasing the risk of harm to human health. Also, sediment in water decreases the efficacy of various water treatment methods.

While the majority of sediment is likely from natural processes, BCTS's road also contributed sediment. Regardless of the proportion of sediment from the two sources, it is not appropriate for forest practices to contribute sediment to water, particularly where water quality for drinking and fish is at stake.

c) Did BCTS ensure that its activities would protect fish habitat, drinking water and the licensed waterworks?

The investigation identified planning and practice issues that likely contributed to the problem of sediment deposition into Roddy Creek.

Planning

The hydrologist cautioned BCTS that construction and use of the road would impair downstream drinking water quality over the long-term, requiring ongoing maintenance of the intake, and there could be damage to the intake and water distribution infrastructure. Despite this caution, BCTS chose to proceed with the road and was ready to construct a well for the complainants as a way of mitigating potential impacts to their water quality and infrastructure.

BCTS was aware of the presence of fish downstream of its road. However, while it planned to ensure long-term protection of drinking water quality by constructing a well, it did not similarly plan for potential long-term impacts on fish and fish habitat. Depending on the concentration of the sediment that has been deposited into the water and the period of time that fish are exposed to the sediment-laden water, sediment may degrade fish habitat and interfere with the ability of fish to obtain oxygen from water or to find food.

BCTS acknowledged that the roles and responsibilities of the contractor, project monitor and environmental monitor were not sufficiently clear, which led to confusion about who was responsible for erosion and sediment control for the entire project. Further, the project monitor—who was BCTS's onsite liaison—was an observer only and lacked the authority to direct the contractor to take immediate actions necessary to prevent harm to drinking water.

The seepage site was identified by the geoscientist. However, it was not identified by the hydrologist or recognized by BCTS as a potential ongoing source of sediment to Roddy Creek.

Practices

Although the hydrologist concluded that BCTS would not likely be able to protect drinking water unless a well was constructed, they provided BCTS with six road-related recommendations intended to reduce erosion and sedimentation into Roddy Creek. However, investigators found that BCTS's road construction did not fully adhere to three of the hydrologist's recommendations. Issues identified by the hydrologist in the implementation of the recommendations include:

- level grades were not constructed on approach and through stream crossing sites. As a result, road surface water flow, extending from the top of the landing, was directed into Roddy Creek
- coarse rock was not applied to the road until after the rainfall event – this likely increased the amount of sediment deposited into Roddy Creek
- appropriate water management structures were not installed during construction. For example, the road surface was not water-barred to direct flow off the road surface and no drainage structure was installed at the seepage site.

BCTS acknowledged that its activities caused sediment to be deposited into Roddy Creek. It anticipated rainfall over the August 21-22 weekend and the plan for erosion and sediment control was not followed. After the rainfall event, sediment control measures were installed by the contractor but had to be re-installed days later by the environmental monitor because they were not effective.

Investigators observed sediment being deposited into a watercourse that connects to Roddy Creek through surface and subsurface flow. Silt fences, which were installed to allow sediment to settle out of suspension, were largely ineffective because they were either not installed correctly or used in the incorrect application (for example, silt fences are not designed to be installed across channels with flowing water).[iv] There was a

lack of road surface drainage control and erosion and sediment control measures were inadequate to address the extent of exposed soil surfaces subject to erosion by rainfall and ditch flow. Investigators also observed that the road grade, extending from a large landing, slopes towards Roddy Creek. Thus, during a rainfall event, surface water would be directed towards the stream and result in the deposition of sediment.

During the August 21-22 rainfall event, the intake ponds filled with sediment and the waterworks' function was impaired until the intake was cleaned. Since the function of the waterworks was impaired, it was damaged.[8] While the majority of sediment that reached the intake was from natural channel erosion processes, sediment from BCTS's road also contributed to the total sediment that was deposited at the intake.

BCTS constructed the road in and around the tributary to Roddy Creek prior to, during and after the timing window that applies to the species of fish that occur downstream in Roddy Creek. The timing window is the period(s) during the year when work may be carried out on or about a stream with the lowest risk to fish species and their habitat. It applies to activities on or about fish-streams or non-fish streams where there is a risk of sediment from the activity affecting downstream fisheries values[v]. Because they were not onsite during a rainfall event, investigators could not quantify the extent of harm to fish that may have occurred as a result of sediment being deposited into Roddy Creek. However, BCTS did not take appropriate steps to ensure that harm to fish or fish habitat was unlikely to occur.

On November 20 BCTS asked its hydrologist to undertake a site assessment of the road and to identify measures that could be implemented to reduce sedimentation into Roddy Creek. The delay in carrying out the assessment and implementing recommendations likely contributed to additional sediment being deposited into Roddy Creek.

Findings

Protection of fish habitat

BCTS did not comply with section 57 of the FPPR. Although there was no evidence of actual harm to fish habitat, BCTS did not conduct its activities at a time and in a manner that was unlikely to harm fish or destroy, damage or harmfully alter fish habitat. Although there was no evidence of harm to fish habitat, it is likely that the deposition of sediment from BCTS's road into Roddy Creek caused harm to fish.

Protection of drinking water quality

BCTS complied with section 59 of the FPPR. Although BCTS's activities contributed to the sediment that reached the licensed waterworks—which is a poor practice—sediment by itself is not necessarily a substance that is harmful to human health. Also, there is no evidence to link BCTS's activities and the presence of the milky-white substance or heavy metals in water.

Protection of the licensed waterworks

The Board could not determine whether or not BCTS complied with section 60(1) of the FPPR. While both natural channel erosion and BCTS's road contributed sediment to the water intake, there is no conclusive evidence that the amount contributed by the road alone was sufficient to damage the waterworks.

However, the lack of appropriate and effective measures to reduce sediment from the road is considered a poor practice.

[8] In relation to licensed waterworks, FRPA does not define damage. However, damage is defined in the Canadian Oxford Dictionary as "harm or injury impairing the value or usefulness of something."

Conclusions

The complainants are concerned that planned harvesting by BCTS will cause landslides and that road construction has impacted their drinking water and damaged their licensed waterworks. The Board considered whether BCTS complied with FRPA's requirements regarding landslides, fish habitat, drinking water and licensed waterworks.

BCTS complied with section 37 of the FPPR as no landslides have occurred. BCTS retained a professional to examine the risks of naturally-induced debris flows upstream of the two stream crossings and the risks of harvesting-induced landslides for two planned cutblocks in the Roddy Creek drainage.

BCTS did not comply with section 57 of the FPPR because it did not conduct its activities at a time and in a manner that was unlikely to harm fish or destroy, damage or harmfully alter fish habitat.

BCTS complied with section 59 of the FPPR because it did not cause material that is harmful to human health to be deposited in, or transported to, water that is diverted for human consumption by a licensed waterworks. Although the deposit of sediment into water used for drinking is a poor practice, sediment on its own is not a substance harmful to human health—the key criteria of the practice requirement. Also, there is no evidence to link BCTS's activities and the presence of the milky-white substance or heavy metals in water.

The Board could not determine whether or not BCTS complied with section 60(1) of the FPPR. While both natural channel erosion and BCTS's road contributed sediment to the water intake, there is no conclusive evidence that the amount contributed by the road alone was sufficient to damage the waterworks.

In terms of why these issues happened, the investigation revealed several shortcomings in BCTS's planning and practices. Some of the same shortcomings were identified by BCTS and documented on an incident report form and root-cause analysis. Shortcomings identified in the Board's investigation include that BCTS did not follow all of the hydrologist's recommendations for road design and construction. Also, BCTS did not take appropriate or effective steps to minimize the deposition of sediment into Roddy Creek.

ENDNOTES

[i] 'Act' refers to the *Forest and Range Practices Act*. The subjects include soils, visual quality, timber, forage and associated plant communities, water, fish, wildlife, biodiversity, recreation resources, resource features, cultural heritage resources.

[ii] The geoscientist stated several limitations in its assessment including that sampling and observations were limited by snow conditions at the time that fieldwork occurred. Also, in its water sampling, BCTS did not request that samples be tested for pH. According to the geoscientist, pH testing is typically undertaken as certain metals would be more at risk of leaching in acidic environments (i.e., pH < 7).

[iii] The limitations of the water sampling by the complainants and BCTS include:

- samples were only collected on three days with the complainant's water intake being the only location where the same site was sampled on each of the three days;
- the protocol in which the presence and abundance of coliforms were tested differs between the samples collected by the complainant and BCTS;
- the Guidelines for Canadian Drinking Water Quality (GCDWQ) establishes limits for parameters such as turbidity, coliforms and heavy metals. However, for most parameters that were tested, the limits are based water that has undergone a treatment process. The complainants do not treat their water. GCDWQ are available at: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

[iv] See page 38 – https://library.fpinnovations.ca/en/viewer?file=%2fmedia%2fFOP%2fADV9N5.PDF#search=erosion%20guide&phrase=false

[v] Source: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/terms_and_conditions_for_cias_th_ok_2016.pdf

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