Forest Practices Board

Road Maintenance and Landslides at Bernard Creek, on Kootenay Lake

Complaint Investigation #19073

FPB/IRC/234

November 2020

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Introduction

The Complaint

On November 28, 2019, the Forest Practices Board received a complaint from a resident of a private campground (the complainant). The complainant is acting on behalf of the owner of the campground who holds two licences to take water from Bernard Creek. The complainant alleges that road maintenance work completed by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) caused landslides that damaged the owner's licensed waterworks and caused slope instability. The complainant is also concerned about the potential impacts to the licensed waterworks from future landslides and wants the area returned to the condition it was in prior to the road maintenance works.

Background

This investigation took place within the traditional territories of Ktunaxa Nation, Secwepemc Nation and Okanagan Nation. The Forest Practices Board would like to recognize the importance of their historical relationship with the land that continues to this day.

Bernard Creek is in the West Kootenays on the east side of Kootenay Lake, approximately 23 kilometres north of Kootenay Bay. The Garland Bay Recreation Site is adjacent to the creek (see Figure 1).

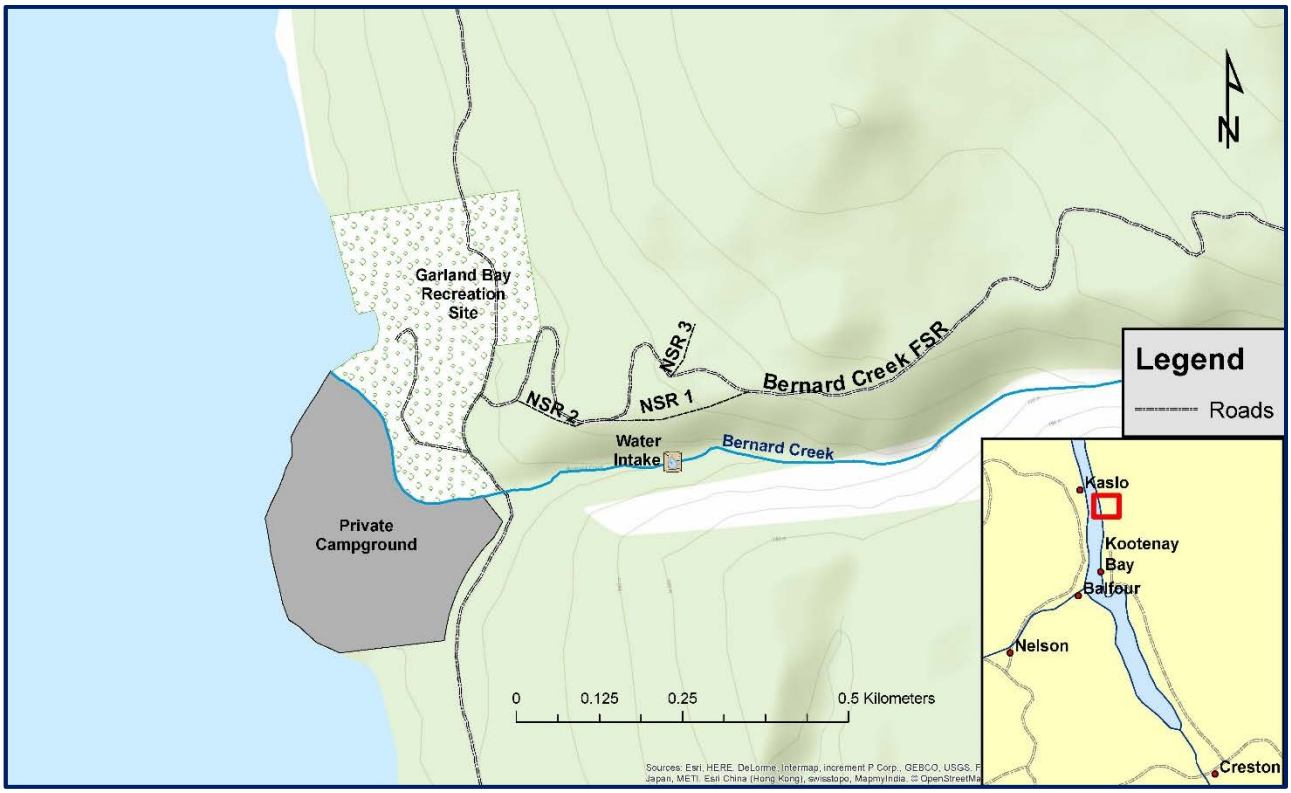

Figure 1. Location of Bernard Creek, the FSR, non-status roads, water intake and campground.

The owner of the private campground holds two licences to take water from Bernard Creek. The licences authorize a point of diversion along with a 25-centimetre diameter penstock (water pipeline) that delivers water to the campground. One licence authorizes the holder to use the water to generate

electricity and the other licence authorizes the use of water for the purposes of operating the campground (e.g., irrigation and toilets), but not for drinking water. The owner is not directly involved in the operation of the campground and residents of the campground perform maintenance on the waterworks.

The Bernard Creek forest service road (FSR) is located on the north side of Bernard Creek and the lower portion of the road (0.0-0.8 km) is used by the residents of the campground to access the licensed waterworks. After 2001, the FSR was semi-permanently deactivated,[1] because it was not being used for industrial purposes, and waterbars were installed between 0.0-1.0 km. Several non-status roads link to the FSR and are accessed by the residents of the campground using ATVs. At a staging area on non-status road (NSR) #1, the residents use ropes and other climbing equipment to rappel down to the water intake on Bernard Creek to maintain the intake and the penstock.

In February 2015, a significant storm event caused widespread erosion along the lower three switchbacks of the FSR and the road leading down to the Garland Bay recreation site. In May 2015, an engineering technician with the Selkirk Natural Resource District of FLNRORD reviewed the damage with the contracted district road foreman. They identified required works along the lower portion of the FSR (0-1km), including the restoration of existing drainage structures and installation of new cross ditches and waterbars.[2]

As the works were marked in the field, a resident of the campground asked the on-site district road foreman not to install drainage structures on NSR #1. The district engineering technician reviewed the planned works with the road foreman, and the request was passed on during a discussion about adding cross ditches to NSR #1. Based on that discussion, cross ditches were installed on the lower portion of the FSR, but were not installed on the NSR, so as not to conflict with the residents' access to the staging area above the water intake. The complainant told the Board that no one from the campground remembered the 2015 conversation with the road foreman.

In October 2016, the complainant noticed muddy water in Bernard Creek near the campground and reported this event as a potential landslide to a recreation technician in FLNRORD, however, the information was not passed on to the Selkirk district engineering staff. A second landslide occurred in April 2017 (landslide #2) and caused damage to the penstock. The complainant told the Board that on May 2, 2017, he observed water flowing from a cross ditch on the FSR to the top of landslide #2. The complainant informed Selkirk district recreation staff on May 3, 2017, and this information was passed on to the engineering staff. On May 4, 2017, the engineering technician and a consulting professional engineer conducted a site assessment and the professional engineer submitted a report that included recommendations to install three additional cross ditches marked in the field; two on NSR #1 and one on the FSR at the junction with NSR #1. The initial site assessment also led the district engineering staff to hire a professional engineer to assess the two landslides.

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[1] "Semi-permanent deactivation" is described in the *FPC Forest Road Engineering Guidebook* (2nd edition (2002), pg. 135) and is an intermediate level of deactivation, between 'temporary' and 'permanent' deactivation. The intent is to place the road in a self-maintaining state that will result in minimal adverse impact on forest resources during the time that regular (i.e. industrial) road use is suspended for greater than three years.

[2] Cross-ditches divert water flowing on the road surface and in the ditch to the outside, downslope side of the road prism that is stable and will not result in negative impacts to resources. Cross ditches also usually include a berm on the downgrade side of the cross ditch and a ditchblock to divert ditch water through the cross ditch on the downgrade side. Water bars divert water on the running surface of the road to either the inside (ditch) or outside (downslope) edge of the road. References include the *FPC Forest Road Engineering Guidebook* (2nd edition (2002), pp. 136-139) and LMH 18 (pp.180-185).

When the district began to implement the professional engineer's recommendations in 2017, residents of the campground again asked that no drainage structures be installed on NSR #1. As a compromise, the district installed one of the two planned drainage structures on NSR #1 that avoided the water intake access point and one long drainage structure on the FSR at the intersection with NSR#1. (Figure 2 shows the general locations of the landslides and drainage structures installed on the FSR in 2015 and on NSR #1 in 2017).

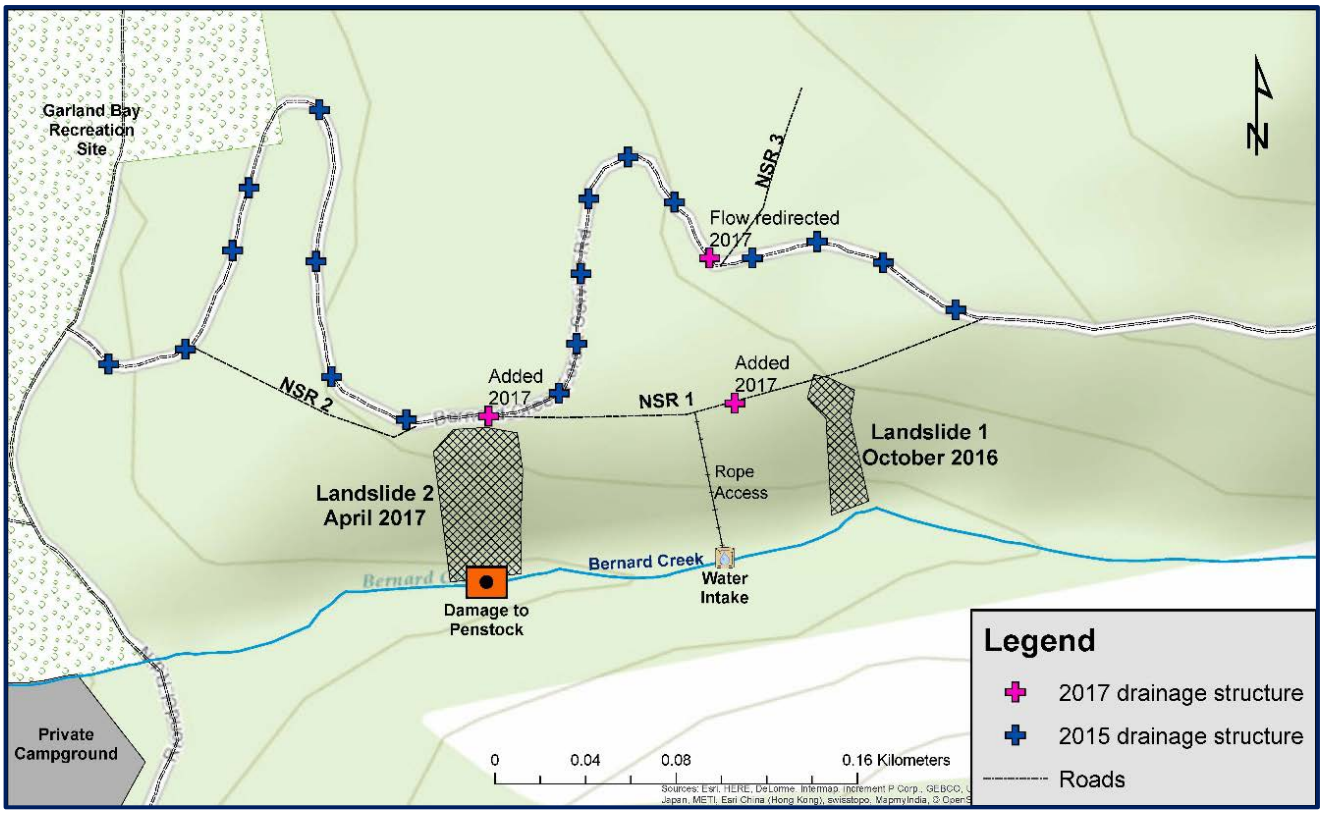

Figure 2. Location of landslides, water intake and drainage structures.

The residents of the campground sought monetary compensation for the damage to the penstock. In September 2019, the residents filed a complaint with the BC Ombudspersons office. The BC Ombudsperson investigates complaints of unfair treatment, in this case it asked the FLNRORD to provide a more detailed rationale to the residents on the issue of compensation. FLNRORD did so.

In November 2019, this complaint was filed with the Forest Practices Board.

FRPA requirements

There are two main requirements in the *Forest Planning and Practices Regulation* (FPPR) related to this complaint.

Section 37 requires an authorized person to ensure that their practices do not cause landslides that have a material adverse effect on soils or water (and other forest resources).

Section 60 requires an authorized person to ensure that primary forest activities do not damage a licensed waterworks. Damage is defined as "harm or injury impairing the value or usefulness of something." If the penstock were damaged, the waterworks would be considered damaged.

Sections 37 and 60 include 'must ensure' as a central element. The 'must ensure' element creates a positive requirement on an authorized person to take all reasonable steps to prevent a non-compliance from occurring. This does not mean that that an authorized person is immediately responsible for non-compliance with the legislation if a landslide occurs, but rather, responsibility is largely dependent on whether the person took reasonable steps or due diligence to prevent the landslide from occurring.

The 'practices' in section 37 and 'primary forest activities' in section 60 refer to the 2015 road maintenance. Section 79(6) requires a person who maintains a road to ensure that the structural integrity of the road prism and clearing width are protected; the drainage systems are functional; and the road can be safely used by industrial users. Section 81 provides an exception to these requirements if the road is not being used by industrial users. In that situation, a road is considered a "wilderness road" and the maintainer must ensure that the structural integrity of the road prism and clearing width are protected and drainage systems are functional "only to the extent necessary to ensure there is no material adverse effect on forest resources." Additionally, the requirement for safe industrial use does not apply to a wilderness road.

For the Bernard FSR, FLNRORD's district manager is the *authorized person* responsible for maintaining the road. The road has not been used for industrial purposes since 2001 and, therefore, is required under FRPA to be maintained as a *wilderness road*.

The non-status roads (trails) used by the complainant to access the licensed waterworks are not under a form of road tenure. Therefore, no one is responsible for maintaining them. Under FLNRORD policy, where a district takes action on a non-status road, it is for the purposes of protecting risks to users or the environment and not for restoring access.[3]

The Investigation

The investigation considered whether the road maintenance completed by the district in 2015 caused the landslides and whether the district manager complied with the requirements of sections 37 and 60 of the FPPR.

Board investigators interviewed the complainant, district manager, district engineering staff and the professional engineer consulted by the district. Investigators did not go into the field because of the long time that had elapsed from when the landslides occurred (2016 and 2017) to when the complaint was filed in late 2019. Over time, it is difficult to verify the likely causal factors, especially given the remedial drainage works completed by the district since the landslides occurred. Instead, the Board relied on the information contained in the landslide assessment report prepared by a professional engineer retained by the district.

The damage to the licensed waterworks was repaired in 2017, therefore, investigators relied on photographs and descriptions provided by the complainant and ministry staff to examine the type and extent of damage that occurred.

[3] FLNRO Engineering Manual section 1.2, Types of Roads and Applicable Permits or Authorizations.

Did maintenance work on the FSR cause the landslides?

Drainage control on the FSR and non-status roads

District engineering staff told investigators that, in response to the February 2015 storm event, cross ditches were installed on the lower portion of Bernard FSR (0-1km) to re-establish previously installed structures. As this work began, a resident of the campground asked the contractor not to install drainage structures on NSR #1 because it would make it difficult to access and turn around above their staging location with their ATVs and associated equipment. As a result, district staff decided not to install drainage structures on NSR #1.

After landslide #2, in early May 2017, district engineering staff and the professional engineer inspected the site. Along the FSR, in the area upslope of landslide #2, the professional engineer recommended that a drainage structure installed in 2015 be inverted so that surface runoff would be directed away from the slope below. The professional engineer also recommended installation of several new drainage structures on NSR #1. A resident from the campground, again, requested that no cross ditches be installed on the staging location of the NSR#1. The professional engineer's recommendations were followed, except for installation of one of the recommended cross ditches on NSR #1, as requested by the residents. This work was completed in 2017 and 2018.

The 2018 landslide report

District engineering staff hired a professional engineer to do an assessment of the two landslides and to examine the likely causal factors, including weather, maintenance activities on the FSR and the condition of the non-status roads.

In February 2018, the professional engineer prepared a geotechnical report for both landslides and made recommendations for several actions to control drainage on the FSR and NSRs. In the report, the engineer stated that rainfall in September and October 2016 and again in February and March 2017 was unusually high, and that snow on the ground was 2.5 times above average. According to the professional engineer, the precipitation and snowmelt "almost certainly led to higher than normal groundwater levels." The high groundwater levels likely reduced the effective shear strength of the soils, initiating both landslides. The professional engineer also identified several other factors that contributed to the landslides (see Table 1).

Table 1 Factors Contributing to the Landslides

Landslide #1 (October 2016)	**Landslide #2 (April 2017) – caused damage to the licensed waterworks**
Local surficial geology – presence of a weak silt layer that restricted downward movement of groundwater causing local high pore pressures.	Local surficial geology – presence of relatively impermeable layers beneath permeable gravel layers.
Fill placed at the edge of NSR#1 that resulted in a steep slope causing high local shear stresses.	Surface water that may have been intercepted and diverted by NSR #1.
Organics buried in NSR #1 – may have further reduced the strength of soils overlying the silt layer.	
Surface flows directed by a cross ditch at site 569 on the Bernard Creek FSR – the flow appeared to be directed down NSR #1.	

The professional engineer did not consider water diversion by the FSR to be a significant contributory factor for landslide #1.

For landslide #2, some of the water intercepted by NSR #1 would have previously flowed across the FSR through three cross ditches. Due, in part, to the lack of traceable evidence of surface flows, it was not possible for the professional engineer to determine the relative influence of each cross ditch on landslide #2. The professional engineer wrote, "The (2015) cross ditches were spaced adequately and there was no evidence that they were diverting watercourses. The intent of the cross ditches was to better maintain natural surface runoff patterns."

The professional engineer concluded, "landslide #2 would likely not have occurred without water diversion and concentration via NSR #1. It is not possible to determine how much of this water was a direct result of the 2015 installation of cross ditches on the FSR."

The Board reviewed the professional engineer's geotechnical assessment and found that the qualified professional used commonly accepted methods and his conclusions were supported with reasonable and sound rationales.

Finding

Government's 2015 maintenance work on the Bernard Creek FSR did not cause the landslides. High groundwater levels likely reduced the effective shear strength of the soils, initiating both landslides. While the professional engineer identified work on the FSR as one contributing factor to landslide #1, it was not a significant factor.

Did the district manager comply with the requirements of sections 37 and 60 of the FPPR?

As the authorized person responsible for the FSR, the district manager was required to ensure that the 2015 work did not cause landslides that had a material adverse effect on soils or water (section 37 of the FPPR), and that it did not damage a licensed waterworks (section 60 of the FPPR). There is no dispute amongst the participants that landslide #2 damaged the licensed waterworks. The investigation considered whether the district manager ensured that the work would not damage a licensed waterworks or have a material adverse effect on soils or water.

The FSR has not been used for industrial purposes since at least 2001 and FLNRORD classified the road risk to be low/moderate in 2003. District staff told investigators that, in 2015, there was no indication that the surrounding terrain was susceptible to landslides or that drainage from the FSR could likely reach the steep slopes above Bernard Creek and potentially cause a landslide. None of the work done to install new, or modify existing, drainage structures on the FSR included the diversion of stream channels. Further, the professional engineer's geotechnical report supports the district's account that the work done in 2015 was reasonable, and did not cause the landslides.

Finding

The district manager complied with sections 37 and 60 of the FPPR and took reasonable steps to ensure that the road maintenance work would not cause landslides or damage the licensed waterworks.

Balancing the need for drainage control on the non-status roads and the need for access by the water users

District staff and the professional engineer told the Board that drainage from the FSR is hydrologically connected to the NSRs, therefore, it is important that drainage on the FSR and NSRs be managed as a 'unit' in order to minimize the risk of future landslides. They say that, to the greatest extent possible, drainage on the FSR needs to be diverted away from the slope but that drainage structures are also required on the NSR.

Since about 2015, district staff have been communicating with various residents of the campground representing the owner of the waterworks, about the need to install drainage structures on the NSRs. The residents said they did not want drainage structures at certain locations on the NSRs because it would make access to the staging point with ATVs difficult. In consideration of those concerns, district staff installed only one of two drainage structures prescribed on NSR #1 and avoided the staging area.

District staff say that they have been sensitive to the needs of the campground residents to access the waterworks. However, they are not legally responsible for ensuring access to the waterworks on NSRs. District staff are responsible for the FSR, but recognize that effective drainage structures on both the FSR and NSRs may be needed for a permanent deactivation prescription-to prevent the future risks of landslides.

One solution, proposed by district staff, is for the owner of the waterworks to apply for a form of tenure on the lower section of the Bernard Creek FSR and the NSRs under the *Land Act*. If granted, a tenure would ensure long-term access on the roads but the licence holder would be responsible for their maintenance to a specified standard.

Conclusions

The investigation examined a complaint alleging maintenance activities on an FSR caused landslides that damaged a licensed waterworks. The Board's investigation did not include an assessment on the ground because the time from when the landslides occurred to when the Board received the complaint would not have enabled the identification of causal factors. In this investigation, the Board made its findings based largely on interviews with the participants and a review of an assessment prepared by the professional engineer.

The Board found that the district complied with relevant legislation and took reasonable steps to maintain the FSR by installing and then modifying drainage structures. The report prepared by the professional engineer used commonly accepted methods and the conclusions were supported with reasonable and sound rationales. The report concluded that the drainage work conducted by the FLNRORD did not cause the landslides.

The future risk of landslides depends on how FLNRORD and the complainant decide to manage access to the waterworks. FLNRORD is currently managing the NSRs as part of a unit with the FSR, as they are hydrologically linked. Whatever decision is made, it should consider all the interests and minimize the risk of any future damage.

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